SPACE SAFETY PROGRAMME - SPACE WEATHER PRODUCT SPECIFICATION DOCUMENT

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APPROVAL

Title	Space Safety Programme - Space Weather Product Specification Document		
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CHANGE LOG

Space Safety Programme - Space Weather PSD	Issue Nr	Revision Number	Date
Update to ensure traceability to Space Safety Programme Customer Requirements and System Requirements including SWWT Steering Board Review. Results of requirements analysis carried out in support of the Vigil mission development also taken into account	1	1	November 2025

CHANGE RECORD

Issue Number	1	Revision Number	1
Reason for change	Date	Pages	Paragraph(s)
Added further subsections to 1.2.3 to describe some of the fields in the specification tables		20 - 22	1.2.3.1 – 1.2.3.5
Numerous updates and clarifications to specification tables across all domains in Section 3		44 - 522	3.1 – 3.8

DISTRIBUTION

Name/Organisational Unit

Table of Contents

1. INTRODUCTION

1.1. SCOPE OF THIS DOCUMENT

This document contains the Product Specifications for the Space Weather System. It forms part of the SWE System Requirements specification and addresses the high-level product definitions derived from the customer requirements.

This issue of the document builds on the Space Situational Awareness Product Specification Document elaborated at the start of the ESA Space Situational Awareness Programme, updated to take into account the transition to the ESA Space Safety Programme and corresponding issue of the Space Safety Programme Customer Requirements document.

1.2. DEFINITION OF TERMS

1.2.1. General Definitions of Terms

The space weather specific definitions of terms can be found in the SWE Customer and System requirements documents as needed.

1.2.2. SWE Specific Definitions of Terms

The SWE specific definitions of terms can be found in Space Safety - Space Weather System Requirements Document [ref needed]

1.2.3. General structure of the SWE Product Descriptions

Chapter 3 of this document contains the SWE Product tables in the following format:

PRODUCT	*<Product name as brief textual description, e.g. "Solar Disc Magnetic Fields - Nowcast">*
Product Code	*<Unique identifier that is used to reference the product type, e.g. "SU-005-N">*
Sensor / Process based	*<"S" = Sensor based or "P" = Process based>*
Input Data required	*<Specifies all data needed to generate the product; can be observation data, ancillary data (e.g. s/c position, s/c pointing,), Level 1 data>*
Data to be provided and associated units	*<Specifies the data to be provided and respective units>*
Dynamic Range	*<Specifies the required dynamic range>*
Physical Range	*<Specifies the required physical range>*
Spatial range	*<Specifies the required spatial range>*
Spatial resolution	*<Specifies the required spatial resolution>*
Time Range	*<Specifies the required time range>*
Time resolution	*<Specifies the required time resolution>*
Timeliness/Latency	*<Specifies the required timeliness/latency>*
Accuracy	*<Specifies the required accuracy>*
Other Specific	*<Specifies other product specific requirements>*
Related CRD Requirement	*<Reference to the related Customer Requirement(s)>*
Justification of the requirements	*<Justification area>*
Comment	*<Comments area>*
Related Services	*<Identifier(s) of the segment service(s) defined in the SRD that are responsible for providing this product to the user.>*

1.2.3.1. Input Data required

This field includes only -M Measurement products, in order to provide and maintain the full observation chain, and its traceability, throughout the SWE system. Including only -M products supports the prioritisation and development of instrumentation, both space- and ground-based, and the provision of other data products. As a consequence, some products – especially forecasts – can include rather long lists of input Measurements that would not all be used as direct inputs to those particular products but rather would be inputs to intermediate products via models or other algorithms that become the products' inputs. (As an example, AG-005-F Local External Magnetic Field on Ground, Forecast specifies numerous solar images as Input Data – these would be used as inputs to an inner heliosphere model, whose outputs are then used to forecasts the geomagnetic field and its perturbations.)

1.2.3.2. Dynamic range

The dynamic ranges quoted typically refer to the relative range specified in order to observe or measure SWE events or disturbances, as opposed to absolute ranges to measure the full

observable range. This difference is most pronounced in the AG domain, where e.g., the local geomagnetic field or induced geoelectric field can take far greater ranges than the ones quoted in this document.

1.2.3.3. Timeliness/Latency

The values given for timeliness/latency is defined differently for each of the M, N, P and F product types, as follows:

- M: for Measurements, latency is defined as the time required for a successfully captured measurement/observation to be made available for ground processing (for example, including transmission time from space segment to ground segment)
- N: for Nowcasts, latency is defined as the amount of time required for additional processing once all needed input data (M products) are available to produce a near real-time nowcast product
- P: for Archives, latency is defined as the amount of time until the final, fully-processed product is stored to the archive
- F: for Forecasts, latency is defined as the amount of time required for further processing once all needed input data (M products) are available to produce a (future) forecast product

Particularly in the case of forecasts, the overall latency of the final product received by the user would then be a combination of the latencies of the inputs. It may take some time for multiple sources of data to arrive, and so the forecast delivery may shift considerably whereas the calculation time is always the same.

1.2.3.4. Accuracy

Values for accuracy are quoted in different ways, depending on the type of measurement or observation:

- Percentages, e.g., 5% or 50%, denoting that the products should be verifiably accurate to within 5% (i.e., as opposed to accurate 5% of the time)

- Decimal, e.g., 0.01, 0.1 or 1.0, where 1.0 denotes accuracy to within an order of magnitude
- Physical values, e.g., +/- 4G or 1nT, in which such cases the units will always be specified
- Dimensionless, e.g., S/N >10

Note that previous versions of this document occasionally quoted decimal accuracy using the comma-separated convention. This version uses decimal point separation exclusively. Note also that SI units are used preferentially throughout the document, but non-SI units (e.g., CGS) are occasionally used where they are still in widespread use within the community.

1.2.3.5. Data sources

Specific sources for input data are not typically included within the specification tables within this document (though some exceptions may appear under Comments). The Space Safety SWE System typically sources data from established providers that have well established links with data exchange programmes operating under the World Data System (WDS). These data flows are managed by WDS member bodies such as ISES, IAGA, Intermagnet, etc.

1.3. ACRONYMS

The general acronyms table can be found in the S2P General Definition of Terms and Acronyms document [ref needed] and the SWE specific acronyms table can be found in S2P - SWE System Requirements Document [ESA-S2P-SWE-RS-0016].

1.4. APPLICABLE AND REFERENCE DOCUMENTS

The applicable and reference documents can be found in the SWE System Requirements Document [ESA-S2P-SWE-RS-0016].

2. SWE PRODUCTS OVERVIEW

The table below gives a summary of the products that will be available from the Space Weather System. The meanings of the columns of the table are:

Product ID: This is a unique identifier that is used to reference the product type.
Product Name: This is a brief textual description of the product.
SRD Requirement: This is the numbered requirement in the System Requirements Document that specifies that the system shall generate this product type.

Product ID	Product Name	SRD Requirement
SU-001-N	Solar Flares - Nowcast	SWE-SRD-30025
SU-001-P	Solar Flares - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-001-F	Solar Flares - Forecast	SWE-SRD-30043
SU-002-N	CMEs – Nowcast	SWE-SRD-30025
SU-002-P	CMEs - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-002-F	CMEs - Forecast	SWE-SRD-30043
SU-004-N	Coronal Holes - Nowcast	SWE-SRD-30025
SU-004-P	Coronal Holes - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-004-F	Coronal Holes - Forecast	SWE-SRD-30043
SU-005-M	Solar Disc Magnetic Fields - Measurements	SWE-SRD-30017
SU-005-N	Solar Disc Magnetic Fields - Nowcast	SWE-SRD-30025
SU-005-P	Solar Disc Magnetic Fields - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-005-F	Solar Disc Magnetic Fields - Forecast	SWE-SRD-30043
SU-006-N	Solar Index R - Nowcast	SWE-SRD-30025
SU-006-P	International Sunspot number (R index)	SWE-SRD-30034
SU-006-F	Solar Index R - Forecast	SWE-SRD-30043
SU-007-N	Smoothed Sunspot Number (SSN, R12) - Nowcast	SWE-SRD-30025

SU-007-P	Smoothed Sunspot Number (SSN, R12) - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-007-F	Smoothed Sunspot Number (SSN, R12) - Forecast	SWE-SRD-30043
SU-008-M	Solar Microwave Index (F10.7) - Measurement	SWE-SRD-30017
SU-008-N	Solar Microwave Index (F10.7) - Nowcast	SWE-SRD-30025
SU-008-P	Solar Microwave Index (F10.7) - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-008-F	Solar Microwave Index (F10.7) - Forecast	SWE-SRD-30043
SU-009-N	Solar EUV Index (S10.7) - Nowcast	SWE-SRD-30025
SU-009-P	Solar EUV Index (S10.7) - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-009-F	Solar EUV Index (S10.7) - Forecast	SWE-SRD-30043
SU-010-N	Solar EUV Index (E10.7) - Nowcast	SWE-SRD-30025
SU-010-P	Solar EUV Index (E10.7) - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-010-F	Solar EUV Index (E10.7) - Forecast	SWE-SRD-30043
SU-011-N	Solar FUV Index (M10.7) - Nowcast	SWE-SRD-30025
SU-011-P	Solar FUV Index (M10.7) - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-011-F	Solar FUV Index (M10.7) - Forecast	SWE-SRD-30043
SU-012-N	Solar X-ray & UV Index (Y10.7) - Nowcast	SWE-SRD-30025
SU-012-P	Solar X-ray & UV Index (Y10.7) - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-012-F	Solar X-ray & UV Index (Y10.7) - Forecast	SWE-SRD-30043
SU-013-N	Ionospheric Index (IG12) - Nowcast	SWE-SRD-30025
SU-013-P	Ionospheric Index (IG12) - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-013-F	Ionospheric Index (IG12) - Forecast	SWE-SRD-30043
SU-015-M	EUV Images of Sun	SWE-SRD-30017
SU-015-N	EUV Images of Sun - Nowcast	SWE-SRD-30025
SU-015-P	EUV Images of Sun - Archives and A Posteriori Reconstruction	SWE-SRD-30034

SU-015-F	EUV Images of the Sun - Forecast	SWE-SRD-30043
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SU-017-P	White Light Solar Imaging - Archives and A Posteriori Reconstruction	SWE-SRD-30034
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SU-019-M	H-alpha Images of Sun	SWE-SRD-30017
SU-019-N	H-alpha Images of Sun - Nowcast	SWE-SRD-30025
SU-019-P	H-alpha Images of Sun - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-020-M	Soft X-ray Images of the Sun	SWE-SRD-30017
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SU-020-P	Soft X-ray Images of the Sun - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-020-F	Soft X-ray Images of the Sun - Forecast	SWE-SRD-30043
SU-021-M	Solar EUV Images Outside of Sun-Earth Line - Measurement	SWE-SRD-30017
SU-021-N	Solar EUV Images Outside of Sun-Earth Line - Nowcast	SWE-SRD-30025
SU-021-P	Solar EUV Images Outside of Sun-Earth Line - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-022-M	Solar Coronagraphic Images Outside of Sun-Earth Line - Measurement	SWE-SRD-30017
SU-022-N	Solar Coronagraphic Images Outside of Sun-Earth Line - Nowcast	SWE-SRD-30025
SU-022-P	Solar Coronagraphic Images Outside of Sun-Earth Line - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-023-M	Solar Far-side Maps (using helioseismology technique)	SWE-SRD-30017
SU-023-N	Solar Far-side Maps (using helioseismology technique) - Nowcast	SWE-SRD-30025
SU-023-P	Solar Far-side Maps (using helioseismology technique) - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-024-M	Ly-alpha Images (for measure of solar far-side activity)	SWE-SRD-30017
SU-024-N	Ly-alpha Images (for measure of solar far-side activity) - Nowcast	SWE-SRD-30025

SU-024-P	Ly-alpha Images (for measure of solar far-side activity) - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-025-M	White-light wide-angle Coronagraph Images	SWE-SRD-30017
SU-025-N	White-light wide-angle Coronagraph Images - Nowcast	SWE-SRD-30025
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SU-034-N	Characteristics of Filaments - Nowcast	SWE-SRD-30025
SU-034-P	Characteristics of Filaments - Archives and A Posteriori Reconstruction	SWE-SRD-30034
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SU-037-P	EUV images of Sun, taken from L4 point - Archives and A Posteriori Reconstruction	SWE-SRD-30034
SU-037-F	EUV images of Sun, taken from L4 point - Forecast	SWE-SRD-30043
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SU-047-N	Solar EUV integrated flux, measured at L5 point - Nowcast	SWE-SRD-30025
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L1-001-F	High Energy >10 MeV Protons in Interplanetary Medium at L1 - Forecast	SWE-SRD-30044
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L1-003-M	1-to-10 MeV Protons in Interplanetary Medium at L1 - Measurement	SWE-SRD-30018
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L1-003-P	1-to-10 MeV Protons in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-30035
L1-003-F	1-to-10 MeV Protons in Interplanetary Medium at L1 - Forecast	SWE-SRD-30044
L1-004-M	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Measurement	SWE-SRD-30018
L1-004-N	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast	SWE-SRD-30026
L1-004-P	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-30035
L1-004-F	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Forecast	SWE-SRD-30044
L1-005-M	30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1 - Measurement	SWE-SRD-30018
L1-005-N	30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast	SWE-SRD-30026
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L1-006-M	2-50 MeV Solar Electrons at L1 - Measurement	SWE-SRD-30018
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L1-006-P	2-50 MeV Solar Electrons at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-30035

L1-006-F	2-50 MeV Solar Electrons at L1 - Forecast	SWE-SRD-30044
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SC-005-M	Dose - Measurement	SWE-SRD-30023
SC-005-N	Dose - Nowcast	SWE-SRD-30032
SC-005-P	Dose - Archives and A Posteriori Reconstruction	SWE-SRD-30041
SC-006-M	Deep Dielectric Charging - Measurement	SWE-SRD-30023
SC-006-N	Deep Dielectric Charging - Nowcast	SWE-SRD-30032
SC-006-P	Deep Dielectric Charging - Archives and A Posteriori Reconstruction	SWE-SRD-30041
SC-006-F	Deep dielectric charging - Forecast	SWE-SRD-30050
SC-007-M	Surface Charging - Measurement	SWE-SRD-30023
SC-007-N	Surface Charging - Nowcast	SWE-SRD-30032
SC-007-P	Surface Charging - Archives and A Posteriori Reconstruction	SWE-SRD-30041
SC-007-F	Surface charging - Forecast	SWE-SRD-30050
SC-008-M	Floating Spacecraft Potential - Measurement	SWE-SRD-30023
SC-008-N	Floating Spacecraft Potential - Nowcast	SWE-SRD-30032
SC-008-P	Floating Spacecraft Potential - Archives and A Posteriori Reconstruction	SWE-SRD-30041
SC-008-F	Floating spacecraft potential - Forecast	SWE-SRD-30050
SC-009-M	Dose at aircraft altitudes - Measurement	SWE-SRD-30023
SC-009-N	Dose at aircraft altitudes - Nowcast	SWE-SRD-30032
SC-009-P	Dose at aircraft altitudes - Archives and A Posteriori Reconstruction	SWE-SRD-30041
SC-009-F	Dose at aircraft altitudes - Forecast	SWE-SRD-30050
AL-001-N	All Quiet Alert - Nowcast	SWE-SRD-30051
AL-001-P	All Quiet Alert - Archives	SWE-SRD-30051
AL-002-N	End-of-Quiet Alert - Nowcast	SWE-SRD-30051
AL-002-P	End-of-Quiet Alert - Archives	SWE-SRD-30051
AL-010-N	Event Based Alarm – Solar Flare Detection	SWE-SRD-30051
AL-011-N	Event Based Alarm – Solar Flare Detection and Location	SWE-SRD-30051
AL-012-N	Event Based Alarm – CME Onset	SWE-SRD-30051
AL-013-N	Event Based Alarm – Halo CME Onset	SWE-SRD-30051

AL-014-N	Event Based Alarm – Coronal Hole Notification	SWE-SRD-30051
AL-015-N	Event Based Alarm – CIR Alert	SWE-SRD-30051
AL-016-N	Event Based Alarm – Solar Particle Event Onset	SWE-SRD-30051
AL-017-N	Event Based Alarm – Geomagnetic Storm Warning / Solar Wind Shock Arrival	SWE-SRD-30051
AL-018-N	Event Based Alarm – Geomagnetic Storm Onset	SWE-SRD-30051
AL-019-N	Event Based Alarm – Ionospheric Disturbance Detection	SWE-SRD-30051
AL-022-N	Event Based Alarm – All Archive	SWE-SRD-30051
AL-023-P	Event Based Alarm - Ground Level Enhancement (GLE) Detection	SWE-SRD-30051
AL-024-N	Event Based Alarm - Solar Radioburst Detection	SWE-SRD-30051

3. SWE Product Descriptions

3.1. SUN DATA

3.1.1. SU-001-N: Solar Flares - Nowcast

PRODUCT	Solar Flares - Nowcast
Product Code	SU-001-N
Input Data required	SU-015-M SU-019-M SU-020-M SU-027-M
Data to be provided and associated units	Start and end times, time of peak intensity, peak X-ray intensity in W/m^2, classification, and location on Sun in heliographic and heliocentric coordinates
Dynamic Range	From 10^-7 W m^-2 (=B1 flare) and up to 10^-2 W m^-2 (X100=Y10 flare)
Physical Range	
Spatial Range	N/A
Spatial Resolution	1 arcmin accuracy on flare location
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 min
Accuracy	5% on peak x-ray intensity
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	

3.1.2. SU-001-P: Solar Flares - Archives and A Posteriori Reconstruction

PRODUCT	Solar Flares - Archives and A Posteriori Reconstruction
Product Code	SU-001-P
Input Data required	SU-015-M SU-019-M SU-020-M SU-027-M
Data to be provided and associated units	Start and end times, time of peak intensity, peak X-ray intensity in W/m^2, classification, and location on Sun in heliographic and heliocentric coordinates
Dynamic Range	Measurements of all flares above 10^-7 W m^-2 (=B1 flare). Range should extend up to 10^-2 W m^-2 (X100=Y10 flare)
Physical Range	
Spatial Range	N/A
Spatial Resolution	1 arcmin accuracy on flare location
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 min
Accuracy	5% on peak x-ray intensity
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	

3.1.3. SU-001-F: Solar Flares - Forecast

PRODUCT	Solar Flares - Forecast
Product Code	SU-001-F
Input Data required	SU-005-M SU-015-M SU-017-M SU-021-M SU-027-M SU-040-M SU-041-M SU-042-M SU-049-M
Data to be provided and associated units	Prediction of flare probabilities: Start and end times, time of peak intensity, peak X-ray intensity in W/m^2, classification, and location on Sun in heliographic and heliocentric coordinates
Dynamic Range	From 10^-7 W m^-2 (=B1 flare) and up to 10^-2 W m^-2 (X100=Y10 flare)
Physical Range	
Spatial Range	N/A
Spatial Resolution	Active Region size (approximately 2 arcmin)
Time Range	Next 24-hour period
Time Resolution	6 hours (time over which we expect a forecast could significantly change)
Timeliness/Latency	N/A
Accuracy	Within a factor 3 (predicting a minor C flare should clearly be different from predicting an M1 flare)
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548 SWE-CRD-LAU-1615
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	The time interval of the forecasts' validity (xxx hours, days) along with the associated skill score should be specified wherever possible

3.1.4. SU-002-N: CMEs – Nowcast

PRODUCT	CMEs – Nowcast
Product Code	SU-002-N
Input Data required	SU-022-M SU-025-M SU-026-M L1-008-M L1-009-M L1-010-M
Data to be provided and associated units	Nowcast of launch time (<30 mins), time at 15 R_sun, angular width (degrees), plane-of-sky velocity (km/s) and direction of propagation (position angle) at >15 R_sun
Dynamic Range	N/A
Physical Range	All CMEs of an angular width >10 degrees and a projected speed >100 km/s
Spatial Range	N/A
Spatial Resolution	Approximately 100 Mm
Time Range	Continuous coverage
Time Resolution	20 min
Timeliness/Latency	1 hour
Accuracy	30% (on speed); angular width should be accurate to within 20%
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	

3.1.5. SU-002-P: CMEs - Archives and A Posteriori Reconstruction

PRODUCT	CMEs - Archives and A Posteriori Reconstruction
Product Code	SU-002-P
Input Data required	SU-022-M SU-025-M SU-026-M L1-008-M L1-009-M L1-010-M
Data to be provided and associated units	Launch time (<30 mins), time at 15 R_sun, angular width (degrees), plane-of-sky velocity (km/s) and direction of propagation (position angle) at >15 R_sun
Dynamic Range	
Physical Range	All CMEs of an angular width >10 degrees and a projected speed >100 km/s
Spatial Range	N/A
Spatial Resolution	Approximately 100 Mm
Time Range	Continuous coverage
Time Resolution	20 min
Timeliness/Latency	1 hour
Accuracy	30% (on speed); angular width should be accurate to within 20%
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the as seen from Earth.
Comment	

3.1.6. SU-002-F: CMEs - Forecast

PRODUCT	CMEs - Forecast
Product Code	SU-002-F
Input Data required	SU-005-M SU-017-M SU-023-M SU-025-M SU-032-M SU-045-M SU-050-M
Data to be provided and associated units	Forecast of launch time (<30 mins), time at 15 R_sun, angular width (degrees), plane-of-sky velocity (km/s) and direction of propagation (position angle) at >15 R_sun
Dynamic Range	N/A
Physical Range	All CMEs of an angular width >10 degrees and a projected speed >100 km/s
Spatial Range	N/A
Spatial Resolution	Angular width should be accurate to within 20%
Time Range	next 0 to 48 hours
Time Resolution	12 hours
Timeliness/Latency	N/A
Accuracy	N/A
Other Specific	CME arrival time forecasts should be iterative, i.e.refining the the expected arrival date and time of the CME
Related CRD Requirement	SWE-CRD-SCO-1548 SWE-CRD-LAU-1615
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	Prediction of CMEs (currently unfeasible)

3.1.7. SU-004-N: Coronal Holes - Nowcast

PRODUCT	Coronal Holes - Nowcast
Product Code	SU-004-N
Input Data required	SU-005-M SU-015-M SU-019-M SU-020-M
Data to be provided and associated units	Coronal hole centre in heliocentric and heliographic coordinates, spatial width in longitude and latitude, and west-most boundary position. Dominant magnetic polarity.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	full solar (near-side) disk
Spatial Resolution	Given by resolution of input images/map (X-ray; EUV plus magnetogram) and smallest feature reliably recognized by coronal-hole detection software
Time Range	Continuous coverage
Time Resolution	12 hrs (meaning every 12 hrs we want an update of the coronal hole parameters)
Timeliness/Latency	12 hrs from the time the coronal hole appears at central meridian
Accuracy	2 degrees on the solar disk (heliographic coordinates)
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	interpretation: detection of CH using algorithm derivation of main parameters

3.1.8. SU-004-P: Coronal Holes - Archives and A Posteriori Reconstruction

PRODUCT	Coronal Holes - Archives and A Posteriori Reconstruction
Product Code	SU-004-P
Input Data required	SU-005-M SU-015-M SU-019-M SU-020-M
Data to be provided and associated units	Coronal hole centre in heliocentric and heliographic coordinates, spatial width in longitude and latitude, and west-most boundary position. Dominant magnetic polarity.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	full solar (near-side) disk
Spatial Resolution	Given by resolution of input images/map (X-ray; EUV plus magnetogram) and smallest feature reliably recognized by coronal-hole detection software
Time Range	Continuous coverage
Time Resolution	12 hrs (meaning every 12 hrs we want an update of the coronal hole parameters)
Timeliness/Latency	12 hrs from the time the coronal hole appears at central meridian
Accuracy	2 degrees on the solar disk(heliographic coordinates)
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	interpretation: detection of CH using algorithm derivation of main parameters

3.1.9. SU-004-F: Coronal Holes - Forecast

PRODUCT	Coronal Holes - Forecast
Product Code	SU-004-F
Input Data required	SU-005-M SU-015-M SU-019-M SU-020-M SU-040-M SU-041-M SU-042-M
Data to be provided and associated units	Coronal hole centre in heliocentric and heliographic coordinates, spatial width in longitude and latitude, and west-most boundary position. Dominant magnetic polarity.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	full solar (near-side) disk
Spatial Resolution	Given by resolution of input images/map (X-ray; EUV plus magnetogram) and smallest feature reliably recognized by coronal-hole detection software
Time Range	next 0 to 27 days
Time Resolution	12 hrs (meaning every 12 hrs we want an update of the coronal hole parameters)
Timeliness/Latency	12 hrs from the time the coronal hole appears at central meridian
Accuracy	7 degrees on the solar disk (heliographic coordinates), e.g. derived from previous solar rotation
Other Specific	Forecast of coronal hole parameters based on past measurements and solar rotation
Related CRD Requirement	SWE-CRD-SCO-1548 SWE-CRD-LAU-1615
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	interpretation: forecast of CH parameters based on past measurements

3.1.10. SU-005-M: Solar Disc Magnetic Fields - Measurements

PRODUCT	Solar Disc Magnetic Fields - Measurements
Product Code	SU-005-M
Input Data required	
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4…+4 kG (-0.4…+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk
Spatial Resolution	<5 arcsec
Time Range	Continuous coverage
Time Resolution	<10 min
Timeliness/Latency	30 min
Accuracy	Approximately 20 Gauss in line-of-sight and 40 Gauss in transverse fields.
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	

3.1.11. SU-005-N: Solar Disc Magnetic Fields - Nowcast

PRODUCT	Solar Disc Magnetic Fields - Nowcast
Product Code	SU-005-N
Input Data required	SU-005-M
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4…+4 kG (-0.4…+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk
Spatial Resolution	<5 arcsec
Time Range	Continuous coverage
Time Resolution	<10 min
Timeliness/Latency	30 min
Accuracy	Approximately 20 Gauss in line-of-sight and 40 Gauss in transverse fields.
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	Interpretation: magnetogram data

3.1.12. SU-005-P: Solar Disc Magnetic Fields - Archives and A Posteriori Reconstruction

PRODUCT	Solar Disc Magnetic Fields - Archives and A Posteriori Reconstruction
Product Code	SU-005-P
Input Data required	SU-005-M
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4...+4 kG (-0.4...+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk
Spatial Resolution	<5 arcsec
Time Range	Continuous coverage
Time Resolution	<10 min
Timeliness/Latency	30 min
Accuracy	Approximately 20 Gauss in line-of-sight and 40 Gauss in transverse fields.
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	Interpretation: magnetogram data

3.1.13. SU-005-F: Solar Disc Magnetic Fields - Forecast

PRODUCT	Solar Disc Magnetic Fields - Forecast
Product Code	SU-005-F
Input Data required	SU-005-M SU-041-M
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4...+4 kG (-0.4...+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk; far-side disk if data available
Spatial Resolution	Arcsec scale, depending on requirement of PFSS extrapolation model
Time Range	next 0 to 14 days (longer if far-side data available)
Time Resolution	<10 min
Timeliness/Latency	30 min
Accuracy	Depending on inversion method used
Other Specific	Model of magnetic field based on past measurements + solar rotation
Related CRD Requirement	SWE-CRD-SCO-1548 SWE-CRD-LAU-1615
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	interpretation: model of magnetic field based on past measurements + solar rotation

3.1.14. SU-006-N: Solar Index R - Nowcast

PRODUCT	Solar Index R - Nowcast
Product Code	SU-006-N
Input Data required	SU-017-M
Data to be provided and associated units	Sunspot number (daily)
Dynamic Range	0 - 300
Physical Range	N/A
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	daily
Timeliness/Latency	1 day
Accuracy	
Other Specific	If available input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-LAU-1625 SWE-CRD-TIO-1643
Justification of the requirements	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere. Used to estimate solar radio flux level for HF radio.
Comment	The International Sunspot Number (ISN) is generated by the Sunspot Index Data Centre, based at the Royal Observatory of Belgium. This nowcast is the unofficial estimate prior to the ISN being generated.

3.1.15. SU-006-P: International Sunspot number (R index)

PRODUCT	International Sunspot number (R index)
Product Code	SU-006-P
Input Data required	SU-017-M
Data to be provided and associated units	Sunspot number (daily)
Dynamic Range	0 - 300
Physical Range	N/A
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	daily
Timeliness/Latency	6 months
Accuracy	
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-LAU-1625 SWE-CRD-TIO-1643
Justification of the requirements	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere. Used to estimate solar radio flux level for HF radio.
Comment	The International Sunspot Number (ISN) is generated by the Sunspot Index Data Centre, based at the Royal Observatory of Belgium.

3.1.16. SU-006-F: Solar Index R - Forecast

PRODUCT	Solar Index R - Forecast
Product Code	SU-006-F
Input Data required	SU-017-M
Data to be provided and associated units	Sunspot number (daily)
Dynamic Range	0 - 300
Physical Range	N/A
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	Short-term forecast: 0 to 14 days in advance; Long-term forecast: one solar cycle
Time Resolution	daily
Timeliness/Latency	1 day
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-LAU-1625 SWE-CRD-TIO-1643
Justification of the requirements	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere. Used to estimate solar radio flux level for HF radio.
Comment	The International Sunspot Number (ISN) is generated by the Sunspot Index Data Centre, based at the Royal Observatory of Belgium. This forecast is the unofficial estimate prior to the ISN being generated.

3.1.17. SU-007-N: Smoothed Sunspot Number (SSN, R12) - Nowcast

PRODUCT	Smoothed Sunspot Number (SSN, R12) - Nowcast
Product Code	SU-007-N
Input Data required	SU-017-M
Data to be provided and associated units	12-month running mean of the sunspot number R
Dynamic Range	0 - 300
Physical Range	N/A
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	daily
Timeliness/Latency	1 day
Accuracy	0.1
Other Specific	If available input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-LAU-1625 SWE-CRD-TIO-1643
Justification of the requirements	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere
Comment	the international sunspot number is generated by the Sunspot Index Data Centre, based at the Royal Observatory of Belgium

3.1.18. SU-007-P: Smoothed Sunspot Number (SSN, R12) - Archives and A Posteriori Reconstruction

PRODUCT	Smoothed Sunspot Number (SSN, R12) - Archives and A Posteriori Reconstruction
Product Code	SU-007-P
Input Data required	SU-017-M
Data to be provided and associated units	12-month running mean of the sunspot number R
Dynamic Range	0 - 300
Physical Range	N/A
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	daily
Timeliness/Latency	6 months
Accuracy	0.05
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-LAU-1625 SWE-CRD-TIO-1643
Justification of the requirements	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere
Comment	the international sunspot number is generated by the Sunspot Index Data Centre, based at the Royal Observatory of Belgium

3.1.19. SU-007-F: Smoothed Sunspot Number (SSN, R12) - Forecast

PRODUCT	Smoothed Sunspot Number (SSN, R12) - Forecast
Product Code	SU-007-F
Input Data required	SU-017-M
Data to be provided and associated units	12-month running mean of the sunspot number R
Dynamic Range	0 - 300
Physical Range	N/A
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	Short-term forecast: 0 to 14 days in advance; Long-term forecast: one solar cycle
Time Resolution	daily
Timeliness/Latency	1 day
Accuracy	0.2
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-LAU-1625 SWE-CRD-TIO-1643
Justification of the requirements	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere
Comment	the international sunspot number is generated by the Sunspot Index Data Centre, based at the Royal Observatory of Belgium

3.1.20. SU-008-M: Solar Microwave Index (F10.7) - Measurement

PRODUCT	Solar Microwave Index (F10.7) - Measurement
Product Code	SU-008-M
Input Data required	
Data to be provided and associated units	Solar radio flux at 10.7 cm (2.8 GHz) [sfu, solar flux units = 10 kJy]
Dynamic Range	65-few hundreds; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in beam
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	N/A
Accuracy	1% on strength
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	A parameter proportional to level of ionisation in the ionosphere. F10.7 is also used as a solar UV proxy in low altitude trapped proton modelling.
Comment	

3.1.21. SU-008-N: Solar Microwave Index (F10.7) - Nowcast

PRODUCT	Solar Microwave Index (F10.7) - Nowcast
Product Code	SU-008-N
Input Data required	SU-008-M
Data to be provided and associated units	Solar radio flux at 10.7 cm (2.8 GHz) [sfu, solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in beam
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	15 mins
Accuracy	0.05
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Useful for many long term activities including spacecraft design, mission planning, atmosphere drag…Required in orbit determination to desired accuracy. Required for mission planning and scheduling. Also required as input to several forecast models. F10.7 is also used as a solar UV proxy in low altitude trapped proton modelling.
Comment	There may not be official sources available for nowcast.

3.1.22. SU-008-P: Solar Microwave Index (F10.7) - Archives and A Posteriori Reconstruction

PRODUCT	Solar Microwave Index (F10.7) - Archives and A Posteriori Reconstruction
Product Code	SU-008-P
Input Data required	SU-008-M
Data to be provided and associated units	Solar radio flux at 10.7 cm (2.8 GHz) [sfu, solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in beam
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	1 day
Accuracy	1% on strength
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Useful for many long term activities including spacecraft design, mission planning, atmosphere drag…Required in orbit determination to desired accuracy. Required for mission planning and scheduling. Also required as input to several forecast models F10.7 is also used as a solar UV proxy in low altitude trapped proton modelling.
Comment	

3.1.23. SU-008-F: Solar Microwave Index (F10.7) - Forecast

PRODUCT	Solar Microwave Index (F10.7) - Forecast	
Product Code	SU-008-F	
Input Data required	SU-008-M	
Data to be provided and associated units	Solar radio flux at 10.7 cm (2.8 GHz) [sfu, solar flux units = 10 kJy]	
Dynamic Range	range typically [65-few hundreds]; maximum can reach a few thousand sfu	
Physical Range	N/A	
Spatial Range	full solar disk in beam	
Spatial Resolution	N/A	
Time Range	Ranging from 1 hr to 200 years	
Time Resolution	Ranging from 1 hour to 1 year	
Timeliness/Latency	Various (depending on time range)	
Accuracy	10 - 50% (depending on time range)	
Other Specific		
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3100 SWE-CRD-STC-3102 SWE-CRD-STC-3104	SWE-CRD-STC-3107 SWE-CRD-STC-3108 SWE-CRD-STC-3109 SWE-CRD-STC-3110 SWE-CRD-STC-3014 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Useful for many long term activities including spacecraft design, mission planning, atmosphere drag…Required in orbit determination to desired accuracy. Required for mission planning and scheduling. Also required as input to several forecast models. F10.7 is also used as a solar UV proxy in low altitude trapped proton modelling.	
Comment	Requirements SWE-CRD-STC-3107 to 3110 and SWE-CRD-STC-3014 contain very specific requirements on forecasting solar indices. Uncertainties and/or confidence levels must be provided where specified, and accuracy may be reduced for longer-term forecasts	

3.1.24. SU-009-N: Solar EUV Index (S10.7) - Nowcast

PRODUCT	Solar EUV Index (S10.7) - Nowcast
Product Code	SU-009-N
Input Data required	SU-028-M SU-029-M
Data to be provided and associated units	Index for EUV solar irradiance between 26-34 nm [solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds];]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	15 mins
Accuracy	0.05
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for EUV radiation emitted from the Solar chromosphere/corona impacting the Earth's thermosphere with a 1-day lag.
Comment	

3.1.25. SU-009-P: Solar EUV Index (S10.7) - Archives and A Posteriori Reconstruction

PRODUCT	Solar EUV Index (S10.7) - Archives and A Posteriori Reconstruction
Product Code	SU-009-P
Input Data required	SU-028-M SU-029-M
Data to be provided and associated units	Index for EUV solar irradiance between 26-34 nm [solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	1 day
Accuracy	1% on strength
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for EUV radiation emitted from the Solar chromosphere/corona impacting the Earth's thermosphere with a 1-day lag.
Comment	

3.1.26. SU-009-F: Solar EUV Index (S10.7) - Forecast

PRODUCT	Solar EUV Index (S10.7) - Forecast
Product Code	SU-009-F
Input Data required	SU-024-M SU-028-M SU-029-M
Data to be provided and associated units	Index for EUV solar irradiance between 26-34 nm [solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds];]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	1 to at least 2 days (up to 6 days is possible with reduced accuracy)
Time Resolution	1 day
Timeliness/Latency	5 min
Accuracy	1
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for EUV radiation emitted from the Solar chromosphere/corona impacting the Earth's thermosphere with a 1-day lag.
Comment	

3.1.27. SU-010-N: Solar EUV Index (E10.7) - Nowcast

PRODUCT	Solar EUV Index (E10.7) - Nowcast
Product Code	SU-010-N
Input Data required	SU-028-M
Data to be provided and associated units	integrated EUV irradiance between 1-105 nm [solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	15 mins
Accuracy	0.05
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	same as for F10.7
Comment	

3.1.28. SU-010-P: Solar EUV Index (E10.7) - Archives and A Posteriori Reconstruction

PRODUCT	Solar EUV Index (E10.7) - Archives and A Posteriori Reconstruction
Product Code	SU-010-P
Input Data required	SU-028-M
Data to be provided and associated units	integrated EUV solar irradiance between 1-105 nm [solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	1 day
Accuracy	1% on strength
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	same as for F10.7
Comment	

3.1.29. SU-010-F: Solar EUV Index (E10.7) - Forecast

PRODUCT	Solar EUV Index (E10.7) - Forecast
Product Code	SU-010-F
Input Data required	SU-024-M SU-028-M
Data to be provided and associated units	integrated EUV irradiance between 1-105 nm [solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	1 to at least 2 days (up to 6 days is possible with reduced accuracy)
Time Resolution	1 day
Timeliness/Latency	5 mins
Accuracy	1
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	same as for F10.7
Comment	

3.1.30. SU-011-N: Solar FUV Index (M10.7) - Nowcast

PRODUCT	Solar FUV Index (M10.7) - Nowcast
Product Code	SU-011-N
Input Data required	SU-029-M
Data to be provided and associated units	FUV solar irradiance between 145-165 nm [solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds];]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	15 mins
Accuracy	0.05
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for FUV radiation emitted from the Solar photosphere/lower chromosphere impacting the Earth's lower thermosphere with a 2-day lag.
Comment	

3.1.31. SU-011-P: Solar FUV Index (M10.7) - Archives and A Posteriori Reconstruction

PRODUCT	Solar FUV Index (M10.7) - Archives and A Posteriori Reconstruction
Product Code	SU-011-P
Input Data required	SU-029-M
Data to be provided and associated units	FUV solar irradiance between 145-165 nm [solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	1 day
Accuracy	1% on strength
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for FUV radiation emitted from the Solar photosphere/lower chromosphere impacting the Earth's lower thermosphere with a 2-day lag.
Comment	

3.1.32. SU-011-F: Solar FUV Index (M10.7) - Forecast

PRODUCT	Solar FUV Index (M10.7) - Forecast
Product Code	SU-011-F
Input Data required	SU-024-M SU-028-M
Data to be provided and associated units	FUV solar irradiance between 145-165 nm [solar flux units = 10 kJy]
Dynamic Range	range typically [65-few hundreds];]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	1 to at least 2 days (up to 6 days is possible with reduced accuracy)
Time Resolution	1 day
Timeliness/Latency	5 mins
Accuracy	1
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for FUV radiation emitted from the Solar photosphere/lower chromosphere impacting the Earth's lower thermosphere with a 2-day lag.
Comment	

3.1.33. SU-012-N: Solar X-ray & UV Index (Y10.7) - Nowcast

PRODUCT	Solar X-ray & UV Index (Y10.7) - Nowcast
Product Code	SU-012-N
Input Data required	SU-008-M SU-027-M SU-029-M
Data to be provided and associated units	Includes x-rays in range 0.1 - 0.8 nm and Lyman-Alpha line at 121.6 nm [solar flux units = 10 KJy].
Dynamic Range	range typically [65-few hundreds];]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	15 mins
Accuracy	0.05
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for X-rays and UV radiation emitted from the Solar chromosphere/transition region/hot corona impacting the Earth's mesopause/lower thermosphere with a 5-day lag.
Comment	

3.1.34. SU-012-P: Solar X-ray & UV Index (Y10.7) - Archives and A Posteriori Reconstruction

PRODUCT	Solar X-ray & UV Index (Y10.7) - Archives and A Posteriori Reconstruction
Product Code	SU-012-P
Input Data required	SU-008-M SU-027-M SU-029-M
Data to be provided and associated units	Includes x-rays in range 0.1 - 0.8 nm and Lyman-Alpha line at 121.6 nm [solar flux units = 10 KJy].
Dynamic Range	range typically [65-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	1 day
Accuracy	1% on strength
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for X-rays and UV radiation emitted from the Solar chromosphere/transition region/hot corona impacting the Earth's mesopause/lower thermosphere with a 5-day lag.
Comment	

3.1.35. SU-012-F: Solar X-ray & UV Index (Y10.7) - Forecast

PRODUCT	Solar X-ray & UV Index (Y10.7) - Forecast
Product Code	SU-012-F
Input Data required	SU-008-M SU-024-M SU-027-M SU-029-M
Data to be provided and associated units	Includes x-rays in range 0.1 - 0.8 nm and Lyman-Alpha line at 121.6 nm [solar flux units = 10 KJy].
Dynamic Range	range typically [65-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in FOV
Spatial Resolution	N/A
Time Range	1 to at least 2 days (up to 6 days is possible with reduced accuracy)
Time Resolution	1 day
Timeliness/Latency	5 mins
Accuracy	1
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for X-rays and UV radiation emitted from the Solar chromosphere/transition region/hot corona impacting the Earth's mesopause/lower thermosphere with a 5-day lag.
Comment	

3.1.36. SU-013-N: Ionospheric Index (IG12) - Nowcast

PRODUCT	Ionospheric Index (IG12) - Nowcast
Product Code	SU-013-N
Input Data required	IT-005-M
Data to be provided and associated units	Monthly mean noon foF2 data measured by 13 ionosonde stations and linear regression with respect to solar activity
Dynamic Range	0 - 15 MHz
Physical Range	N/A
Spatial Range	Global - Stations located at (or near) same latitude, ideally low latitude.
Spatial Resolution	20 degrees (longitude)
Time Range	Continuous coverage
Time Resolution	1 day
Timeliness/Latency	15 mins
Accuracy	Goal of 5%, threshold of 10% (if fewer stations are available)
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Primarily used as input to IRI model.
Comment	

3.1.37. SU-013-P: Ionospheric Index (IG12) - Archives and A Posteriori Reconstruction

PRODUCT	Ionospheric Index (IG12) - Archives and A Posteriori Reconstruction
Product Code	SU-013-P
Input Data required	IT-005-M
Data to be provided and associated units	Monthly mean noon foF2 data measured by 13 ionosonde stations and linear regression with respect to solar activity
Dynamic Range	0 - 15 MHz
Physical Range	N/A
Spatial Range	Global - Stations located at (or near) same latitude, ideally low latitude.
Spatial Resolution	20 degrees (longitude)
Time Range	Continuous coverage
Time Resolution	1 day
Timeliness/Latency	1 day
Accuracy	Goal of 5%, threshold of 10% (if fewer stations are available)
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Primarily used as input to IRI model.
Comment	

3.1.38. SU-013-F: Ionospheric Index (IG12) - Forecast

PRODUCT	Ionospheric Index (IG12) - Forecast
Product Code	SU-013-F
Input Data required	SU-024-M IT-005-M
Data to be provided and associated units	Monthly mean noon foF2 data measured by 13 ionosonde stations and linear regression with respect to solar activity
Dynamic Range	0 - 15 MHz
Physical Range	N/A
Spatial Range	Global - Stations located at (or near) same latitude, ideally low latitude.
Spatial Resolution	20 degrees (longitude)
Time Range	1 to at least 2 days (up to 6 days is possible with reduced accuracy)
Time Resolution	1 day
Timeliness/Latency	5 mins
Accuracy	0.1
Other Specific	Cf. to standard definition/reference of the index for specifications on range, accuracy. Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-SCO-1564 SWE-CRD-LAU-1625 SWE-CRD-TIO-1644 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Primarily used as input to IRI model.
Comment	

3.1.39. SU-015-M: EUV Images of Sun

PRODUCT	EUV Images of Sun
Product Code	SU-015-M
Input Data required	
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	<1 hr
Accuracy	S/N > 10 in quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1687
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	

3.1.40. SU-015-N: EUV Images of Sun - Nowcast

PRODUCT	EUV Images of Sun - Nowcast
Product Code	SU-015-N
Input Data required	SU-015-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	<1 hr
Accuracy	S/N > 10 in quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1687
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	

3.1.41. SU-015-P: EUV Images of Sun - Archives and A Posteriori Reconstruction

PRODUCT	EUV Images of Sun - Archives and A Posteriori Reconstruction
Product Code	SU-015-P
Input Data required	SU-015-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	< 1day for insertion in archive
Accuracy	S/N > 10 in quiet Sun
Other Specific	(Difference) movie production should be foreseen
Related CRD Requirement	SWE-CRD-GEN-1687
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	

3.1.42. SU-015-F: EUV Images of the Sun - Forecast

PRODUCT	EUV Images of the Sun - Forecast
Product Code	SU-015-F
Input Data required	SU-005-M SU-015-M SU-021-M SU-037-M SU-040-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	6 hrs
Timeliness/Latency	24 hrs
Accuracy	S/N > 10 in quiet Sun
Other Specific	
Related CRD Requirement	SWE-SRD-11038 SWE-SRD-11077
Justification of the requirements	Monitor and forecast coronal holes, active regions, and solar activity. Use as input to models
Comment	Forecast of image: e.g. solar disk as seen from another location, tomorrow.

3.1.43. SU-017-M: White Light Solar Imaging

PRODUCT	White Light Solar Imaging
Product Code	SU-017-M
Input Data required	
Data to be provided and associated units	Solar images in white-light (continuum)
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	Visible wavelength range
Spatial Range	full disk
Spatial Resolution	1 arcsec
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	<1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1689
Justification of the requirements	Input to calculation of International Sunspot Number (ISN). Classification of sunspot groups.
Comment	

3.1.44. SU-017-N: White Light Solar Imaging - Nowcast

PRODUCT	White Light Solar Imaging - Nowcast
Product Code	SU-017-N
Input Data required	SU-017-M
Data to be provided and associated units	Solar images in white-light (continuum)
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	Visible wavelength range
Spatial Range	full disk
Spatial Resolution	1 arcsec
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	<1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1689
Justification of the requirements	Input to calculation of International Sunspot Number (ISN). Classification of sunspot groups.
Comment	

3.1.45. SU-017-P: White Light Solar Imaging - Archives and A Posteriori Reconstruction

PRODUCT	White Light Solar Imaging - Archives and A Posteriori Reconstruction
Product Code	SU-017-P
Input Data required	SU-017-M
Data to be provided and associated units	Solar images in white-light (continuum)
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	Visible wavelength range
Spatial Range	full disk
Spatial Resolution	1 arcsec
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1689
Justification of the requirements	Input to calculation of International Sunspot Number (ISN). Classification of sunspot groups.
Comment	

3.1.46. SU-017-F: White Light Solar Imaging - Forecast

PRODUCT	White Light Solar Imaging - Forecast
Product Code	SU-017-F
Input Data required	SU-005-M SU-017-M SU-042-M
Data to be provided and associated units	Solar images in white-light (continuum)
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	Visible wavelength range
Spatial Range	full disk
Spatial Resolution	1 arcsec
Time Range	Continuous coverage
Time Resolution	6 hrs
Timeliness/Latency	24 hrs
Accuracy	S/N > 10 in quiet Sun
Other Specific	
Related CRD Requirement	SWE-SRD-11038 SWE-SRD-11077
Justification of the requirements	Input to prediction of International Sunspot Number (ISN). Classification of sunspot groups
Comment	Forecast of image: e.g. solar disk as seen from another location, tomorrow.

3.1.47. SU-019-M: H-alpha Images of Sun

PRODUCT	H-alpha Images of Sun
Product Code	SU-019-M
Input Data required	
Data to be provided and associated units	Solar images in H-alpha line of hydrogen
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	656.3 nm, FWHM of filter bandpass <0.1 nm
Spatial Range	full disk
Spatial Resolution	1 arcsec
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	<1 hr
Accuracy	S/N > 20 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1690
Justification of the requirements	Monitor solar flare and quiescent filament development for activity prediction. Observe Moreton waves accompanying CMEs.
Comment	

3.1.48. SU-019-N: H-alpha Images of Sun - Nowcast

PRODUCT	H-alpha Images of Sun - Nowcast
Product Code	SU-019-N
Input Data required	SU-019-M
Data to be provided and associated units	Solar images in H-alpha line of hydrogen
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	656.3 nm, FWHM of filter bandpass <0.1 nm
Spatial Range	full disk
Spatial Resolution	1 arcsec
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	<1 hr
Accuracy	S/N > 20 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1690
Justification of the requirements	Monitor solar flare and quiescent filament development for activity prediction. Observe Moreton waves accompanying CMEs.
Comment	

3.1.49. SU-019-P: H-alpha Images of Sun - Archives and A Posteriori Reconstruction

PRODUCT	H-alpha Images of Sun - Archives and A Posteriori Reconstruction
Product Code	SU-019-P
Input Data required	SU-019-M
Data to be provided and associated units	Solar images in H-alpha line of hydrogen
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	656.3 nm, FWHM of filter bandpass <0.1 nm
Spatial Range	full disk
Spatial Resolution	1 arcsec
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	1 hr
Accuracy	S/N > 20 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1690
Justification of the requirements	Monitor solar flare and quiescent filament development for activity prediction. Observe Moreton waves accompanying CMEs.
Comment	

3.1.50. SU-020-M: Soft X-ray Images of the Sun

PRODUCT	Soft X-ray Images of the Sun
Product Code	SU-020-M
Input Data required	
Data to be provided and associated units	Full Sun images with 1 min cadence showing 1-10MK corona
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images showing million degree corona; Photon energy of the order of 1 keV, corresponding to wavelengths of 1 - 5 nm.
Spatial Range	Field-of-view of >30 arcmin (full disk)
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	Goal of 1 min, threshold of 2 mins.
Timeliness/Latency	<1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1691
Justification of the requirements	Monitor solar activity and input to modelling activities
Comment	

3.1.51. SU-020-N: Soft X-ray Images of the Sun - Nowcast

PRODUCT	Soft X-ray Images of the Sun - Nowcast
Product Code	SU-020-N
Input Data required	SU-020-M
Data to be provided and associated units	Full Sun images with 1 min cadence showing 1-10MK corona
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images showing million degree corona; Photon energy of the order of 1 keV, corresponding to wavelengths of 1 - 5 nm.
Spatial Range	Field-of-view of >30 arcmin (full disk)
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	Goal of 1 min, threshold of 2 mins.
Timeliness/Latency	<1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1691
Justification of the requirements	Monitor solar activity and input to modelling activities
Comment	

3.1.52. SU-020-P: Soft X-ray Images of the Sun - Archives and A Posteriori Reconstruction

PRODUCT	Soft X-ray Images of the Sun - Archives and A Posteriori Reconstruction
Product Code	SU-020-P
Input Data required	SU-020-M
Data to be provided and associated units	Full Sun images with 1 min cadence showing 1-10MK corona
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images showing million degree corona; Photon energy of the order of 1 keV, corresponding to wavelengths of 1 - 5 nm.
Spatial Range	Field-of-view of >30 arcmin (full disk)
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	Goal of 1 min, threshold of 2 mins.
Timeliness/Latency	1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1691
Justification of the requirements	Monitor solar activity and input to modelling activities
Comment	

3.1.53. SU-020-F: Soft X-ray Images of the Sun – Forecast

PRODUCT	Soft X-ray Images of the Sun - Forecast
Product Code	SU-020-F
Input Data required	SU-005-M SU-020-M SU-044-M
Data to be provided and associated units	Full Sun images showing 1-10MK corona
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images showing million degree corona; Photon energy of the order of 1 keV, corresponding to wavelengths of 1 - 5 nm.
Spatial Range	Field-of-view of >30 arcmin (full disk)
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	6 hrs
Timeliness/Latency	24 hrs
Accuracy	S/N > 10 in quiet Sun
Other Specific	
Related CRD Requirement	SWE-SRD-11038 SWE-SRD-11077
Justification of the requirements	Forecast solar activity and input to modelling activities
Comment	Forecast of image: e.g. solar disk as seen from another location, tomorrow.

3.1.54. SU-021-M: Solar EUV Images Outside of Sun-Earth Line

PRODUCT	Solar EUV Images Outside of Sun-Earth Line
Product Code	SU-021-M
Input Data required	
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	Full disk images taken from Lagrange points L4 or L5 (preferentially L5) or at least 30° of separation with Earth
Spatial Resolution	the image resolution shall be better than 10 arcsec per pixel
Time Range	Continuous coverage
Time Resolution	the data shall be producible with a cadence of 20 minutes
Timeliness/Latency	6 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1692
Justification of the requirements	Monitor the Sun's disk from solar longitudinally separated locations to observe active regions which may pose a threat in the near-future and coronal holes and solar activity magnetically well-connected to the Earth more reliably. Use as input to models.
Comment	STEREO observes the Sun in the EUV at locations longitudinally separated from the Earth. It has demonstrated that useful information on flares, coronal holes, etc. can help with space weather predictions. NB: STEREO spacecraft are on Earth-leading (STEREO A) and Earth-trailing (STEREO B) solar orbit.

3.1.55. SU-021-N: Solar EUV Images Outside of Sun-Earth Line - Nowcast

PRODUCT	Solar EUV Images Outside of Sun-Earth Line - Nowcast
Product Code	SU-021-N
Input Data required	SU-021-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	Full disk images taken from Lagrange points L4 or L5 (preferentially L5) or at least 30° of separation with Earth
Spatial Resolution	the image resolution shall be better than 10 arcsec per pixel
Time Range	Continuous coverage
Time Resolution	the data shall be producible with a cadence of 20 minutes
Timeliness/Latency	6 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1692
Justification of the requirements	Monitor the Sun's disk from solar longitudinally separated locations to observe active regions which may pose a threat in the near-future and coronal holes and solar activity magnetically well-connected to the Earth more reliably. Use as input to models.
Comment	STEREO observes the Sun in the EUV at locations longitudinally separated from the Earth. It has demonstrated that useful information on flares, coronal holes, etc. can help with space weather predictions. NB: STEREO spacecraft are on Earth-leading (STEREO A) and Earth-trailing (STEREO B) solar orbit.

3.1.56. SU-021-P: Solar EUV Images Outside of Sun-Earth Line - Archives and A Posteriori Reconstruction

PRODUCT	Solar EUV Images Outside of Sun-Earth Line - Archives and A Posteriori Reconstruction
Product Code	SU-021-P
Input Data required	SU-021-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	Full disk images taken from Lagrange points L4 or L5 (preferentially L5) or at least 30° of separation with Earth
Spatial Resolution	the image resolution shall be better than 10 arcsec per pixel
Time Range	Continuous coverage
Time Resolution	the data shall be producible with a cadence of 20 minutes
Timeliness/Latency	6 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1692
Justification of the requirements	Monitor the Sun's disk from solar longitudianally separated loctions to observe active regions which may pose a threat in the near-future and coronal holes and solar activity magnetically well-connected to the Earth more reliably. Use as input to models.
Comment	STEREO observes the Sun in the EUV at locations longitudinally separated from the Earth. It has demonstrated that useful information on flares, coronal holes, etc. can help with space weather predictions. NB: STEREO spacecraft are on Earth-leading (STEREO A) and Earth-trailing (STEREO B) solar orbit.

3.1.57. SU-022-M: Solar Coronagraphic Images Outside of Sun-Earth Line

PRODUCT	Solar Coronagraphic Images Outside of Sun-Earth Line
Product Code	SU-022-M
Input Data required	
Data to be provided and associated units	white light coronagraphic images
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	White light coronagraph images from 2 - 20 solar radii
Spatial Range	Images taken from Lagrange points L4 or L5 (preferentially L5) or at least 30° of separation with Earth
Spatial Resolution	the image resolution shall be better than 10 arcsec
Time Range	Continuous coverage
Time Resolution	the data shall be producible with a cadence of 20 minutes
Timeliness/Latency	6 hr
Accuracy	S/N > 10 in Corona at 20Rs; stray light reduction of 10^-11 at 20Rs
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1692
Justification of the requirements	For stereoscopic imaging of CMEs/CIRs. Also, to determine CME speed and direction from single sensor using the J-plot technique.
Comment	STEREO is now routinely tracking CMEs out to the Earth (so 200+ solar radii). It is now demonstrated that the ability to track a CME to elongations of 40 to 50 degrees from the Sun, from a single spacecraft near L4 or L5, allows determination of the speed and direction of the CME. 15 arcsec is the resolution of COR2.

3.1.58. SU-022-N: Solar Coronagraphic Images Outside of Sun-Earth Line - Nowcast

PRODUCT	Solar Coronagraphic Images Outside of Sun-Earth Line - Nowcast
Product Code	SU-022-N
Input Data required	SU-022-M
Data to be provided and associated units	white light coronagraphic images
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	White light coronagraph images from 2 - 20 solar radii
Spatial Range	Images taken from Lagrange points L4 or L5 (preferentially L5) or at least 30° of separation with Earth
Spatial Resolution	the image resolution shall be better than 10 arcsec
Time Range	Continuous coverage
Time Resolution	the data shall be producible with a cadence of 20 minutes
Timeliness/Latency	6 hr
Accuracy	S/N > 10 in Corona at 20Rs; stray light reduction of 10^-11 at 20Rs
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1692
Justification of the requirements	For stereoscopic imaging of CMEs/CIRs. Also, to determine CME speed and direction from single sensor using the J-plot technique.
Comment	STEREO is now routinely tracking CMEs out to the Earth (so 200+ solar radii). It is now demonstrated that the ability to track a CME to elongations of 40 to 50 degrees from the Sun, from a single spacecraft near L4 or L5, allows determination of the speed and direction of the CME. 15 arcsec is the resolution of COR2.

3.1.59. SU-022-P: Solar Coronagraphic Images Outside of Sun-Earth Line - Archives and A Posteriori Reconstruction

PRODUCT	Solar Coronagraphic Images Outside of Sun-Earth Line - Archives and A Posteriori Reconstruction
Product Code	SU-022-P
Input Data required	SU-022-M
Data to be provided and associated units	white light coronagraphic images
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	White light coronagraph images from 2 - 20 solar radii
Spatial Range	Images taken from Lagrange points L4 or L5 (preferentially L5) or at least 30° of separation with Earth
Spatial Resolution	the image resolution shall be better than 10 arcsec
Time Range	Continuous coverage
Time Resolution	the data shall be producible with a cadence of 20 minutes
Timeliness/Latency	6 hr
Accuracy	S/N > 10 in Corona at 20Rs; stray light reduction of 10^-11 at 20Rs
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1692
Justification of the requirements	For stereoscopic imaging of CMEs/CIRs. Also, to determine CME speed and direction from single sensor using the J-plot technique.
Comment	STEREO is now routinely tracking CMEs out to the Earth (so 200+ solar radii). It is now demonstrated that the ability to track a CME to elongations of 40 to 50 degrees from the Sun, from a single spacecraft near L4 or L5, allows determination of the speed and direction of the CME. 15 arcsec is the resolution of COR2.

3.1.60. SU-023-M: Solar Far-side Maps (using helioseismology technique)

PRODUCT	Solar Far-side Maps (using helioseismology technique)
Product Code	SU-023-M
Input Data required	
Data to be provided and associated units	Farside images computed from sound travel time analysis
Dynamic Range	-20 < tau < 15, where tau is the heliosesmic travel time perturbation
Physical Range	Doppler imaging in photospheric absorption line, e.g. Ni I 6768 A
Spatial Range	full disk
Spatial Resolution	2 deg (heliographic coordinates)
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	1 day
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1693
Justification of the requirements	Identify formation and evolution of large solar active regions on the far side of the Sun. Extends forecast validity period to up to 14 days.
Comment	

3.1.61. SU-023-N: Solar Far-side Maps (using helioseismology technique) - Nowcast

PRODUCT	Solar Far-side Maps (using helioseismology technique) - Nowcast
Product Code	SU-023-N
Input Data required	SU-023-M
Data to be provided and associated units	Farside images computed from sound travel time analysis
Dynamic Range	-20 < tau < 15, where tau is the heliosesmic travel time perturbation
Physical Range	Doppler imaging in photospheric absorption line, e.g. Ni I 6768 A
Spatial Range	full disk
Spatial Resolution	2 deg (heliographic coordinates)
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	1 day
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1693
Justification of the requirements	Identify formation and evolution of large solar active regions on the far side of the Sun. Extends forecast validity period to up to 14 days.
Comment	

3.1.62. SU-023-P: Solar Far-side Maps (using helioseismology technique) - Archives and A Posteriori Reconstruction

PRODUCT	Solar Far-side Maps (using helioseismology technique) - Archives and A Posteriori Reconstruction
Product Code	SU-023-P
Input Data required	SU-023-M
Data to be provided and associated units	Farside images computed from sound travel time analysis
Dynamic Range	-20 < tau < 15, where tau is the heliosesmic travel time perturbation
Physical Range	Doppler imaging in photospheric absorption line, e.g. Ni I 6768 A
Spatial Range	full disk
Spatial Resolution	2 deg (heliographic coordinates)
Time Range	Continuous coverage
Time Resolution	2 mins
Timeliness/Latency	1 day
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1693
Justification of the requirements	Identify formation and evolution of large solar active regions on the far side of the Sun. Extends forecast validity period to up to 14 days.
Comment	

3.1.63. SU-024-M: Ly-alpha Images (for measure of solar far-side activity)

PRODUCT	Ly-alpha Images (for measure of solar far-side activity)
Product Code	SU-024-M
Input Data required	
Data to be provided and associated units	Maps of Ly-alpha backscattered flux [Rayleigh]
Dynamic Range	0.9 - 1.2 counts s-1
Physical Range	Hydrogen Lyman-alpha line, 1216 A
Spatial Range	Image sun-centered; very wide FOV (>=100 deg); solar disk and inner ~10 Rsun occulted
Spatial Resolution	0.5 deg
Time Range	Continuous coverage
Time Resolution	12 hours
Timeliness/Latency	1 day
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1694
Justification of the requirements	Identification of solar active regions on the far side of the sun through illumination of interplanetary Hydrogen atoms
Comment	

3.1.64. SU-024-N: Ly-alpha Images (for measure of solar far-side activity) - Nowcast

PRODUCT	Ly-alpha Images (for measure of solar far-side activity) - Nowcast
Product Code	SU-024-N
Input Data required	SU-024-M
Data to be provided and associated units	Maps of Ly-alpha backscattered flux [Rayleigh]
Dynamic Range	0.9 - 1.2 counts s-1
Physical Range	Hydrogen Lyman-alpha line, 1216 A
Spatial Range	Image sun-centered; very wide FOV (>=100 deg); solar disk and inner ~10 Rsun occulted
Spatial Resolution	0.5 deg
Time Range	Continuous coverage
Time Resolution	12 hours
Timeliness/Latency	1 day
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1694
Justification of the requirements	Identification of solar active regions on the far side of the sun through illumination of interplanetary Hydrogen atoms
Comment	

3.1.65. SU-024-P: Ly-alpha Images (for measure of solar far-side activity) - Archives and A Posteriori Reconstruction

PRODUCT	Ly-alpha Images (for measure of solar far-side activity) - Archives and A Posteriori Reconstruction
Product Code	SU-024-P
Input Data required	SU-024-M
Data to be provided and associated units	Maps of Ly-alpha backscattered flux [Rayleigh]
Dynamic Range	0.9 - 1.2 counts s-1
Physical Range	Hydrogen Lyman-alpha line, 1216 A
Spatial Range	Image sun-centered; very wide FOV (>=100 deg); solar disk and inner ~10 Rsun occulted
Spatial Resolution	0.5 deg
Time Range	Continuous coverage
Time Resolution	12 hours
Timeliness/Latency	1 day
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1694
Justification of the requirements	Identification of solar active regions on the far side of the sun through illumination of interplanetary Hydrogen atoms
Comment	

3.1.66. SU-025-M: White-light wide-angle Coronagraph Images

PRODUCT	White-light wide-angle Coronagraph Images
Product Code	SU-025-M
Input Data required	
Data to be provided and associated units	white light coronagraphic images
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	White light coronagraph images from ~1.2 - 20 solar radii
Spatial Range	Provide images of heliospheric transients out to at least 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	20 mins
Timeliness/Latency	1 hour
Accuracy	S/N > 10 in Corona at 20Rs; stray light reduction of 10^-11 at 20Rs
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1695
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~1-20 solar radii)
Comment	

3.1.67. SU-025-N: White-light wide-angle Coronagraph Images - Nowcast

PRODUCT	White-light wide-angle Coronagraph Images - Nowcast
Product Code	SU-025-N
Input Data required	SU-025-M
Data to be provided and associated units	white light coronagraphic images
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	White light coronagraph images from ~1.2 - 20 solar radii
Spatial Range	Provide images of heliospheric transients out to 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	20 mins
Timeliness/Latency	1 hour
Accuracy	S/N > 10 in Corona at 20Rs; stray light reduction of 10^-11 at 20Rs
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1695
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~1-20 solar radii)
Comment	

3.1.68. SU-025-P: White-light wide-angle Coronagraph Images - Archives and A Posteriori Reconstruction

PRODUCT	White-light wide-angle Coronagraph Images - Archives and A Posteriori Reconstruction
Product Code	SU-025-P
Input Data required	SU-025-M
Data to be provided and associated units	white light coronagraphic images
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	White light coronagraph images from ~1.2 - 20 solar radii
Spatial Range	Provide images of heliospheric transients out to at least 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	20 mins
Timeliness/Latency	1 hour
Accuracy	S/N > 10 in Corona at 20Rs; stray light reduction of 10^-11 at 20Rs
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1695
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~1-20 solar radii)
Comment	

3.1.69. SU-025-F: White-light wide-angle Coronagraph Images - Forecast

PRODUCT	White-light wide-angle Coronagraph Images - Forecast
Product Code	SU-025-F
Input Data required	SU-005-M SU-025-M SU-038-M SU-039-M SU-041-M SU-045-M
Data to be provided and associated units	white light coronagraphic images
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	White light coronagraph images from 2 - 20 solar radii
Spatial Range	Provide images of heliospheric transients out to at least 6 degrees elongation from the centre of the solar disc
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	3 hrs
Timeliness/Latency	24 hrs
Accuracy	S/N > 10 in Corona at 20Rs; stray light reduction of 10^-11 at 20Rs
Other Specific	
Related CRD Requirement	SWE-SRD-11038 SWE-SRD-11077 SWE-SRD-11400 SWE-SRD-11432 SWE-SRD-11461 SWE-SRD-11810
Justification of the requirements	Forecast large-scale structures e.g. streamers in the low corona and into the inner heliosphere
Comment	Forecast of image: e.g. solar corona as seen from another location, tomorrow. Forecasts of CMEs are provided by other products

3.1.70. SU-026-M: Solar Radiospectrographic Observations (for monitoring of radio bursts)

PRODUCT	Solar Radiospectrographic Observations (for monitoring of radio bursts)
Product Code	SU-026-M
Input Data required	
Data to be provided and associated units	Solar radio wave spectra, radio burst classification
Dynamic Range	Dependent on the frequency range: < 150 kHz, 120 dB (110 dB) > 150 kHz, 80 dB > 30 MHz, 50 dB
Physical Range	Solar radio wave spectra from 100 kHz to 8 GHz. At frequencies below ionospheric cutoff (~10 MHz) measurements must be done from space. Target range for space-based observations is 10 kHz – 60 MHz to permit cross-calibration with GBOs
Spatial Range	Dependent on frequency observed and on triangulation with two or more separated observatories.
Spatial Resolution	Dependent on frequency observed and on triangulation with two or more separated observatories.
Time Range	Continuous coverage
Time Resolution	Dependent on the frequency range: < 150 kHz; 30 s > 150 kHz; 5 s (goal: < 150 kHz; 10 s > 150 kHz; 1 s > 30 MHz; 0.1s)
Timeliness/Latency	1 min
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1699
Justification of the requirements	May provide some information of initial speed of CME
Comment	Time resolution and timeliness requirements commensurate with SU-001.

3.1.71. SU-026-N: Solar Radiospectrographic Observations (for monitoring of radio bursts) - Nowcast

PRODUCT	Solar Radiospectrographic Observations (for monitoring of radio bursts) - Nowcast
Product Code	SU-026-N
Input Data required	SU-026-M
Data to be provided and associated units	Solar radio wave spectra, radio burst classification
Dynamic Range	Dependent on the frequency range: < 150 kHz, 120 dB (110 dB) > 150 kHz, 80 dB > 30 MHz, 50 dB
Physical Range	Solar radio wave spectra from 100 kHz to 8 GHz. At frequencies below ionospheric cutoff (~10 MHz) measurements must be done from space. Target range for space-based observations is 10 kHz – 60 MHz to permit cross-calibration with GBOs
Spatial Range	Dependent on frequency observed and on triangulation with two or more separated observatories.
Spatial Resolution	Dependent on frequency observed and on triangulation with two or more separated observatories.
Time Range	Continuous coverage
Time Resolution	Dependent on the frequency range: < 150 kHz; 30 s > 150 kHz; 5 s (goal: < 150 kHz; 10 s > 150 kHz; 1 s > 30 MHz; 0.1s)1 min
Timeliness/Latency	1 min
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1699
Justification of the requirements	Monitor solar radio bursts as a means of tracking solar activity and input to forecast models
Comment	

3.1.72. SU-026-P: Solar Radiospectrographic Observations (for monitoring of radio bursts) - Archives and A Posteriori Reconstruction

PRODUCT	Solar Radiospectrographic Observations (for monitoring of radio bursts) - Archives and A Posteriori Reconstruction
Product Code	SU-026-P
Input Data required	SU-026-M
Data to be provided and associated units	Solar radio wave spectra, radio burst classification
Dynamic Range	Dependent on the frequency range: < 150 kHz, 120 dB (110 dB) > 150 kHz, 80 dB > 30 MHz, 50 dB
Physical Range	Solar radio wave spectra from 100 kHz to 8 GHz. At frequencies below ionospheric cutoff (~10 MHz) measurements must be done from space. Target range for space-based observations is 10 kHz – 60 MHz to permit cross-calibration with GBOs
Spatial Range	Dependent on frequency observed and on triangulation with two or more separated observatories.
Spatial Resolution	Dependent on frequency observed and on triangulation with two or more separated observatories.
Time Range	Continuous coverage
Time Resolution	Dependent on the frequency range: < 150 kHz; 30 s > 150 kHz; 5 s (goal: < 150 kHz; 10 s > 150 kHz; 1 s > 30 MHz; 0.1s)
Timeliness/Latency	1 min
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1699
Justification of the requirements	Monitor solar radio bursts as a means of tracking solar activity and input to forecast models
Comment	Time resolution and timeliness requirements commensurate with SU-001.

3.1.73. SU-027-M: Solar X-ray Flux

PRODUCT	Solar X-ray Flux
Product Code	SU-027-M
Input Data required	
Data to be provided and associated units	Solar soft X-ray flux in [W/m^2]
Dynamic Range	10^6 (to avoid any saturation)
Physical Range	Solar x-ray flux in range 0.1 to 0.8 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 min
Accuracy	0.01
Other Specific	N/A
Related CRD Requirement	SWE-CRD-GEN-1696
Justification of the requirements	Measure flare activity
Comment	High-cadence data (~seconds) could provide information about flare precursors

3.1.74. SU-027-N: Solar X-ray Flux - Nowcast

PRODUCT	Solar X-ray Flux - Nowcast
Product Code	SU-027-N
Input Data required	SU-027-M
Data to be provided and associated units	Solar soft X-ray flux in [W/m^2]
Dynamic Range	10^6 (to avoid any saturation)
Physical Range	Solar x-ray flux in range 0.1 to 0.8 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 min
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1696 SWE-CRD-AVI-3127
Justification of the requirements	Monitor D-region absorption for communication in HF (shortwave fadeout events) and contribute to SEP and global activity forecast; Monitor full sun integrated X-ray flux at 1-8A, 0.5-4A for monitoring and identifying solar flares
Comment	

3.1.75. SU-027-P: Solar X-ray Flux - Archives and A Posteriori Reconstruction

PRODUCT	Solar X-ray Flux - Archives and A Posteriori Reconstruction
Product Code	SU-027-P
Input Data required	SU-027-M
Data to be provided and associated units	Solar soft X-ray flux in [W/m^2]
Dynamic Range	10^6 (to avoid any saturation)
Physical Range	Solar x-ray flux in range 0.1 to 0.8 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 day
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1696 SWE-CRD-AVI-3127
Justification of the requirements	Monitor D-region absorption for communication in HF (shortwave fadeout events) and contribute to SEP and global activity forecast; Monitor full sun integrated X-ray flux at 1-8A, 0.5-4A for monitoring and identifying solar flares
Comment	

3.1.76. SU-027-F: Solar X-ray Flux - Forecast

PRODUCT	Solar X-ray Flux - Forecast
Product Code	SU-027-F
Input Data required	SU-005-M SU-027-M
Data to be provided and associated units	Solar soft X-ray flux in [W/m^2]
Dynamic Range	10^6 (to avoid any saturation)
Physical Range	Solar x-ray flux in range 0.1 to 0.8 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 day
Timeliness/Latency	1 min
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-SRD-10959 SWE-SRD-11038 SWE-SRD-11077 SWE-SRD-11135 SWE-SRD-11806 SWE-SRD-11250 SWE-SRD-11265 SWE-SRD-11444
Justification of the requirements	Forecast D-region absorption for communication in HF (shortwave fadeout events) and contribute to SEP and global activity forecast; Forecast full sun integrated X-ray flux at 1-8A, 0.5-4A for monitoring and identifying solar flares
Comment	Forecast of X-ray flux is a generalisation of the forecast of flares. It should probably take the form of a probabilistic forecast of characteristic parameters derived from the flux-timeline (Max. over a period, min over a period, average over a period, background over a period, ...)

3.1.77. SU-028-M: Solar EUV Integrated Flux

PRODUCT	Solar EUV Integrated Flux
Product Code	SU-028-M
Input Data required	
Data to be provided and associated units	Solar EUV integrated flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the spectral range from 1 - 120 nm. Threshold is radiometer measurements of lines between 26 - 34 nm and of flux from 1 - 20 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 min
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1697
Justification of the requirements	Measure flare activity and provide EUV input flux on Earth atmosphere/ionosphere system
Comment	

3.1.78. SU-028-N: Solar EUV Integrated Flux - Nowcast

PRODUCT	Solar EUV Integrated Flux - Nowcast
Product Code	SU-028-N
Input Data required	SU-028-M
Data to be provided and associated units	Solar EUV integrated flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the spectral range from 1 - 120 nm. Threshold is radiometer measurements of lines between 26 - 34 nm and of flux from 1 - 20 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 min
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1697
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models.
Comment	

3.1.79. SU-028-P: Solar EUV Integrated Flux - Archives and A Posteriori Reconstruction

PRODUCT	Solar EUV Integrated Flux - Archives and A Posteriori Reconstruction
Product Code	SU-028-P
Input Data required	SU-028-M
Data to be provided and associated units	Solar EUV integrated flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the spectral range from 1 - 120 nm. Threshold is radiometer measurements of lines between 26 - 34 nm and of flux from 1 - 20 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 day
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1697
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models.
Comment	

3.1.80. SU-028-F: Solar EUV Integrated Flux - Forecast

PRODUCT	Solar EUV Integrated Flux - Forecast
Product Code	SU-028-F
Input Data required	SU-024-M SU-028-M
Data to be provided and associated units	Prediction of future measurements: solar EUV integrated flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the spectral range from 1 - 120 nm. Threshold is radiometer measurements of lines between 26 - 34 nm and of flux from 1 - 20 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 day
Timeliness/Latency	1 min
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1697
Justification of the requirements	Forecast full sun integrated flux for input to upper atmosphere models.
Comment	

3.1.81. SU-029-M: Solar UV Flux

PRODUCT	Solar UV Flux
Product Code	SU-029-M
Input Data required	
Data to be provided and associated units	Solar UV flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the range of 120 - 200 nm and Mg II lines around 280 nm. Threshold is radiometer measurements including the Lyman-Alpha line at 121.6 nm, the 146 -165 nm range and Mg II lines around 280 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 min
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1698
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models
Comment	

3.1.82. SU-029-N: Solar UV Flux - Nowcast

PRODUCT	Solar UV Flux - Nowcast
Product Code	SU-029-N
Input Data required	SU-029-M
Data to be provided and associated units	Solar UV flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the range of 120 - 200 nm and Mg II lines around 280 nm. Threshold is radiometer measurements including the Lyman-Alpha line at 121.6 nm, the 146 -165 nm range and Mg II lines around 280 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 min
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1698
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models
Comment	

3.1.83. SU-029-P: Solar UV Flux - Archives and A Posteriori Reconstruction

PRODUCT	Solar UV Flux - Archives and A Posteriori Reconstruction
Product Code	SU-029-P
Input Data required	SU-024-M SU-029-M
Data to be provided and associated units	Solar UV flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the range of 120 - 200 nm and Mg II lines around 280 nm. Threshold is radiometer measurements including the Lyman-Alpha line at 121.6 nm, the 146 -165 nm range and Mg II lines around 280 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	1 day
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1698
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models
Comment	

3.1.84. SU-029-F: Solar UV Flux - Forecast

PRODUCT	Solar UV Flux - Forecast
Product Code	SU-029-F
Input Data required	SU-024-M SU-029-M
Data to be provided and associated units	Prediction of future measurements: solar UV flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the range of 120 - 200 nm and Mg II lines around 280 nm. Threshold is radiometer measurements including the Lyman-Alpha line at 121.6 nm, the 146 -165 nm range and Mg II lines around 280 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 day
Timeliness/Latency	1 min
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1698
Justification of the requirements	Forecast full sun integrated flux for input to upper atmosphere models
Comment	

3.1.85. SU-031-F: Long-term Solar Activity - Forecast

PRODUCT	Long-term Solar Activity - Forecast
Product Code	SU-031-F
Input Data required	SU-008-M SU-017-M SU-024-M SU-029-M
Data to be provided and associated units	At least: Sun Spot Number, Solar Flux EUV, F10.7, expected flare activity level, with a forecast-ability period depending on the parameter.
Dynamic Range	See constituting Level 1 measurements
Physical Range	See constituting Level 1 measurements
Spatial Range	See constituting Level 1 measurements
Spatial Resolution	
Time Range	Long-term (several years), upon user's request within the limits of the 1 to 15 year period
Time Resolution	1 month
Timeliness/Latency	Refer to individual product codes
Accuracy	Refer to individual product codes
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1511
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models
Comment	

3.1.86. SU-032-M: Heliospheric Imaging of Sun-Earth Line (tracking of Earth-directed CMEs)

PRODUCT	Heliospheric Imaging of Sun-Earth Line (tracking of Earth-directed CMEs)
Product Code	SU-032-M
Input Data required	
Data to be provided and associated units	Maps of white light intensity from Thomson scattered photospheric light off free electrons within the interplanetary CME and CIR structures
Dynamic Range	10^-10 to 10^-13 B0
Physical Range	Broadband visible (nominal 350 - 1000 nm)
Spatial Range	Wide-angle FOV looking into deep-space, offset from the Sun to about 2 AU; Earth in the FOV
Spatial Resolution	<1 arcmin/pixel
Time Range	Continuous coverage
Time Resolution	30 min
Timeliness/Latency	120 mins
Accuracy	Stray light rejection less than 10^-14 of the solar brightness
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1692
Justification of the requirements	Several spacecraft effects exhibit solar cycle variation which has a ~11 years timescale.
Comment	

3.1.87. SU-032-N: Heliospheric Imaging of Sun-Earth Line (tracking of Earth-directed CMEs) - Nowcast

PRODUCT	Heliospheric Imaging of Sun-Earth Line (tracking of Earth-directed CMEs) - Nowcast
Product Code	SU-032-N
Input Data required	SU-032-M
Data to be provided and associated units	Maps of white light intensity from Thomson scattered photospheric light off free electrons within the interplanetary CME and CIR structures
Dynamic Range	10^-10 to 10^-13 B0
Physical Range	Broadband visible (nominal 350 - 1000 nm)
Spatial Range	Wide-angle FOV looking into deep-space, offset from the Sun to about 2 AU; Earth in the FOV
Spatial Resolution	<1 arcmin/pixel
Time Range	Continuous coverage
Time Resolution	30 min
Timeliness/Latency	120 mins
Accuracy	Stray light rejection less than 10^-14 of the solar brightness
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1692
Justification of the requirements	Identified by SN2 as a consequence of CRD requirements SWE-CRD-GEN-1694, SWE-CRD-LAU-1632
Comment	

3.1.88. SU-032-P: Heliospheric Imaging of Sun-Earth Line (tracking of Earth-directed CMEs) – Archive

PRODUCT	Heliospheric Imaging of Sun-Earth Line (tracking of Earth-directed CMEs) - Archive
Product Code	SU-032-P
Input Data required	SU-032-M
Data to be provided and associated units	Maps of white light intensity from Thomson scattered photospheric light off free electrons within the interplanetary CME and CIR structures
Dynamic Range	10^-10 to 10^-13 B0
Physical Range	Broadband visible (nominal 350 - 1000 nm)
Spatial Range	Wide-angle FOV looking into deep-space, offset from the Sun to about 2 AU; Earth in the FOV
Spatial Resolution	<1 arcmin/pixel
Time Range	Continuous coverage
Time Resolution	30 min
Timeliness/Latency	120 mins
Accuracy	Stray light rejection less than 10^-14 of the solar brightness
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1692
Justification of the requirements	Identified by SN2 as a consequence of CRD requirements SWE-CRD-GEN-1694, SWE-CRD-LAU-1632
Comment	

3.1.89. SU-033-N: Characteristics of Sunspot groups - Nowcast

PRODUCT	Characteristics of Sunspot groups - Nowcast
Product Code	SU-033-N
Input Data required	SU-017-M
Data to be provided and associated units	Characteristics of Sunspot groups, including observatory numbering, and using different morphological-magnetic classifications, such as McIntosh-Zurich modified, Mount Wilson etc. Other characteristics as disk location (in solar longitude and latitude), area or longitudinal extent, growth trend, leading sunspot details, numbers of sunspots inside each group, and also Wolf number of the observation may be provided.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	Full solar disk
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	Daily
Timeliness/Latency	Up to 2 hours after image acquisition
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1689
Justification of the requirements	Catalogue the critical features, properties and characteristics of sunspot groups, as morphology and magnetic polarity of the sunspot group. Relevant for estimation of solar activity and for methods of flare forecasting among other uses
Comment	Nowcast of characteristics of Sunspot groups, including observer analysis

3.1.90. SU-033-P: Characteristics of Sunspot groups - Archives and A Posteriori Reconstruction

PRODUCT	Characteristics of Sunspot groups - Archives and A Posteriori Reconstruction
Product Code	SU-033-P
Input Data required	SU-017-M SU-033-N
Data to be provided and associated units	Characteristics of Sunspot groups, including observatory numbering, and using different morphological-magnetic classifications, such as McIntosh-Zurich modified, Mount Wilson etc. Other characteristics as disk location (in solar longitude and latitude), area or longitudinal extent, growth trend, leading sunspot details, numbers of sunspots inside each group, and also Wolf number of the observation may be provided.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	Full solar disk
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	Daily
Timeliness/Latency	Up to 2 hours after image acquisition
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1689
Justification of the requirements	Catalogue the critical features, properties and characteristics of sunspot groups, as morphology and magnetic polarity of the sunspot group. Relevant for estimation of solar activity and for methods of flare forecasting among other uses
Comment	Archive of characteristics of Sunspot groups, including observer analysis

3.1.91. SU-033-F: Characteristics of Sunspot groups - Forecast

PRODUCT	Characteristics of Sunspot groups - Forecast
Product Code	SU-033-F
Input Data required	SU-005-M SU-017-M SU-033-N SU-041-M SU-042-M
Data to be provided and associated units	Characteristics of Sunspot groups, including observatory numbering, and using different morphological-magnetic classifications, such as McIntosh-Zurich modified, Mount Wilson etc. Other characteristics as disk location (in solar longitude and latitude), area or longitudinal extent, growth trend, leading sunspot details, numbers of sunspots inside each group, and also Wolf number of the observation may be provided.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	Full solar disk
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	Daily
Timeliness/Latency	2 hours
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1689
Justification of the requirements	Catalogue the critical features, properties and characteristics of sunspot groups, as morphology and magnetic polarity of the sunspot group. Relevant for estimation of solar activity and for methods of flare forecasting among other uses
Comment	Forecast of characteristics of Sunspot groups as morphology and magnetic polarity of the sunspot group. Relevant for estimation of solar activity and for methods of flare forecasting among other uses

3.1.92. SU-034-N: Characteristics of Filaments - Nowcast

PRODUCT	Characteristics of Filaments - Nowcast
Product Code	SU-034-N
Input Data required	SU-019-M SU-034-M
Data to be provided and associated units	Characteristics of filaments observed in H-alpha, such as area, length, position and orientation on the disk, and identifier number. Other features as chirality may be listed.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	Full solar disk
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	Daily
Timeliness/Latency	2 hours
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1690
Justification of the requirements	Catalogue the critical features, properties and characteristics of filaments and its monitoring since filament eruption is critical for CME onsets.
Comment	Nowcast of characteristics of filaments. Some EUV passbands can be used

3.1.93. SU-034-P: Characteristics of Filaments - Archives and A Posteriori Reconstruction

PRODUCT	Characteristics of Filaments - Archives and A Posteriori Reconstruction
Product Code	SU-034-P
Input Data required	SU-019-M SU-034-M
Data to be provided and associated units	Characteristics of filaments observed in H-alpha, such as area, length, position and orientation on the disk, and identifier number. Other features as chirality may be listed.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	Full solar disk
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	Daily
Timeliness/Latency	2 hours
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1690
Justification of the requirements	Catalogue the critical features, properties and characteristics of filaments and its monitoring since filament eruption is critical for CME onsets.
Comment	Archive of characteristics of filaments. Some EUV passbands can be used

3.1.94. SU-034-F: Characteristics of Filaments - Forecast

PRODUCT	Characteristics of Filaments - Forecast
Product Code	SU-034-F
Input Data required	SU-019-M SU-034-M SU-037-M SU-040-M SU-043-M
Data to be provided and associated units	Characteristics of filaments observed in H-alpha, such as area, length, position and orientation on the disk, and identifier number. Other features as chirality may be listed.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	Full solar disk
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	Daily
Timeliness/Latency	2 hours
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1690
Justification of the requirements	Catalogue the critical features, properties and characteristics of filaments and its monitoring since filament eruption is critical for CME onsets.
Comment	Forecast of characteristics of filaments. Some EUV passbands can be used

3.1.95. SU-035-N: Characteristics of Solar Radiobursts - Nowcast

PRODUCT	Characteristics of Solar Radiobursts - Nowcast
Product Code	SU-035-N
Input Data required	SU-026-M SU-035-M
Data to be provided and associated units	Characteristics of radiobursts, such as onset time and radio burst type.
Dynamic Range	N/A
Physical Range	Solar radio wave spectra from 100 kHz to 8 GHz. At frequencies below ionospheric cutoff (~10 MHz) measurements must be done from space.
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	Per event
Timeliness/Latency	Per event
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1699
Justification of the requirements	Catalogue the critical features, properties and characteristics of solar radio bursts
Comment	Measurement of characteristics of radiobursts

3.1.96. SU-035-P: Characteristics of Solar Radiobursts - Archives and A Posteriori Reconstruction

PRODUCT	Characteristics of Solar Radiobursts - Archives and A Posteriori Reconstruction
Product Code	SU-035-P
Input Data required	SU-026-M SU-035-M
Data to be provided and associated units	Characteristics of radiobursts, such as onset time and radio burst type.
Dynamic Range	N/A
Physical Range	Solar radio wave spectra from 100 kHz to 8 GHz. At frequencies below ionospheric cutoff (~10 MHz) measurements must be done from space.
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	Per event
Timeliness/Latency	Per event
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1699
Justification of the requirements	Catalogue the critical features, properties and characteristics of solar radio bursts
Comment	Measurement of characteristics of radiobursts

3.1.97. SU-036-N: CME arrival times & solar wind speed values - Nowcast

PRODUCT	CME arrival times & solar wind speed values - Nowcast
Product Code	SU-036-N
Input Data required	SU-005-M SU-017-M SU-023-M
Data to be provided and associated units	Forecast of arrival time of (I)CME at a specific heliospheric location eg L1
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	Upon user's request
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	60 mins
Timeliness/Latency	30 mins
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1725
Justification of the requirements	Model outputs, including CME arrival/properties at specific heliospheric location
Comment	SU-002-F is forecast of CME launch only , not subsequent propagation. This is a new code for CME propagation forecasting,

3.1.98. SU-036-P: CME arrival times & solar wind speed values - Archives and A Posteriori Reconstruction

PRODUCT	CME arrival times & solar wind speed values - Archives and A Posteriori Reconstruction
Product Code	SU-036-P
Input Data required	SU-005-M SU-017-M SU-023-M
Data to be provided and associated units	Forecast of arrival time of (I)CME at a specific heliospheric location eg L1
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	Upon user's request
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	60 mins
Timeliness/Latency	30 mins
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1725
Justification of the requirements	Model outputs, including CME arrival/properties at specific heliospheric location
Comment	SU-002-F is forecast of CME launch only , not subsequent propagation. This is a new code for CME propagation forecasting,

3.1.99. SU-036-F: CME arrival times & solar wind speed values - Forecast

PRODUCT	CME arrival times & solar wind speed values - Forecast	
Product Code	SU-036-F	
Input Data required	SU-005-M SU-017-M SU-019-M ~~SU-023-M~~ SU-025-M SU-032-M SU-037-M SU-038-M SU-039-M SU-040-M SU-041-M SU-042-M SU-045-M	SU-050-M L1-008-M L1-009-M L1-010-M L1-011-M IP-003-M IP-004-M IP-005-M IP-006-M IP-010-M IP-011-M IP-012-M IP-013-M
Data to be provided and associated units	Forecast of arrival time of (I)CME at a specific heliospheric location eg L1	
Dynamic Range	N/A	
Physical Range	N/A	
Spatial Range	Upon user's request	
Spatial Resolution	N/A	
Time Range	N/A	
Time Resolution	60 mins	
Timeliness/Latency	30 mins	
Accuracy	N/A	
Other Specific		
Related CRD Requirement	SWE-CRD-GEN-1725	
Justification of the requirements	Model outputs, including CME arrival/properties at specific heliospheric location	
Comment	SU-002-F is forecast of CME launch only , not subsequent propagation. This is a new code for CME propagation forecasting,	

3.1.100. SU-037-M: EUV images of Sun, taken from L4 point

PRODUCT	EUV images of Sun, taken from L4 point - Measurements
Product Code	SU-037-M
Input Data required	
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	>16,000 (i.e. 14 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	5 arcsec
Time Range	Continuous coverage
Time Resolution	5 mins
Timeliness/Latency	60 mins
Accuracy	S/N > 10 in quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3147
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	Combining images from L4 as well as L1 and L5 will give well-separated viewpoints of active regions, while L4 is optimal for flare observations

3.1.101. SU-037-N: EUV images of Sun, taken from L4 point - Nowcast

PRODUCT	EUV images of Sun, taken from L4 point - Nowcast
Product Code	SU-037-N
Input Data required	SU-040-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	>16,000 (i.e. 14 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	5 arcsec
Time Range	Continuous coverage
Time Resolution	5 mins
Timeliness/Latency	60 mins
Accuracy	S/N > 10 in quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3147
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	Combining images from L4 as well as L1 and L5 will give well-separated viewpoints of active regions, while L4 is optimal for flare observations

3.1.102. SU-037-P: EUV images of Sun, taken from L4 point - Archives and A Posteriori Reconstruction

PRODUCT	EUV images of Sun, taken from L4 point - Archives and A Posteriori Reconstruction
Product Code	SU-037-P
Input Data required	SU-040-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	>16,000 (i.e. 14 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	5 arcsec
Time Range	Continuous coverage
Time Resolution	5 mins
Timeliness/Latency	60 mins
Accuracy	S/N > 10 in quiet Sun
Other Specific	(Difference) movie production should be foreseen
Related CRD Requirement	SWE-CRD-GEN-3147
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	Combining images from L4 as well as L1 and L5 will give well-separated viewpoints of active regions, while L4 is optimal for flare observations

3.1.103. SU-037-F: EUV images of Sun, taken from L4 point - Forecast

PRODUCT	EUV images of Sun, taken from L4 point - Forecast
Product Code	SU-037-F
Input Data required	SU-005-M SU-015-M SU-040-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	>16,000 (i.e. 14 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	5 arcsec
Time Range	Continuous coverage
Time Resolution	6 hrs
Timeliness/Latency	24 hrs
Accuracy	S/N > 10 in quiet Sun
Other Specific	(Difference) movie production should be foreseen
Related CRD Requirement	SWE-CRD-GEN-3147
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	Combining images from L4 as well as L1 and L5 will give well-separated viewpoints of active regions, while L4 is optimal for flare observations

3.1.104. SU-038-M: Solar coronagraphic images, taken from L4 point

PRODUCT	Solar coronagraphic images, taken from L4 point - Measurements
Product Code	SU-038-M
Input Data required	
Data to be provided and associated units	White light coronagraphic images
Dynamic Range	>64,000 (i.e. 16 bit image depth)
Physical Range	White light coronagraph images from 3 - 22 solar radii
Spatial Range	Provide images of heliospheric transients out to at least 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	2 arcmin
Time Range	Continuous coverage
Time Resolution	15 mins
Timeliness/Latency	30 mins
Accuracy	Detection of CMEs corresponding to ~2 x 10-13 of solar brightness with SNR > 4 dB at 22 solar radii.
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3152
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~3-22 solar radii)
Comment	Specification for L4 is the same as for L5 as CMEs will look the same from both viewpoints

3.1.105. SU-038-N: Solar coronagraphic images, taken from L4 point - Nowcast

PRODUCT	Solar coronagraphic images, taken from L4 point - Nowcast
Product Code	SU-038-N
Input Data required	SU-038-N
Data to be provided and associated units	White light coronagraphic images
Dynamic Range	>64,000 (i.e. 16 bit image depth)
Physical Range	White light coronagraph images from 3 - 22 solar radii
Spatial Range	Provide images of heliospheric transients out to 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	2 arcmin
Time Range	Continuous coverage
Time Resolution	15 mins
Timeliness/Latency	30 mins
Accuracy	Detection of CMEs corresponding to ~2 x 10-13 of solar brightness with SNR > 4 dB at 22 solar radii.
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3152
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~3-22 solar radii)
Comment	Specification for L4 is the same as for L5 as CMEs will look the same from both viewpoints

3.1.106. SU-038-P: Solar coronagraphic images, taken from L4 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar coronagraphic images, taken from L4 point - Archives and A Posteriori Reconstruction
Product Code	SU-038-P
Input Data required	SU-038-M
Data to be provided and associated units	White light coronagraphic images
Dynamic Range	>64,000 (i.e. 16 bit image depth)
Physical Range	White light coronagraph images from 3 - 22 solar radii
Spatial Range	Provide images of heliospheric transients out to at least 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	2 arcmin
Time Range	Continuous coverage
Time Resolution	15 mins
Timeliness/Latency	30 mins
Accuracy	Detection of CMEs corresponding to ~2 x 10-13 of solar brightness with SNR > 4 dB at 22 solar radii.
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3152
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~3-22 solar radii)
Comment	Specification for L4 is the same as for L5 as CMEs will look the same from both viewpoints

3.1.107. SU-038-F: Solar coronagraphic images, taken from L4 point - Forecast

PRODUCT	Solar coronagraphic images, taken from L4 point - Forecast
Product Code	SU-038-F
Input Data required	SU-005-M SU-025-M SU-045-M
Data to be provided and associated units	White light coronagraphic images
Dynamic Range	>64,000 (i.e. 16 bit image depth)
Physical Range	White light coronagraph images from 3 - 22 solar radii
Spatial Range	Provide images of heliospheric transients out to at least 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	2 arcmin
Time Range	Continuous coverage
Time Resolution	3 hrs
Timeliness/Latency	24 hrs
Accuracy	Detection of CMEs corresponding to ~2 x 10-13 of solar brightness with SNR > 4 dB at 22 solar radii.
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3152
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~3-22 solar radii)
Comment	Specification for L4 is the same as for L5 as CMEs will look the same from both viewpoints

3.1.108. SU-039-M: Solar magnetograph images, taken from L4 point

PRODUCT	Solar magnetograph images, taken from L4 point - Measurements
Product Code	SU-039-M
Input Data required	
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4...+4 kG (-0.4...+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	10G
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3148
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth. L4 observes the solar sources that are better magnetically connected to the near-Earth region
Comment	Combining with images from L1 and L5 will give well-separated viewpoints of solar magnetic fields. The specifications for L4 are the same as for L5

3.1.109. SU-039-N: Solar magnetograph images, taken from L4 point - Nowcast

PRODUCT	Solar magnetograph images, taken from L4 point - Nowcast
Product Code	SU-039-N
Input Data required	SU-039-M
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4...+4 kG (-0.4...+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	10G
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3148
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth. L4 observes the solar sources that are better magnetically connected to the near-Earth region
Comment	Combining with images from L1 and L5 will give well-separated viewpoints of solar magnetic fields. The specifications for L4 are the same as for L5

3.1.110. SU-039-P: Solar magnetograph images, taken from L4 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar magnetograph images, taken from L4 point - Archives and A Posteriori Reconstruction
Product Code	SU-039-P
Input Data required	SU-039-M
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4...+4 kG (-0.4...+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	10G
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3148
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth. L4 observes the solar sources that are better magnetically connected to the near-Earth region
Comment	Combining with images from L1 and L5 will give well-separated viewpoints of solar magnetic fields. The specifications for L4 are the same as for L5

3.1.111. SU-039-F: Solar magnetograph images, taken from L4 point - Forecast

PRODUCT	Solar magnetograph images, taken from L4 point - Forecast
Product Code	SU-039-F
Input Data required	SU-005-M SU-039-M
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4...+4 kG (-0.4...+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk; far-side disk if data available
Spatial Resolution	~5 arcsec scale, depending on requirement of PFSS extrapolation model
Time Range	next 0 to 14 days (longer if far-side data available)
Time Resolution	6 hrs
Timeliness/Latency	24 hrs
Accuracy	Depending on inversion method used
Other Specific	Model of magnetic field based on past measurements + solar rotation
Related CRD Requirement	SWE-CRD-GEN-3148
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth. L4 observes the solar sources that are better magnetically connected to the near-Earth region
Comment	interpretation: model of magnetic field based on past measurements + solar rotation

3.1.112. SU-040-M: EUV images of Sun, taken from L5 point

PRODUCT	EUV images of Sun, taken from L5 point - Measurements
Product Code	SU-040-M
Input Data required	
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	>16,000 (i.e. 14 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	5 arcsec
Time Range	Continuous coverage
Time Resolution	5 mins
Timeliness/Latency	60 mins
Accuracy	S/N > 10 in quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3147
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of active regions

3.1.113. SU-040-N: EUV images of Sun, taken from L5 point - Nowcast

PRODUCT	EUV images of Sun, taken from L5 point - Nowcast
Product Code	SU-040-N
Input Data required	SU-040-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	>16,000 (i.e. 14 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	5 arcsec
Time Range	Continuous coverage
Time Resolution	5 mins
Timeliness/Latency	60 mins
Accuracy	S/N > 10 in quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3147
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of active regions

3.1.114. SU-040-P: EUV images of Sun, taken from L5 point -Archives and A Posteriori Reconstruction

PRODUCT	EUV images of Sun, taken from L5 point -Archives and A Posteriori Reconstruction
Product Code	SU-040-P
Input Data required	SU-040-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	>16,000 (i.e. 14 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	5 arcsec
Time Range	Continuous coverage
Time Resolution	5 mins
Timeliness/Latency	60 mins
Accuracy	S/N > 10 in quiet Sun
Other Specific	(Difference) movie production should be foreseen
Related CRD Requirement	SWE-CRD-GEN-3147
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of active regions

3.1.115. SU-040-F: EUV images of Sun, taken from L5 point - Forecast

PRODUCT	EUV images of Sun, taken from L5 point - Forecast
Product Code	SU-040-F
Input Data required	SU-005-M SU-037-M SU-040-M
Data to be provided and associated units	Solar images taken in EUV emission line bandpass
Dynamic Range	>16,000 (i.e. 14 bit image depth)
Physical Range	Images of ~1MK corona; bandpass centered on 19.5 nm or equivalent
Spatial Range	full disk
Spatial Resolution	~20 arcsec scale, depending on requirement of PFSS extrapolation model
Time Range	Continuous coverage
Time Resolution	6 hrs
Timeliness/Latency	24 hrs
Accuracy	S/N > 10 in quiet Sun
Other Specific	(Difference) movie production should be foreseen
Related CRD Requirement	SWE-CRD-GEN-3147
Justification of the requirements	Monitor coronal holes, active regions, and solar activity. Use as input to models.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of active regions

3.1.116. SU-041-M: Solar magnetograph images, taken from L5 point

PRODUCT	Solar magnetograph images, taken from L5 point - Measurements
Product Code	SU-041-M
Input Data required	
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4...+4 kG (-0.4...+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	10G
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3148
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of solar magnetic fields

3.1.117. SU-041-N: Solar magnetograph images, taken from L5 point - Nowcast

PRODUCT	Solar magnetograph images, taken from L5 point - Nowcast
Product Code	SU-041-N
Input Data required	SU-041-M
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4...+4 kG (-0.4...+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	10G
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3148
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of solar magnetic fields

3.1.118. SU-041-P: Solar magnetograph images, taken from L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar magnetograph images, taken from L5 point - Archives and A Posteriori Reconstruction
Product Code	SU-041-P
Input Data required	SU-041-M
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4...+4 kG (-0.4...+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	10G
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3148
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of solar magnetic fields

3.1.119. SU-041-F: Solar magnetograph images, taken from L5 point - Forecast

PRODUCT	Solar magnetograph images, taken from L5 point - Forecast
Product Code	SU-041-F
Input Data required	SU-039-M SU-041-M
Data to be provided and associated units	Near-side vector magnetogram
Dynamic Range	-4...+4 kG (-0.4...+0.4 T)
Physical Range	
Spatial Range	full solar (near-side) disk; far-side disk if data available
Spatial Resolution	~5 arcsec scale, depending on requirement of PFSS extrapolation model
Time Range	next 0 to 14 days (longer if far-side data available)
Time Resolution	6 hrs
Timeliness/Latency	24 hrs
Accuracy	Depending on inversion method used
Other Specific	Model of magnetic field based on past measurements + solar rotation
Related CRD Requirement	SWE-CRD-GEN-3148
Justification of the requirements	Required to predict change in the terrestrial environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far-side as seen from Earth.
Comment	interpretation: model of magnetic field based on past measurements + solar rotation

3.1.120. SU-042-M: White-light solar images, taken from L5 point

PRODUCT	White-light solar images, taken from L5 point - Measurements
Product Code	SU-042-M
Input Data required	
Data to be provided and associated units	Solar images in white-light (continuum)
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	Visible wavelength range
Spatial Range	full disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3149
Justification of the requirements	Input to calculation of International Sunspot Number (ISN). Classification of sunspot groups.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of sunspots

3.1.121. SU-042-N: White-light solar images, taken from L5 point - Nowcast

PRODUCT	White-light solar images, taken from L5 point - Nowcast
Product Code	SU-042-N
Input Data required	SU-042-M
Data to be provided and associated units	Solar images in white-light (continuum)
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	Visible wavelength range
Spatial Range	full disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3149
Justification of the requirements	Input to calculation of International Sunspot Number (ISN). Classification of sunspot groups.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of sunspots

3.1.122. SU-042-P: White-light solar images, taken from L5 point - Archives and A Posteriori Reconstruction

PRODUCT	White-light solar images, taken from L5 point - Archives and A Posteriori Reconstruction
Product Code	SU-042-P
Input Data required	SU-042-M
Data to be provided and associated units	Solar images in white-light (continuum)
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	Visible wavelength range
Spatial Range	full disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3149
Justification of the requirements	Input to calculation of International Sunspot Number (ISN). Classification of sunspot groups.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of sunspots

3.1.123. SU-042-F: White-light solar images, taken from L5 point - Forecast

PRODUCT	White-light solar images, taken from L5 point - Forecast
Product Code	SU-042-F
Input Data required	SU-041-M SU-042-M
Data to be provided and associated units	Solar images in white-light (continuum)
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	Visible wavelength range
Spatial Range	full disk
Spatial Resolution	~5 arcsec scale, depending on requirement of PFSS extrapolation model
Time Range	Continuous coverage
Time Resolution	6 hrs
Timeliness/Latency	24 hrs
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3149
Justification of the requirements	Input to calculation of International Sunspot Number (ISN). Classification of sunspot groups.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of sunspots

3.1.124. SU-043-M: H-alpha solar images, taken from L5 point

PRODUCT	H-alpha solar images, taken from L5 point - Measurements
Product Code	SU-043-M
Input Data required	
Data to be provided and associated units	Solar images in H-alpha line of hydrogen
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	656.3 nm, FWHM of filter bandpass <0.1 nm
Spatial Range	full disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	S/N > 20 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3150
Justification of the requirements	Monitor solar flare and quiescent filament development for activity prediction. Observe Moreton waves accompanying CMEs.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of filaments

3.1.125. SU-043-N: H-alpha solar images, taken from L5 point - Nowcast

PRODUCT	H-alpha solar images, taken from L5 point - Nowcast
Product Code	SU-043-N
Input Data required	SU-043-M
Data to be provided and associated units	Solar images in H-alpha line of hydrogen
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	656.3 nm, FWHM of filter bandpass <0.1 nm
Spatial Range	full disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	S/N > 20 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3150
Justification of the requirements	Monitor solar flare and quiescent filament development for activity prediction. Observe Moreton waves accompanying CMEs.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of filaments

3.1.126. SU-043-P: H-alpha solar images, taken from L5 point - Archives and A Posteriori Reconstruction

PRODUCT	H-alpha solar images, taken from L5 point - Archives and A Posteriori Reconstruction
Product Code	SU-043-P
Input Data required	SU-043-M
Data to be provided and associated units	Solar images in H-alpha line of hydrogen
Dynamic Range	5,000 (i.e. >12 bit image depth)
Physical Range	656.3 nm, FWHM of filter bandpass <0.1 nm
Spatial Range	full disk
Spatial Resolution	2.5 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	S/N > 20 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3150
Justification of the requirements	Monitor solar flare and quiescent filament development for activity prediction. Observe Moreton waves accompanying CMEs.
Comment	Combining images from L1 and L5 will give well-separated viewpoints of filaments

3.1.127. SU-044-M: Soft X-ray solar images, taken from L5 point

PRODUCT	Soft X-ray solar images, taken from L5 point - Measurements
Product Code	SU-044-M
Input Data required	
Data to be provided and associated units	Full Sun images with 1 min cadence showing 1-10MK corona
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images showing million degree corona; Photon energy of the order of 1 keV, corresponding to wavelengths of 1 - 5 nm.
Spatial Range	Field-of-view of >30 arcmin (full disk)
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3151
Justification of the requirements	Monitor solar activity and input to modelling activities
Comment	Combining images from L1 and L5 will give well-separated viewpoints of active regions

3.1.128. SU-044-N: Soft X-ray solar images, taken from L5 point - Nowcast

PRODUCT	Soft X-ray solar images, taken from L5 point - Nowcast
Product Code	SU-044-N
Input Data required	SU-044-M
Data to be provided and associated units	Full Sun images with 1 min cadence showing 1-10MK corona
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images showing million degree corona; Photon energy of the order of 1 keV, corresponding to wavelengths of 1 - 5 nm.
Spatial Range	Field-of-view of >30 arcmin (full disk)
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3151
Justification of the requirements	Monitor solar activity and input to modelling activities
Comment	Combining images from L1 and L5 will give well-separated viewpoints of active regions

3.1.129. SU-044-P: Soft X-ray solar images, taken from L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Soft X-ray solar images, taken from L5 point - Archives and A Posteriori Reconstruction
Product Code	SU-044-P
Input Data required	SU-044-M
Data to be provided and associated units	Full Sun images with 1 min cadence showing 1-10MK corona
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images showing million degree corona; Photon energy of the order of 1 keV, corresponding to wavelengths of 1 - 5 nm.
Spatial Range	Field-of-view of >30 arcmin (full disk)
Spatial Resolution	10 arcsec
Time Range	Continuous coverage
Time Resolution	6 hrs
Timeliness/Latency	24 hrs
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3151
Justification of the requirements	Monitor solar activity and input to modelling activities
Comment	Combining images from L1 and L5 will give well-separated viewpoints of active regions

3.1.130. SU-044-F: Soft X-ray solar images, taken from L5 point - Forecast

PRODUCT	Soft X-ray solar images, taken from L5 point - Forecast
Product Code	SU-044-F
Input Data required	SU-005-M SU-044-M
Data to be provided and associated units	Full Sun images with 1 min cadence showing 1-10MK corona
Dynamic Range	10,000 (i.e. >13 bit image depth)
Physical Range	Images showing million degree corona; Photon energy of the order of 1 keV, corresponding to wavelengths of 1 - 5 nm.
Spatial Range	Field-of-view of >30 arcmin (full disk)
Spatial Resolution	~20 arcsec scale, depending on requirement of PFSS extrapolation model
Time Range	Continuous coverage
Time Resolution	30 mins
Timeliness/Latency	120 mins
Accuracy	S/N > 10 in Quiet Sun
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3151
Justification of the requirements	Monitor solar activity and input to modelling activities
Comment	Combining images from L1 and L5 will give well-separated viewpoints of active regions

3.1.131. SU-045-M: White-light coronagraph images, taken from L5 point

PRODUCT	White-light coronagraph images, taken from L5 point - Measurements
Product Code	SU-045-M
Input Data required	
Data to be provided and associated units	White light coronagraphic images
Dynamic Range	>64,000 (i.e. 16 bit image depth)
Physical Range	White light coronagraph images from 3 - 22 solar radii
Spatial Range	Provide images of heliospheric transients out to at least 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	2 arcmin
Time Range	Continuous coverage
Time Resolution	15 mins
Timeliness/Latency	30 mins
Accuracy	Detection of CMEs corresponding to ~2 x 10-13 of solar brightness with SNR > 4 dB at 22 solar radii.
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3152
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~3-22 solar radii)
Comment	L5 offers the optimal viewpoint for observing Earth-directed CMEs, allowing them to the tracked and measured accurately throughout the field of view within the inner heliosphere

3.1.132. SU-045-N: White-light coronagraph images, taken from L5 point - Nowcast

PRODUCT	White-light coronagraph images, taken from L5 point - Nowcast
Product Code	SU-045-N
Input Data required	SU-045-M
Data to be provided and associated units	White light coronagraphic images
Dynamic Range	>64,000 (i.e. 16 bit image depth)
Physical Range	White light coronagraph images from 3 - 22 solar radii
Spatial Range	Provide images of heliospheric transients out to 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	2 arcmin
Time Range	Continuous coverage
Time Resolution	15 mins
Timeliness/Latency	30 mins
Accuracy	Detection of CMEs corresponding to ~2 x 10-13 of solar brightness with SNR > 4 dB at 22 solar radii.
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3152
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~3-22 solar radii)
Comment	L5 offers the optimal viewpoint for observing Earth-directed CMEs, allowing them to the tracked and measured accurately throughout the field of view within the inner heliosphere

3.1.133. SU-045-P: White-light coronagraph images, taken from L5 point - Archives and A Posteriori Reconstruction

PRODUCT	White-light coronagraph images, taken from L5 point - Archives and A Posteriori Reconstruction
Product Code	SU-045-P
Input Data required	SU-045-M
Data to be provided and associated units	White light coronagraphic images
Dynamic Range	>64,000 (i.e. 16 bit image depth)
Physical Range	White light coronagraph images from 3 - 22 solar radii
Spatial Range	Provide images of heliospheric transients out to at least 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	2 arcmin
Time Range	Continuous coverage
Time Resolution	15 mins
Timeliness/Latency	30 mins
Accuracy	Detection of CMEs corresponding to ~2 x 10-13 of solar brightness with SNR > 4 dB at 22 solar radii.
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3152
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~3-22 solar radii)
Comment	L5 offers the optimal viewpoint for observing Earth-directed CMEs, allowing them to the tracked and measured accurately throughout the field of view within the inner heliosphere

3.1.134. SU-045-F: White-light coronagraph images, taken from L5 point - Forecast

PRODUCT	White-light coronagraph images, taken from L5 point - Forecast
Product Code	SU-045-F
Input Data required	SU-005-M SU-038-M SU-045-M
Data to be provided and associated units	White light coronagraphic images
Dynamic Range	>64,000 (i.e. 16 bit image depth)
Physical Range	White light coronagraph images from 3 - 22 solar radii
Spatial Range	Provide images of heliospheric transients out to at least 6 degrees elongation from the centre of the solar disc.
Spatial Resolution	10 arcmin
Time Range	Continuous coverage
Time Resolution	3 hrs
Timeliness/Latency	24 hrs
Accuracy	Detection of CMEs corresponding to ~2 x 10-13 of solar brightness with SNR > 4 dB at 22 solar radii.
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3152
Justification of the requirements	Monitor coronal mass ejections as they extend out into the low corona (~3-22 solar radii)
Comment	L5 offers the optimal viewpoint for observing Earth-directed CMEs, allowing them to the tracked and measured accurately throughout the field of view within the inner heliosphere

3.1.135. SU-046-M: Solar X-ray flux, measured at L5 point - Measurements

PRODUCT	Solar X-ray flux, measured at L5 point - Measurements
Product Code	SU-046-M
Input Data required	
Data to be provided and associated units	Solar soft X-ray flux in [W/m^2]
Dynamic Range	10^6 (to avoid any saturation)
Physical Range	Solar x-ray flux in range 0.1 to 0.8 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	15 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3153
Justification of the requirements	Monitor D-region absorption for communication in HF (shortwave fadeout events) and contribute to SEP and global activity forecast; Monitor full sun integrated X-ray flux at 1-8A, 0.5-4A for monitoring and identifying solar flares
Comment	Time resolution and timeliness requirements commensurate with L5 User Needs. High cadence data (~seconds) could provide information about flare precursors

3.1.136. SU-046-N: Solar X-ray flux, measured at L5 point - Nowcast

PRODUCT	Solar X-ray flux, measured at L5 point - Nowcast
Product Code	SU-046-N
Input Data required	SU-046-M
Data to be provided and associated units	Solar soft X-ray flux in [W/m^2]
Dynamic Range	10^6 (to avoid any saturation)
Physical Range	Solar x-ray flux in range 0.1 to 0.8 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	15 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3153
Justification of the requirements	Monitor D-region absorption for communication in HF (shortwave fadeout events) and contribute to SEP and global activity forecast; Monitor full sun integrated X-ray flux at 1-8A, 0.5-4A for monitoring and identifying solar flares
Comment	Time resolution and timeliness requirements commensurate with L5 User Needs.

3.1.137. SU-046-P: Solar X-ray flux, measured at L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar X-ray flux, measured at L5 point - Archives and A Posteriori Reconstruction
Product Code	SU-046-P
Input Data required	SU-046-M
Data to be provided and associated units	Solar soft X-ray flux in [W/m^2]
Dynamic Range	10^6 (to avoid any saturation)
Physical Range	Solar x-ray flux in range 0.1 to 0.8 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	15 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3153
Justification of the requirements	Monitor D-region absorption for communication in HF (shortwave fadeout events) and contribute to SEP and global activity forecast; Monitor full sun integrated X-ray flux at 1-8A, 0.5-4A for monitoring and identifying solar flares
Comment	Time resolution and timeliness requirements commensurate with L5 User Needs.

3.1.138. SU-046-F: Solar X-ray flux, measured at L5 point - Forecast

PRODUCT	Solar X-ray flux, measured at L5 point - Forecast
Product Code	SU-046-F
Input Data required	SU-005-M SU-046-M
Data to be provided and associated units	Solar soft X-ray flux in [W/m^2]
Dynamic Range	10^6
Physical Range	Solar x-ray flux in range 0.1 to 0.8 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 day
Timeliness/Latency	60 mins
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3153
Justification of the requirements	Forecast D-region absorption for communication in HF (shortwave fadeout events) and contribute to SEP and global activity forecast; forecast full sun integrated X-ray flux at 1-8A, 0.5-4A for predicting solar flares
Comment	Time resolution and timeliness requirements commensurate with L5 User Needs.

3.1.139. SU-047-M: Solar EUV integrated flux, measured at L5 point - Measurements

PRODUCT	Solar EUV integrated flux, measured at L5 point - Measurements
Product Code	SU-047-M
Input Data required	
Data to be provided and associated units	Solar EUV integrated flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the spectral range from 1 - 120 nm. Threshold is radiometer measurements of lines between 26 - 34 nm and of flux from 1 - 20 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3154
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models.
Comment	Time resolution and timeliness requirements extrapolated from other instruments listed in L5 User Needs.

3.1.140. SU-047-N: Solar EUV integrated flux, measured at L5 point - Nowcast

PRODUCT	Solar EUV integrated flux, measured at L5 point - Nowcast
Product Code	SU-047-N
Input Data required	SU-047-M
Data to be provided and associated units	Solar EUV integrated flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the spectral range from 1 - 120 nm. Threshold is radiometer measurements of lines between 26 - 34 nm and of flux from 1 - 20 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3154
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models.
Comment	Time resolution and timeliness requirements extrapolated from other instruments listed in L5 User Needs.

3.1.141. SU-047-P: Solar EUV integrated flux, measured at L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar EUV integrated flux, measured at L5 point - Archives and A Posteriori Reconstruction
Product Code	SU-047-P
Input Data required	SU-047-M
Data to be provided and associated units	Solar EUV integrated flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the spectral range from 1 - 120 nm. Threshold is radiometer measurements of lines between 26 - 34 nm and of flux from 1 - 20 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3154
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models.
Comment	Time resolution and timeliness requirements extrapolated from other instruments listed in L5 User Needs.

3.1.142. SU-047-F: Solar EUV integrated flux, measured at L5 point - Forecast

PRODUCT	Solar EUV integrated flux, measured at L5 point - Forecast
Product Code	SU-047-F
Input Data required	SU-024-M SU-047-M
Data to be provided and associated units	Prediction of future measurements: solar EUV integrated flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the spectral range from 1 - 120 nm. Threshold is radiometer measurements of lines between 26 - 34 nm and of flux from 1 - 20 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 day
Timeliness/Latency	60 mins
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3154
Justification of the requirements	Forecast full sun integrated flux for input to upper atmosphere models.
Comment	Time resolution and timeliness requirements extrapolated from other instruments listed in L5 User Needs.

3.1.143. SU-048-M: Solar UV flux, measured at L5 point - Measurements

PRODUCT	Solar UV flux, measured at L5 point - Measurements
Product Code	SU-048-M
Input Data required	
Data to be provided and associated units	Solar UV flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the range of 120 - 200 nm and Mg II lines around 280 nm. Threshold is radiometer measurements including the Lyman-Alpha line at 121.6 nm, the 146 -165 nm range and Mg II lines around 280 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3155
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models.
Comment	Time resolution and timeliness requirements extrapolated from other instruments listed in L5 User Needs.

3.1.144. SU-048-N: Solar UV flux, measured at L5 point - Nowcast

PRODUCT	Solar UV flux, measured at L5 point - Nowcast
Product Code	SU-048-N
Input Data required	SU-048-M
Data to be provided and associated units	Solar UV flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the range of 120 - 200 nm and Mg II lines around 280 nm. Threshold is radiometer measurements including the Lyman-Alpha line at 121.6 nm, the 146 -165 nm range and Mg II lines around 280 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3155
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models
Comment	Time resolution and timeliness requirements extrapolated from other instruments listed in L5 User Needs.

3.1.145. SU-048-P: Solar UV flux, measured at L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar UV flux, measured at L5 point - Archives and A Posteriori Reconstruction
Product Code	SU-048-P
Input Data required	SU-024-M SU-048-M
Data to be provided and associated units	Solar UV flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the range of 120 - 200 nm and Mg II lines around 280 nm. Threshold is radiometer measurements including the Lyman-Alpha line at 121.6 nm, the 146 -165 nm range and Mg II lines around 280 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3155
Justification of the requirements	Monitor full sun integrated flux for input to upper atmosphere models
Comment	Time resolution and timeliness requirements extrapolated from other instruments listed in L5 User Needs.

3.1.146. SU-048-F: Solar UV flux, measured at L5 point - Forecast

PRODUCT	Solar UV flux, measured at L5 point - Forecast
Product Code	SU-048-F
Input Data required	SU-024-M SU-048-M
Data to be provided and associated units	Prediction of future measurements: solar UV flux in [W/m^2]
Dynamic Range	10^2
Physical Range	Goal is spectrometer measurements covering the range of 120 - 200 nm and Mg II lines around 280 nm. Threshold is radiometer measurements including the Lyman-Alpha line at 121.6 nm, the 146 -165 nm range and Mg II lines around 280 nm.
Spatial Range	Sun in the FOV
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 day
Timeliness/Latency	60 mins
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3155
Justification of the requirements	Forecast full sun integrated flux for input to upper atmosphere models
Comment	Time resolution and timeliness requirements extrapolated from other instruments listed in L5 User Needs.

3.1.147. SU-049-M: Solar radio bursts, measured at L5 point - Measurements

PRODUCT	Solar radio bursts, measured at L5 point - Measurements
Product Code	SU-049-M
Input Data required	
Data to be provided and associated units	Solar radio wave spectra, radio burst classification
Dynamic Range	Dependent on the frequency range: < 150 kHz, 120 dB (110 dB) > 150 kHz, 80 dB > 30 MHz, 50 dB
Physical Range	Solar radio wave spectra from 10 kHz to 8 GHz. At frequencies below ionospheric cutoff (~10 MHz) measurements must be done from space. Target range for space-based observations is 10 kHz – 60 MHz to permit cross-calibration with GBOs
Spatial Range	Dependent on frequency observed and on triangulation with two or more separated observatories.
Spatial Resolution	Dependent on frequency observed and on triangulation with two or more separated observatories.
Time Range	Continuous coverage
Time Resolution	Dependent on the frequency range: < 150 kHz; 30 s > 150 kHz; 5 s (goal: < 150 kHz; 10 s > 150 kHz; 1 s > 30 MHz; 0.1s)
Timeliness/Latency	40 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3156
Justification of the requirements	Monitor solar radio bursts as a means of tracking solar activity and input to forecast models. Can provide information on initial speed of CMEs
Comment	Time resolution and timeliness requirements commensurate with L5 User Needs.

3.1.148. SU-049-N: Solar radio bursts, measured at L5 point - Nowcast

PRODUCT	Solar radio bursts, measured at L5 point - Nowcast
Product Code	SU-049-N
Input Data required	SU-049-M
Data to be provided and associated units	Solar radio wave spectra, radio burst classification
Dynamic Range	Dependent on the frequency range: < 150 kHz, 120 dB (110 dB) > 150 kHz, 80 dB > 30 MHz, 50 dB
Physical Range	Solar radio wave spectra from 10 kHz to 8 GHz. At frequencies below ionospheric cutoff (~10 MHz) measurements must be done from space. Target range for space-based observations is 10 kHz – 60 MHz to permit cross-calibration with GBOs
Spatial Range	Dependent on frequency observed and on triangulation with two or more separated observatories.
Spatial Resolution	Dependent on frequency observed and on triangulation with two or more separated observatories.
Time Range	Continuous coverage
Time Resolution	Dependent on the frequency range: < 150 kHz; 30 s > 150 kHz; 5 s (goal: < 150 kHz; 10 s > 150 kHz; 1 s > 30 MHz; 0.1s)
Timeliness/Latency	40 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3156
Justification of the requirements	Monitor solar radio bursts as a means of tracking solar activity and input to forecast models. Can provide information on initial speed of CMEs
Comment	Time resolution and timeliness requirements commensurate with L5 User Needs.

3.1.149. SU-049-P: Solar radio bursts, measured at L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar radio bursts, measured at L5 point - Archives and A Posteriori Reconstruction
Product Code	SU-049-P
Input Data required	SU-049-M
Data to be provided and associated units	Solar radio wave spectra, radio burst classification
Dynamic Range	Dependent on the frequency range: < 150 kHz, 120 dB (110 dB) > 150 kHz, 80 dB > 30 MHz, 50 dB
Physical Range	Solar radio wave spectra from 10 kHz to 8 GHz. At frequencies below ionospheric cutoff (~10 MHz) measurements must be done from space. Target range for space-based observations is 10 kHz – 60 MHz to permit cross-calibration with GBOs
Spatial Range	Dependent on frequency observed and on triangulation with two or more separated observatories.
Spatial Resolution	Dependent on frequency observed and on triangulation with two or more separated observatories.
Time Range	Continuous coverage
Time Resolution	Dependent on the frequency range: < 150 kHz; 30 s > 150 kHz; 5 s (goal: < 150 kHz; 10 s > 150 kHz; 1 s > 30 MHz; 0.1s)
Timeliness/Latency	40 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3156
Justification of the requirements	Monitor solar radio bursts as a means of tracking solar activity and input to forecast models. Can provide information on initial speed of CMEs
Comment	Time resolution and timeliness requirements commensurate with L5 User Needs.

3.1.150. SU-050-M: Heliospheric imaging, taken from L5 point

PRODUCT	Heliospheric imaging, taken from L5 point - Measurements
Product Code	SU-050-M
Input Data required	
Data to be provided and associated units	Maps of white light intensity from Thomson scattered photospheric light off free electrons within the interplanetary CME and CIR structures
Dynamic Range	10^-10 to 10^-13 B0
Physical Range	Broadband visible (nominal 350 - 1000 nm)
Spatial Range	4 to 50 degrees elongation from Sun-Centre towards Earth.
Spatial Resolution	<=6 arcmin 4 arcmin in inner heliopshere, 6 arcmin in outer heliosphere
Time Range	Continuous coverage
Time Resolution	<=60 min 30 mins in inner heliosphere, 60 mins in outer heliosphere
Timeliness/Latency	120 mins
Accuracy	Photometric absolute accuracy better than 5% of the measured signal
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3266
Justification of the requirements	L5 point offers the best vantage point to track and measure CMEs throughout the heliosphere until they each Earth
Comment	Ensure overlapping inner field of view with outer FoV of coronagraph to provide uninterrupted monitoring

3.1.151. SU-050-N: Heliospheric imaging, taken from L5 point - Nowcast

PRODUCT	Heliospheric imaging, taken from L5 point - Nowcast
Product Code	SU-050-N
Input Data required	SU-050-M
Data to be provided and associated units	Maps of white light intensity from Thomson scattered photospheric light off free electrons within the interplanetary CME and CIR structures
Dynamic Range	10^-10 to 10^-13 B0
Physical Range	Broadband visible (nominal 350 - 1000 nm)
Spatial Range	4 to 50 degrees elongation from Sun-Centre towards Earth.
Spatial Resolution	<=6 arcmin 4 arcmin in inner heliopshere, 6 arcmin in outer heliosphere
Time Range	Continuous coverage
Time Resolution	<=60 min 30 mins in inner heliosphere, 60 mins in outer heliosphere
Timeliness/Latency	120 mins
Accuracy	Photometric absolute accuracy better than 5% of the measured signal
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3266
Justification of the requirements	L5 point offers the best vantage point to track and measure CMEs throughout the heliosphere until they each Earth
Comment	Ensure overlapping inner field of view with outer FoV of coronagraph to provide uninterrupted monitoring

3.1.152. SU-050-P: Heliospheric imaging, taken from L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Heliospheric imaging, taken from L5 point - Archives and A Posteriori Reconstruction
Product Code	SU-050-P
Input Data required	SU-050-M
Data to be provided and associated units	Maps of white light intensity from Thomson scattered photospheric light off free electrons within the interplanetary CME and CIR structures
Dynamic Range	10^-10 to 10^-13 B0
Physical Range	Broadband visible (nominal 350 - 1000 nm)
Spatial Range	4 to 50 degrees elongation from Sun-Centre towards Earth.
Spatial Resolution	<=6 arcmin 4 arcmin in inner heliopshere, 6 arcmin in outer heliosphere
Time Range	Continuous coverage
Time Resolution	<=60 min 30 mins in inner heliosphere, 60 mins in outer heliosphere
Timeliness/Latency	120 mins
Accuracy	Photometric absolute accuracy better than 5% of the measured signal
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3266
Justification of the requirements	L5 point offers the best vantage point to track and measure CMEs throughout the heliosphere until they each Earth
Comment	Ensure overlapping inner field of view with outer FoV of coronagraph to provide uninterrupted monitoring

3.1.153. SU-051-M: Solar Microwave Index (F30) - Measurement

PRODUCT	Solar Microwave Index (F30) - Measurement
Product Code	SU-051-M
Input Data required	
Data to be provided and associated units	Solar radio flux at 30 cm (1 GHz) [sfu, solar flux units = 10 kJy]
Dynamic Range	range typically [45-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in beam
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	N/A
Accuracy	1% on strength
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCO-1564 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-3018
Justification of the requirements	A parameter proportional to level of ionisation in the ionosphere, and used for thermosphere modelling.
Comment	

3.1.154. SU-051-N: Solar Microwave Index (F30) - Nowcast

PRODUCT	Solar Microwave Index (F30) - Nowcast
Product Code	SU-051-N
Input Data required	SU-051-M
Data to be provided and associated units	Solar radio flux at 30 cm (1 GHz) [sfu, solar flux units = 10 kJy]
Dynamic Range	range typically [45-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in beam
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	15 mins
Accuracy	0.05
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCO-1564 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-3018
Justification of the requirements	Useful for many long term activities including spacecraft design, mission planning, atmosphere drag…Required in orbit determination to desired accuracy. Required for mission planning and scheduling. Also required as input to several forecast models.
Comment	Desirable to have hourly cadence

3.1.155. SU-051-P: Solar Microwave Index (F30) - Archives and A Posteriori Reconstruction

PRODUCT	Solar Microwave Index (F30) - Archives and A Posteriori Reconstruction
Product Code	SU-051-P
Input Data required	SU-051-M
Data to be provided and associated units	Solar radio flux at 30 cm (1 GHz) [sfu, solar flux units = 10 kJy]
Dynamic Range	range typically [45-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in beam
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	few samples per day
Timeliness/Latency	1 day
Accuracy	1% on strength
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCO-1564 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-3018
Justification of the requirements	Useful for many long term activities including spacecraft design, mission planning, atmosphere drag…Required in orbit determination to desired accuracy. Required for mission planning and scheduling. Also required as input to several forecast models.
Comment	

3.1.156. SU-051-F: Solar Microwave Index (F30) - Forecast

PRODUCT	Solar Microwave Index (F30) - Forecast
Product Code	SU-051-F
Input Data required	SU-051-M
Data to be provided and associated units	Solar radio flux at 30 cm (1 GHz) [sfu, solar flux units = 10 kJy]
Dynamic Range	range typically [45-few hundreds]; maximum can reach a few thousand sfu
Physical Range	N/A
Spatial Range	full solar disk in beam
Spatial Resolution	N/A
Time Range	1 to at least 3 days (up to 27 days is possible with reduced accuracy)
Time Resolution	1 day
Timeliness/Latency	5 mins
Accuracy	10-50%, depending on time range
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1564 SWE-CRD-STC-3102 SWE-CRD-STC-3104 SWE-CRD-GEN-3018
Justification of the requirements	Useful for many long term activities including spacecraft design, mission planning, atmosphere drag…Required in orbit determination to desired accuracy. Required for mission planning and scheduling. Also required as input to several forecast models.
Comment	

3.2. DATA ON INTERPLANETARY MEDIUM

3.2.1. L1-001-M: High Energy >10 MeV Protons in Interplanetary Medium - Measurement

PRODUCT	High Energy >10 MeV Protons in Interplanetary Medium - Measurement
Product Code	L1-001-M
Input Data required	
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^8 per channel (min. 0.0001 > 200 MeV; max. 100000 @ 10 MeV)
Physical Range	Threshold of 5 channels, goal of 10+ channels, logarithmically-spaced in energy ranging from 10 MeV to 500 MeV with an integral channel above the upper threshold of the highest differential channel. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1 or GEO
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	30 s
Timeliness/Latency	10 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1704 SWE-CRD-AVI-3052
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. N.B. Protons in the range 1-10 MeV affect solar cells, depending on coverglass thickness, and is covered by L1-003-P.
Comment	If measurement is made from GEO the detector must face West.

3.2.2. L1-001-N: High Energy >10 MeV Protons in Interplanetary Medium at L1 - Nowcast

PRODUCT	High Energy >10 MeV Protons in Interplanetary Medium at L1 - Nowcast
Product Code	L1-001-N
Input Data required	L1-001-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^8 per channel (min. 0.0001 > 200 MeV; max. 100000 @ 10 MeV)
Physical Range	Threshold of 5 channels, goal of 10+ channels, logarithmically-spaced in energy ranging from 10 MeV to 500 MeV with an integral channel above the upper threshold of the highest differential channel. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1 or GEO
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	1 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1704 SWE-CRD-AVI-3052
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. N.B. Protons in the range 1-10 MeV affect solar cells, depending on coverglass thickness, and is covered by L1-003-M.
Comment	Post-event radiation data shall be available <2 days following crew dose evaluation. Longer than 2 days is applicable if no activity is observed

3.2.3. L1-001-P: High Energy >10 MeV Protons in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction

PRODUCT	High Energy >10 MeV Protons in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction
Product Code	L1-001-P
Input Data required	L1-001-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^8 per channel (min. 0.0001 > 200 MeV; max. 100000 @ 10 MeV)
Physical Range	Threshold of 5 channels, goal of 10+ channels, logarithmically-spaced in energy ranging from 10 MeV to 500 MeV with an integral channel above the upper threshold of the highest differential channel. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1 or GEO
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	24 hours
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1704 SWE-CRD-AVI-3052
Justification of the requirements	
Comment	Post-event radiation data shall be available <2 days following crew dose evaluation. Longer than 2 days is applicable if no activity is observed

3.2.4. L1-001-F: High Energy >10 MeV Protons in Interplanetary Medium at L1 - Forecast

PRODUCT	High Energy >10 MeV Protons in Interplanetary Medium at L1 - Forecast	
Product Code	L1-001-F	
Input Data required	SU-015-M SU-020-M SU-022-M SU-025-M SU-026-M SU-027-M SU-028-M SU-032-M	L1-001-M L1-002-M L1-006-M IP-001-M IP-007-M IP-008-M IP-009-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1	
Dynamic Range	10^8 per channel (min. 0.0001 > 200 MeV; max. 100000 @ 10 MeV)	
Physical Range	Threshold of 5 channels, goal of 10+ channels, logarithmically-spaced in energy ranging from 10 MeV to 500 MeV with an integral channel above the upper threshold of the highest differential channel. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.	
Spatial Range	L1 or GEO	
Spatial Resolution	N/A	
Time Range	up to 24 days	
Time Resolution	600 s	
Timeliness/Latency	10 min	
Accuracy	Accuracy within an order of magnitude is required.	
Other Specific		
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1704 SWE-CRD-AVI-3052	
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. N.B. Protons in the range 1-10 MeV affect solar cells, depending on coverglass thickness, and is covered by L1-003-N.	
Comment	Post-event radiation data shall be available <2 days following crew dose evaluation. Longer than 2 days is applicable if no activity is observed	

3.2.5. L1-002-M: High Energy >10 MeV/nuc Ions in Interplanetary Medium - Measurement

PRODUCT	High Energy >10 MeV/nuc Ions in Interplanetary Medium - Measurement
Product Code	L1-002-M
Input Data required	
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	Threshold of 5 channels, goal of 10+ channels, logarithmically spaced in energy ranging from 10 MeV/nuc to 5 GeV/nuc. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1 or GEO
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	30 s
Timeliness/Latency	10 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513 SWE-CRD-GEN-1705
Justification of the requirements	A factor in a wide range of single-event related effects and biological effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28. If measurement is made from GEO the detector must face West.

3.2.6. L1-002-N: High Energy >10 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast

PRODUCT	High Energy >10 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast
Product Code	L1-002-N
Input Data required	L1-002-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	Threshold of 5 channels, goal of 10+ channels, logarithmically spaced in energy ranging from 10 MeV/nuc to 5 GeV/nuc. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1 or GEO
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	1 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513 SWE-CRD-GEN-1705
Justification of the requirements	A factor in a wide range of single-event related effects and biological effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.

3.2.7. L1-002-P: High Energy >10 MeV/nuc Ions in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction

PRODUCT	High Energy >10 MeV/nuc Ions in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction
Product Code	L1-002-P
Input Data required	L1-002-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	Threshold of 5 channels, goal of 10+ channels, logarithmically spaced in energy ranging from 10 MeV/nuc to 5 GeV/nuc. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1 or GEO
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	24 hours
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513 SWE-CRD-GEN-1705
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. N.B. Protons in the range 1-10 MeV affect solar cells, depending on coverglass thickness, and is covered by L1-003-F.
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.

3.2.8. L1-002-F: High Energy >10 MeV/nuc Ions in Interplanetary Medium at L1 - Forecast

PRODUCT	High Energy >10 MeV/nuc Ions in Interplanetary Medium at L1 - Forecast	
Product Code	L1-002-F	
Input Data required	SU-015-M SU-020-M SU-022-M SU-025-M SU-026-M SU-027-M SU-028-M SU-032-M	L1-001-M L1-002-M L1-006-M IP-001-M IP-007-M IP-008-M IP-009-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1	
Dynamic Range	10^8 (min./max. vary with energy and species)	
Physical Range	Threshold of 5 channels, goal of 10+ channels, logarithmically spaced in energy ranging from 10 MeV/nuc to 5 GeV/nuc. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.	
Spatial Range	L1 or GEO	
Spatial Resolution	N/A	
Time Range	up to 24 days	
Time Resolution	600 s	
Timeliness/Latency	10 min	
Accuracy	Accuracy within an order of magnitude is required.	
Other Specific		
Related CRD Requirement	SWE-CRD-SCD-1513 SWE-CRD-GEN-1705	
Justification of the requirements	A factor in a wide range of single-event related effects and biological effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).	
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.	

3.2.9. L1-003-M: 1-to-10 MeV Protons in Interplanetary Medium at L1 - Measurement

PRODUCT	1-to-10 MeV Protons in Interplanetary Medium at L1 - Measurement
Product Code	L1-003-M
Input Data required	
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^8 per channel (min. 0.001 @ 10 MeV; max. 10000000 @ 1 MeV)
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	30 s
Timeliness/Latency	10 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1704 SWE-CRD-AVI-3052
Justification of the requirements	Low energy protons can be significant for dose effects on unshielded or lightly shielded components and ionisation and displacement damage in solar cells which affect performance.
Comment	

3.2.10. L1-003-N: 1-to-10 MeV Protons in Interplanetary Medium at L1 - Nowcast

PRODUCT	1-to-10 MeV Protons in Interplanetary Medium at L1 - Nowcast
Product Code	L1-003-N
Input Data required	L1-003-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^8 per channel (min. 0.001 @ 10 MeV; max. 10000000 @ 1 MeV)
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	1 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1704 SWE-CRD-AVI-3052
Justification of the requirements	Low energy protons can be significant for dose effects on unshielded or lightly shielded components and ionisation and displacement damage in solar cells which affect performance.
Comment	

3.2.11. L1-003-P: 1-to-10 MeV Protons in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction

PRODUCT	1-to-10 MeV Protons in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction
Product Code	L1-003-P
Input Data required	L1-003-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^8 per channel (min. 0.001 @ 10 MeV; max. 10000000 @ 1 MeV)
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	24 hours
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1704 SWE-CRD-AVI-3052
Justification of the requirements	A factor in a wide range of single-event related effects and biological effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	

3.2.12. L1-003-F: 1-to-10 MeV Protons in Interplanetary Medium at L1 - Forecast

PRODUCT	1-to-10 MeV Protons in Interplanetary Medium at L1 - Forecast	
Product Code	L1-003-F	
Input Data required	SU-015-M SU-020-M SU-022-M SU-025-M SU-026-M SU-027-M SU-028-M SU-032-M	L1-001-M L1-002-M L1-003-M L1-006-M IP-001-M IP-007-M IP-008-M IP-009-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1	
Dynamic Range	10^8 per channel (min. 0.001 @ 10 MeV; max. 10000000 @ 1 MeV)	
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.	
Spatial Range	L1	
Spatial Resolution	N/A	
Time Range	up to 24 days	
Time Resolution	600 s	
Timeliness/Latency	10 min	
Accuracy	Accuracy within an order of magnitude is required.	
Other Specific		
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1704 SWE-CRD-AVI-3052	
Justification of the requirements	Low energy protons can be significant for dose effects on unshielded or lightly shielded components and ionisation and displacement damage in solar cells which affect performance.	
Comment		

3.2.13. L1-004-M: 1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Measurement

PRODUCT	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Measurement
Product Code	L1-004-M
Input Data required	
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	30 s
Timeliness/Latency	10 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513 SWE-CRD-GEN-1705
Justification of the requirements	There may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.

3.2.14. L1-004-N: 1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast

PRODUCT	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast
Product Code	L1-004-N
Input Data required	L1-004-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	1 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513 SWE-CRD-GEN-1705
Justification of the requirements	There may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.

3.2.15. L1-004-P: 1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction

PRODUCT	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction
Product Code	L1-004-P
Input Data required	L1-004-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	24 hours
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513 SWE-CRD-GEN-1705
Justification of the requirements	Low energy protons can be significant for dose effects on unshielded or lightly shielded components and ionisation and displacement damage in solar cells which affect performance.
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.

3.2.16. L1-004-F: 1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Forecast

PRODUCT	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Forecast	
Product Code	L1-004-F	
Input Data required	SU-015-M SU-020-M SU-022-M SU-025-M SU-026-M SU-027-M SU-028-M SU-032-M	L1-001-M L1-002-M L1-004-M L1-006-M IP-001-M IP-007-M IP-008-M IP-009-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1	
Dynamic Range	10^8 (min./max. vary with energy and species)	
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.	
Spatial Range	L1	
Spatial Resolution	N/A	
Time Range	up to 24 days	
Time Resolution	600 s	
Timeliness/Latency	10 min	
Accuracy	Accuracy within an order of magnitude is required.	
Other Specific		
Related CRD Requirement	SWE-CRD-SCD-1513 SWE-CRD-GEN-1705	
Justification of the requirements	There may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).	
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.	

3.2.17. L1-005-M: 30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1 - Measurement

PRODUCT	30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1 - Measurement
Product Code	L1-005-M
Input Data required	
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	Threshold of 4 channels, goal of 5+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	30 s
Timeliness/Latency	10 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1515
Justification of the requirements	A factor in a wide range of degradation effects of surfaces and sensitive components such as unshielded CCDs.
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.

3.2.18. L1-005-N: 30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast

PRODUCT	30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast
Product Code	L1-005-N
Input Data required	L1-005-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	Threshold of 4 channels, goal of 5+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	1 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1515
Justification of the requirements	A factor in a wide range of degradation effects of surfaces and sensitive components such as unshielded CCDs.
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.

3.2.19. L1-005-P: 30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1-Archives and A Posteriori Reconstruction

PRODUCT	30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1-Archives and A Posteriori Reconstruction
Product Code	L1-005-P
Input Data required	L1-005-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	Threshold of 4 channels, goal of 5+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	24 hours
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1515
Justification of the requirements	There may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.

3.2.20. L1-005-F: 30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1 - Forecast

PRODUCT	30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1 - Forecast	
Product Code	L1-005-F	
Input Data required	SU-015-M SU-020-M SU-022-M SU-025-M SU-026-M SU-027-M SU-028-M SU-032-M L1-001-M	L1-002-M L1-004-M L1-005-M L1-006-M IP-001-M IP-007-M IP-008-M IP-009-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1	
Dynamic Range	10^8 (min./max. vary with energy and species)	
Physical Range	Threshold of 4 channels, goal of 5+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.	
Spatial Range	L1	
Spatial Resolution	N/A	
Time Range	up to 24 days	
Time Resolution	600 s	
Timeliness/Latency	10 min	
Accuracy	Accuracy within an order of magnitude is required.	
Other Specific		
Related CRD Requirement	SWE-CRD-SCD-1515	
Justification of the requirements	A factor in a wide range of degradation effects of surfaces and sensitive components such as unshielded CCDs.	
Comment	Regarding species coverage the goal is Z = 2 - 92 with a threshold of Z = 2 - 28.	

3.2.21. L1-006-M: 2-50 MeV Solar Electrons at L1 - Measurement

PRODUCT	2-50 MeV Solar Electrons at L1 - Measurement
Product Code	L1-006-M
Input Data required	
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^8
Physical Range	Threshold of 1 channel, goal of 3 channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	30 s
Timeliness/Latency	10 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1706
Justification of the requirements	Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	

3.2.22. L1-006-N: 2-50 MeV Solar Electrons at L1 - Nowcast

PRODUCT	2-50 MeV Solar Electrons at L1 - Nowcast
Product Code	L1-006-N
Input Data required	L1-006-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^8
Physical Range	Threshold of 1 channel, goal of 3 channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	1 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1706
Justification of the requirements	Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	

3.2.23. L1-006-P: 2-50 MeV Solar Electrons at L1 - Archives and A Posteriori Reconstruction

PRODUCT	2-50 MeV Solar Electrons at L1 - Archives and A Posteriori Reconstruction
Product Code	L1-006-P
Input Data required	L1-006-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^8
Physical Range	Threshold of 1 channel, goal of 3 channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	24 hours
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1706
Justification of the requirements	A factor in a wide range of degradation effects of surfaces and sensitive components such as unshielded CCDs.
Comment	

3.2.24. L1-006-F: 2-50 MeV Solar Electrons at L1 - Forecast

PRODUCT	2-50 MeV Solar Electrons at L1 - Forecast	
Product Code	L1-006-F	
Input Data required	SU-015-M SU-020-M SU-022-M SU-025-M SU-026-M SU-027-M SU-028-M	SU-032-M L1-006-M IP-001-M IP-007-M IP-008-M IP-009-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)	
Dynamic Range	10^8	
Physical Range	Threshold of 1 channel, goal of 3 channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.	
Spatial Range	L1	
Spatial Resolution	N/A	
Time Range	up to 24 days	
Time Resolution	600 s	
Timeliness/Latency	10 min	
Accuracy	Accuracy within an order of magnitude is required.	
Other Specific		
Related CRD Requirement	SWE-CRD-GEN-1706	
Justification of the requirements	Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed	
Comment		

3.2.25. L1-007-M: E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Measurement

PRODUCT	E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Measurement
Product Code	L1-007-M
Input Data required	L1-007-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1keV^-1
Dynamic Range	10^8
Physical Range	Threshold of 8 channels, goal of 10 channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 30 degree half-angle cones. Threshold of single cone of minimum 30 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	30 s
Timeliness/Latency	10 min
Accuracy	0.5
Other Specific	Note: the upper limit depends on the region considered, if high latitude a few 100s of keV is enough, if radiation zone ~ 10 MeV. For solar events limits should be ~ 5 MeV at high latitudes
Related CRD Requirement	SWE-CRD-SCD-1514
Justification of the requirements	High energy electrons can cause deep dielectric charging in components and very high energy electrons can cause ionization damage
Comment	

3.2.26. L1-007-N: E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Nowcast

PRODUCT	E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Nowcast
Product Code	L1-007-N
Input Data required	L1-007-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1keV^-1
Dynamic Range	10^8
Physical Range	Threshold of 8 channels, goal of 10 channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 30 degree half-angle cones. Threshold of single cone of minimum 30 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	1 min
Accuracy	0.3
Other Specific	Note: the upper limit depends on the region considered, if high latitude a few 100s of keV is enough, if radiation zone ~ 10 MeV. For solar events limits should be ~ 5 MeV at high latitudes
Related CRD Requirement	SWE-CRD-SCD-1514
Justification of the requirements	High energy electrons can cause deep dielectric charging in components and very high energy electrons can cause ionization damage
Comment	

3.2.27. L1-007-P: E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction

PRODUCT	E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction
Product Code	L1-007-P
Input Data required	L1-007-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1keV^-1
Dynamic Range	10^8
Physical Range	Threshold of 8 channels, goal of 10 channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 30 degree half-angle cones. Threshold of single cone of minimum 30 deg half-angle.
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	24 hours
Accuracy	0.1
Other Specific	Note: the upper limit depends on the region considered, if high latitude a few 100s of keV is enough, if radiation zone ~ 10 MeV. For solar events limits should be ~ 5 MeV at high latitudes
Related CRD Requirement	SWE-CRD-SCD-1514
Justification of the requirements	Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	

3.2.28. L1-007-F: E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Forecast

PRODUCT	E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Forecast	
Product Code	L1-007-F	
Input Data required	SU-015-M SU-020-M SU-022-M SU-025-M SU-026-M SU-027-M SU-028-M	SU-032-M L1-006-M L1-007-M IP-001-M IP-007-M IP-008-M IP-009-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1keV^-1	
Dynamic Range	10^8	
Physical Range	Threshold of 8 channels, goal of 10 channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 30 degree half-angle cones. Threshold of single cone of minimum 30 deg half-angle.	
Spatial Range	L1	
Spatial Resolution	N/A	
Time Range	up to 24 days	
Time Resolution	600 s	
Timeliness/Latency	10 min	
Accuracy	Accuracy within an order of magnitude is required.	
Other Specific	Note: the upper limit depends on the region considered, if high latitude a few 100s of keV is enough, if radiation zone ~ 10 MeV. For solar events limits should be ~ 5 MeV at high latitudes	
Related CRD Requirement	SWE-CRD-SCD-1514	
Justification of the requirements	High energy electrons can cause deep dielectric charging in components and very high energy electrons can cause ionization damage	
Comment		

3.2.29. L1-008-M: Interplanetary Magnetic Field (IMF) at L1 - Measurement

PRODUCT	Interplanetary Magnetic Field (IMF) at L1 - Measurement
Product Code	L1-008-M
Input Data required	
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L1
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	1 s
Timeliness/Latency	10 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-POW-3115 SWE-CRD-PPL-3140 SWE-CRD-AVI-3125 SWE-CRD-RES-3176 SWE-CRD-RES-3185
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	

3.2.30. L1-008-N: Interplanetary Magnetic Field (IMF) at L1 - Nowcast

PRODUCT	Interplanetary Magnetic Field (IMF) at L1 - Nowcast
Product Code	L1-008-N
Input Data required	L1-008-M
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	30 s
Timeliness/Latency	1 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-POW-3115 SWE-CRD-PPL-3140 SWE-CRD-AVI-3125 SWE-CRD-RES-3176 SWE-CRD-RES-3185
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	

3.2.31. L1-008-P: Interplanetary Magnetic Field (IMF) at L1 - Archives and A Posteriori Reconstruction

PRODUCT	Interplanetary Magnetic Field (IMF) at L1 - Archives and A Posteriori Reconstruction
Product Code	L1-008-P
Input Data required	L1-008-M
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	1 s
Timeliness/Latency	24 hours
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-POW-3115 SWE-CRD-PPL-3140 SWE-CRD-AVI-3125 SWE-CRD-RES-3176 SWE-CRD-RES-3185
Justification of the requirements	High energy electrons can cause deep dielectric charging in components and very high energy electrons can cause ionization damage
Comment	

3.2.32. L1-008-F: Interplanetary Magnetic Field (IMF) at L1 - Forecast

PRODUCT	Interplanetary Magnetic Field (IMF) at L1 - Forecast
Product Code	L1-008-F
Input Data required	SU-005-M SU-015-M SU-019-M SU-026-M SU-027-M SU-032-M L1-008-M L1-009-M L1-010-M L1-011-M IP-006-M
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L1
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	60 s
Timeliness/Latency	10 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-POW-3115 SWE-CRD-PPL-3140 SWE-CRD-AVI-3125 SWE-CRD-RES-3176 SWE-CRD-AUR-3185
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	

3.2.33. L1-009-M: Solar Wind Bulk Velocity at L1 - Measurement

PRODUCT	Solar Wind Bulk Velocity at L1 - Measurement
Product Code	L1-009-M
Input Data required	
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	100 - 3000 km.s^-1
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	10 s
Timeliness/Latency	10 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-POW-3113 SWE-CRD-PPL-3138 SWE-CRD-RES-3174 SWE-CRD-AUR-3183
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	

3.2.34. L1-009-N: Solar Wind Bulk Velocity at L1 - Nowcast

PRODUCT	Solar Wind Bulk Velocity at L1 - Nowcast
Product Code	L1-009-N
Input Data required	L1-009-M
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	100 - 3000 km.s^-1
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	60 s
Timeliness/Latency	1 min
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-POW-3113 SWE-CRD-PPL-3138 SWE-CRD-RES-3174 SWE-CRD-AUR-3183
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	

3.2.35. L1-009-P: Solar Wind Bulk Velocity at L1 - Archives and A Posteriori Reconstruction

PRODUCT	Solar Wind Bulk Velocity at L1 - Archives and A Posteriori Reconstruction
Product Code	L1-009-P
Input Data required	L1-009-M
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	100 - 3000 km.s^-1
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	10 s
Timeliness/Latency	24 hours
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-POW-3113 SWE-CRD-PPL-3138 SWE-CRD-RES-3174 SWE-CRD-AUR-3183
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	

3.2.36. L1-009-F: Solar Wind Bulk Velocity at L1 - Forecast

PRODUCT	Solar Wind Bulk Velocity at L1 - Forecast
Product Code	L1-009-F
Input Data required	SU-005-M SU-015-M SU-019-M SU-026-M SU-027-M SU-032-M L1-008-M L1-009-M L1-010-M L1-011-M IP-003-M
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	100 - 3000 km.s^-1
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	300 s
Timeliness/Latency	10 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1511 SWE-CRD-POW-3113 SWE-CRD-PPL-3138 SWE-CRD-RES-3174 SWE-CRD-AUR-3183
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	

3.2.37. L1-010-M: Solar Wind Bulk Density at L1 - Measurement

PRODUCT	Solar Wind Bulk Density at L1 - Measurement
Product Code	L1-010-M
Input Data required	
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 200 cm^-3
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	10 s
Timeliness/Latency	10 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1701 SWE-CRD-POW-3114 SWE-CRD-PPL-3139 SWE-CRD-AVI-3124 SWE-CRD-RES-3175 SWE-CRD-AUR-3184
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	

3.2.38. L1-010-N: Solar Wind Bulk Density at L1 - Nowcast

PRODUCT	Solar Wind Bulk Density at L1 - Nowcast
Product Code	L1-010-N
Input Data required	L1-010-M
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 200 cm^-3
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	60 s
Timeliness/Latency	1 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1701 SWE-CRD-POW-3114 SWE-CRD-PPL-3139 SWE-CRD-AVI-3124 SWE-CRD-RES-3175 SWE-CRD-AUR-3184
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	

3.2.39. L1-010-P: Solar Wind Bulk Density at L1 - Archives and A Posteriori Reconstruction

PRODUCT	Solar Wind Bulk Density at L1 - Archives and A Posteriori Reconstruction
Product Code	L1-010-P
Input Data required	L1-010-M
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 200 cm^-3
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	10 s
Timeliness/Latency	24 hours
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1701 SWE-CRD-POW-3114 SWE-CRD-PPL-3139 SWE-CRD-AVI-3124 SWE-CRD-RES-3175 SWE-CRD-AUR-3184
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	

3.2.40. L1-010-F: Solar Wind Bulk Density at L1 - Forecast

PRODUCT	Solar Wind Bulk Density at L1 - Forecast
Product Code	L1-010-F
Input Data required	SU-005-M SU-015-M SU-019-M SU-026-M SU-027-M SU-032-M L1-008-M L1-009-M L1-010-M L1-011-M IP-004-M
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 200 cm^-3
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	300 s
Timeliness/Latency	10 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1701 SWE-CRD-POW-3114 SWE-CRD-PPL-3139 SWE-CRD-AVI-3124 SWE-CRD-RES-3175 SWE-CRD-AUR-3184
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	

3.2.41. L1-011-M: Solar Wind Temperature at L1 - Measurement

PRODUCT	Solar Wind Temperature at L1 - Measurement
Product Code	L1-011-M
Input Data required	
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	10,000 - 100,000 K
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	10 s
Timeliness/Latency	10 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1702
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	

3.2.42. L1-011-N: Solar Wind Temperature at L1 - Nowcast

PRODUCT	Solar Wind Temperature at L1 - Nowcast
Product Code	L1-011-N
Input Data required	L1-011-M
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	10,000 - 10,000,000 K
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	60 s
Timeliness/Latency	1 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1702
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	

3.2.43. L1-011-P: Solar Wind Temperature at L1 - Archives and A Posteriori Reconstruction

PRODUCT	Solar Wind Temperature at L1 - Archives and A Posteriori Reconstruction
Product Code	L1-011-P
Input Data required	L1-011-M
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	10,000 - 100,000 K
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	10 s
Timeliness/Latency	24 hours
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1702
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	

3.2.44. L1-011-F: Solar Wind Temperature at L1 - Forecast

PRODUCT	Solar Wind Temperature at L1 - Forecast
Product Code	L1-011-F
Input Data required	SU-005-M SU-015-M SU-019-M SU-026-M SU-027-M SU-032-M L1-008-M L1-009-M L1-010-M L1-011-M IP-005-M
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	10,000 - 10,000,000 K
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	300 s
Timeliness/Latency	10 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1702
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	

3.2.45. L1-012-F: Activity at L1 - Long-term Forecast

PRODUCT	Activity at L1 - Long-term Forecast	
Product Code	L1-012-F	
Input Data required	SU-005-M SU-008-M SU-015-M SU-017-M SU-019-M SU-023-M SU-024-M SU-037-M SU-039-M SU-040-M SU-041-M SU-042-M	L1-008-M L1-009-M L1-010-M L1-011-M IP-003-M IP-004-M IP-005-M IP-006-M IP-010-M IP-011-M IP-012-M IP-013-M
Data to be provided and associated units	At least: mean and standard deviation of interplanetary magnetic field strength, median and sextiles of solar wind pressure with a forecast-ability period depending on the parameter.	
Dynamic Range	N/A	
Physical Range	N/A	
Spatial Range	L1	
Spatial Resolution	N/A	
Time Range	27 days & all historical measurements for archive	
Time Resolution	300 s	
Timeliness/Latency	1 day	
Accuracy	Various, see Level 1 data required	
Other Specific		
Related CRD Requirement	SWE-CRD-SCD-1511	
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity	
Comment		

3.2.46. IP-001-M: Solar Energetic Particles - Measurement

PRODUCT	Solar Energetic Particles - Measurement
Product Code	IP-001-M
Input Data required	
Data to be provided and associated units	proton/ion flux in cm-2s-1sr-1(MeV/u)-1
Dynamic Range	10^8 per channel from maximum of 10^7 at 1 MeV to a minimum of 10^-5 at 1 GeV
Physical Range	10 or more channels (nice to have: with a directional resolution of 20 deg for 2 pi)
Spatial Range	Interplanetary orbit, away from Earth
Spatial Resolution	0.01 AU
Time Range	N/A
Time Resolution	30 s
Timeliness/Latency	30 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomena and CIRs. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the farside as seen from Earth.
Comment	e.g. STEREO and Solar Orbiter missions

3.2.47. IP-001-N: Solar Energetic Particle Events - Nowcast

PRODUCT	Solar Energetic Particle Events - Nowcast
Product Code	IP-001-N
Input Data required	SU-015-M SU-020-M SU-022-M SU-025-M SU-026-M SU-027-M SU-028-M SU-032-M L1-001-M L1-002-M L1-006-M IP-001-M
Data to be provided and associated units	proton/ion flux in cm-2s-1sr-1(MeV/u)-1
Dynamic Range	10^8 per channel from maximum of 10^7 at 1 MeV to a minimum of 10^-5 at 1 GeV
Physical Range	10 or more channels (nice to have: with a directional resolution of 20 deg for 2 pi)
Spatial Range	Interplanetary orbit, away from Earth
Spatial Resolution	0.01 AU
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	1 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomena and CIRs. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the farside as seen from Earth.
Comment	e.g. STEREO and Solar Orbiter missions

3.2.48. IP-001-P: Solar Energetic Particle Events - Archives and A Posteriori Reconstruction

PRODUCT	Solar Energetic Particle Events - Archives and A Posteriori Reconstruction
Product Code	IP-001-P
Input Data required	SU-015-M SU-020-M SU-022-M SU-025-M SU-026-M SU-027-M SU-028-M SU-032-M L1-001-M L1-002-M L1-006-M IP-001-M
Data to be provided and associated units	proton/ion flux in cm-2s-1sr-1(MeV/u)-1
Dynamic Range	10^8 per channel from maximum of 10^7 at 1 MeV to a minimum of 10^-5 at 1 GeV
Physical Range	10 or more channels (nice to have: with a directional resolution of 20 deg for 2 pi)
Spatial Range	Interplanetary orbit, away from Earth
Spatial Resolution	0.01 AU
Time Range	1 hr - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	24 hours
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomena and CIRs. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the farside as seen from Earth.
Comment	e.g. STEREO and Solar Orbiter missions

3.2.49. IP-001-F: Solar Energetic Particle Events - Forecast

PRODUCT	Solar Energetic Particle Events - Forecast	
Product Code	IP-001-F	
Input Data required	SU-015-M SU-020-M SU-022-M SU-025-M SU-026-M SU-027-M SU-028-M SU-032-M L1-001-M	L1-002-M L1-006-M IP-001-M IP-007-M IP-008-M IP-009-M IP-014-M IP-015-M IP-016-M
Data to be provided and associated units	proton/ion flux in cm-2s-1sr-1(MeV/u)-1	
Dynamic Range	10^8 per channel from maximum of 10^7 at 1 MeV to a minimum of 10^-5 at 1 GeV	
Physical Range	10 or more channels (nice to have: with a directional resolution of 20 deg for 2 pi)	
Spatial Range	Interplanetary orbit, away from Earth	
Spatial Resolution	0.01 AU	
Time Range	up to 24 days	
Time Resolution	600 s	
Timeliness/Latency	10 min	
Accuracy	0.5	
Other Specific		
Related CRD Requirement	SWE-CRD-SCO-1548 SWE-CRD-LAU-1615	
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomena and CIRs. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the farside as seen from Earth.	
Comment	e.g. STEREO and Solar Orbiter missions	

3.2.50. IP-002-M: Data on Interplanetary Medium Outside L1 - Measurement

PRODUCT	Data on Interplanetary Medium Outside L1 - Measurement
Product Code	IP-002-N
Input Data required	SU-005-M SU-015-M SU-019-M SU-026-M SU-027-M SU-032-M L1-008-M L1-009-M L1-010-M L1-011-M
Data to be provided and associated units	Plasma and fields in the interplanetary medium (see L1-008-N, L1-009-N, L1-010-N, L1-011-N)
Dynamic Range	N/A
Physical Range	Ideally same data as for L1 (see L1-008-P, L1-009-P, L1-010-P, L1-011-P) but in practice with reduced list
Spatial Range	Interplanetary orbit, away from Earth
Spatial Resolution	0.01 AU
Time Range	1 hr - 24 hr
Time Resolution	60 s
Timeliness/Latency	30 min
Accuracy	variable (see L1-008-N, L1-009-N, L1-010-N, L1-011-N)
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1541
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity for spacecraft not orbiting Earth, and nowcast and forecast of atmospheric properties for drag calculation on Mars, Venus and other relevant planets
Comment	e.g. STEREO and Solar Orbiter missions

3.2.51. IP-002-N: Data on Interplanetary Medium Outside L1 - Nowcast

PRODUCT	Data on Interplanetary Medium Outside L1 - Nowcast
Product Code	IP-002-N
Input Data required	SU-005-M SU-015-M SU-019-M SU-026-M SU-027-M SU-032-M L1-008-M L1-009-M L1-010-M L1-011-M
Data to be provided and associated units	Plasma and fields in the interplanetary medium (see L1-008-N, L1-009-N, L1-010-N, L1-011-N)
Dynamic Range	N/A
Physical Range	Ideally same data as for L1 (see L1-008-P, L1-009-P, L1-010-P, L1-011-P) but in practice with reduced list
Spatial Range	Interplanetary orbit, away from Earth
Spatial Resolution	0.01 AU
Time Range	1 hr - 24 hr
Time Resolution	60 s
Timeliness/Latency	1 min
Accuracy	variable (see L1-008-N, L1-009-N, L1-010-N, L1-011-N)
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1541
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity for spacecraft not orbiting Earth, and nowcast and forecast of atmospheric properties for drag calculation on Mars, Venus and other relevant planets
Comment	e.g. STEREO and Solar Orbiter missions

3.2.52. IP-002-P: Data on Interplanetary Medium Outside L1 - Archives and A Posteriori Reconstruction

PRODUCT	Data on Interplanetary Medium Outside L1 - Archives and A Posteriori Reconstruction
Product Code	IP-002-P
Input Data required	SU-005-M SU-015-M SU-019-M SU-026-M SU-027-M SU-032-M L1-008-M L1-009-M L1-010-M L1-011-M
Data to be provided and associated units	Plasma and fields in the interplanetary medium (see L1-008-P, L1-009-P, L1-010-P, L1-011-P)
Dynamic Range	N/A
Physical Range	Ideally same data as for L1 (see L1-008-P, L1-009-P, L1-010-P, L1-011-P) but in practice with reduced list
Spatial Range	Interplanetary orbit, away from Earth
Spatial Resolution	0.01 AU
Time Range	1 hr - 27 days & all historical measurements for archive
Time Resolution	10 s
Timeliness/Latency	24 hours
Accuracy	variable (see L1-008-P, L1-009-P, L1-010-P, L1-011-P)
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1541
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity for spacecraft not orbiting Earth, and nowcast and forecast of atmospheric properties for drag calculation on Mars, Venus and other relevant planets
Comment	e.g. STEREO and Solar Orbiter missions

3.2.53. IP-002-F: Data on Interplanetary Medium Outside L1 - Forecast

PRODUCT	Data on Interplanetary Medium Outside L1 - Forecast	
Product Code	IP-002-F	
Input Data required	SU-005-M SU-015-M SU-019-M SU-026-M SU-027-M SU-032-M L1-008-M L1-009-M L1-010-M	L1-011-M IP-003-M IP-004-M IP-005-M IP-006-M IP-010-M IP-011-M IP-012-M IP-013-M
Data to be provided and associated units	Plasma and fields in the interplanetary medium (see L1-008-F, L1-009-F, L1-010-F, L1-011-F)	
Dynamic Range	N/A	
Physical Range	Ideally same data as for L1 (see L1-008-P, L1-009-P, L1-010-P, L1-011-P) but in practice with reduced list	
Spatial Range	Interplanetary orbit, away from Earth	
Spatial Resolution	0.01 AU	
Time Range	up to 24 days	
Time Resolution	300 s	
Timeliness/Latency	10 min	
Accuracy	variable (see L1-008-F, L1-009-F, L1-010-F, L1-011-F)	
Other Specific		
Related CRD Requirement	SWE-CRD-SCO-1541	
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity for spacecraft not orbiting Earth, and nowcast and forecast of atmospheric properties for drag calculation on Mars, Venus and other relevant planets	
Comment	e.g. STEREO and Solar Orbiter missions	

3.2.54. IP-003-M: Solar wind bulk velocity, measured at the L5 point - Measurement

PRODUCT	Solar wind bulk velocity, measured at the L5 point - Measurement
Product Code	IP-003-M
Input Data required	
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	200 - 2500 km.s^-1
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3157
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	Cadence and latency from Vigil MRD

3.2.55. IP-003-N: Solar wind bulk velocity, measured at the L5 point - Nowcast

PRODUCT	Solar wind bulk velocity, measured at the L5 point - Nowcast
Product Code	IP-003-N
Input Data required	IP-003-M
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	200 - 2500 km.s^-1
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3157
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	Cadence and latency from Vigil MRD

3.2.56. IP-003-P: Solar wind bulk velocity, measured at the L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar wind bulk velocity, measured at the L5 point - Archives and A Posteriori Reconstruction
Product Code	IP-003-P
Input Data required	IP-003-M
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	200 - 2500 km.s^-1
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3157
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	Cadence and latency from Vigil MRD

3.2.57. IP-003-F: Solar wind bulk velocity, measured at the L5 point - Forecast

PRODUCT	Solar wind bulk velocity, measured at the L5 point - Forecast
Product Code	IP-003-F
Input Data required	SU-040-M SU-041-M SU-043-M SU-046-M SU-049-M SU-050-M IP-003-M IP-004-M IP-005-M IP-006-M
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	200 - 2500 km.s^-1
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3157
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	Cadence and latency from Vigil MRD

3.2.58. IP-004-M: Solar wind bulk density, measured at the L5 point - Measurement

PRODUCT	Solar wind bulk density, measured at the L5 point - Measurement
Product Code	IP-004-M
Input Data required	
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 150 cm^-3
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3158
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.59. IP-004-N: Solar wind bulk density, measured at the L5 point - Nowcast

PRODUCT	Solar wind bulk density, measured at the L5 point - Nowcast
Product Code	IP-004-N
Input Data required	IP-004-M
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 150 cm^-3
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3158
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.60. IP-004-P: Solar wind bulk density, measured at the L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar wind bulk density, measured at the L5 point - Archives and A Posteriori Reconstruction
Product Code	IP-004-P
Input Data required	IP-004-M
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 150 cm^-3
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3158
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.61. IP-004-F: Solar wind bulk density, measured at the L5 point - Forecast

PRODUCT	Solar wind bulk density, measured at the L5 point - Forecast
Product Code	IP-004-F
Input Data required	SU-040-M SU-041-M SU-043-M SU-046-M SU-049-M SU-050-M IP-003-M IP-004-M IP-005-M IP-006-M
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 150 cm^-3
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3158
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.62. IP-005-M: Solar wind temperature, measured at the L5 point - Measurement

PRODUCT	Solar wind temperature, measured at the L5 point - Measurement
Product Code	IP-005-M
Input Data required	
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	40,000 - 1,000,000 K
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3159
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.63. IP-005-N: Solar wind temperature, measured at the L5 point - Nowcast

PRODUCT	Solar wind temperature, measured at the L5 point - Nowcast
Product Code	IP-005-N
Input Data required	IP-005-M
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	40,000 - 1,000,000 K
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3159
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.64. IP-005-P: Solar wind temperature, measured at the L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar wind temperature, measured at the L5 point - Archives and A Posteriori Reconstruction
Product Code	IP-005-P
Input Data required	IP-005-M
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	40,000 - 1,000,000 K
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3159
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.65. IP-005-F: Solar wind temperature, measured at the L5 point - Forecast

PRODUCT	Solar wind temperature, measured at the L5 point - Forecast
Product Code	IP-005-F
Input Data required	SU-040-M SU-041-M SU-043-M SU-046-M SU-049-M SU-050-M IP-003-M IP-004-M IP-005-M IP-006-M
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	40,000 - 1,000,000 K
Physical Range	N/A
Spatial Range	L5
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3159
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.66. IP-006-M: Interplanetary magnetic field, measured at the L5 point - Measurement

PRODUCT	Interplanetary magnetic field, measured at the L5 point - Measurement
Product Code	IP-006-M
Input Data required	
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	(+/-)1nT
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3160
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.67. IP-006-N: Interplanetary magnetic field, measured at the L5 point - Nowcast

PRODUCT	Interplanetary magnetic field, measured at the L5 point - Nowcast
Product Code	IP-006-N
Input Data required	IP-006-M
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	(+/-)1nT
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3160
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.68. IP-006-P: Interplanetary magnetic field, measured at the L5 point - Archives and A Posteriori Reconstruction

PRODUCT	Interplanetary magnetic field, measured at the L5 point - Archives and A Posteriori Reconstruction
Product Code	IP-006-P
Input Data required	IP-006-M
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L5
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	(+/-)1nT
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3160
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.69. IP-006-F: Interplanetary magnetic field, measured at the L5 point - Forecast

PRODUCT	Interplanetary magnetic field, measured at the L5 point - Forecast
Product Code	IP-006-F
Input Data required	SU-040-M SU-041-M SU-043-M SU-046-M SU-049-M SU-050-M IP-003-M IP-004-M IP-005-M IP-006-M
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L5
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	(+/-)1nT
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3160
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	Cadence and latency from Vigil MRD

3.2.70. IP-007-M: 1 MeV to >500 MeV interplanetary protons, measured at the L5 point - Measurement

PRODUCT	1 MeV to >500 MeV interplanetary protons, measured at the L5 point - Measurement
Product Code	IP-007-M
Input Data required	
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 1 MeV to ~ 500 MeV (Goal of 15 energy channels covering 1 MeV to ~ 1000 MeV) Need to determine energy spectrum, particularly > 150 MeV One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3161
Justification of the requirements	Detection of SEP events. Latency is low to support SEP event warning because solar protons may reach the Earth in less than 30 min.
Comment	Cadence and latency from L5 User Needs

3.2.71. IP-007-N: 1 MeV to >500 MeV interplanetary protons, measured at the L5 point - Nowcast

PRODUCT	1 MeV to >500 MeV interplanetary protons, measured at the L5 point - Nowcast
Product Code	IP-007-N
Input Data required	IP-007-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 1 MeV to ~ 500 MeV (Goal of 15 energy channels covering 1 MeV to ~ 1000 MeV) Need to determine energy spectrum, particularly > 150 MeV One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3161
Justification of the requirements	Detection of SEP events. Latency is low to support SEP event warning because solar protons may reach the Earth in less than 30 min.
Comment	Cadence and latency from L5 User Needs

3.2.72. IP-007-P: 1 MeV to >500 MeV interplanetary protons, measured at the L5 point - Archives and A Posteriori Reconstruction

PRODUCT	1 MeV to >500 MeV interplanetary protons, measured at the L5 point - Archives and A Posteriori Reconstruction
Product Code	IP-007-P
Input Data required	IP-007-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 1 MeV to ~ 500 MeV (Goal of 15 energy channels covering 1 MeV to ~ 1000 MeV) Need to determine energy spectrum, particularly > 150 MeV One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3161
Justification of the requirements	Detection of SEP events. Latency is low to support SEP event warning because solar protons may reach the Earth in less than 30 min.
Comment	Cadence and latency from L5 User Needs

3.2.73. IP-007-F: 1 MeV to >500 MeV interplanetary protons, measured at the L5 point - Forecast

PRODUCT	1 MeV to >500 MeV interplanetary protons, measured at the L5 point - Forecast
Product Code	IP-007-F
Input Data required	SU-040-M SU-044-M SU-045-M SU-046-M SU-047-M SU-049-M SU-050-M IP-007-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 1 MeV to ~ 500 MeV (Goal of 15 energy channels covering 1 MeV to ~ 1000 MeV) Need to determine energy spectrum, particularly > 150 MeV One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3161
Justification of the requirements	Forecast of SEP events. Latency is low to support SEP event warning because solar protons may reach the Earth in less than 30 min.
Comment	Cadence and latency from L5 User Needs

3.2.74. IP-008-M: 30 keV to 1 MeV interplanetary ions, measured at the L5 point - Measurement

PRODUCT	30 keV to 1 MeV interplanetary ions, measured at the L5 point - Measurement
Product Code	IP-008-M
Input Data required	
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	4 energy channels covering 30 keV to 1 MeV (Goal of 5 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 1 or 2 channels per decade. Note: Physical range is not rigid requirement when applying for different species. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3162
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks.
Comment	Cadence and latency from L5 User Needs

3.2.75. IP-008-N: 30 keV to 1 MeV interplanetary ions, measured at the L5 point - Nowcast

PRODUCT	30 keV to 1 MeV interplanetary ions, measured at the L5 point - Nowcast
Product Code	IP-008-N
Input Data required	IP-008-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	4 energy channels covering 30 keV to 1 MeV (Goal of 5 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 1 or 2 channels per decade. Note: Physical range is not rigid requirement when applying for different species. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3162
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks.
Comment	Cadence and latency from L5 User Needs

3.2.76. IP-008-P: 30 keV to 1 MeV interplanetary ions, measured at the L5 point - Archives and A Posteriori Reconstruction

PRODUCT	30 keV to 1 MeV interplanetary ions, measured at the L5 point - Archives and A Posteriori Reconstruction
Product Code	IP-008-P
Input Data required	IP-008-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	4 energy channels covering 30 keV to 1 MeV (Goal of 5 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 1 or 2 channels per decade. Note: Physical range is not rigid requirement when applying for different species. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3162
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks.
Comment	Cadence and latency from L5 User Needs

3.2.77. IP-008-F: 30 keV to 1 MeV interplanetary ions, measured at the L5 point - Forecast

PRODUCT	30 keV to 1 MeV interplanetary ions, measured at the L5 point - Forecast
Product Code	IP-008-F
Input Data required	SU-040-M SU-044-M SU-045-M SU-046-M SU-047-M SU-049-M SU-050-M IP-008-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	4 energy channels covering 30 keV to 1 MeV (Goal of 5 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 1 or 2 channels per decade. Note: Physical range is not rigid requirement when applying for different species. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3162
Justification of the requirements	Forecast of potential precursors of interplanetary shocks.
Comment	Cadence and latency from L5 User Needs

3.2.78. IP-009-M: 30 keV to 8 MeV solar electrons, measured at the L5 point - Measurement

PRODUCT	30 keV - 8 MeV solar electrons, measured at the L5 point - Measurement
Product Code	IP-009-M
Input Data required	
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^6; Range from event threshold (100 pfu) to largest events (10^6 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 30 keV to 1 MeV (Goal of 10 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 2 or 3 channels per decade. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3163
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks. Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	Cadence and latency from L5 User Needs

3.2.79. IP-009-N: 30 keV to 8 MeV solar electrons, measured at the L5 point - Nowcast

PRODUCT	30 keV - 8 MeV solar electrons, measured at the L5 point - Nowcast
Product Code	IP-009-N
Input Data required	IP-009-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^6; Range from event threshold (100 pfu) to largest events (10^6 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 30 keV to 1 MeV (Goal of 10 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 2 or 3 channels per decade. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3163
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks. Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	Cadence and latency from L5 User Needs

3.2.80. IP-009-P: 30 keV to 8 MeV solar electrons, measured at the L5 point - Archives and A Posteriori Reconstruction

PRODUCT	30 keV - 8 MeV solar electrons, measured at the L5 point - Archives and A Posteriori Reconstruction
Product Code	IP-009-P
Input Data required	IP-009-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^6; Range from event threshold (100 pfu) to largest events (10^6 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 30 keV to 1 MeV (Goal of 10 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 2 or 3 channels per decade. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3163
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks. Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	Cadence and latency from L5 User Needs

3.2.81. IP-009-F: 30 keV to 8 MeV solar electrons, measured at the L5 point - Forecast

PRODUCT	30 keV - 8 MeV solar electrons, measured at the L5 point - Forecast
Product Code	IP-009-F
Input Data required	SU-040-M SU-044-M SU-045-M SU-046-M SU-047-M SU-049-M SU-050-M IP-009-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^6; Range from event threshold (100 pfu) to largest events (10^6 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 30 keV to 1 MeV (Goal of 10 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 2 or 3 channels per decade. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L5
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3163
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks. Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	Cadence and latency from L5 User Needs

3.2.82. IP-010-M: Solar wind bulk velocity, measured at the L4 point - Measurement

PRODUCT	Solar wind bulk velocity, measured at the L4 point - Measurement
Product Code	IP-010-M
Input Data required	
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	200 - 2500 km.s^-1
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3157
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.83. IP-010-N: Solar wind bulk velocity, measured at the L4 point - Nowcast

PRODUCT	Solar wind bulk velocity, measured at the L4 point - Nowcast
Product Code	IP-010-N
Input Data required	IP-0010-M
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	200 - 2500 km.s^-1
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3157
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.84. IP-010-P: Solar wind bulk velocity, measured at the L4 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar wind bulk velocity, measured at the L4 point - Archives and A Posteriori Reconstruction
Product Code	IP-010-P
Input Data required	IP-0010-M
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	200 - 2500 km.s^-1
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3157
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.85. IP-010-F: Solar wind bulk velocity, measured at the L4 point - Forecast

PRODUCT	Solar wind bulk velocity, measured at the L4 point - Forecast
Product Code	IP-010-F
Input Data required	SU-037-M SU-038-M SU-039-M SU-050-M IP-010-M IP-011-M IP-012-M IP-013-M
Data to be provided and associated units	Solar wind plasma bulk velocity in km.s-1 (orthogonal contributions required on a Sun-Earth line oriented co-ordinate system)
Dynamic Range	200 - 2500 km.s^-1
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3157
Justification of the requirements	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity;
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.86. IP-011-M: Solar wind bulk density, measured at the L4 point - Measurement

PRODUCT	Solar wind bulk density, measured at the L4 point - Measurement
Product Code	IP-011-M
Input Data required	
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 150 cm^-3
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3158
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.87. IP-011-N: Solar wind bulk density, measured at the L4 point - Nowcast

PRODUCT	Solar wind bulk density, measured at the L4 point - Nowcast
Product Code	IP-011-N
Input Data required	IP-011-M
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 150 cm^-3
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3158
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.88. IP-011-P: Solar wind bulk density, measured at the L4 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar wind bulk density, measured at the L4 point - Archives and A Posteriori Reconstruction
Product Code	IP-011-P
Input Data required	IP-011-M
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 150 cm^-3
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3158
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.89. IP-011-F: Solar wind bulk density, measured at the L4 point - Forecast

PRODUCT	Solar wind bulk density, measured at the L4 point - Forecast
Product Code	IP-011-F
Input Data required	SU-037-M SU-038-M SU-039-M SU-050-M IP-010-M IP-011-M IP-012-M IP-013-M
Data to be provided and associated units	Solar wind plasma density in cm-3
Dynamic Range	0.2 - 150 cm^-3
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3158
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.90. IP-012-M: Solar wind temperature, measured at the L4 point - Measurement

PRODUCT	Solar wind temperature, measured at the L4 point - Measurement
Product Code	IP-012-M
Input Data required	
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	40,000 - 1,000,000 K
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3159
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.91. IP-012-N: Solar wind temperature, measured at the L4 point - Nowcast

PRODUCT	Solar wind temperature, measured at the L4 point - Nowcast
Product Code	IP-012-N
Input Data required	IP-012-M
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	40,000 - 1,000,000 K
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3159
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.92. IP-012-P: Solar wind temperature, measured at the L4 point - Archives and A Posteriori Reconstruction

PRODUCT	Solar wind temperature, measured at the L4 point - Archives and A Posteriori Reconstruction
Product Code	IP-012-P
Input Data required	IP-012-M
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	40,000 - 1,000,000 K
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3159
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.93. IP-012-F: Solar wind temperature, measured at the L4 point - Forecast

PRODUCT	Solar wind temperature, measured at the L4 point - Forecast
Product Code	IP-012-F
Input Data required	SU-037-M SU-038-M SU-039-M SU-050-M IP-010-M IP-011-M IP-012-M IP-013-M
Data to be provided and associated units	Solar wind temperature in K
Dynamic Range	40,000 - 1,000,000 K
Physical Range	N/A
Spatial Range	L4
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3159
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.94. IP-013-M: Interplanetary magnetic field, measured at the L4 point - Measurement

PRODUCT	Interplanetary magnetic field, measured at the L4 point - Measurement
Product Code	IP-013-M
Input Data required	
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	(+/-)1nT
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3160
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.95. IP-013-N: magnetic field, measured at the L4 point - Nowcast

PRODUCT	Interplanetary magnetic field, measured at the L4 point - Nowcast
Product Code	IP-013-N
Input Data required	IP-013-M
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	(+/-)1nT
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3160
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.96. IP-013-P: Interplanetary magnetic field, measured at the L4 point - Archives and A Posteriori Reconstruction

PRODUCT	Interplanetary magnetic field, measured at the L4 point - Archives and A Posteriori Reconstruction
Product Code	IP-013-P
Input Data required	IP-013-M
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L4
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	(+/-)1nT
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3160
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.97. IP-013-F: Interplanetary magnetic field, measured at the L4 point - Forecast

PRODUCT	Interplanetary magnetic field, measured at the L4 point - Forecast
Product Code	IP-013-F
Input Data required	SU-037-M SU-038-M SU-039-M SU-050-M IP-010-M IP-011-M IP-012-M IP-013-M
Data to be provided and associated units	3D Solar wind magnetic field in nT
Dynamic Range	0 - 200 nT
Physical Range	3 orthogonal measurements
Spatial Range	L4
Spatial Resolution	N/A
Time Range	up to 24 days
Time Resolution	1 min
Timeliness/Latency	60 min
Accuracy	(+/-)1nT
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3160
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	Cadence and latency based on Vigil MRD and/or L5 User Needs.

3.2.98. IP-014-M: 1 MeV to >500 MeV interplanetary protons, measured at the L4 point - Measurement

PRODUCT	1 MeV to >500 MeV interplanetary protons, measured at the L4 point - Measurement
Product Code	IP-014-M
Input Data required	
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 1 MeV to ~ 500 MeV (Goal of 15 energy channels covering 1 MeV to ~ 1000 MeV) Need to determine energy spectrum, particularly > 150 MeV One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3161
Justification of the requirements	Detection of SEP events. Latency is low to support SEP event warning because solar protons may reach the Earth in less than 30 min.
Comment	Cadence and latency from L5 User Needs

3.2.99. IP-014-N: 1 MeV to >500 MeV interplanetary protons, measured at the L4 point - Nowcast

PRODUCT	1 MeV to >500 MeV interplanetary protons, measured at the L4 point - Nowcast
Product Code	IP-014-N
Input Data required	IP-014-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 1 MeV to ~ 500 MeV (Goal of 15 energy channels covering 1 MeV to ~ 1000 MeV) Need to determine energy spectrum, particularly > 150 MeV One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3161
Justification of the requirements	Detection of SEP events. Latency is low to support SEP event warning because solar protons may reach the Earth in less than 30 min.
Comment	Cadence and latency from L5 User Needs

3.2.100. IP-014-P: 1 MeV to >500 MeV interplanetary protons, measured at the L4 point - Archives and A Posteriori Reconstruction

PRODUCT	1 MeV to >500 MeV interplanetary protons, measured at the L4 point - Archives and A Posteriori Reconstruction
Product Code	IP-014-P
Input Data required	IP-014-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 1 MeV to ~ 500 MeV (Goal of 15 energy channels covering 1 MeV to ~ 1000 MeV) Need to determine energy spectrum, particularly > 150 MeV One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3161
Justification of the requirements	Detection of SEP events. Latency is low to support SEP event warning because solar protons may reach the Earth in less than 30 min.
Comment	Cadence and latency from L5 User Needs

3.2.101. IP-014-F: 1 MeV to >500 MeV interplanetary protons, measured at the L4 point - Forecast

PRODUCT	1 MeV to >500 MeV interplanetary protons, measured at the L4 point - Forecast
Product Code	IP-014-F
Input Data required	SU-037-M SU-038-M SU-039-M SU-050-M IP-014-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 1 MeV to ~ 500 MeV (Goal of 15 energy channels covering 1 MeV to ~ 1000 MeV) Need to determine energy spectrum, particularly > 150 MeV One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3161
Justification of the requirements	Forecast of SEP events. Latency is low to support SEP event warning because solar protons may reach the Earth in less than 30 min.
Comment	Cadence and latency from L5 User Needs

3.2.102. IP-015-M: 30 keV to 1 MeV interplanetary ions, measured at the L4 point - Measurement

PRODUCT	30 keV to 1 MeV interplanetary ions, measured at the L4 point - Measurement
Product Code	IP-015-M
Input Data required	
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	4 energy channels covering 30 keV to 1 MeV (Goal of 5 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 1 or 2 channels per decade. Note: Physical range is not rigid requirement when applying for different species. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3162
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks.
Comment	Cadence and latency from L5 User Needs

3.2.103. IP-015-N: 30 keV to 1 MeV interplanetary ions, measured at the L4 point - Nowcast

PRODUCT	30 keV to 1 MeV interplanetary ions, measured at the L4 point - Nowcast
Product Code	IP-015-N
Input Data required	IP-015-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	4 energy channels covering 30 keV to 1 MeV (Goal of 5 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 1 or 2 channels per decade. Note: Physical range is not rigid requirement when applying for different species. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3162
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks.
Comment	Cadence and latency from L5 User Needs

3.2.104. IP-015-P: 30 keV to 1 MeV interplanetary ions, measured at the L4 point - Archives and A Posteriori Reconstruction

PRODUCT	30 keV to 1 MeV interplanetary ions, measured at the L4 point - Archives and A Posteriori Reconstruction
Product Code	IP-015-P
Input Data required	IP-015-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^4; Range from event threshold (10 pfu) to largest events (10^4 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	4 energy channels covering 30 keV to 1 MeV (Goal of 5 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 1 or 2 channels per decade. Note: Physical range is not rigid requirement when applying for different species. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3162
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks.
Comment	Cadence and latency from L5 User Needs

3.2.105. IP-015-F: 30 keV to 1 MeV interplanetary ions, measured at the L4 point - Forecast

PRODUCT	30 keV to 1 MeV interplanetary ions, measured at the L4 point - Forecast
Product Code	IP-015-F
Input Data required	SU-037-M SU-038-M SU-039-M SU-050-M IP-015-M
Data to be provided and associated units	ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 (min./max. vary with energy and species)
Physical Range	4 energy channels covering 30 keV to 1 MeV (Goal of 5 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 1 or 2 channels per decade. Note: Physical range is not rigid requirement when applying for different species. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3162
Justification of the requirements	Forecast of potential precursors of interplanetary shocks.
Comment	Cadence and latency from L5 User Needs

3.2.106. IP-016-M: 30 keV to 8 MeV solar electrons, measured at the L4 point - Measurement

PRODUCT	30 keV - 8 MeV solar electrons, measured at the L4 point - Measurement
Product Code	IP-016-M
Input Data required	
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^6; Range from event threshold (100 pfu) to largest events (10^6 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 30 keV to 8 MeV (Goal of 10 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 2 or 3 channels per decade. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3163
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks. Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	Cadence and latency from L5 User Needs

3.2.107. IP-016-N: 30 keV to 8 MeV solar electrons, measured at the L4 point - Nowcast

PRODUCT	30 keV - 8 MeV solar electrons, measured at the L4 point - Nowcast
Product Code	IP-016-N
Input Data required	IP-016-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^6; Range from event threshold (100 pfu) to largest events (10^6 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 30 keV to 8 MeV (Goal of 10 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 2 or 3 channels per decade. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3163
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks. Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	Cadence and latency from L5 User Needs

3.2.108. IP-016-P: 30 keV to 8 MeV solar electrons, measured at the L4 point - Archives and A Posteriori Reconstruction

PRODUCT	30 keV - 8 MeV solar electrons, measured at the L4 point - Archives and A Posteriori Reconstruction
Product Code	IP-016-P
Input Data required	IP-016-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^6; Range from event threshold (100 pfu) to largest events (10^6 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 30 keV to 8 MeV (Goal of 10 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 2 or 3 channels per decade. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3163
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks. Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	Cadence and latency from L5 User Needs

3.2.109. IP-016-F: 30 keV to 8 MeV solar electrons, measured at the L4 point - Forecast

PRODUCT	30 keV - 8 MeV solar electrons, measured at the L4 point - Forecast
Product Code	IP-016-F
Input Data required	SU-037-M SU-038-M SU-039-M SU-050-M IP-016-M
Data to be provided and associated units	electron flux in cm^-2s^-1sr^-1 (integral in energy)
Dynamic Range	10^6; Range from event threshold (100 pfu) to largest events (10^6 pfu) + one extra order of magnitude. No operational need for accurate measurements when flux is below threshold.
Physical Range	8 energy channels covering 30 keV to 8 MeV (Goal of 10 energy channels) Need to determine energy spectrum in order to assess impact on systems, with 2 or 3 channels per decade. One sensor with 60 degree half-width conical field of view. Should be centred at the ecliptic plane and look along the Parker spiral. (Goal: two oppositely directed sensors, along and opposite to the Parker spiral and centred in the ecliptic plane. Each sensor has 60-degree half-width conical field of view.)
Spatial Range	L4
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	5 mins threshold, 1 min goal
Timeliness/Latency	13 min
Accuracy	0.15 relative accuracy; 0.5 absolute accuracy
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3163
Justification of the requirements	Monitoring of potential precursors of interplanetary shocks. Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	Cadence and latency from L5 User Needs

3.2.110. IP-017-M: Interplanetary scintillation - Measurement

PRODUCT	Interplanetary scintillation - Measurement
Product Code	IP-017-M
Input Data required	
Data to be provided and associated units	IPS is the fast variation in signal from a compact radio source arising from scattering by small-scale density variations in the solar wind. This observations allow solar wind proxied density and speed derived from IPS measurements
Dynamic Range	Various
Physical Range	Non dimensional for intensity fluctuations
Spatial Range	Dependent on available radio sources
Spatial Resolution	Dependent on available radio sources
Time Range	Dependent on available radio sources
Time Resolution	Between 3 and 15 minutes, dependent upon the radio observatory, frequency of observation, radio source, distance from radio source on the sky from the Sun, and heliospheric conditions.
Timeliness/Latency	Depending on the radio observatory, between one hour and one day.
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3020
Justification of the requirements	Improve accuracy of CME arrival time in MHD models (through ensemble modelling, model outcomes are compared with IPS data, and constrain/reject some, thus improving the prediction accuracy)
Comment	suggestions of prepared products or inputs: -ecliptic latitude-elongation maps with speeds.

3.2.111. IP-017-P: Interplanetary scintillation - Archives and A Posteriori Reconstruction

PRODUCT	Interplanetary scintillation - Archives and A Posteriori Reconstruction
Product Code	IP-017-P
Input Data required	SU-005-M IP-017-M L1-009-M L1-010-M
Data to be provided and associated units	IPS is the fast variation in signal from a compact radio source arising from scattering by small-scale density variations in the solar wind. This observations allow solar wind proxied density and speed derived from IPS measurements
Dynamic Range	Various
Physical Range	Non dimensional for intensity fluctuations
Spatial Range	Dependent on available radio sources
Spatial Resolution	Dependent on available radio sources
Time Range	Dependent on available radio sources
Time Resolution	Between 3 and 15 minutes, dependent upon the radio observatory, frequency of observation, radio source, distance from radio source on the sky from the Sun, and heliospheric conditions.
Timeliness/Latency	Depending on the radio observatory, between one hour and one day.
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3020
Justification of the requirements	Improve accuracy of CME arrival time in MHD models (through ensemble modelling, model outcomes are compared with IPS data, and constrain/reject some, thus improving the prediction accuracy)
Comment	suggestions of prepared products or inputs: -ecliptic latitude-elongation maps with speeds.

3.3. DATA FOR EARTH MAGNETOSPHERE & RADIATION BELT

3.3.1. MR-001-N: Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and high-latitude) - Nowcast

PRODUCT	Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and high-latitude) - Nowcast
Product Code	MR-001-N
Input Data required	
Data to be provided and associated units	scale of geomagnetic storm condition
Dynamic Range	6 levels (none, minor, moderate, strong, severe,extreme)
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	Global, Northern and southern auroral, northern and southern mid-latitude
Time Range	current date
Time Resolution	30 min
Timeliness/Latency	30 min
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	Official sources may not be available for nowcast.

3.3.2. MR-001-P: Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and high-latitude) - Archives and A Posteriori Reconstruction

PRODUCT	Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and high-latitude) - Archives and A Posteriori Reconstruction
Product Code	MR-001-P
Input Data required	
Data to be provided and associated units	geomagnetic storm condition according to a scale
Dynamic Range	6 levels (none, minor, moderate, strong, severe,extreme)
Physical Range	Defined by the indices specifications
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	oldest date of data to most recent
Time Resolution	3 hours
Timeliness/Latency	1 week (after publication)
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	
Comment	

3.3.3. MR-001-F: Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and high-latitude) - Forecast

PRODUCT	Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and high-latitude) - Forecast
Product Code	MR-001-F
Input Data required	L1-008-M L1-009-M L1-010-M AG-005-M
Data to be provided and associated units	scale of geomagnetic storm condition
Dynamic Range	6 levels (none, minor, moderate, strong, severe, extreme)
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	Global, Northern and southern auroral, northern and southern mid-latitude
Time Range	current date to 3 days ahead
Time Resolution	3 hours
Timeliness/Latency	1 hour
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	

3.3.4. MR-002-N: Geomagnetic Indices Kp and K - Nowcast

PRODUCT	Geomagnetic Indices Kp and K - Nowcast
Product Code	MR-002-N
Input Data required	Recordings from 13 geomagnetic observatories
Data to be provided and associated units	K in different locations, Kp
Dynamic Range	0 - 9
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	Global, Northern and southern auroral, northern and southern mid-latitude
Time Range	current date
Time Resolution	3 hours
Timeliness/Latency	1 hour
Accuracy	N/A
Other Specific	If available official and traceable sources should be used
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	The Kp index is a 3-hourly planetary index of geomagnetic activity derived from recordings at 13 geomagnetic observatories. In terms of accuracy, 80% of the time the correct Kp value is nowcast and 19% out by 1 Kp unit are the objectives. The statistical performance of the nowcast is validated against the observed Kp values.

3.3.5. MR-002-P: Geomagnetic Indices Kp and K - Archives and A Posteriori Reconstruction

PRODUCT	Geomagnetic Indices Kp and K - Archives and A Posteriori Reconstruction
Product Code	MR-002-P
Input Data required	Recordings from 13 geomagnetic observatories
Data to be provided and associated units	K in different locations, Kp
Dynamic Range	0 - 9
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	Global, Northern and southern auroral, northern and southern mid-latitude
Time Range	oldest date of data to most recent
Time Resolution	3 hours
Timeliness/Latency	1 week (after publication)
Accuracy	N/A
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	The Kp index is a 3-hourly planetary index of geomagnetic activity derived from recordings at 13 geomagnetic observatories.

3.3.6. MR-002-F: Geomagnetic Indices Kp and K - Forecast

PRODUCT	Geomagnetic Indices Kp and K - Forecast
Product Code	MR-002-F
Input Data required	Recordings at 13 geomagnetic observatories L1-008-M L1-009-M L1-010-M AG-005-M
Data to be provided and associated units	K in different locations, Kp
Dynamic Range	0 - 9
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	Global, Northern and southern auroral, northern and southern mid-latitude
Time Range	current date to 3 days ahead
Time Resolution	3 hours
Timeliness/Latency	1 hour
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	The Kp index is a 3-hourly planetary index of geomagnetic activity derived from recordings at 13 geomagnetic observatories. In terms of accuracy, 50% of the time the correct Kp value is forecast and 40% out by 1 Kp unit are the objectives. The statistical performance of the forecast is validated against the observed Kp values.

3.3.7. MR-003-N: Geomagnetic Index Ap and A - Nowcast

PRODUCT	Geomagnetic Index Ap and A - Nowcast
Product Code	MR-003-N
Input Data required	
Data to be provided and associated units	A in different location and Ap
Dynamic Range	0 - 400
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	Global, Northern and southern auroral, northern and southern mid-latitude
Time Range	current date
Time Resolution	3 hours
Timeliness/Latency	1 hour
Accuracy	0.2
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	Ap index is generated by the International Service for Geomagnetic indices, based in Paris. There may not be available sources for nowcast.

3.3.8. MR-003-P: Geomagnetic Index Ap and A - Archives and A Posteriori Reconstruction

PRODUCT	Geomagnetic Index Ap and A - Archives and A Posteriori Reconstruction
Product Code	MR-003-P
Input Data required	
Data to be provided and associated units	A in different location and Ap
Dynamic Range	0 - 400
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	Global, Northern and southern auroral, northern and southern mid-latitude
Time Range	oldest date of data to most recent
Time Resolution	3 hours
Timeliness/Latency	1 day (after publication)
Accuracy	0.1
Other Specific	Ap and A should be acquired from officially recognised and traceable source.
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	Ap index is currently generated by the International Service for Geomagnetic indices, based in Paris.

3.3.9. MR-003-F: Geomagnetic Index Ap and A - Forecast

PRODUCT	Geomagnetic Index Ap and A - Forecast
Product Code	MR-003-F
Input Data required	L1-008-M L1-009-M L1-010-M AG-005-M
Data to be provided and associated units	A in different location and Ap
Dynamic Range	0 - 400
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	Global, Northern and southern auroral, northern and southern mid-latitude
Time Range	current date to 3 days ahead
Time Resolution	3 hours
Timeliness/Latency	1 hour
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	Ap index is generated by the International Service for Geomagnetic indices, based in Paris

3.3.10. MR-004-N: Geomagnetic Index Dst - Nowcast

PRODUCT	Geomagnetic Index Dst - Nowcast
Product Code	MR-004-N
Input Data required	
Data to be provided and associated units	Dst
Dynamic Range	-600 to 100 nT
Physical Range	Defined by the indices specifications
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	current date
Time Resolution	1 hour
Timeliness/Latency	1 hour
Accuracy	0.2 (based on "Real Time Publication")
Other Specific	If available input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	Dst is issued with "Real-time" with a very small latency (1 hour) which is covered under this requirement. These values are later updated but while the first review is of the order of 1 week the final values can take months to years, this is covered in MR-004-P.

3.3.11. MR-004-P: Geomagnetic Index Dst - Archives and A Posteriori Reconstruction

PRODUCT	Geomagnetic Index Dst - Archives and A Posteriori Reconstruction
Product Code	MR-004-P
Input Data required	
Data to be provided and associated units	Dst
Dynamic Range	-600 to 100 nT
Physical Range	Defined by the indices specifications
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	oldest date of data to most recent
Time Resolution	1 hour
Timeliness/Latency	1 week (for provisional) but final (internationally agreed) values can take from months to years.
Accuracy	0.1
Other Specific	Input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	Dst is issued with "Real-time" with a very small latency (1 hour), this is covered in requirement MR-004-N. The "Provisional" values are published with a substantial lag time (months to years), the "Final" are published with multi-year latency. This requirement covers values which are checked (internal to SSA) and then may be updated with internationally approved values at a later date.

3.3.12. MR-004-F: Geomagnetic Index Dst - Forecast

PRODUCT	Geomagnetic Index Dst - Forecast
Product Code	MR-004-F
Input Data required	L1-008-M L1-009-M L1-010-M AG-005-M
Data to be provided and associated units	Dst
Dynamic Range	-600 to 100 nT
Physical Range	Defined by the indices specifications
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	current date to 3 days ahead
Time Resolution	1 hour
Timeliness/Latency	1 hour
Accuracy	0.3 (based on "Real Time Publication")
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1548
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	

3.3.13. MR-006-M: High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt – Measurement

PRODUCT	High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt – Measurement
Product Code	MR-006-M
Input Data required	
Data to be provided and associated units	proton flux in m^-2.s^-1.sr^-1.MeV^-1
Dynamic Range	10^8 per channel (min. 0.00001 > 200 MeV; max. 10^9 @ 10 MeV)
Physical Range	Threshold of 5 channels, goal of 8+ channels, logarithmically spaced in energy ranging from 10 MeV to 400 MeV. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	2 observation points on polar LEO, 2 observation points on MEO and 2 observation points on GEO.
Time Range	current date
Time Resolution	10 s
Timeliness/Latency	5 min. This requirement can be downgraded subject to Customer approval to 100 min.
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1713
Justification of the requirements	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR. Particles in the south atlantic anomaly are included in the requirements. Sensors should remain in two separate hemispheres (i.e. the phasing should roughly be 180 degrees). for MEO, Galileo altitudes are adequate (threshold), a greater range of altitudes is desirable (goal).

3.3.14. MR-006-N: High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt - Nowcast

PRODUCT	High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt - Nowcast
Product Code	MR-006-N
Input Data required	MR-006-M
Data to be provided and associated units	proton flux in m^-2.s^-1.sr^-1.MeV^-1
Dynamic Range	10^8 per channel (min. 0.00001 > 200 MeV; max. 10^9 @ 10 MeV)
Physical Range	Threshold of 5 channels, goal of 8+ channels, logarithmically spaced in energy ranging from 10 MeV to 400 MeV. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date
Time Resolution	10 s (in LEO); 30 s (higher altitudes)
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1713
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR. Particles in the south atlantic anomaly are included in the requirements.

3.3.15. MR-006-P: High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction

PRODUCT	High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction
Product Code	MR-006-P
Input Data required	MR-006-M
Data to be provided and associated units	proton flux in m^-2.s^-1.sr^-1.MeV^-1
Dynamic Range	10^8 per channel (min. 0.00001 > 200 MeV; max. 10^9 @ 10 MeV)
Physical Range	Threshold of 5 channels, goal of 8+ channels, logarithmically spaced in energy ranging from 10 MeV to 400 MeV. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	oldest date of data to most recent
Time Resolution	10 s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1713
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR. Particles in the south atlantic anomaly are included in the requirements.

3.3.16. MR-006-F: High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt - Forecast

PRODUCT	High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt - Forecast
Product Code	MR-006-F
Input Data required	L1-009-M L1-010-M MR-006-M AG-005-M
Data to be provided and associated units	proton flux in m^-2.s^-1.sr^-1.MeV^-1
Dynamic Range	10^8 per channel (min. 0.00001 > 200 MeV; max. 10^9 @ 10 MeV)
Physical Range	Threshold of 5 channels, goal of 8+ channels, logarithmically spaced in energy ranging from 10 MeV to 400 MeV. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date to 3 days ahead
Time Resolution	10 s (in LEO); 30 s (higher altitudes)
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1713
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR. Particles in the south atlantic anomaly are included in the requirements.

3.3.17. MR-007-M: High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Measurement

PRODUCT	High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Measurement
Product Code	MR-007-M
Input Data required	
Data to be provided and associated units	Ion flux in cm^-2.s^-1.sr^-1.(MeV/nuc)^-1
Dynamic Range	Threshold of 10^7 to cover all species from He (max: 0.1 cm-2.s-1.sr-1.MeV-1 @ ~250 MeV) to Fe. Goal of 10^12 to cover all species from He to U. Threshold of 10^4 to cover all energies for a given species.
Physical Range	Threshold of 5 channels, goal of 8+ channels, logarithmically spaced in energy ranging from 10 MeV/nuc to 400 MeV/nuc. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	2 observation points on polar LEO, 2 observation points on MEO and 2 observation points on GEO.
Time Range	current date
Time Resolution	10 s
Timeliness/Latency	5 min. This requirement can be downgraded subject to Customer approval to 100 min.
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR. Sensors should remain in two separate hemispheres (i.e. the phasing should roughly be 180 degrees). for MEO, Galileo altitudes are adequate (threshold), a greater range of altitudes is desirable (goal).

3.3.18. MR-007-N: High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Nowcast

PRODUCT	High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Nowcast
Product Code	MR-007-N
Input Data required	MR-007-M
Data to be provided and associated units	Ion flux in cm^-2.s^-1.sr^-1.(MeV/nuc)^-1
Dynamic Range	Threshold of 10^7 to cover all species from He (max: 0.1 cm-2.s-1.sr-1.MeV-1 @ ~250 MeV) to Fe. Goal of 10^12 to cover all species from He to U. Threshold of 10^4 to cover all energies for a given species.
Physical Range	Threshold of 5 channels, goal of 8+ channels, logarithmically spaced in energy ranging from 10 MeV/nuc to 400 MeV/nuc. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date
Time Resolution	10 s (in LEO); 30 s (higher altitudes)
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR

3.3.19. MR-007-P: High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction

PRODUCT	High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction
Product Code	MR-007-P
Input Data required	MR-007-M
Data to be provided and associated units	Ion flux in cm^-2.s^-1.sr^-1.(MeV/nuc)^-1
Dynamic Range	Threshold of 10^7 to cover all species from He (max: 0.1 cm-2.s-1.sr-1.MeV-1 @ ~250 MeV) to Fe. Goal of 10^12 to cover all species from He to U. Threshold of 10^4 to cover all energies for a given species.
Physical Range	Threshold of 5 channels, goal of 8+ channels, logarithmically spaced in energy ranging from 10 MeV/nuc to 400 MeV/nuc. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	oldest date of data to most recent
Time Resolution	10 s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR

3.3.20. MR-007-F: High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Forecast

PRODUCT	High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Forecast
Product Code	MR-007-F
Input Data required	L1-009-M L1-010-M MR-007-M AG-005-M
Data to be provided and associated units	Ion flux in cm^-2.s^-1.sr^-1.(MeV/nuc)^-1
Dynamic Range	Threshold of 10^7 to cover all species from He (max: 0.1 cm-2.s-1.sr-1.MeV-1 @ ~250 MeV) to Fe. Goal of 10^12 to cover all species from He to U. Threshold of 10^4 to cover all energies for a given species.
Physical Range	Threshold of 5 channels, goal of 8+ channels, logarithmically spaced in energy ranging from 10 MeV/nuc to 400 MeV/nuc. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date to 3 days ahead
Time Resolution	10 s (in LEO); 30 s (higher altitudes)
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR

3.3.21. MR-008-M: 1-to-10MeV Protons in Earth Magnetosphere and Radiation Belt - Measurement

PRODUCT	1-to-10MeV Protons in Earth Magnetosphere and Radiation Belt - Measurement
Product Code	MR-008-M
Input Data required	
Data to be provided and associated units	proton flux in m^-2.s^-1.sr^-1.MeV^-1
Dynamic Range	10^8 per channel (min. 0.0001 @ 10 MeV; max. 10^12 @ 1 MeV)
Physical Range	Threshold of 4 channels, goal of 4+ channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	2 observation points on polar LEO, 2 observation points on MEO and 2 observation points on GEO.
Time Range	current date
Time Resolution	10 s (in LEO); 30 s (higher altitudes)
Timeliness/Latency	5 min. This requirement can be downgraded subject to Customer approval to 100 min.
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1713
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR. Sensors should remain in two separate hemispheres (i.e. the phasing should roughly be 180 degrees). for MEO, Galileo altitudes are adequate (threshold), a greater range of altitudes is desirable (goal).

3.3.22. MR-008-N: 1-to-10MeV Protons in Earth Magnetosphere and Radiation Belt - Nowcast

PRODUCT	1-to-10MeV Protons in Earth Magnetosphere and Radiation Belt - Nowcast
Product Code	MR-008-N
Input Data required	MR-008-M
Data to be provided and associated units	proton flux in m^-2.s^-1.sr^-1.MeV^-1
Dynamic Range	10^8 per channel (min. 0.0001 @ 10 MeV; max. 10^12 @ 1 MeV)
Physical Range	Threshold of 4 channels, goal of 4+ channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date
Time Resolution	Goal: 5 min; Threshold: 30 min
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1713
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR

3.3.23. MR-008-P: 1-to-10MeV Protons in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction

PRODUCT	1-to-10MeV Protons in Earth Magnetosphere and Radiation Beltt - Archives and A Posteriori Reconstruction
Product Code	MR-008-P
Input Data required	MR-008-M
Data to be provided and associated units	proton flux in m^-2.s^-1.sr^-1.MeV^-1
Dynamic Range	10^8 per channel (min. 0.0001 @ 10 MeV; max. 10^12 @ 1 MeV)
Physical Range	Threshold of 4 channels, goal of 4+ channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	oldest date of data to most recent
Time Resolution	10 s (in LEO); 30 s (higher altitudes)
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1713
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR

3.3.24. MR-008-F: 1-to-10MeV Protons in Earth Magnetosphere and Radiation Belt - Forecast

PRODUCT	1-to-10MeV Protons in Earth Magnetosphere and Radiation Belt - Forecast
Product Code	MR-008-F
Input Data required	L1-009-M L1-010-M MR-008-M AG-005-M
Data to be provided and associated units	proton flux in m^-2.s^-1.sr^-1.MeV^-1
Dynamic Range	10^8 per channel (min. 0.0001 @ 10 MeV; max. 10^12 @ 1 MeV)
Physical Range	Threshold of 4 channels, goal of 4+ channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date to 3 days ahead
Time Resolution	Goal: 1 hour; Threshold: 3 hours
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1713
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR

3.3.25. MR-009-M: 1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Measurement

PRODUCT	1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Measurement
Product Code	MR-009-M
Input Data required	
Data to be provided and associated units	Ion flux in cm^-2.s^-1.sr^-1.(MeV/nuc)^-1
Dynamic Range	TBD
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	2 observation points on polar LEO, 2 observation points on MEO and 2 observation points on GEO.
Time Range	current date
Time Resolution	10 s (in LEO); 30 s (higher altitudes)
Timeliness/Latency	5 min. This requirement can be downgraded subject to Customer approval to 100 min.
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR. Sensors should remain in two separate hemispheres (i.e. the phasing should roughly be 180 degrees). for MEO, Galileo altitudes are adequate (threshold), a greater range of altitudes is desirable (goal).

3.3.26. MR-009-N: 1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Nowcast

PRODUCT	1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Nowcast
Product Code	MR-009-N
Input Data required	MR-009-M
Data to be provided and associated units	Ion flux in cm^-2.s^-1.sr^-1.(MeV/nuc)^-1
Dynamic Range	TBD
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date
Time Resolution	Goal: 5 mins; Threshold: 30 mins
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR

3.3.27. MR-009-P: 1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction

PRODUCT	1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction
Product Code	MR-009-P
Input Data required	MR-009-M
Data to be provided and associated units	Ion flux in cm^-2.s^-1.sr^-1.(MeV/nuc)^-1
Dynamic Range	TBD
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	oldest date of data to most recent
Time Resolution	10 s (in LEO); 30 s (higher altitudes)
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR.

3.3.28. MR-009-F: 1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Forecast

PRODUCT	1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Forecast
Product Code	MR-009-F
Input Data required	L1-009-M L1-010-M MR-009-M AG-005-M
Data to be provided and associated units	Ion flux in cm^-2.s^-1.sr^-1.(MeV/nuc)^-1
Dynamic Range	TBD
Physical Range	Threshold of 3 channels, goal of 4+ channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 10 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date to 3 days ahead
Time Resolution	Goal: 1 hour; Threshold: 3 hours
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1513
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR

3.3.29. MR-010-M: 30 keV/nuc-to-1 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Measurement

PRODUCT	30 keV/nuc-to-1 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Measurement
Product Code	MR-010-M
Input Data required	
Data to be provided and associated units	ion flux in m^-2.s^-1.sr^-1.(keV/nuc)^-1
Dynamic Range	TBD
Physical Range	Threshold of 4 channels, goal of 5+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	2 observation points on polar LEO, 2 observation points on MEO and 2 observation points on GEO.
Time Range	current date
Time Resolution	10 s (in LEO); 30 s (higher altitudes)
Timeliness/Latency	5 min. This requirement can be downgraded subject to Customer approval to 100 min.
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1515
Justification of the requirements	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR. Sensors should remain in two separate hemispheres (i.e. the phasing should roughly be 180 degrees). for MEO, Galileo altitudes are adequate (threshold), a greater range of altitudes is desirable (goal).

3.3.30. MR-010-N: 30 keV/nuc-to-1 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Nowcast

PRODUCT	30 keV/nuc-to-1 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Nowcast
Product Code	MR-010-N
Input Data required	MR-010-M
Data to be provided and associated units	ion flux in m^-2.s^-1.sr^-1.(keV/nuc)^-1
Dynamic Range	TBD
Physical Range	Threshold of 4 channels, goal of 5+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date
Time Resolution	Goal: 5 mins; Threshold: 30 mins
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1515
Justification of the requirements	A factor in a wide range of degradation effects of surfaces and sensitive components such as unshielded CCDs.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR.

3.3.31. MR-010-P: 30 keV/nuc-to-1 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction

PRODUCT	30 keV/nuc-to-1 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction
Product Code	MR-010-P
Input Data required	MR-010-M
Data to be provided and associated units	ion flux in m^-2.s^-1.sr^-1.(keV/nuc)^-1
Dynamic Range	TBD
Physical Range	Threshold of 4 channels, goal of 5+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	oldest date of data to most recent
Time Resolution	10 s (in LEO); 30 s (higher altitudes)
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1515
Justification of the requirements	A factor in a wide range of degradation effects of surfaces and sensitive components such as unshielded CCDs.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR.

3.3.32. MR-010-F: 30 keV/nuc-to-1 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Forecast

PRODUCT	30 keV/nuc-to-1 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Forecast
Product Code	MR-010-F
Input Data required	L1-009-M L1-010-M MR-010-M AG-005-M
Data to be provided and associated units	ion flux in m^-2.s^-1.sr^-1.(keV/nuc)^-1
Dynamic Range	TBD
Physical Range	Threshold of 4 channels, goal of 5+ channels. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date to 3 days ahead
Time Resolution	Goal: 1 hour; Threshold: 3 hours
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1515
Justification of the requirements	A factor in a wide range of degradation effects of surfaces and sensitive components such as unshielded CCDs.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR.

3.3.33. MR-011-M: 30 keV-8 MeV Electrons in Earth Magnetosphere and Radiation Belt - Measurements

PRODUCT	30 keV-8 MeV Electrons in Earth Magnetosphere and Radiation Belt - Measurements
Product Code	MR-011-M
Input Data required	
Data to be provided and associated units	electron flux in m^-2.s^-1.sr^-1.keV^-1
Dynamic Range	TBD
Physical Range	Threshold of 8 channels, goal of 10 channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	2 observation points on polar LEO, 2 observation points on MEO and 2 observation points on GEO.
Time Range	current date
Time Resolution	10 s
Timeliness/Latency	5 min. This requirement can be downgraded subject to Customer approval to 100 min.
Accuracy	0.2
Other Specific	Note: the upper limit depends on the region considered, if high latitude a few 100's of keV is enough, if radiation zone ~ 10 MeV. For solar events limits should be ~ 5 MeV at high latitudes
Related CRD Requirement	SWE-CRD-SCD-1514 SWE-CRD-GEN-1714
Justification of the requirements	A factor in a wide range of degradation effects of surfaces and sensitive components such as unshielded CCDs.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR. Sensors should remain in two separate hemispheres (i.e. the phasing should roughly be 180 degrees). for MEO, Galileo altitudes are adequate (threshold), a greater range of altitudes is desirable (goal).

3.3.34. MR-011-N: 30 keV-8 MeV Electrons in Earth Magnetosphere and Radiation Belt – Nowcast

PRODUCT	30 keV-8 MeV Electrons in Earth Magnetosphere and Radiation Belt – Nowcast
Product Code	MR-011-N
Input Data required	MR-011-M
Data to be provided and associated units	electron flux in m^-2.s^-1.sr^-1.keV^-1
Dynamic Range	TBD
Physical Range	Threshold of 8 channels, goal of 10 channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date
Time Resolution	Goal: 5 mins; Threshold: 30 mins
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	Note: the upper limit depends on the region considered, if high latitude a few 100's of keV is enough, if radiation zone ~ 10 MeV. For solar events limits should be ~ 5 MeV at high latitudes
Related CRD Requirement	SWE-CRD-SCD-1514 SWE-CRD-GEN-1714
Justification of the requirements	A factor in a wide range of dose, NIEL and internal charging related effects.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR.

3.3.35. MR-011-P: 30 keV-8 MeV Electrons in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction

PRODUCT	30 keV-8 MeV Electrons in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction
Product Code	MR-011-P
Input Data required	MR-011-M
Data to be provided and associated units	electron flux in m^-2.s^-1.sr^-1.keV^-1
Dynamic Range	TBD
Physical Range	Threshold of 8 channels, goal of 10 channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	oldest date of data to most recent
Time Resolution	10 s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	Note: the upper limit depends on the region considered, if high latitude a few 100's of keV is enough, if radiation zone ~ 10 MeV. For solar events limits should be ~ 5 MeV at high latitudes
Related CRD Requirement	SWE-CRD-SCD-1514 SWE-CRD-GEN-1714
Justification of the requirements	A factor in a wide range of dose, NIEL and internal charging related effects.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR.

3.3.36. MR-011-F: 30 keV-8 MeV Electrons in Earth Magnetosphere and Radiation Belt – Forecast

PRODUCT	30 keV-8 MeV Electrons in Earth Magnetosphere and Radiation Belt – Forecast
Product Code	MR-011-F
Input Data required	L1-009-M L1-010-M MR-011-M AG-005-M
Data to be provided and associated units	electron flux in m^-2.s^-1.sr^-1.keV^-1
Dynamic Range	TBD
Physical Range	Threshold of 8 channels, goal of 10 channels. Goal of 2 PI steradians with PI pitch angle coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date to 3 days ahead
Time Resolution	Goal: 1 hour; Threshold: 3 hours
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	Note: the upper limit depends on the region considered, if high latitude a few 100's of keV is enough, if radiation zone ~ 10 MeV. For solar events limits should be ~ 5 MeV at high latitudes
Related CRD Requirement	SWE-CRD-SCD-1514 SWE-CRD-GEN-1714
Justification of the requirements	A factor in a wide range of dose, NIEL and internal charging related effects.
Comment	Also required outside the radiation belts, e.g. above polar cap, at GEO; Source of radiation also include Solar Energetic Particles and Galactic Cosmic Rays; For the ions (other than proton) the source is mainly SEP and GCR.

3.3.37. MR-012-M: Thermal and Supra-thermal Electron and Ion Energy Spectra in the Range 0 to 30 keV - Measurement

PRODUCT	Thermal and Supra-thermal Electron and Ion Energy Spectra in the Range 0 to 30 keV - Measurement
Product Code	MR-012-M
Input Data required	
Data to be provided and associated units	electron flux in m^-2 s^-1 sr^-1 eV^-1 ; ion flux in m^-2 s^-1 sr^-1 eV^-1
Dynamic Range	TBD
Physical Range	flux data for the energy ranges: 0—10, 10—30, keV, with 4 pi coverage
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	2 observation points on polar LEO, 2 observation points on MEO and 2 observation points on GEO.
Time Range	current date
Time Resolution	10 s
Timeliness/Latency	5 min. This requirement can be downgraded subject to Customer approval to 100 min.
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1516 SWE-CRD-SCO-1572
Justification of the requirements	A factor in a wide range of dose, NIEL and internal charging related effects.
Comment	Sensors should remain in two separate hemispheres (i.e. the phasing should roughly be 180 degrees). for MEO, Galileo altitudes are adequate (threshold), a greater range of altitudes is desirable (goal).

3.3.38. MR-012-N: Thermal and Supra-thermal Electron and Ion Energy Spectra in the Range 0 to 30 keV - Nowcast

PRODUCT	Thermal and Supra-thermal Electron and Ion Energy Spectra in the Range 0 to 30 keV - Nowcast
Product Code	MR-012-N
Input Data required	MR-012-M
Data to be provided and associated units	electron flux in m^-2 s^-1 sr^-1 eV^-1 ; ion flux in m^-2 s^-1 sr^-1 eV^-1
Dynamic Range	TBD
Physical Range	flux data for the energy ranges: 0—10, 10—30, keV, with 4 pi coverage
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date
Time Resolution	30 s
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1516 SWE-CRD-SCO-1572
Justification of the requirements	A factor in spacecraft charging and other spacecraft plasma interactions effects
Comment	

3.3.39. MR-012-P: Thermal and Supra-thermal Electron and Ion Energy Spectra in the Range 0 to 30 keV - Archives and A Posteriori Reconstruction

PRODUCT	Thermal and Supra-thermal Electron and Ion Energy Spectra in the Range 0 to 30 keV - Archives and A Posteriori Reconstruction
Product Code	MR-012-P
Input Data required	MR-012-M
Data to be provided and associated units	thermal and superthermal electron flux in m^-2 s^-1 sr^-1 eV^-1 and ion flux in m^-2 s^-1 sr^-1 eV^-1; parameters quantifying the distribution (either bi-Maxwellian or Lorentzian, in Lorentzian case: provide the Kappa index)
Dynamic Range	TBD
Physical Range	flux data for the energy ranges: 0—10, 10—30, keV, with 4 pi coverage
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	oldest date of data to most recent
Time Resolution	10 s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1516 SWE-CRD-SCO-1572
Justification of the requirements	A factor in spacecraft charging and other spacecraft plasma interactions effects
Comment	

3.3.40. MR-012-F: Thermal and Supra-thermal Electron and Ion Energy Spectra in the Range 0 to 30 keV - Forecast

PRODUCT	Thermal and Supra-thermal Electron and Ion Energy Spectra in the Range 0 to 30 keV - Forecast
Product Code	MR-012-F
Input Data required	L1-009-M L1-010-M MR-012-M AG-005-M
Data to be provided and associated units	electron flux in m^-2 s^-1 sr^-1 eV^-1 ; ion flux in m^-2 s^-1 sr^-1 eV^-1
Dynamic Range	TBD
Physical Range	flux data for the energy ranges: 0—10, 10—30, keV, with 4 pi coverage
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date to 3 days ahead
Time Resolution	30 s
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1516 SWE-CRD-SCO-1572
Justification of the requirements	A factor in spacecraft charging and other spacecraft plasma interactions effects
Comment	

3.3.41. MR-013-M: Magnetospheric Radiowave Spectra - Measurement

PRODUCT	Magnetospheric Radiowave Spectra - Measurement
Product Code	MR-013-M
Input Data required	
Data to be provided and associated units	Magnetospheric radio wave spectra
Dynamic Range	TBD
Physical Range	(1 kHz, 500 kHz)
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	2 observation points on polar LEO, 2 observation points on MEO and 2 observation points on GEO.
Time Range	current date
Time Resolution	10 s
Timeliness/Latency	60 min. This requirement can be downgraded to 100 min subject to Customer approval.
Accuracy	0.2
Other Specific	AKR shall be measured from non-occulted location
Related CRD Requirement	SWE-CRD-GEN-1728
Justification of the requirements	A factor in spacecraft charging and other spacecraft plasma interactions effects
Comment	Sensors should remain in two separate hemispheres (i.e. the phasing should roughly be 180 degrees). for MEO, Galileo altitudes are adequate (threshold), a greater range of altitudes is desirable (goal).

3.3.42. MR-013-N: Magnetospheric Radiowave Spectra - Nowcast

PRODUCT	Magnetospheric Radiowave Spectra - Nowcast
Product Code	MR-013-N
Input Data required	MR-013-M
Data to be provided and associated units	Magnetospheric radio wave spectra in W m^-2 Hz^-1
Dynamic Range	TBD
Physical Range	(1 kHz, 500 kHz)
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date
Time Resolution	30 s
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1728
Justification of the requirements	For incorporation into end-to-end space weather simulation
Comment	

3.3.43. MR-013-P: Magnetospheric Radiowave Spectra - Archives and A Posteriori Reconstruction

PRODUCT	Magnetospheric Radiowave Spectra - Archives and A Posteriori Reconstruction
Product Code	MR-013-P
Input Data required	MR-013-M
Data to be provided and associated units	Magnetospheric radio wave spectra in W m^-2 Hz^-1
Dynamic Range	TBD
Physical Range	(1 kHz, 500 kHz)
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	oldest date of data to most recent
Time Resolution	10 s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1728
Justification of the requirements	For incorporation into end-to-end space weather simulation
Comment	

3.3.44. MR-014-M: Thermal Ions Density and Temperature - Measurement

PRODUCT	Thermal Ions Density and Temperature - Measurement
Product Code	MR-014-M
Input Data required	
Data to be provided and associated units	Ions density in m^-3; temperature in eV
Dynamic Range	Density: 10^5 to 10^11 m^-3; Temperature: 0.1 eV to 30 keV
Physical Range	as a function of altitude, long, lat
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	2 observation points on polar LEO, 2 observation points on MEO and 2 observation points on GEO.
Time Range	current date
Time Resolution	10 s
Timeliness/Latency	5 min. This requirement can be downgraded subject to Customer approval to 100 min.
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1517
Justification of the requirements	For incorporation into end-to-end space weather simulation
Comment	Sensors should remain in two separate hemispheres (i.e. the phasing should roughly be 180 degrees). for MEO, Galileo altitudes are adequate (threshold), a greater range of altitudes is desirable (goal).

3.3.45. MR-014-N: Thermal Ions Density and Temperature - Nowcast

PRODUCT	Thermal Ions Density and Temperature - Nowcast
Product Code	MR-014-N
Input Data required	MR-014-M
Data to be provided and associated units	Ions density in m^-3; temperature in eV
Dynamic Range	Density: 10^5 to 10^11 m^-3; Temperature: 0.1 eV to 30 keV
Physical Range	as a function of altitude, long, lat
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date
Time Resolution	30 s
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1517
Justification of the requirements	A factor in a wide range of charging, current collection and surface erosion effects
Comment	

3.3.46. MR-014-P: Thermal Ions Density and Temperature - Archives and A Posteriori Reconstruction

PRODUCT	Thermal Ions Density and Temperature - Archives and A Posteriori Reconstruction
Product Code	MR-014-P
Input Data required	MR-014-M
Data to be provided and associated units	Ions density in m^-3; temperature in eV
Dynamic Range	Density: 10^5 to 10^11 m^-3; Temperature: 0.1 eV to 30 keV
Physical Range	as a function of altitude, long, lat
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	oldest date of data to most recent
Time Resolution	10 s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1517
Justification of the requirements	A factor in a wide range of charging, current collection and surface erosion effects
Comment	

3.3.47. MR-014-F: Thermal Ions Density and Temperature - Forecast

PRODUCT	Thermal Ions Density and Temperature - Forecast
Product Code	MR-014-F
Input Data required	L1-009-M L1-010-M MR-014-M AG-005-M
Data to be provided and associated units	Ions density in m-3; temperature in eV
Dynamic Range	Density: 10^5 to 10^11 m^-3; Temperature: 0.1 eV to 30 keV
Physical Range	as a function of altitude, long, lat
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date to 3 days ahead
Time Resolution	30 s
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1517
Justification of the requirements	A factor in a wide range of charging, current collection and surface erosion effects
Comment	

3.3.48. MR-015-M: Local Magnetospheric Magnetic Field in Orbit - Measurement

PRODUCT	Local Magnetospheric Magnetic Field in Orbit - Measurement
Product Code	MR-015-M
Input Data required	
Data to be provided and associated units	Magnetic field strength and vector components in T
Dynamic Range	1 - 6*10^4 nT
Physical Range	N/A
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	2 observation points on polar LEO, 2 observation points on MEO and 2 observation points on GEO.
Time Range	current date
Time Resolution	1 s
Timeliness/Latency	5 min. This requirement can be downgraded subject to Customer approval to 100 min.
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1711 SWE-CRD-GEN-1717
Justification of the requirements	A factor in a wide range of charging, current collection and surface erosion effects
Comment	Sensors should remain in two separate hemispheres (i.e. the phasing should roughly be 180 degrees). for MEO, Galileo altitudes are adequate (threshold), a greater range of altitudes is desirable (goal). To provide pitch angle determination, these measurements should be made on the same spacecraft as the MR-006-M, MR-007-M, MR-008-M, MR-009-M, MR-010-M and MR-011-M requirements.

3.3.49. MR-015-N: Local Magnetospheric Magnetic Field in Orbit - Nowcast

PRODUCT	Local Magnetospheric Magnetic Field in Orbit - Nowcast
Product Code	MR-015-N
Input Data required	MR-015-M
Data to be provided and associated units	Magnetic field strength and vector components in T
Dynamic Range	1 - 6*10^4 nT
Physical Range	N/A
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date
Time Resolution	10 s
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1711 SWE-CRD-GEN-1717
Justification of the requirements	Monitoring spacecraft environment and disturbances; Monitor disturbances for input to nowcast and forecast models of the magnetosphere and upper atmosphere.
Comment	Geomagnetically Induced Current nowcasts shall be provided in as close to near real-time as possible. MEO orbits have a wide altitude range and sampling on more than one altitude should be considered. To provide pitch angle determination, these measurements should be made on the same spacecraft as the MR-006-M, MR-007-M, MR-008-M, MR-009-M, MR-010-M and MR-011-M requirements.

3.3.50. MR-015-P: Local Magnetospheric Magnetic Field in Orbit - Archives and A Posteriori Reconstruction

PRODUCT	Local Magnetospheric Magnetic Field in Orbit - Archives and A Posteriori Reconstruction
Product Code	MR-015-P
Input Data required	MR-015-M
Data to be provided and associated units	Magnetic field strength and vector components in T
Dynamic Range	1 - 6*10^4 nT
Physical Range	N/A
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	oldest date of data to most recent
Time Resolution	1 s
Timeliness/Latency	2 days
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1711 SWE-CRD-GEN-1717
Justification of the requirements	Monitoring spacecraft environment and disturbances; Monitor disturbances for input to nowcast and forecast models of the magnetosphere and upper atmosphere.
Comment	MEO orbits have a wide altitude range and sampling on more than one altitude should be considered. To provide pitch angle determination, these measurements should be made on the same spacecraft as the MR-006-M, MR-007-M, MR-008-M, MR-009-M, MR-010-M and MR-011-M requirements.

3.3.51. MR-015-F: Local Magnetospheric Magnetic Field in Orbit - Forecast

PRODUCT	Local Magnetospheric Magnetic Field in Orbit - Forecast
Product Code	MR-015-F
Input Data required	L1-008-M L1-009-M L1-010-M MR-015-M AG-005-M
Data to be provided and associated units	Magnetic field strength and vector components in T
Dynamic Range	1 - 6*10^4 nT
Physical Range	N/A
Spatial Range	400 km - 60,000 km altitude, long: 0 - 360, lat: -90, 90
Spatial Resolution	100 km at LEO, 2000 km at GEO
Time Range	current date to 3 days ahead
Time Resolution	30 s
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1711 SWE-CRD-GEN-1717
Justification of the requirements	Monitoring spacecraft environment and disturbances; Monitor disturbances for input to nowcast and forecast models of the magnetosphere and upper atmosphere.
Comment	Geomagnetically Induced Current forecast shall be provided, prediction 3 days ahead is achievable only through solar wind forecast technique. MEO orbits have a wide altitude range and sampling on more than one altitude should be considered. To provide pitch angle determination, these measurements should be made on the same spacecraft as the MR-006-M, MR-007-M, MR-008-M, MR-009-M, MR-010-M and MR-011-M requirements.

3.3.52. MR-016-M: Plasma Drift Velocity - Measurement

PRODUCT	Plasma Drift Velocity - Measurement
Product Code	MR-016-M
Input Data required	
Data to be provided and associated units	plasma drift velocity in m/s
Dynamic Range	[-10,10 km/s]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	2 observation points on polar LEO
Time Range	current date
Time Resolution	10 s
Timeliness/Latency	5 min. This requirement can be downgraded subject to Customer approval to 100 min.
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712
Justification of the requirements	Monitoring spacecraft environment and disturbances; Monitor disturbances for input to nowcast and forecast models of the magnetosphere and upper atmosphere.
Comment	

3.3.53. MR-016-P: Plasma Drift Velocity - Archives and A Posteriori Reconstruction

PRODUCT	Plasma Drift Velocity - Archives and A Posteriori Reconstruction
Product Code	MR-016-P
Input Data required	MR-016-M
Data to be provided and associated units	plasma drift velocity in m/s
Dynamic Range	[-10,10 km/s]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	100 km
Time Range	Oldest date of data to most recent.
Time Resolution	10 s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712
Justification of the requirements	Monitoring spacecraft environment and disturbances; Monitor disturbances for input to nowcast and forecast models of the magnetosphere and upper atmosphere.
Comment	

3.3.54. MR-017-N: Transpolar Electric Field - Nowcast

PRODUCT	Transpolar Electric Field - Nowcast
Product Code	MR-017-N
Input Data required	MR-015-M MR-016-M
Data to be provided and associated units	transpolar magnetospheric electric field in V/m
Dynamic Range	[-50,50 mV/m]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	100 km at LEO
Time Range	current date
Time Resolution	30 s
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712
Justification of the requirements	Inputs to upper atmospheric modelling
Comment	

3.3.55. MR-017-P: Transpolar Electric Field - Archives and A Posteriori Reconstruction

PRODUCT	Transpolar Electric Field - Archives and A Posteriori Reconstruction
Product Code	MR-017-P
Input Data required	MR-015-M MR-016-M
Data to be provided and associated units	transpolar magnetospheric electric field in V/m
Dynamic Range	[-50,50 mV/m]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	100 km at LEO
Time Range	oldest date of data to most recent
Time Resolution	10 s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712
Justification of the requirements	Inputs to upper atmospheric modelling
Comment	

3.3.56. MR-017-F: Transpolar Electric Field - Forecast

PRODUCT	Transpolar Electric Field - Forecast
Product Code	MR-017-F
Input Data required	L1-009-M L1-010-M AG-005-M
Data to be provided and associated units	transpolar magnetospheric electric field in V/m
Dynamic Range	[-50,50 mV/m]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	100 km at LEO
Time Range	current date to 3 days ahead
Time Resolution	30 s
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712
Justification of the requirements	Inputs to upper atmospheric modelling
Comment	3 days is achievable only through solar wind forecast technique.

3.3.57. MR-018-N: Auroral Particle Precipitation - Nowcast

PRODUCT	Auroral Particle Precipitation - Nowcast
Product Code	MR-018-N
Input Data required	MR-012-M
Data to be provided and associated units	Particle precipitation power dissipated in a scale of 10 values
Dynamic Range	0 - 10
Physical Range	0 - 100 GW
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	current date
Time Resolution	1.5 hour
Timeliness/Latency	1 hour
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1708
Justification of the requirements	Inputs to upper atmospheric modelling
Comment	

3.3.58. MR-018-P: Auroral Particle Precipitation - Archives and A Posteriori Reconstruction

PRODUCT	Auroral Particle Precipitation - Archives and A Posteriori Reconstruction
Product Code	MR-018-P
Input Data required	MR-012-M
Data to be provided and associated units	Particle precipitation power dissipated in a scale of 10 values
Dynamic Range	0 - 10
Physical Range	0 - 100 GW
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	oldest date of data to most recent
Time Resolution	1.5 hour
Timeliness/Latency	1 hour
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1708
Justification of the requirements	Inputs to upper atmospheric modelling
Comment	

3.3.59. MR-018-F: Auroral Particle Precipitation - Forecast

PRODUCT	Auroral Particle Precipitation - Forecast
Product Code	MR-018-F
Input Data required	L1-009-M L1-010-M AG-005-M
Data to be provided and associated units	Particle precipitation power dissipated in a scale of 10 values
Dynamic Range	0 - 10
Physical Range	0 - 100 GW
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	current date to 3 days
Time Resolution	1.5 hour
Timeliness/Latency	1 hour
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1708
Justification of the requirements	Inputs to upper atmospheric modelling
Comment	

3.3.60. MR-019-N: Geomagnetic Index AE, AL and AU - Nowcast

PRODUCT	Geomagnetic Index AE, AL and AU - Nowcast
Product Code	MR-019-N
Input Data required	
Data to be provided and associated units	Geomagnetic index AE, AL and AU in nT
Dynamic Range	[-2000,+2000 nT]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	current date
Time Resolution	1 min
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	If available input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCH-1604 SWE-CRD-LAU-1625 SWE-CRD-GEN-1721 SWE-CRD-SCO-2650
Justification of the requirements	Inputs to upper atmospheric modelling
Comment	

3.3.61. MR-019-P: Geomagnetic Index AE, AL and AU - Archives and A Posteriori Reconstruction

PRODUCT	Geomagnetic Index AE, AL and AU - Archives and A Posteriori Reconstruction
Product Code	MR-019-P
Input Data required	
Data to be provided and associated units	Geomagnetic index AE, AL and AU - Archives in nT
Dynamic Range	[-2000,+2000 nT]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	oldest date of data to most recent
Time Resolution	1 min
Timeliness/Latency	1 day (after publication)
Accuracy	N/A
Other Specific	If available input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCH-1604 SWE-CRD-LAU-1625 SWE-CRD-GEN-1721 SWE-CRD-SCO-2650 SWE-CRD-STC-3101 SWE-CRD-STC-3103
Justification of the requirements	Inputs to upper atmospheric modelling
Comment	

3.3.62. MR-019-F: Geomagnetic Index AE, AL and AU - Forecast

PRODUCT	Geomagnetic Index AE, AL and AU - Forecast
Product Code	MR-019-F
Input Data required	L1-009-M L1-010-M AG-005-M
Data to be provided and associated units	Geomagnetic index AE, AL and AU in NnT
Dynamic Range	[-2000,+2000 nT]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	current date to 3 days ahead
Time Resolution	1 min
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCH-1604 SWE-CRD-LAU-1625 SWE-CRD-GEN-1721 SWE-CRD-SCO-2650
Justification of the requirements	Inputs to upper atmospheric modelling
Comment	3 days is achievable only through solar wind forecast technique.

3.3.63. MR-020-N: Geomagnetic Index PC - Nowcast

PRODUCT	Geomagnetic Index PC - Nowcast
Product Code	MR-020-N
Input Data required	
Data to be provided and associated units	Geomagnetic index PC in mV/m
Dynamic Range	[-10,+20]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	current date
Time Resolution	15 min
Timeliness/Latency	15 min
Accuracy	0.2
Other Specific	If available input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCH-1604 SWE-CRD-LAU-1625 SWE-CRD-GEN-1721 SWE-CRD-SCO-2650
Justification of the requirements	Look in G-ESC TNs
Comment	

3.3.64. MR-020-P: Geomagnetic Index PC - Archives and A Posteriori Reconstruction

PRODUCT	Geomagnetic Index PC - Archives and A Posteriori Reconstruction
Product Code	MR-020-P
Input Data required	
Data to be provided and associated units	Geomagnetic index PC - Archives in mV/m
Dynamic Range	[-10,+20]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	oldest date of data to most recent
Time Resolution	15 min
Timeliness/Latency	1 week (after publication)
Accuracy	N/A
Other Specific	If available input data shall be acquired from officially recognised and traceable sources.
Related CRD Requirement	SWE-CRD-SCH-1604 SWE-CRD-LAU-1625 SWE-CRD-GEN-1721 SWE-CRD-SCO-2650 SWE-CRD-STC-3101 SWE-CRD-STC-3103
Justification of the requirements	Inputs to upper atmospheric modelling
Comment	

3.3.65. MR-020-F: Geomagnetic Index PC - Forecast

PRODUCT	Geomagnetic Index PC - Forecast
Product Code	MR-020-F
Input Data required	L1-009-M L1-010-M AG-005-M
Data to be provided and associated units	Geomagnetic index PC in mV/m
Dynamic Range	[-10,+20]
Physical Range	
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	current date to 3 days ahead
Time Resolution	15 min
Timeliness/Latency	15 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCH-1604 SWE-CRD-LAU-1625 SWE-CRD-GEN-1721 SWE-CRD-SCO-2650
Justification of the requirements	TBD
Comment	

3.3.66. MR-021-P: Magnetopause Location - Archives and A Posteriori Reconstruction

PRODUCT	Magnetopause Location - Archives and A Posteriori Reconstruction
Product Code	MR-021-P
Input Data required	L1-008-M L1-009-M L1-010-M MR-015-M AG-005-M
Data to be provided and associated units	Distance of magnetopause sub-solar point
Dynamic Range	N/A
Physical Range	TBD
Spatial Range	TBD
Spatial Resolution	500 km
Time Range	current date to 3 days ahead
Time Resolution	30 s
Timeliness/Latency	5 min; this requirement can be downgraded to 100 min subject to Customer approval.
Accuracy	0.3
Other Specific	A model of the magnetopause location is required.
Related CRD Requirement	
Justification of the requirements	Location of the sub-solar point of the magnetopause is useful for spacecraft operation at GEO
Comment	

3.3.67. MR-021-F: Magnetopause Location - Forecast

PRODUCT	Magnetopause Location - Forecast
Product Code	MR-021-F
Input Data required	L1-008-M L1-009-M L1-010-M MR-015-M AG-005-M
Data to be provided and associated units	Distance of magnetopause sub-solar point
Dynamic Range	TBD
Physical Range	TBD
Spatial Range	TBD
Spatial Resolution	500 km
Time Range	current date to 3 days ahead
Time Resolution	30 s
Timeliness/Latency	5 min; this requirement can be downgraded to 100 min subject to Customer approval.
Accuracy	0.3
Other Specific	A model of the magnetopause location is required.
Related CRD Requirement	
Justification of the requirements	Location of the sub-solar point of the magnetopause is useful for spacecraft operation at GEO
Comment	

3.3.68. MR-022-N: Auroral Kilometric Radiation (AKR) - Nowcast

PRODUCT	Auroral Kilometric Radiation (AKR) - Nowcast
Product Code	MR-022-N
Input Data required	MR-013-M
Data to be provided and associated units	AKR in W m^-2 Hz^-1
Dynamic Range	[1*10^-20, 1*10^-12]
Physical Range	Spectral power in the range 50 kHz - 800 kHz
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	current date
Time Resolution	1 min
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1710
Justification of the requirements	Measurement of disturbance above auroral regions
Comment	

3.3.69. MR-022-P: Auroral Kilometric Radiation (AKR) - Archives and A Posteriori Reconstruction

PRODUCT	Auroral Kilometric Radiation (AKR) - Archives and A Posteriori Reconstruction
Product Code	MR-022-P
Input Data required	MR-013-M
Data to be provided and associated units	AKR in W m^-2 Hz^-1
Dynamic Range	[1*10^-20, 1*10^-12]
Physical Range	Spectral power in the range 50 kHz - 800 kHz
Spatial Range	auroral-polar
Spatial Resolution	N/A
Time Range	oldest date of data to most recent
Time Resolution	1 min
Timeliness/Latency	1 day
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1710
Justification of the requirements	Measurement of disturbance above auroral regions
Comment	

3.3.70. MR-023-N: Geomagnetic index AZ - Nowcast

PRODUCT	Geomagnetic index AZ - Nowcast
Product Code	MR-023-N
Input Data required	AG-005-M
Data to be provided and associated units	Auroral Zone (AZ) index, in nT
Dynamic Range	[0,+2000 nT]
Physical Range	
Spatial Range	Auroral zone, site-specific
Spatial Resolution	N/A
Time Range	current date
Time Resolution	1 hr
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3038
Justification of the requirements	Geomagnetic Activity index for auroral zone (AZ index). It is used to characterise the local impact of geomagnetic activity on the MLT region as it reflects the integrated level of local geomagnetic activity over the previous 24 hours.
Comment	Principally used to support scientific research. This is a site-specific product, and so potentially may be delivered as a range of similar datasets, one per site.

3.3.71. MR-023-P: Geomagnetic index AZ - Archives and A Posteriori Reconstruction

PRODUCT	Geomagnetic index AZ - Archives and A Posteriori Reconstruction
Product Code	MR-023-P
Input Data required	AG-005-M
Data to be provided and associated units	Auroral Zone (AZ) index, in nT
Dynamic Range	[0,+2000 nT]
Physical Range	
Spatial Range	Auroral zone, site-specific
Spatial Resolution	N/A
Time Range	oldest date of data to most recent
Time Resolution	1 hr
Timeliness/Latency	1 day
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3038
Justification of the requirements	Geomagnetic Activity index for auroral zone (AZ index). It is used to characterise the local impact of geomagnetic activity on the MLT region as it reflects the integrated level of local geomagnetic activity over the previous 24 hours.
Comment	Principally used to support scientific research. This is a site-specific product, and so potentially may be delivered as a range of similar datasets, one per site. This is the archive of the 33-day products

3.3.72. MR-023-F: Geomagnetic index AZ - Forecast

PRODUCT	Geomagnetic index AZ- Forecast
Product Code	MR-023-F
Input Data required	L1-009-M L1-010-M AG-005-M
Data to be provided and associated units	Auroral Zone (AZ) index, in nT
Dynamic Range	[0,+2000 nT]
Physical Range	
Spatial Range	Auroral zone, site-specific
Spatial Resolution	N/A
Time Range	current date to 3 days ahead
Time Resolution	1 hr
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3038
Justification of the requirements	Geomagnetic Activity index for auroral zone (AZ index). It is used to characterise the local impact of geomagnetic activity on the MLT region as it reflects the integrated level of local geomagnetic activity over the previous 24 hours.
Comment	Principally used to support scientific research. This is a site-specific product, and so potentially may be delivered as a range of similar datasets, one per site.

3.3.73. MR-024-P: Geomagnetic index AZ long-term variation - Archives and A Posteriori Reconstruction

PRODUCT	Geomagnetic index AZ long-term variation - Archives and A Posteriori Reconstruction
Product Code	MR-024-P
Input Data required	AG-005-M
Data to be provided and associated units	Auroral Zone (AZ) index, in nT
Dynamic Range	[0,+2000 nT]
Physical Range	
Spatial Range	Auroral zone, site-specific
Spatial Resolution	N/A
Time Range	oldest date of data to most recent
Time Resolution	1 hr
Timeliness/Latency	1 day
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3038
Justification of the requirements	Geomagnetic Activity index for auroral zone (AZ index), long term variation. It is used to characterise the local impact of geomagnetic activity on the MLT region as it reflects the integrated level of local geomagnetic activity over the previous 24 hours. This product is provided in addition to MP-023-P to record the various trends observed in the long-term dataset of the previous product.
Comment	Principally used to support scientific research. This is a site-specific product, and so potentially may be delivered as a range of similar datasets, one per site. This is the archive of the underlying data

3.3.74. MR-026-N: Plasmapause location - Nowcast

PRODUCT	Plasmapause location - Nowcast
Product Code	MR-026-N
Input Data required	SU-008-N L1-008-M L1-010-M MR-014-M IT-002-M
Data to be provided and associated units	Location of the Plasmapause, characterising the size and shape of the plasmasphere in the equatorial plane.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	L = 1.5 - 8.0 MLT = 0-23 h
Spatial Resolution	MLT = 1h L = 0.05
Time Range	Current date
Time Resolution	15 min
Timeliness/Latency	10 min
Accuracy	0.4
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3164
Justification of the requirements	The plasmapause is a key parameter for space weather (separates various particle and wave populations, affects wave propagation, its ionospheric footprint separates the mid-latitude and sub-auroral ionosphere.) This parameter is relevant for radiation risk and spacecraft charging risk assessment.
Comment	Nowcast, forecast and archive can be generated from the same model using different inputs

3.3.75. MR-026-P: Plasmapause location - Archives and A Posteriori Reconstruction

PRODUCT	Plasmapause location - Archives and A Posteriori Reconstruction
Product Code	MR-026-P
Input Data required	SU-008-N L1-008-M L1-010-M MR-014-M IT-002-M
Data to be provided and associated units	Location of the Plasmapause, characterising the size and shape of the plasmasphere in the equatorial plane.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	L = 1.5 - 8.0 MLT = 0-23 h
Spatial Resolution	MLT = 1h L = 0.05
Time Range	oldest date of data to most recent
Time Resolution	15min
Timeliness/Latency	1 day
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3164
Justification of the requirements	The plasmapause is a key parameter for space weather (separates various particle and wave populations, affects wave propagation, its ionospheric footprint separates the mid-latitude and sub-auroral ionosphere.) This parameter is relevant for radiation risk and spacecraft charging risk assessment.
Comment	Nowcast, forecast and archive can be generated from the same model using different inputs

3.3.76. MR-026-F: Plasmapause location - Forecast

PRODUCT	Plasmapause location - Forecast
Product Code	MR-026-F
Input Data required	SU-008-M L1-008-M L1-010-M MR-014-M IT-002-M
Data to be provided and associated units	Location of the Plasmapause, characterising the size and shape of the plasmasphere in the equatorial plane.
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	L = 1.5 - 8.0 MLT = 0-23 h
Spatial Resolution	MLT = 1h L = 0.05
Time Range	Current date, 1hr ahead
Time Resolution	15min
Timeliness/Latency	1hr ahead forecast
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3164
Justification of the requirements	The plasmapause is a key parameter for space weather (separates various particle and wave populations, affects wave propagation, its ionospheric footprint separates the mid-latitude and sub-auroral ionosphere.) This parameter is relevant for radiation risk and spacecraft charging risk assessment.
Comment	Nowcast, forecast and archive can be generated from the same model using different inputs

3.3.77. MR-027-N: Plasmaspheric Electron Density - Nowcast

PRODUCT	Plasmaspheric Electron Density - Nowcast
Product Code	MR-027-N
Input Data required	SU-008-M L1-008-M L1-010-M MR-014-M IT-002-M
Data to be provided and associated units	3-D electron density above the ionosphere, as far as the plasmapause, in m^-3
Dynamic Range	0 – 10^-10 m^-3
Physical Range	electron density as a function of 3D spatial coordinates
Spatial Range	L = 1.5 - 10.0 MLT = 0-23 h
Spatial Resolution	MLT = 0.25h, ie 15mins L = 0.05
Time Range	Current date
Time Resolution	15 min
Timeliness/Latency	10 mins
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3165
Justification of the requirements	Used as inputs to model wave-particle interactions in the radiation belts. Further processing allows the derivation of 2-D electron density maps at various altitudes, and also plasmaspheric TEC (PTEC); this in turn can be provided as input to ionospheric modelers to remove PTEC contributions to TEC
Comment	The region between 8 < L < 10 includes the plasmaspheric trough, and accuracy can be reduced here.

3.3.78. MR-027-P: Plasmaspheric Electron Density - Archives and A Posteriori Reconstruction

PRODUCT	Plasmaspheric Electron Density - Archives and A Posteriori Reconstruction
Product Code	MR-027-P
Input Data required	SU-008-M L1-008-M L1-010-M MR-014-M IT-002-M
Data to be provided and associated units	3-D electron density above the ionosphere, as far as the plasmapause
Dynamic Range	0 – 10^-10 m^-3
Physical Range	electron density as a function of 3D spatial coordinates
Spatial Range	L = 1.5 - 10.0 MLT = 0-23 h
Spatial Resolution	MLT = 0.25h, ie 15mins L = 0.05
Time Range	oldest date of data to most recent
Time Resolution	15 min
Timeliness/Latency	1 day
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3165
Justification of the requirements	Used as inputs to model wave-particle interactions in the radiation belts. Further processing allows the derivation of 2-D electron density maps at various altitudes, and also plasmaspheric TEC (PTEC); this in turn can be provided as input to ionospheric modelers to remove PTEC contributions to TEC
Comment	The region between 8 < L < 10 includes the plasmaspheric trough, and accuracy can be reduced here.

3.3.79. MR-027-F: Plasmaspheric Electron Density - Forecast

PRODUCT	Plasmaspheric Electron Density - Forecast
Product Code	MR-027-F
Input Data required	SU-008-M L1-008-M L1-010-M MR-014-M IT-002-M
Data to be provided and associated units	3-D electron density above the ionosphere, as far as the plasmapause
Dynamic Range	0 – 10^-10 m^-3
Physical Range	electron density as a function of 3D spatial coordinates
Spatial Range	L = 1.5 - 10.0 MLT = 0-23 h
Spatial Resolution	MLT = 0.25h, ie 15mins L = 0.05
Time Range	Current date, 1hr ahead
Time Resolution	15 min
Timeliness/Latency	1 hr ahead forecast
Accuracy	1.0 i.e., within an order of magnitude
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3165
Justification of the requirements	Used as inputs to model wave-particle interactions in the radiation belts. Further processing allows the derivation of 2-D electron density maps at various altitudes, and also plasmaspheric TEC (PTEC); this in turn can be provided as input to ionospheric modelers to remove PTEC contributions to TEC
Comment	The region between 8 < L < 10 includes the plasmaspheric trough, and accuracy can be reduced here.

3.3.80. MR-028-P: Database of GCR measurements - Archives and A Posteriori Reconstruction

PRODUCT	Database of GCR measurements - Archives and A Posteriori Reconstruction
Product Code	MR-028-P
Input Data required	L1-001-M L1-002-M IP-007-M IP-008-M MR-006-M MR-007-M
Data to be provided and associated units	proton flux in cm^-2s^-1sr^-1MeV^-1 ion flux in cm^-2s^-1sr^-1(MeV/nuc)^-1
Dynamic Range	10^8 per channel (min. 0.0001 > 200 MeV; max. 100000 @ 10 MeV)
Physical Range	Threshold of 5 channels, goal of 10+ channels, logarithmically-spaced in energy ranging from 10 MeV to 500 MeV (threshold) or 5000MeV (goal) with an integral channel above the upper threshold of the highest differential channel. Goal of 2 PI steradians (hemisphere) coverage with resolution of 20 degree half-angle cones. Threshold of single cone of minimum 20 deg half-angle.
Spatial Range	L1, L5, GEO, MEO, LEO
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	10s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3270
Justification of the requirements	Supports model validation
Comment	Filtering required to distinguish between GCRs and highly-energetic SEPs

3.3.81. MR-029-N: Geomagnetic Indices Hpo (Hp60 and Hp30) - Nowcast

PRODUCT	Geomagnetic Indices Hpo (Hp60 and Hp30) - Nowcast
Product Code	MR-029-N
Input Data required	Recordings from 13 geomagnetic observatories
Data to be provided and associated units	Hpo (Hp60 and Hp30)
Dynamic Range	0 to open-ended
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	
Time Range	Current date, since 2020
Time Resolution	60 mins (Hp60) 30 mins (Hp30)
Timeliness/Latency	40 mins
Accuracy	N/A
Other Specific	
Related CRD Requirement	
Justification of the requirements	Improved measure of global geomagnetic activity
Comment	The Hpo indices (also known as Hp60 and Hp30 indices) are 60- and 30-mins planetary indices of geomagnetic activity derived from H indices which are derived from recordings at 13 geomagnetic observatories

3.3.82. MR-029-P: Geomagnetic Indices Hpo (Hp60 and Hp30) - Archives and A Posteriori Reconstruction

PRODUCT	Geomagnetic Indices Hpo (Hp60 and Hp30) - Archives and A Posteriori Reconstruction
Product Code	MR-029-P
Input Data required	Recordings from 13 geomagnetic observatories
Data to be provided and associated units	Hpo (Hp60 and Hp30)
Dynamic Range	1 to open-ended
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	
Time Range	Current date, since 1996
Time Resolution	60 mins (Hp60) 30 mins (Hp30)
Timeliness/Latency	40 mins
Accuracy	N/A
Other Specific	
Related CRD Requirement	
Justification of the requirements	Improved measure of global geomagnetic activity
Comment	The Hpo indices (also known as Hp60 and Hp30 indices) are 60- and 30-mins planetary indices of geomagnetic activity derived from H indices which are derived from recordings at 13 geomagnetic observatories

3.3.83. MR-029-F: Geomagnetic Indices Hpo (Hp60 and Hp30) - Forecast

PRODUCT	Geomagnetic Indices Hpo (Hp60 and Hp30) - Forecast
Product Code	MR-029-F
Input Data required	Recordings from 13 geomagnetic observatories
Data to be provided and associated units	Hpo (Hp60 and Hp30)
Dynamic Range	1 to open-ended
Physical Range	Defined by the indices specifications
Spatial Range	Global, Northern and southern auroral, northern and southern mid-latitude
Spatial Resolution	
Time Range	Rolling 72hr forecast wndow
Time Resolution	60 mins (Hp60) 30 mins (Hp30)
Timeliness/Latency	40 mins
Accuracy	N/A
Other Specific	
Related CRD Requirement	
Justification of the requirements	Improved measure of global geomagnetic activity
Comment	Forecasts are currently under development, using a machine learning method based on solar wind parameters and sunspot number

3.4. DATA FOR OTHER PLANETS

3.4.1. NM-001-N: Planetary Atmospheric Properties (other than Earth) - Nowcast

PRODUCT	Planetary Atmospheric Properties (other than Earth) - Nowcast
Product Code	NM-001-N
Input Data required	SU-008-M SU-029-M
Data to be provided and associated units	UV flux120-200 nm, MgII, and F10.7
Dynamic Range	TBD
Physical Range	TBD
Spatial Range	n/a
Spatial Resolution	n/a
Time Range	current date
Time Resolution	5 min
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1541
Justification of the requirements	space weather services around planets other than Earth required to provide information on the longitudinal distribution of activity on the solar surface, including the farside as seen from Earth
Comment	

3.4.2. NM-001-P: Planetary Atmospheric Properties (other than Earth) - Archives and A Posteriori Reconstruction

PRODUCT	Planetary Atmospheric Properties (other than Earth) - Archives and A Posteriori Reconstruction
Product Code	NM-001-P
Input Data required	SU-008-M SU-029-M
Data to be provided and associated units	UV flux: 120-200 nm, MgII, and F10.7
Dynamic Range	TBD
Physical Range	TBD
Spatial Range	n/a
Spatial Resolution	n/a
Time Range	oldest date of data to most recent
Time Resolution	5 min
Timeliness/Latency	2 days
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1541
Justification of the requirements	space weather services around planets other than Earth required to provide information on the longitudinal distribution of activity on the solar surface, including the farside as seen from Earth
Comment	

3.4.3. NM-001-F: Planetary Atmospheric Properties (other than Earth) - Forecast

PRODUCT	Planetary Atmospheric Properties (other than Earth) - Forecast
Product Code	NM-001-F
Input Data required	SU-008-M SU-029-M SU-047-M SU-048-M
Data to be provided and associated units	UV flux: 120-200 nm, MgII, and F10.7
Dynamic Range	TBD
Physical Range	TBD
Spatial Range	n/a
Spatial Resolution	n/a
Time Range	current date to 3 days ahead
Time Resolution	5 min
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1541
Justification of the requirements	space weather services around planets other than Earth required to provide information on the longitudinal distribution of activity on the solar surface, including the farside as seen from Earth
Comment	

3.5. DATA ON EARTH IONOSPHERE / THERMOSPHERE

3.5.1. IT-001-M: Vertical Total Electron Content - Measurements

PRODUCT	Vertical Total Electron Content - Measurements
Product Code	IT-001-M
Input Data required	
Data to be provided and associated units	TEC unit = 10^16 e/m^2
Dynamic Range	factor 30
Physical Range	Electron density integrated along vertical line from 0 km to 1000 km altitude as a function of latitude and longitude
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km in some key regions to be agreed with the Customer 1000 km otherwise
Time Range	current date
Time Resolution	1 min
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3034
Justification of the requirements	An important characteristic for analysis of ionospheric effects; Measure of ionospheric influence on signal for GNSS and SATCOM
Comment	Data relating to airline critical communications and precise location determination shall be obtained for specific regions with narrow 3D volumetric grid with an update not larger than 30 mins.

3.5.2. IT-001-N: Vertical Total Electron Content - Nowcast

PRODUCT	Vertical Total Electron Content - Nowcast
Product Code	IT-001-N
Input Data required	IT-002-M
Data to be provided and associated units	TEC unit = 10^16 e/m^2
Dynamic Range	factor 30
Physical Range	Electron density integrated along vertical line from 0 km to 1000 km altitude as a function of latitude and longitude.
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km in some key regions to be agreed with the Customer 1000 km otherwise.
Time Range	current date
Time Resolution	1 min
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1561 SWE-CRD-TIO-1639 SWE-CRD-AVI-3131 SWE-CRD-RES-3181
Justification of the requirements	An important characteristic for analysis of ionospheric effects; Measure of ionospheric influence on signal for GNSS and SATCOM
Comment	Data relating to airline critical communications and precise location determination shall be obtained for specific regions with narrow 3D volumetric grid with an update not larger than 30 mins.

3.5.3. IT-001-P: Vertical Total Electron Content Map - Archives and A Posteriori Reconstruction

PRODUCT	Vertical Total Electron Content Map - Archives and A Posteriori Reconstruction
Product Code	IT-001-P
Input Data required	IT-002-M
Data to be provided and associated units	TEC unit = 10^16 e/m^2
Dynamic Range	factor 30
Physical Range	Electron density integrated along vertical line from 0 km to 1000 km altitude as a function of latitude and longitude.
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km in some key regions to be agreed with the Customer 1000 km otherwise.
Time Range	oldest date of data to most recent
Time Resolution	30 s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1561 SWE-CRD-TIO-1639 SWE-CRD-AVI-3131 SWE-CRD-RES-3181
Justification of the requirements	An important characteristic for analysis of ionospheric effects; Measure of ionospheric influence on signal for GNSS and SATCOM
Comment	Data relating to airline critical communications and precise location determination shall be obtained for specific regions with narrow 3D volumetric grid with an update not larger than 30 mins.

3.5.4. IT-001-F: Vertical Total Electron Content - Forecast

PRODUCT	Vertical Total Electron Content - Forecast
Product Code	IT-001-F
Input Data required	L1-008-M L1-009-M L1-010-M IT-002-M AG-005-M
Data to be provided and associated units	TEC unit = 10^16 e/m^2
Dynamic Range	factor 30
Physical Range	Electron density integrated along vertical line from 0 km to 1000 km altitude as a function of latitude and longitude.
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km in some key regions to be agreed with the Customer 1000 km otherwise.
Time Range	current date to 3 days ahead
Time Resolution	5 min
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1561 SWE-CRD-TIO-1639 SWE-CRD-AVI-3131 SWE-CRD-RES-3181
Justification of the requirements	An important characteristic for analysis of ionospheric effects; Measure of ionospheric influence on signal for GNSS and SATCOM.
Comment	Data relating to airline critical communications and precise location determination shall be forecast for specific regions with narrow 3D volumetric grid with an update not larger than 30 mins.

3.5.5. IT-002-M: Electron density - Measurements

PRODUCT	Electron Density - Measurements
Product Code	IT-002-M
Input Data required	
Data to be provided and associated units	3D electron density grids in m^-3
Dynamic Range	10^9 to 10^14 m^-3
Physical Range	electron density as a function of 3D spatial coordinates
Spatial Range	From 100 km to 1000 km altitude
Spatial Resolution	100 km in some key regions to be agreed with the Customer 1000 km otherwise.
Time Range	N/A
Time Resolution	30 s
Timeliness/Latency	5 min
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-STC-3106
Justification of the requirements	In the future some GNSS and radio propagation applications may need 3D electron density grids
Comment	Possible techniques for 3D density measurements include sensors that allow ionospheric tomography (GNSS, ionosonde, riometer, scattering radar)

3.5.6. IT-002-N: 3D Electron Density Grids - Nowcast

PRODUCT	3D Electron Density Grids - Nowcast
Product Code	IT-002-N
Input Data required	IT-002-M
Data to be provided and associated units	3D electron density grids in m^-3
Dynamic Range	10^9 to 10^14 m^-3
Physical Range	electron density as a function of 3D spatial coordinates
Spatial Range	From 100 km to 1000 km altitude
Spatial Resolution	100 km in some key regions to be agreed with the Customer 1000 km otherwise.
Time Range	N/A
Time Resolution	1 min
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	
Justification of the requirements	3D electron density grids (and locally 2D) for GNSS and radio propagation applications and to compute ionospheric effects on radars
Comment	

3.5.7. IT-002-P: 3D Electron Density Grids - Archives and A Posteriori Reconstruction

PRODUCT	3D Electron Density Grids - Archives and A Posteriori Reconstruction
Product Code	IT-002-P
Input Data required	IT-002-M
Data to be provided and associated units	3D electron density grids in m^-3
Dynamic Range	10^9 to 10^14 m^-3
Physical Range	electron density as a function of 3D spatial coordinates
Spatial Range	From 100 km to 1000 km altitude
Spatial Resolution	100 km in some key regions to be agreed with the Customer 1000 km otherwise.
Time Range	oldest date of data to most recent
Time Resolution	30 s
Timeliness/Latency	2 days
Accuracy	0.1
Other Specific	
Related CRD Requirement	
Justification of the requirements	In the future some GNSS and radio propagation applications may need 3D electron density grids
Comment	

3.5.8. IT-002-F: 3D Electron Density Grids - Forecast

PRODUCT	3D Electron Density Grids - Forecast
Product Code	IT-002-F
Input Data required	L1-008-M L1-009-M L1-010-M IT-002-M AG-005-M
Data to be provided and associated units	3D electron density grids in m^-3
Dynamic Range	10^9 to 10^14 m^-3
Physical Range	electron density as a function of 3D spatial coordinates
Spatial Range	From 100 km to 1000 km altitude
Spatial Resolution	100 km in some key regions to be agreed with the Customer 1000 km otherwise.
Time Range	current date to 3 days ahead
Time Resolution	15 min
Timeliness/Latency	15 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	
Justification of the requirements	In the future some GNSS and radio propagation applications may need 3D electron density grids
Comment	

3.5.9. IT-005-M: URSI Ionospheric Parameters - Measurements

PRODUCT	URSI Ionospheric Parameters - Measurements
Product Code	IT-005-M
Input Data required	
Data to be provided and associated units	URSI ionospheric parameters derived from ionograms including as a minimum: foF2 (in MHz), M(3000)F2 (in percent), fmin (in MHz), fbEs (in MHz), hmF2 (in km), ITEC (in TEC unit=10^16 e/m^2), h'F (in km), foEs (in MHz)
Dynamic Range	frequency: 0-15 MHz; height: 0-500 km; TEC units: 0-30
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg; lat: -90, 90; goal: global coverage; threshold: wherever possible.
Spatial Resolution	500 km
Time Range	N/A
Time Resolution	1 hr (with possibility to sample down to 1 min)
Timeliness/Latency	5 min
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1645
Justification of the requirements	foF2 and M(3000)F2, fmin, and fbE are important characteristics to accurate estimate transionopheric propagation below 100 MHz from URSI recommendations
Comment	use of ionospheric vertical sounding needed

3.5.10. IT-005-N: URSI Ionospheric Parameters - Nowcast

PRODUCT	URSI Ionospheric Parameters - Nowcast
Product Code	IT-005-N
Input Data required	IT-005-M
Data to be provided and associated units	URSI ionospheric parameters derived from ionograms including as a minimum: foF2 (in MHz), M(3000)F2 (in percent), fmin (in MHz), fbEs (in MHz), hmF2 (in km), ITEC (in TEC unit=10^16 e/m^2), h'F (in km), foEs (in MHz)
Dynamic Range	frequency: 0-15 MHz; height: 0-500 km; TEC units: 0-30
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg; lat: -90, 90; goal: global coverage; threshold: wherever possible.
Spatial Resolution	500 km
Time Range	N/A
Time Resolution	1 hr (with possibility to sample down to 1 min)
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1645
Justification of the requirements	foF2 and M(3000)F2, fmin, and fbE are important characteristics to accurate estimate transionopheric propagation below 100 MHz from URSI recommendations
Comment	use of ionospheric vertical sounding needed

3.5.11. IT-005-P: URSI Ionospheric Parameters - Archives and A Posteriori Reconstruction

PRODUCT	URSI Ionospheric Parameters - Archives and A Posteriori Reconstruction
Product Code	IT-005-P
Input Data required	IT-005-M
Data to be provided and associated units	URSI ionospheric parameters derived from ionograms including as a minimum: foF2 (in MHz), M(3000)F2 (in percent), fmin (in MHz), fbEs (in MHz), hmF2 (in km), ITEC (in TEC unit=10^16 e/m^2), h'F (in km), foEs (in MHz)
Dynamic Range	frequency: 0-15 MHz; height: 0-500 km; TEC units: 0-30
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg; lat: -90, 90; goal: global coverage; threshold: wherever possible.
Spatial Resolution	500 km
Time Range	oldest date of data to most recent
Time Resolution	1 hr (with possibility to sample down to 1 min)
Timeliness/Latency	2 days
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1645
Justification of the requirements	foF2 and M(3000)F2, fmin, and fbE are important characteristics to accurate estimate transionopheric propagation below 100 MHz from URSI recommendations
Comment	use of ionospheric vertical sounding needed

3.5.12. IT-005-F: URSI Ionospheric Parameters - Forecast

PRODUCT	URSI Ionospheric Parameters - Forecast
Product Code	IT-005-F
Input Data required	L1-008-M L1-009-M L1-010-M IT-002-M IT-005-M AG-005-M
Data to be provided and associated units	URSI ionospheric parameters including as a minimum: foF2 (in MHz), M(3000)F2 (in percent), fmin (in MHz), fbEs (in MHz), hmF2 (in km), ITEC (in TEC unit=10^16 e/m^2), h'F (in km), foEs (in MHz)
Dynamic Range	0-15 MHz; height: 0-500 km; TEC units: 0-30
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg; lat: -90, 90; goal: global coverage; threshold: wherever possible
Spatial Resolution	500 km
Time Range	N/A
Time Resolution	1 hr (with possibility to sample down to 1 min)
Timeliness/Latency	20 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1645
Justification of the requirements	foF2 and M(3000)F2, fmin, and fbE are important characteristics to accurate estimate transionopheric propagation below 100 MHz from URSI recommendations
Comment	use of ionospheric vertical sounding needed

3.5.13. IT-006-M: Riometer Data - Measurement

PRODUCT	Riometer Data - Measurement
Product Code	IT-006-M
Input Data required	
Data to be provided and associated units	Riometer measurement in dB
Dynamic Range	0 - 10 dB
Physical Range	absorption as a function of lat and long
Spatial Range	long: 0 - 360 deg; lat: -90, 90; goal: global coverage; threshold: wherever possible.
Spatial Resolution	500 km (generally), 10 km with imaging riometers
Time Range	N/A
Time Resolution	10 min
Timeliness/Latency	10 min
Accuracy	0.001 dB
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1636 SWE-CRD-TIO-1647
Justification of the requirements	Detect D region absorption events
Comment	

3.5.14. IT-006-N: Riometer Data - Nowcast

PRODUCT	Riometer Data - Nowcast
Product Code	IT-006-N
Input Data required	IT-006-M
Data to be provided and associated units	Riometer measurement in dB
Dynamic Range	0 - 10 dB
Physical Range	absorption as a function of lat and long
Spatial Range	long: 0 - 360 deg; lat: -90, 90; goal: global coverage; threshold: wherever possible
Spatial Resolution	500 km (generally), 10 km with imaging riometers
Time Range	N/A
Time Resolution	10 min
Timeliness/Latency	10 min
Accuracy	0.001 dB
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1647
Justification of the requirements	Nowcast D region absorption events
Comment	

3.5.15. IT-006-P: Riometer Data - Archives and A Posteriori Reconstruction

PRODUCT	Riometer Data - Archives and A Posteriori Reconstruction
Product Code	IT-006-P
Input Data required	IT-006-M
Data to be provided and associated units	Riometer measurement in dB
Dynamic Range	0 - 10 dB
Physical Range	absorption as a function of lat and long
Spatial Range	long: 0 - 360 deg; lat: -90, 90; goal: global coverage; threshold: wherever possible
Spatial Resolution	500 km (generally), 10 km with imaging riometers
Time Range	N/A
Time Resolution	10 min
Timeliness/Latency	10 min
Accuracy	0.001 dB
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1647
Justification of the requirements	Archive D region absorption events
Comment	

3.5.16. IT-006-F: Riometer Data - Forecast

PRODUCT	Riometer Data - Forecast
Product Code	IT-006-F
Input Data required	L1-008-M L1-009-M L1-010-M L1-011-M IT-006-M
Data to be provided and associated units	Riometer measurement in dB
Dynamic Range	0 - 10 dB
Physical Range	absorption as a function of lat and long
Spatial Range	long: 0 - 360 deg; lat: -90, 90; goal: global coverage; threshold: wherever possible
Spatial Resolution	500 km (generally), 10 km with imaging riometers
Time Range	N/A
Time Resolution	10 min
Timeliness/Latency	10 min
Accuracy	0.001 dB
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1647
Justification of the requirements	Forecast D region absorption events
Comment	

3.5.17. IT-007-M: Neutral Density in Thermosphere - Measurement

PRODUCT	Neutral Density in Thermosphere - Measurement
Product Code	IT-007-M
Input Data required	
Data to be provided and associated units	Neutral density in m^-3 or kg.m^-3 (typical)
Dynamic Range	number density: 10^10 m^-3 to 10^20 m^-3; mass density: 10^-6 to 10^-15 kg.m^-3
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided.
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	Horizonal goal of 500 km, threshold as fine as possible Vertical: N/A
Time Range	N/A
Time Resolution	30 min
Timeliness/Latency	60 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1519 SWE-CRD-SCO-1565 SWE-CRD-STC-3095 SWE-CRD-GEN-1715
Justification of the requirements	Archive for a posteriori spacecraft drag calculations
Comment	A downgrading for the time resolution to 180 min is sometimes acceptable subject to confirmation from the Customer.

3.5.18. IT-007-N: Neutral Density in Thermosphere - Nowcast

PRODUCT	Neutral Density in Thermosphere - Nowcast
Product Code	IT-007-N
Input Data required	IT-007-M
Data to be provided and associated units	Neutral density in m^-3 or kg.m^-3 (typical)
Dynamic Range	number density: 10^10 m^-3 to 10^20 m^-3; mass density: 10^-6 to 10^-15 kg.m^-3
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided.
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	Horizonal goal of 500 km, threshold as fine as possible Vertical: N/A
Time Range	N/A
Time Resolution	30 min
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1540 SWE-CRD-GEN-1715
Justification of the requirements	Monitor for input to spacecraft drag calculations.
Comment	A downgrading for the time resolution to 180 min is sometimes acceptable subject to confirmation from the Customer.

3.5.19. IT-007-P: Neutral Density in Thermosphere - Archives and A Posteriori Reconstruction

PRODUCT	Neutral Density in Thermosphere - Archives and A Posteriori Reconstruction
Product Code	IT-007-P
Input Data required	IT-007-M
Data to be provided and associated units	Neutral density in m^-3 or kg.m^-3 (typical)
Dynamic Range	number density: 10^10 m^-3 to 10^20 m^-3; mass density: 10^-6 to 10^-15 kg.m^-3
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided.
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	Horizonal goal of 500 km, threshold as fine as possible Vertical: N/A
Time Range	oldest date of data to most recent
Time Resolution	30 min
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1507 SWE-CRD-SCD-1508 SWE-CRD-SCD-1509 SWE-CRD-STC-3095 SWE-CRD-GEN-1715
Justification of the requirements	Input to spacecraft drag calculations
Comment	A downgrading for the time resolution to 180 min is sometimes acceptable subject to confirmation from the Customer.

3.5.20. IT-007-F: Neutral Density in Thermosphere - Forecast

PRODUCT	Neutral Density in Thermosphere - Forecast
Product Code	IT-007-F
Input Data required	SU-008-M SU-028-M L1-009-M L1-010-M IT-007-M AG-005-M
Data to be provided and associated units	neutral density in m^-3 or kg.m^-3 (typical)
Dynamic Range	number density: 10^10 m^-3 to 10^20 m^-3; mass density: 10^-6 to 10^-15 kg.m^-3
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided.
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	Horizonal goal of 500 km, threshold as fine as possible Vertical: N/A
Time Range	current date to 3 days ahead
Time Resolution	3 hrs
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1540 SWE-CRD-GEN-1715
Justification of the requirements	Used to generate forecast of spacecraft drag
Comment	

3.5.21. IT-008-M: Neutral Wind Velocity in Thermosphere - Measurement

PRODUCT	Neutral Wind Velocity in Thermosphere - Measurement
Product Code	IT-008-M
Input Data required	
Data to be provided and associated units	m s^-1
Dynamic Range	0 - 1500 m/s
Physical Range	Directional measurement. Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided.
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	Horizonal goal of 500 km, threshold as fine as possible Vertical: N/A
Time Range	N/A
Time Resolution	30 min
Timeliness/Latency	5 mins (90 mins for space-based measurements)
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1716
Justification of the requirements	Archive for a posteriori spacecraft drag calculations.
Comment	

3.5.22. IT-008-N: Neutral Wind Velocity in Thermosphere - Nowcast

PRODUCT	Neutral Wind Velocity in Thermosphere - Nowcast
Product Code	IT-008-N
Input Data required	IT-008-M
Data to be provided and associated units	m s^-1
Dynamic Range	0 - 1500 m/s
Physical Range	Directional measurement. Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided.
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	Horizonal goal of 500 km, threshold as fine as possible Vertical: N/A
Time Range	N/A
Time Resolution	30 min
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1540 SWE-CRD-GEN-1716
Justification of the requirements	Monitor for input to spacecraft drag calculations
Comment	A downgrade of the resolution to is sometimes acceptable and only order of magnitude can be provided subject to Customer approval.

3.5.23. IT-008-P: Neutral Wind Velocity in Thermosphere - Archives and A Posteriori Reconstruction

PRODUCT	Neutral Wind Velocity in Thermosphere - Archives and A Posteriori Reconstruction
Product Code	IT-008-P
Input Data required	IT-008-M
Data to be provided and associated units	m s^-1
Dynamic Range	0 - 1500 m/s
Physical Range	Directional measurement. Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided.
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	Horizonal goal of 500 km, threshold as fine as possible Vertical: N/A
Time Range	oldest date of data to most recent
Time Resolution	30 min
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1716
Justification of the requirements	Input to spacecraft drag calculations
Comment	A downgrade of the resolution to is sometimes acceptable and only order of magnitude can be provided subject to Customer approval.

3.5.24. IT-008-F: Neutral Wind Velocity in Thermosphere - Forecast

PRODUCT	Neutral Wind Velocity in Thermosphere - Forecast
Product Code	IT-008-F
Input Data required	SU-008-M SU-028-M L1-009-M L1-010-M IT-007-M IT-008-M AG-005-M
Data to be provided and associated units	m s^-1
Dynamic Range	0 - 1500 m/s
Physical Range	Directional measurement. Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided.
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	Horizonal goal of 500 km, threshold as fine as possible Vertical: N/A
Time Range	current date to 3 days ahead
Time Resolution	3 hours
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1540 SWE-CRD-GEN-1716
Justification of the requirements	Used to generate forecast of spacecraft drag
Comment	A downgrade of the resolution to is sometimes acceptable and only order of magnitude can be provided subject to Customer approval.

3.5.25. IT-009-M: Scintillation Parameters - Measurements

PRODUCT	Scintillation Parameters - Measurements
Product Code	IT-009-M
Input Data required	
Data to be provided and associated units	Indices: S4, sigma_phi, fading depth, fade duration, time between fades
Dynamic Range	S4: 0.0-1.0; sigma_phi: 0.0-1.0; fading depth: -40 dB; fade duration: 10 s at -10 dB; time between fades: 100 s at -10 dB
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km
Time Range	N/A
Time Resolution	1 min
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-LAU-1619 SWE-CRD-TIO-1640 SWE-CRD-AVI-3132 SWE-CRD-RES-3181
Justification of the requirements	Estimate performance degradation of GNSS reception due to scintillation. Required for post-event reconstruction.
Comment	Statistical indicators such as S4 and sigma_phi can be provided. However the other ones mentioned (fading depth, fade duration, time between fades) are more to be taken as intrinsic characteristics of the scintillation phenomena. It is seen as difficult to monitor them on a large scale basis.

3.5.26. IT-009-N: Scintillation Indices and Parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Nowcast

PRODUCT	Scintillation Indices and Parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Nowcast
Product Code	IT-009-N
Input Data required	IT-009-M
Data to be provided and associated units	Indices: S4, sigma_phi, fading depth, fade duration, time between fades
Dynamic Range	S4: 0.0-1.0; sigma_phi: 0.0-1.0; fading depth: -40 dB; fade duration: 10 s at -10 dB; time between fades: 100 s at -10 dB
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km
Time Range	N/A
Time Resolution	5 min
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-LAU-1619 SWE-CRD-TIO-1640 SWE-CRD-AVI-3132 SWE-CRD-RES-3181
Justification of the requirements	Data required to characterise ionospheric scintillation events allowing to estimate performance degradation due to those events; Measure performance degradation of GNSS due to scintillation. Required by users 003 and 004.
Comment	Statistical indicators such as S4 and sigma_phi can be provided. However the other ones mentioned (fading depth, fade duration, time between fades) are more to be taken as intrinsic characteristics of the scintillation phenomena. It is seen as difficult to monitor them on a large scale basis.

3.5.27. IT-009-P: Scintillation Indices and Parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Archives and A Posteriori Reconstruction

PRODUCT	Scintillation Indices and Parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Archives and A Posteriori Reconstruction
Product Code	IT-009-P
Input Data required	IT-009-M
Data to be provided and associated units	Indices: S4, sigma_phi, fading depth, fade duration, time between fades
Dynamic Range	S4: 0.0-1.0; sigma_phi: 0.0-1.0; fading depth: -40 dB; fade duration: 10 s at -10 dB; time between fades: 100 s at -10 dB
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km
Time Range	oldest date of data to most recent
Time Resolution	1 min
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-LAU-1619 SWE-CRD-TIO-1640 SWE-CRD-AVI-3132 SWE-CRD-RES-3181
Justification of the requirements	Nowcast performance degradation of GNSS reception due to scintillation.
Comment	Statistical indicators such as S4 and sigma_phi can be provided. The other ones mentioned (fading depth, fade duration, time between fades) are to be taken as intrinsic characteristics of the scintillation phenomena. It is seen as difficult to monitor them on a large scale basis.

3.5.28. IT-009-F: Scintillation Indices and Parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Forecast

PRODUCT	Scintillation Indices and Parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Forecast
Product Code	IT-009-F
Input Data required	L1-009-M L1-010-M IT-009-M AG-005-M
Data to be provided and associated units	Indices: S4, sigma_phi, fading depth, fade duration, time between fades
Dynamic Range	S4: 0.0-1.0; sigma_phi: 0.0-1.0; fading depth: -40 dB; fade duration: 10 s at -10 dB; time between fades: 100 s at -10 dB
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km
Time Range	current date to 3 days ahead
Time Resolution	5 min
Timeliness/Latency	5 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-LAU-1619 SWE-CRD-TIO-1640 SWE-CRD-AVI-3132 SWE-CRD-RES-3181
Justification of the requirements	Data required to characterise ionospheric scintillation events allowing to estimate performance degradation due to those events; Measure performance degradation of GNSS due to scintillation. Required by users 003 and 004.
Comment	

3.5.29. IT-010-M: Atomic Oxygen Density - Measurements

PRODUCT	Atomic Oxygen Density - Measurements
Product Code	IT-010-M
Input Data required	
Data to be provided and associated units	Density in m^-3 (or kg.m^-3)
Dynamic Range	10^8 m^-3 to 10^16 m^-3
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided
Spatial Range	200 km-1000 km altitude, long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	500 km
Time Range	current date
Time Resolution	30 s
Timeliness/Latency	100 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1523
Justification of the requirements	Effects in eroding surfaces of low Earth orbiting satellites
Comment	

3.5.30. IT-010-N: Atomic Oxygen Density - Nowcast

PRODUCT	Atomic Oxygen Density - Nowcast
Product Code	IT-010-N
Input Data required	IT-010-M
Data to be provided and associated units	Density in m^-3 (or kg.m^-3)
Dynamic Range	10^8 m^-3 to 10^16 m^-3
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided
Spatial Range	200 km-1000 km altitude, long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	500 km
Time Range	current date
Time Resolution	30 s
Timeliness/Latency	100 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	WE-CRD-SCD-1523
Justification of the requirements	Effects in eroding surfaces of low Earth orbiting satellites.
Comment	Nowcasts of IT-010 (Atomic Oxygen Density) are required. Types P, M are defined.

3.5.31. IT-010-P: Atomic Oxygen Density - Archives and A Posteriori Reconstruction

PRODUCT	Atomic Oxygen Density - Archives and A Posteriori Reconstruction
Product Code	IT-010-P
Input Data required	IT-010-M
Data to be provided and associated units	Density in m^-3 (or kg.m^-3)
Dynamic Range	10^8 m^-3 to 10^16 m^-3
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided
Spatial Range	200 km-1000 km altitude, long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	500 km
Time Range	oldest date of data to most recent
Time Resolution	30 s
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1523
Justification of the requirements	Effects in eroding surfaces of low Earth orbiting satellites.
Comment	

3.5.32. IT-010-F: Atomic Oxygen Density - Forecast

PRODUCT	Atomic Oxygen Density - Forecast
Product Code	IT-010-F
Input Data required	L1-008-M L1-009-M L1-010-M L1-011-M IT-010-M
Data to be provided and associated units	Density in m^-3 (or kg.m^-3)
Dynamic Range	10^8 m^-3 to 10^16 m^-3
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided
Spatial Range	200 km-1000 km altitude, long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	500 km
Time Range	current date
Time Resolution	30 s
Timeliness/Latency	300 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	WE-CRD-SCD-1523
Justification of the requirements	Forecast erosion of surfaces of low Earth orbiting satellites
Comment	Forecasts of IT-010 (Atomic Oxygen Density) are required. Types P, M are defined.

3.5.33. IT-011-N: Ionospheric Disturbances - Nowcast

PRODUCT	Ionospheric Disturbances - Nowcast
Product Code	IT-011-N
Input Data required	IT-005-M IT-006-M
Data to be provided and associated units	n/a
Dynamic Range	N/A (see comment)
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km
Time Range	current date
Time Resolution	5 min
Timeliness/Latency	5 min
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1634 SWE-CRD-TIO-1636
Justification of the requirements	Space and ground system performance is affected locally by small-scale ionospheric disturbances which add to TEC variations, scintillations and D-region absorption.
Comment	Product builds on IT-001-P, IT-002-P, IT-005-P, IT-009-P.

3.5.34. IT-011-P: Ionospheric Disturbances – Archive and a posteriori reconstruction

PRODUCT	Ionospheric Disturbances – Archive and a posteriori reconstruction
Product Code	IT-011-P
Input Data required	IT-005-M IT-006-M
Data to be provided and associated units	n/a
Dynamic Range	N/A (see comment)
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km
Time Range	From oldest date of data to most recent
Time Resolution	5 min
Timeliness/Latency	2 days
Accuracy	0.3
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1634 SWE-CRD-TIO-1636
Justification of the requirements	Space and ground system performance is affected locally by small-scale ionospheric disturbances which add to TEC variations, scintillations and D-region absorption.
Comment	Product builds on IT-001-P, IT-002-P, IT-005-P, IT-009-P.

3.5.35. IT-011-F: Ionospheric Disturbances – Forecast

PRODUCT	Ionospheric Disturbances - Forecast
Product Code	IT-011-F
Input Data required	L1-009-M L1-010-M IT-005-M AG-005-M
Data to be provided and associated units	n/a
Dynamic Range	N/A (see comment)
Physical Range	as a function of lat and long
Spatial Range	long: 0 - 360 deg, lat: -90, 90
Spatial Resolution	100 km
Time Range	current date to 3 days ahead
Time Resolution	15 min
Timeliness/Latency	15 min
Accuracy	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1634 SWE-CRD-TIO-1636
Justification of the requirements	Useful parameters for estimating Joule heating and impact of auroral precipitation in the ionosphere
Comment	Product builds on IT-001-P, IT-002-P, IT-005-P, IT-009-P.

3.5.36. IT-012-N: Ionospheric Hall conductance - Nowcast

PRODUCT	Ionospheric Hall conductance - Nowcast
Product Code	IT-012-N
Input Data required	IT-002-M AG-007-M
Data to be provided and associated units	Electric conductance in Siemens S (kg^-1.m^-1.s^3.A^2) or mho (1 ℧)
Dynamic Range	0 - 100 S or mho
Physical Range	As a function of latitude and longitude
Spatial Range	Aurora oval region
Spatial Resolution	Horizontal 10 km Vertical N/a
Time Range	N/A
Time Resolution	30 min
Timeliness/Latency	5 min
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3021
Justification of the requirements	Useful parameters for estimating the strength of the auroral electrojet
Comment	Height-integrated conductivities.The Hall current is the component of the electric current that flows perpendicular to both the electric and the magnetic field.

3.5.37. IT-012-P: Ionospheric Hall conductance - Archives and A Posteriori Reconstruction

PRODUCT	Ionospheric Hall conductance - Archives and A Posteriori Reconstruction
Product Code	IT-012-P
Input Data required	IT-002-M AG-007-M
Data to be provided and associated units	Electric conductance in Siemens S (kg^-1.m^-1.s^3.A^2) or mho (1 ℧)
Dynamic Range	0 - 100 S or mho
Physical Range	As a function of latitude and longitude
Spatial Range	Aurora oval region
Spatial Resolution	Horizontal 10 km Vertical N/a
Time Range	oldest date of data to most recent
Time Resolution	30 min
Timeliness/Latency	2 days
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3021
Justification of the requirements	Useful parameters for estimating the strength of the auroral electrojet
Comment	Height-integrated conductivities.The Hall current is the component of the electric current that flows perpendicular to both the electric and the magnetic field.

3.5.38. IT-012-F: Ionospheric Hall conductance - Forecast

PRODUCT	Ionospheric Hall conductance - Forecast
Product Code	IT-012-F
Input Data required	IT-002-M AG-007-M
Data to be provided and associated units	Electric conductance in Siemens S (kg^-1.m^-1.s^3.A^2) or mho (1 ℧)
Dynamic Range	0 - 100 S or mho
Physical Range	As a function of latitude and longitude
Spatial Range	Aurora oval region
Spatial Resolution	Horizontal 10 km Vertical N/a
Time Range	current date to 3 days ahead
Time Resolution	3 hrs
Timeliness/Latency	5 min
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3021
Justification of the requirements	Useful parameters for estimating the strength of the auroral electrojet
Comment	Height-integrated conductivities.The Hall current is the component of the electric current that flows perpendicular to both the electric and the magnetic field.

3.5.39. IT-013-N: Ionospheric Pedersen conductance - Nowcast

PRODUCT	Ionospheric Pedersen conductance - Nowcast
Product Code	IT-013-N
Input Data required	IT-002-M AG-007-M
Data to be provided and associated units	Electric conductance in Siemens S (kg^-1.m^-1.s^3.A^2) or mho (1 ℧)
Dynamic Range	0 - 50 S or mho
Physical Range	As a function of latitude and longitude
Spatial Range	Aurora oval region
Spatial Resolution	Horizontal 10 km Vertical N/a
Time Range	N/A
Time Resolution	30 min
Timeliness/Latency	5 min
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3021
Justification of the requirements	Useful parameters for estimating Joule heating and impact of auroral precipitation in the ionosphere
Comment	Height-integrated conductivities. Pedersen current is the component on the electric current that flows parallel to the electric field and perpendicular to magnetic field.

3.5.40. IT-013-P: Ionospheric Pedersen conductance - Archives and A Posteriori Reconstruction

PRODUCT	Ionospheric Pedersen conductance - Archives and A Posteriori Reconstruction
Product Code	IT-013-P
Input Data required	IT-002-M AG-007-M
Data to be provided and associated units	Electric conductance in Siemens S (kg^-1.m^-1.s^3.A^2) or mho (1 ℧)
Dynamic Range	0 - 50 S or mho
Physical Range	As a function of latitude and longitude
Spatial Range	Aurora oval region
Spatial Resolution	Horizontal 10 km Vertical N/a
Time Range	oldest date of data to most recent
Time Resolution	30 min
Timeliness/Latency	2 days
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3021
Justification of the requirements	Useful parameters for estimating Joule heating and impact of auroral precipitation in the ionosphere
Comment	Height-integrated conductivities. Pedersen current is the component on the electric current that flows parallel to the electric field and perpendicular to magnetic field.

3.5.41. IT-013-F: Ionospheric Pedersen conductance - Forecast

PRODUCT	Ionospheric Pedersen conductance - Forecast
Product Code	IT-013-F
Input Data required	IT-002-M AG-007-M
Data to be provided and associated units	Electric conductance in Siemens S (kg^-1.m^-1.s^3.A^2) or mho (1 ℧)
Dynamic Range	0 - 50 S or mho
Physical Range	As a function of latitude and longitude
Spatial Range	Aurora oval region
Spatial Resolution	Horizontal 10 km Vertical N/a
Time Range	current date to 3 days ahead
Time Resolution	3 hrs
Timeliness/Latency	5 min
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3021
Justification of the requirements	Useful parameter for electron density forecasts, for estimating Joule heating and for strength of auroral electrojets in global scales
Comment	Height-integrated conductivities. Pedersen current is the component on the electric current that flows parallel to the electric field and perpendicular to magnetic field.

3.5.42. IT-014-M: Global high-latitude convection electric field – Measurement

PRODUCT	Global high-latitude convection electric field - Measurement
Product Code	IT-014-M
Input Data required	
Data to be provided and associated units	volt per meter (V/m)
Dynamic Range	-200 to 200 mV.m^-1
Physical Range	N/A
Spatial Range	Aurora oval region
Spatial Resolution	10 km
Time Range	N/A
Time Resolution	30 min
Timeliness/Latency	5 min
Accuracy	
Other Specific	
Related CRD Requirement	
Justification of the requirements	Useful parameter for electron density forecasts, for estimating Joule heating and for strength of auroral electrojets in global scales
Comment	

3.5.43. IT-014-N: Global high-latitude convection electric field - Nowcast

PRODUCT	Global high-latitude convection electric field - Nowcast
Product Code	IT-014-N
Input Data required	IT-014-M SU-008-M
Data to be provided and associated units	volt per meter (V/m)
Dynamic Range	-200 to 200 mV.m^-1
Physical Range	As a function of latitude and longitude
Spatial Range	Aurora oval region
Spatial Resolution	10 km
Time Range	N/A
Time Resolution	30 min
Timeliness/Latency	5 min
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3022
Justification of the requirements	Useful parameter for electron density forecasts, for estimating Joule heating and for strength of auroral electrojets in global scales
Comment	Generally provided as map.

3.5.44. IT-014-P: Global high-latitude convection electric field - Archives and A Posteriori Reconstruction

PRODUCT	Global high-latitude convection electric field - Archives and A Posteriori Reconstruction
Product Code	IT-014-P
Input Data required	IT-014-M SU-008-M
Data to be provided and associated units	volt per meter (V/m)
Dynamic Range	-200 to 200 mV.m^-1
Physical Range	As a function of latitude and longitude
Spatial Range	Aurora oval region
Spatial Resolution	10 km
Time Range	oldest date of data to most recent
Time Resolution	30 min
Timeliness/Latency	2 days
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3022
Justification of the requirements	Useful parameter for electron density forecasts, for estimating Joule heating and for strength of auroral electrojets in global scales
Comment	Generally provided as map.

3.5.45. IT-014-F: Global high-latitude convection electric field - Forecast

PRODUCT	Global high-latitude convection electric field - Forecast
Product Code	IT-014-F
Input Data required	SU-008-M
Data to be provided and associated units	volt per meter (V/m)
Dynamic Range	-200 to 200 mV.m^-1
Physical Range	As a function of latitude and longitude
Spatial Range	Aurora oval region
Spatial Resolution	10km
Time Range	current date to 3 days ahead
Time Resolution	3 hrs
Timeliness/Latency	5 min
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3022
Justification of the requirements	Space and ground system performance is affected locally by small-scale ionospheric disturbances which add to TEC variations, scintillations and D-region absorption.
Comment	Generally provided as map.

3.5.46. IT-015-M: VLF radio measurements - Measurement

PRODUCT	VLF radio measurements - Measurement
Product Code	IT-015-M
Input Data required	
Data to be provided and associated units	Amplitude perturbation (in dB) and phase (in degrees) of Very low Frequency (VLF) signals. Polarization parameters (e.g. location on polarisation ellipse in units of picotesla, pT) may also be useful when available
Dynamic Range	[0, 15 dB] amplitude perturbation; [0, 800 degrees] phase; [-50, 50 pT] polarization parameters
Physical Range	N/A
Spatial Range	Global coverage
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	1 min
Timeliness/Latency	1 min
Accuracy	1 dB, 10°, 1pT
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3145
Justification of the requirements	VLF measurements can be used to detect large solar flares, and can provide resilient backup to space-based observations of flares in the case that extreme space weather disrupted operations of those satellites. VLF measurements are not vulnerable to disruption by tropospheric weather, and since they usually use propagation paths at low and mid-latitudes they are rarely affected by solar radiation storms. VLF measurements can also be used to assess conditions in the lower layers of the ionosphere (D-region) and detect unusual events that create ionisation in this region, e.g. relativistic electron precipitation from the radiation belts, also gamma-ray bursts from objects well outside the solar system.
Comment	A network of receivers is desirable, but a single transmitter, together with a single receiver distant from the transmitter, is sufficient.

3.5.47. IT-015-P: VLF radio measurements - Archives and A Posteriori Reconstruction

PRODUCT	VLF radio measurements - Archives and A Posteriori Reconstruction
Product Code	IT-015-P
Input Data required	IT-015-M
Data to be provided and associated units	Amplitude perturbation (in dB) and phase (in degrees) of Very low Frequency (VLF) signals. Polarization parameters (e.g. location on polarisation ellipse in units of picotesla, pT) may also be useful when available
Dynamic Range	[0, 15 dB] amplitude perturbation; [0, 800 degrees] phase; [-50, 50 pT] polarization parameters
Physical Range	N/A
Spatial Range	Global coverage
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	1 min
Timeliness/Latency	24 hours
Accuracy	1 dB, 10°, 1pT
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3145
Justification of the requirements	VLF measurements can be used to detect large solar flares and also assess conditions in the lower layers of the ionosphere (D-region) as discussed under IT-015-N. Archival copies of these measurements are an important tool for future development of techniques to exploit VLF measurements.
Comment	A network of receivers is desirable, but a single transmitter, together with a single receiver distant from the transmitter, is sufficient.

3.5.48. IT-016-M: Neutral atmosphere temperature - Measurement

PRODUCT	Neutral atmosphere temperature - Measurement
Product Code	IT-016-M
Input Data required	
Data to be provided and associated units	Temperature in K
Dynamic Range	100 to 2000 K
Physical Range	As a function of solar activity and geomagnetic conditions, latitude, local time and season
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	10 km
Time Range	N/a
Time Resolution	30 min
Timeliness/Latency	60 min
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3023
Justification of the requirements	A useful input parameter for models which estimate atmospheric drag
Comment	

3.5.49. IT-016-N: Neutral atmosphere temperature - Nowcast

PRODUCT	Neutral atmosphere temperature - Nowcast
Product Code	IT-016-N
Input Data required	SU-008-M
Data to be provided and associated units	Temperature in K
Dynamic Range	100 to 2000 K
Physical Range	As a function of solar activity and geomagnetic conditions, latitude, local time and season
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	10 km
Time Range	N/A
Time Resolution	30 min
Timeliness/Latency	5 min
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3023
Justification of the requirements	A useful input parameter for models which estimate atmospheric drag
Comment	

3.5.50. IT-016-P: Neutral atmosphere temperature - Archives and A Posteriori Reconstruction

PRODUCT	Neutral atmosphere temperature - Archives and A Posteriori Reconstruction
Product Code	IT-016-P
Input Data required	SU-008-M
Data to be provided and associated units	Temperature in K
Dynamic Range	100 to 2000 K
Physical Range	As a function of solar activity and geomagnetic conditions, latitude, local time and season
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	10 km
Time Range	oldest date of data to most recent
Time Resolution	30 min
Timeliness/Latency	2 days
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3023
Justification of the requirements	A useful input parameter for models which estimate atmospheric drag
Comment	

3.5.51. IT-016-F: Neutral atmosphere temperature - Forecast

PRODUCT	Neutral atmosphere temperature - Forecast
Product Code	IT-016-F
Input Data required	SU-008-M
Data to be provided and associated units	Temperature in K
Dynamic Range	100 to 2000 K
Physical Range	As a function of solar activity and geomagnetic conditions, latitude, local time and season
Spatial Range	From 100 km to 600 km altitude
Spatial Resolution	10 km
Time Range	current date to 3 days ahead
Time Resolution	3 hrs
Timeliness/Latency	5 min
Accuracy	
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3023
Justification of the requirements	
Comment	

3.6. DATA ON EARTH ATMOSPHERE AND GEOMAGNETIC ENVIRONMENT

3.6.1. AG-001-M: Auroral Visible Imaging - Measurement

PRODUCT	Auroral Visible Imaging - Measurement
Product Code	AG-001-M
Input Data required	
Data to be provided and associated units	Auroral white-light images from space-based sensors and ground-based all-sky cameras
Dynamic Range	3000 (intensity contrast)
Physical Range	visible from 350 nm to 750 nm
Spatial Range	Latitudes from 45 deg to 90 deg, North and South.
Spatial Resolution	5 km (<5 km for ground-based all-sky cameras)
Time Range	N/A
Time Resolution	60 s, 10 s for ground-based all-sky cameras
Timeliness/Latency	5 min (applies to space-based sensors only when they are in a position from which imaging is possible, always applies to ground-based sensors)
Accuracy	5% intensity, 10 km spatial
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1708 SWE-CRD-AUR-3188
Justification of the requirements	Optical aurora is the only visible manifestation of physical processes occurring in the magnetosphere. It corresponds to the convolution of solar wind, interplanetary and geomagnetic field. The emissions contain information about the incident primary particles and about physical and chemical processes occurring locally.
Comment	High latitude ground stations should enable timeliness requirement to be fulfilled for space-based sensors.

3.6.2. AG-001-N: Auroral Visible Imaging - Nowcast

PRODUCT	Auroral Visible Imaging - Nowcast
Product Code	AG-001-N
Input Data required	AG-001-M
Data to be provided and associated units	Auroral white-light images from ground-based and space-based sensors
Dynamic Range	3000 (intensity contrast)
Physical Range	visible from 350 nm to 750 nm
Spatial Range	Latitudes from 45 deg to 90 deg, North and South.
Spatial Resolution	25 km
Time Range	N/A
Time Resolution	60 min
Timeliness/Latency	10 min
Accuracy	5% intensity, 10 km spatial
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1709 SWE-CRD-AUR-3188
Justification of the requirements	Input to tourism oriented services: ground based or space based data applicable; Auroral boundary may be used as input to magnetospheric modelling activities.
Comment	Processing is needed to convert photos to images at common horizontal reference level.

3.6.3. AG-001-P: Auroral Visible Imaging - Archives and A Posteriori Reconstruction

PRODUCT	Auroral Visible Imaging - Archive and a posteriori reconstruction
Product Code	AG-001-P
Input Data required	AG-001-M
Data to be provided and associated units	Auroral white-light images from ground-based and space-based sensors
Dynamic Range	3000 (intensity contrast)
Physical Range	visible from 350 nm to 750 nm
Spatial Range	Latitudes from 45 deg to 90 deg, North and South.
Spatial Resolution	25 km
Time Range	1 day - 27 days & all historical measurements for archive (see comment)
Time Resolution	60 min
Timeliness/Latency	24 hours
Accuracy	5% intensity, 10 km spatial
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1709 SWE-CRD-AUR-3188
Justification of the requirements	Auroral boundary may be used as input to magnetospheric modelling activities.
Comment	Many historical observations exist only on celluloid film but not in digital form.

3.6.4. AG-001-F: Probability of Visible Auroras - Forecast

PRODUCT	Probability of Visible Auroras - Forecast
Product Code	AG-001-F
Input Data required	AG-001-M AG-005-M
Data to be provided and associated units	Alert tourists giving brackets of probability of visible aurora
Dynamic Range	3 - 5 levels of warning based on percentage (0-100) calculation
Physical Range	visible from 350 nm to 750 nm
Spatial Range	Latitudes from 45 deg to 90 deg, North and South.
Spatial Resolution	25 km
Time Range	1 hr - 7 days
Time Resolution	60 min
Timeliness/Latency	5 min
Accuracy	70-80% hit rate
Other Specific	
Related CRD Requirement	SWE-CRD-AUR-3008 SWE-CRD-AUR-3188
Justification of the requirements	Alert tourists during daylight hours of probability of visible aurora. Input to tourism oriented services: ground based or space based data applicable.
Comment	

3.6.5. AG-002-M: Auroral UV Imaging - Measurement

PRODUCT	Auroral UV Imaging - Measurement
Product Code	AG-002-M
Input Data required	
Data to be provided and associated units	Auroral UV images from space-based sensors
Dynamic Range	3000 (intensity contrast)
Physical Range	UV from 110 nm to 350 nm or smaller bandwidth covering key spectra lines such as 130.4 & 135.6 nm lines.
Spatial Range	Latitudes from 45 deg to 90 deg, North and South.
Spatial Resolution	5 km
Time Range	N/A
Time Resolution	60 s (see comment)
Timeliness/Latency	5 min (applies to space-based sensors only when they are in a position from which imaging is possible, always applies to ground-based sensors)
Accuracy	5% intensity, 10 km spatial
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1706
Justification of the requirements	Optical aurora is the only visible manifestation of physical processes occurring in the magnetosphere. It corresponds to the convolution of solar wind, interplanetary and geomagnetic field. The emissions contain information about the incident primary particles and about physical and chemical processes occurring locally.
Comment	High latitude ground stations should enable timeliness requirement to be fulfilled for space-based sensors. A polar orbiting LEO satellite can take images in rapid sequence when in the auroral zone and then nothing for 80-90 min because an orbit lasts 100 min. MEO satellites (Polar) can see the entire polar cap for a while and then not at all for several hours. Highly eccentric, Molniya-type orbits give improved proportional orbital coverage.

3.6.6. AG-002-N: Auroral UV Imaging - Nowcast

PRODUCT	Auroral UV Imaging - Nowcast
Product Code	AG-002-N
Input Data required	AG-002-M
Data to be provided and associated units	Auroral UV images from space borne sensors
Dynamic Range	3000 (intensity contrast)
Physical Range	UV from 110 nm to 350 nm or smaller bandwidth covering key spectra lines such as 130.4 & 135.6 nm lines.
Spatial Range	global
Spatial Resolution	25 km
Time Range	N/A
Time Resolution	60 min (see comment)
Timeliness/Latency	10 min
Accuracy	5% intensity, 20 km spatial
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1707
Justification of the requirements	Identify strength and extent of auroral region during active periods
Comment	High latitude ground stations should enable timeliness requirement to be fulfilled for space-based sensors. A polar orbiting LEO satellite can take images in rapid sequence when in the auroral zone and then nothing for 80-90 min because an orbit lasts 100 min. MEO satellites (Polar) can see the entire polar cap for a while and then not at all for several hours. Highly eccentric, Molniya-type orbits give improved proportional orbital coverage.

3.6.7. AG-002-P: Auroral UV Imaging - Archives and A Posteriori Reconstruction

PRODUCT	Auroral UV Imaging - Archive and a posteriori reconstruction
Product Code	AG-002-P
Input Data required	AG-002-M
Data to be provided and associated units	Auroral UV images from space-based sensors
Dynamic Range	3000 (intensity contrast)
Physical Range	UV from 110 nm to 350 nm or smaller bandwidth covering key spectra lines such as 130.4 & 135.6 nm lines.
Spatial Range	global
Spatial Resolution	25 km
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	60 min (see comment)
Timeliness/Latency	24 hours
Accuracy	5% intensity, 50 km spatial
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1707
Justification of the requirements	Identify strength and extent of auroral region during active periods
Comment	High latitude ground stations should enable timeliness requirement to be fulfilled for space-based sensors. A polar orbiting LEO satellite can take images in rapid sequence when in the auroral zone and then nothing for 80-90 min because an orbit lasts 100 min. MEO satellites (Polar) can see the entire polar cap for a while and then not at all for several hours. Highly eccentric, Molniya-type orbits give improved proportional orbital coverage.

3.6.8. AG-005-M: Local External Magnetic Field on Ground - Measurement

PRODUCT	Local External Magnetic Field on Ground - Measurement
Product Code	AG-005-M
Input Data required	
Data to be provided and associated units	magnetic field strength (B) [nT] and deduced rate of change of magnetic field (dB/dT) [nT/s]; both in 3D vector form.
Dynamic Range	-8,000 to 8,000 nT (B); -2 nT/s to 2 Nt/s (dB/dt)
Physical Range	N/A
Spatial Range	Regional, with denser network of magnetometers in vicinity of customer power grid, pipeline or drilling/survey site.
Spatial Resolution	Network spacing goal of 50 km with threshold of 200 km. Spacing below 50 km is not necessary.
Time Range	N/A
Time Resolution	10 s
Timeliness/Latency	2 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-AUR-3008
Justification of the requirements	Prerequisite for AG-005-P, AG-005-N, AG-005-F
Comment	

3.6.9. AG-005-N: Local External Magnetic Field on Ground - Nowcast

PRODUCT	Local External Magnetic Field on Ground - Nowcast
Product Code	AG-005-N
Input Data required	AG-005-M
Data to be provided and associated units	magnetic field strength (B) [nT] and deduced rate of change of magnetic field (dB/dT) [nT/s]; both in 3D vector form.
Dynamic Range	-8,000 to 8,000 nT (B); -2 nT/s to 2 Nt/s (dB/dt)
Physical Range	N/A
Spatial Range	Regional, with denser network of magnetometers in vicinity of customer power grid, pipeline or drilling/survey site.
Spatial Resolution	Network spacing goal of 50 km with threshold of 200 km. Spacing below 50 km is not necessary.
Time Range	N/A
Time Resolution	Threshold 1 min, goal of 10 s (for GIC estimation)
Timeliness/Latency	3 min
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-POW-3062 SWE-CRD-PPL-3063 SWE-CRD-RES-3076
Justification of the requirements	Determination of dB/dt, monitoring disturbance levels leading to geomagnetically induced currents in power lines. Generation of indices. Determination of magnetospheric plasma density through magnetospheric seismology.
Comment	Geomagnetically Induced Current nowcasts shall be provided in as close to near real-time as possible.

3.6.10. AG-005-P: Local External Magnetic Field on Ground - Archives and A Posteriori Reconstruction

PRODUCT	Local External Magnetic Field on Ground - Archives and A Posteriori Reconstruction
Product Code	AG-005-P
Input Data required	AG-005-M
Data to be provided and associated units	magnetic field strength (B) [nT] and deduced rate of change of magnetic field (dB/dT) [nT/s]; both in 3D vector form.
Dynamic Range	-8,000 to 8,000 nT (B); -2 nT/s to 2 Nt/s (dB/dt)
Physical Range	N/A
Spatial Range	Regional, with denser network of magnetometers in vicinity of customer power grid, pipeline or drilling/survey site.
Spatial Resolution	Network spacing goal of 50 km with threshold of 200 km. Spacing below 50 km is not necessary.
Time Range	1 day - 27 days & all historical measurements for archive (see comment)
Time Resolution	Threshold 1 min, goal of 10 s (for GIC estimation)
Timeliness/Latency	24 hours
Accuracy	Goal 0.5%, threshold 10% (applicable more for historical records)
Other Specific	
Related CRD Requirement	SWE-CRD-POW-3062 SWE-CRD-PPL-3063 SWE-CRD-RES-3076
Justification of the requirements	Determination of dB/dt, monitoring disturbance levels leading to geomagnetically induced currents in power lines. Generation of indices. Determination of Earth's electrical conductivity structure from ground magnetotelluric measurements for estimating geomagnetically threats by Geomagnetically Induced Currents to power lines. Determination of magnetospheric plasma density through magnetospheric seismology.
Comment	Geomagnetically Induced Current nowcasts shall be provided in as close to near real-time as possible. Many historical measurements exist only on celluloid film or photographic paper but not in digital form, their accuracy is far from 0.5%. For plasmaspheric and magnetospheric seismology a time resolution of 1 s is needed.

3.6.11. AG-005-F: Local External Magnetic Field on Ground - Forecast

PRODUCT	Local External Magnetic Field on Ground - Forecast
Product Code	AG-005-F
Input Data required	SU-005-M SU-015-M SU-019-M SU-020-M SU-025-M SU-026-M SU-027-M SU-028-M L1-001-M L1-002-M L1-008-M L1-009-M L1-010-M L1-011-M AG-005-M
Data to be provided and associated units	magnetic field strength (B) [nT] and deduced rate of change of magnetic field (dB/dT) [nT/s]; both in 3D vector form.
Dynamic Range	-8,000 to 8,000 nT (B); -2 nT/s to 2 Nt/s (dB/dt)
Physical Range	N/A
Spatial Range	regional to local
Spatial Resolution	Network spacing goal of 50 km with threshold of 200 km. Spacing below 50 km is not necessary.
Time Range	15 mins – 27 days
Time Resolution	1 min
Timeliness/Latency	5 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-POW-3062 SWE-CRD-PPL-3063 SWE-CRD-RES-3076
Justification of the requirements	Forecast of dB/dt, forecasting disturbance levels leading to geomagnetically induced currents in power lines. Forecast of indices.
Comment	Geomagnetically Induced Current nowcasts shall be provided in as close to near real-time as possible. A 7-day qualitative forecast (daily range of B) can be delivered. A dB/dt forecast more than ~1 hr ahead is not possible.

3.6.12. AG-006-N: Local Geomagnetic Induced Geoelectric Field - Nowcast

PRODUCT	Local Geomagnetic Induced Geoelectric Field - Nowcast
Product Code	AG-006-N
Input Data required	AG-005-M
Data to be provided and associated units	E field in mV.km-1
Dynamic Range	-200 mV/km to 200 mV/km
Physical Range	Electric field strength in horizontal northward and eastward directions
Spatial Range	regional to local, with denser network of magnetometers in vicinity of customer power grid, pipeline or drilling/survey site
Spatial Resolution	100 km.
Time Range	N/A
Time Resolution	1 min
Timeliness/Latency	10 min
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712 SWE-CRD-POW-3073 SWE-CRD-PPL-3136 SWE-CRD-POW-3062 SWE-CRD-PPL-3063 SWE-CRD-RES-3076 SWE-CRD-POW-3064 SWE-CRD-PPL-3065
Justification of the requirements	Used to nowcast GIC in power lines and pipelines.
Comment	Geomagnetically induced electric field nowcasts shall be provided in as close to near real-time as possible.

3.6.13. AG-006-P: Local Geomagnetic Induced Geoelectric Field - Archives and A Posteriori Reconstruction

PRODUCT	Local Geomagnetic Induced Geoelectric Field - Archives and A Posteriori Reconstruction
Product Code	AG-006-P
Input Data required	AG-005-M
Data to be provided and associated units	E field in mV.km-1
Dynamic Range	-200 mV/km to 200 mV/km
Physical Range	Electric field strength in horizontal northward and eastward directions
Spatial Range	regional to local, with denser network of magnetometers in vicinity of customer power grid, pipeline or drilling/survey site
Spatial Resolution	100 km
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	1 min
Timeliness/Latency	24 hours
Accuracy	Goal 10%, threshold 20% (see comment)
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712 SWE-CRD-POW-3073 SWE-CRD-PPL-3136 SWE-CRD-POW-3062 SWE-CRD-PPL-3063 SWE-CRD-RES-3076 SWE-CRD-POW-3064 SWE-CRD-PPL-3065
Justification of the requirements	Used in combination with magnetometer measurements to map the spatial variation of the Earth's conductivity. Determination of ground impedance, and post-event analysis of GIC effects
Comment	Some historical measurements exist only on photographic media but not in digital form, their accuracy is worse than 10%.

3.6.14. AG-006-F: Local Geomagnetic Induced Geoelectric Field - Forecast

PRODUCT	Local Geomagnetic Induced Geoelectric Field - Forecast
Product Code	AG-006-F
Input Data required	SU-005-M SU-015-M SU-019-M SU-020-M SU-025-M SU-026-M SU-027-M SU-028-M L1-001-M L1-002-M L1-008-M L1-009-M L1-010-M L1-011-M AG-005-M
Data to be provided and associated units	E field in mV.km-1
Dynamic Range	-200 mV/km to 200 mV/km
Physical Range	Electric field strength in horizontal northward and eastward directions
Spatial Range	regional to local
Spatial Resolution	100 km
Time Range	1 hr - 7 days
Time Resolution	1 min
Timeliness/Latency	5 min
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712 SWE-CRD-POW-3073 SWE-CRD-PPL-3136 SWE-CRD-POW-3062 SWE-CRD-PPL-3063 SWE-CRD-RES-3076 SWE-CRD-POW-3064 SWE-CRD-PPL-3065
Justification of the requirements	Used to forecast GIC in power lines and pipelines
Comment	A 7-day forecast of the geomagnetically induced electric field is impossible as this requires dB/dt which cannot be forecast with great accuracy.

3.6.15. AG-007-M: Neutral Density and Wind - Measurement

PRODUCT	Neutral Density and Wind - Measurement
Product Code	AG-007-M
Input Data required	
Data to be provided and associated units	Density in m^-3 or kg.m^-3 (typical); wind in m.s-1
Dynamic Range	number density: 10^15 m^-3 to 10^20 m^-3; mass density: 10^-7 to 10^-11 kg.m^-3; wind speed 0 to 400 m/s
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided
Spatial Range	120 to 200 km
Spatial Resolution	50 km (horizontal)
Time Range	N/A
Time Resolution	5 min
Timeliness/Latency	5 min
Accuracy	0.05
Other Specific	
Related CRD Requirement	
Justification of the requirements	Prerequisite for AG-007-P, AG-007-N, AG-007-F
Comment	

3.6.16. AG-007-N: Neutral Density and Wind - Nowcast

PRODUCT	Neutral Density and Wind - Nowcast
Product Code	AG-007-N
Input Data required	AG-007-M
Data to be provided and associated units	Density in m^-3 or kg.m^-3 (typical); wind in m.s-1
Dynamic Range	number density: 10^15 m^-3 to 10^20 m^-3; mass density: 10^-7 to 10^-11 kg.m^-3; wind speed 0 to 400 m/s
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided
Spatial Range	120 to 200 km
Spatial Resolution	1000 km (horizontal), 20 km (vertical)
Time Range	N/A
Time Resolution	3 hours
Timeliness/Latency	Goal of 3 hours
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-LAU-1618
Justification of the requirements	Principally important because of effects on launch trajectory
Comment	Relevant altitude range and relevance of thermosphere for Launchers to be checked.

3.6.17. AG-007-P: Neutral Density and Wind - Archives and A Posteriori Reconstruction

PRODUCT	Neutral Density and Wind - Archives and A Posteriori Reconstruction
Product Code	AG-007-P
Input Data required	AG-007-M
Data to be provided and associated units	Density in m^-3 or kg.m^-3 (typical); wind in m.s-1
Dynamic Range	number density: 10^15 m^-3 to 10^20 m^-3; mass density: 10^-7 to 10^-11 kg.m^-3; wind speed 0 to 400 m/s
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided
Spatial Range	120 to 200 km
Spatial Resolution	50 km (horizontal)
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	5 min
Timeliness/Latency	24 hours
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-LAU-1618
Justification of the requirements	Principally important because of atmospheric effects on launcher drag; used to include drag effect in computing launcher trajectory back in time.
Comment	

3.6.18. AG-007-F: Neutral Density and Wind - Forecast

PRODUCT	Neutral Density and Wind - Forecast
Product Code	AG-007-F
Input Data required	SU-008-M SU-028-M IT-010-M AG-005-M AG-007-M
Data to be provided and associated units	Density in m^-3 or kg.m^-3 (typical); wind in m.s-1
Dynamic Range	number density: 10^15 m^-3 to 10^20 m^-3; mass density: 10^-7 to 10^-11 kg.m^-3; wind speed 0 to 400 m/s
Physical Range	Variations with latitude, solar cycle, SLT time, magnetic activity shall be provided
Spatial Range	120 to 200 km
Spatial Resolution	1000 km (horizontal), 20 km (vertical)
Time Range	1 hr - 7 days
Time Resolution	3 hours
Timeliness/Latency	Goal of 3 hours
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-LAU-1618
Justification of the requirements	Principally important to forecast effects on launch trajectory
Comment	Relevant altitude range and relevance of thermosphere for Launchers to be checked.

3.6.19. AG-008-M: Atmospheric neutrons - Measurement

PRODUCT	Atmospheric neutrons - Measurement
Product Code	AG-008-M
Input Data required	
Data to be provided and associated units	Atmospheric neutrons flux in cm-2.s-1
Dynamic Range	+/-5% (diurnal), -10% (Forbush decrease) and +100000% (secondaries from extreme SEP events) - up to 100000 counts/sec.
Physical Range	Energy range 1 - 20 GeV
Spatial Range	global
Spatial Resolution	1000 km (horizontal)
Time Range	N/A
Time Resolution	1 min
Timeliness/Latency	5 mins
Accuracy	0.01
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1719 SWE-CRD-AVI-3129
Justification of the requirements	Monitor ground level and aircraft altitude level events caused by solar particle events or observe anisotropies in the background distribution caused by CME propagation in the solar wind. The hardest spectra particle events name Ground-Level Enhancements (GLEs) result in significant neutron monitor enhancements on the ground.
Comment	Provide access to cosmic ray neutron count rates measured by standard monitors around the world. Rates should be adjusted for local atmospheric pressure. The increase for the 1956 event showed a ~5000% increase in neutron monitor count rates, for a Carrington-type event this might be far higher, i.e. >>10000%.

3.6.20. AG-008-N: Atmospheric neutrons - Nowcast

PRODUCT	Atmospheric neutrons - Nowcast
Product Code	AG-008-N
Input Data required	AG-008-M
Data to be provided and associated units	Atmospheric neutrons flux in cm-2.s-1
Dynamic Range	+/-5% (diurnal), -10% (Forbush decrease) and +100000% (secondaries from extreme SEP events) - up to 100000 counts/sec.
Physical Range	Energy range 1 - 20 GeV
Spatial Range	global
Spatial Resolution	1000 km (horizontal)
Time Range	1 hr - 24 hr
Time Resolution	1 min
Timeliness/Latency	5 min
Accuracy	0.01
Other Specific	
Related CRD Requirement	
Justification of the requirements	Monitor ground level and aircraft altitude level events caused by solar particle events or observe anisotropies in the background distribution caused by CME propagation in the solar wind. The hardest spectra particle events name Ground-Level Enhancements (GLEs) result in significant neutron monitor enhancements on the ground.
Comment	Provide cosmic ray flux enhancement rates due to SEPs measured by standard monitors around the world to users. Rates should be adjusted for local atmospheric pressure.

3.6.21. AG-008-P: Atmospheric neutrons - Archives and A Posteriori Reconstruction

PRODUCT	Atmospheric neutrons - Archives and A Posteriori Reconstruction
Product Code	AG-008-P
Input Data required	AG-008-M
Data to be provided and associated units	Atmospheric neutrons flux in cm-2.s-1
Dynamic Range	+/-5% (diurnal), -10% (Forbush decrease) and +100000% (secondaries from extreme SEP events) - up to 100000 counts/sec.
Physical Range	Energy range 1 - 20 GeV
Spatial Range	global
Spatial Resolution	1000 km (horizontal)
Time Range	1 day - 27 days & all historical measurements for archive
Time Resolution	1 min
Timeliness/Latency	24 hours
Accuracy	0.005
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1719 SWE-CRD-AVI-3129
Justification of the requirements	Provide data on ground level and aircraft altitude level events caused by solar particle events or observe anisotropies in the background distribution caused by CME propagation in the solar wind. The hardest spectra particle events name Ground-Level Enhancements (GLEs) result in significant neutron monitor enhancements on the ground.
Comment	Provide access to cosmic ray neutron count rates measured by standard monitors around the world. Rates should be adjusted for local atmospheric pressure. The increase for the 1956 event showed a ~5000% increase in neutron monitor count rates, for a Carrington-type event this might be far higher, i.e. >>10000%.

3.6.22. AG-009-M: Atmospheric muons – Measurement

PRODUCT	Atmospheric muons - Measurement
Product Code	AG-009-M
Input Data required	
Data to be provided and associated units	Atmospheric muons counts/s, inter-calibrated between sites to deduce cosmic ray density and anisotropies
Dynamic Range	100 (variations from 95% - 105% of normal values)
Physical Range	Rigidities > 1 GV (threshold), goal of several channels in the range from 1 - 150 GV. 5 perpendicular viewing cones (N, S, E, W & zenith) of 30 degrees half angle (threshold) or 60 degrees for zenith (goal).
Spatial Range	global and all viewing directions
Spatial Resolution	Less than 10000 km (horizontal)
Time Range	N/A
Time Resolution	10 s at each monitor providing 1-hour when inter-calibrated
Timeliness/Latency	1 hour (desired to reduce to 15 min)
Accuracy	0.1% (due to low dynamic range)
Other Specific	10 degrees angular resolution at each telescope
Related CRD Requirement	SWE-CRD-GEN-1720
Justification of the requirements	Observe anisotropies in the background distribution caused by CME propagation in the solar wind.
Comment	Provide access to cosmic ray muon count rates measured by standard monitors around the world. Rates should be adjusted for local atmospheric pressure. Muon spectra are probably not needed for operations and are challenging to determine.

3.6.23. AG-009-P: Atmospheric muons – Archives and A Posteriori Reconstruction

PRODUCT	Atmospheric muons - Archives and A Posteriori Reconstruction
Product Code	AG-009-P
Input Data required	AG-009-M
Data to be provided and associated units	Atmospheric muons counts/s, inter-calibrated between sites to deduce cosmic ray density and anisotropies
Dynamic Range	100 (variations from 95% - 105% of normal values)
Physical Range	Rigidities > 1 GV (threshold), goal of several channels in the range from 1 - 150 GV. 5 perpendicular viewing cones (N, S, E, W & zenith) of 30 degrees half angle (threshold) or 60 degrees for zenith (goal).
Spatial Range	global and all viewing directions
Spatial Resolution	Less than 10000 km (horizontal)
Time Range	N/A
Time Resolution	10 s at each monitor providing 1-hour when inter-calibrated
Timeliness/Latency	24 hours
Accuracy	0.1% (due to low dynamic range)
Other Specific	10 degrees angular resolution at each telescope
Related CRD Requirement	SWE-CRD-GEN-1720
Justification of the requirements	Observe anisotropies in the background distribution caused by CME propagation in the solar wind.
Comment	Provide access to cosmic ray muon count rates measured by standard monitors around the world. Rates should be adjusted for local atmospheric pressure. Muon spectra are probably not needed for operations and are challenging to determine.

3.6.24. AG-010-P: Magnetotelluric data on ground impedance tensor - Archives and A Posteriori Reconstruction

PRODUCT	Magnetotelluric data on ground impedance tensor - Archives and A Posteriori Reconstruction
Product Code	AG-010-P
Input Data required	AG-005-M AG-006-M
Data to be provided and associated units	Apparent resistivity [Ohm m] and phase angle (degrees) for the Magnetotelluric impedance tensor components (Zxx, Zxy, Zyx, Zyy). Each of these tensor values is a series of frequency-dependent values
Dynamic Range	[0,10000 ohm m] apparent resistivity; [0,100 degrees] phase; [1 - 100 millihertz] frequency
Physical Range	location grid lat-long dependant on local measurements of geoelectric and geomagnetic fields.
Spatial Range	European coverage
Spatial Resolution	50km
Time Range	N/A
Time Resolution	N/A
Timeliness/Latency	N/A
Accuracy	TBD
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-3017
Justification of the requirements	Determination of Earth's electrical conductivity structure for estimating geomagnetic threats by GICs to power lines. These data are needed to estimate quantitatively how geomagnetic variations (dB/dt) induce geoelectric fields at the surface of the Earth.
Comment	Parameter usually calculated as part of an offline campaign, with data made available following the conclusion of the activity. It may be required to increase the spatial resolution in regions with complex subsurfaces and nearby assets of interest.

3.6.25. AG-011-N: Data on Ground Level Events - Nowcast

PRODUCT	Data on Ground Level Events - Nowcast
Product Code	AG-011-N
Input Data required	L1-001-M MR-006-M AG-008-M
Data to be provided and associated units	Neutrons: flux in cm-2.s-1 Protons: flux in m^-2.s^-1.sr^-1.MeV^-1
Dynamic Range	Neutrons: 10^5 Protons: 10^8 per channel
Physical Range	Neutrons: energy range 1 - 20 GeV Protons: 10 to >500 MeV (goal 1000 MeV)
Spatial Range	L1, L5, GEO, MEO, LEO, GBOs
Spatial Resolution	Neutrons: 1000 km horizontal on ground Protons: 200 km - 60,000 km altitude, long: 0-360, lat: -90, 90 in Earth orbits N/A for L1, L5
Time Range	Near real time
Time Resolution	1 min
Timeliness/Latency	10 mins
Accuracy	0.2
Other Specific	Nowcast anisotropy to be provided via Northen-Southern hemispheric difference
Related CRD Requirement	SWE-CRD-AVI-3268 SWE-CRD-AVI-3129 SWE-CRD-AVI-31052
Justification of the requirements	Support model validation
Comment	A GLE event is registered when there are near-time coincident and statistically significant enhancements of the count rates of at least two differently located neutron monitors, including at least one neutron monitor near sea level, and a corresponding enhancement in the proton flux measured by a space-borne instrument(s)

3.6.26. AG-011-P: Data on Ground Level Events - Archives and A Posteriori Reconstruction

PRODUCT	Data on Ground Level Events - Archives and A Posteriori Reconstruction
Product Code	AG-011-P
Input Data required	L1-001-M MR-006-M AG-008-M
Data to be provided and associated units	Neutrons: flux in cm-2.s-1 Protons: flux in m^-2.s^-1.sr^-1.MeV^-1
Dynamic Range	Neutrons: 10^5 Protons: 10^8 per channel
Physical Range	Neutrons: energy range 1 - 20 GeV Protons: 10 to >500 MeV (goal 1000 MeV)
Spatial Range	L1, L5, GEO, MEO, LEO, GBOs
Spatial Resolution	Neutrons: 1000 km horizontal on ground Protons: 200 km - 60,000 km altitude, long: 0-360, lat: -90, 90 in Earth orbits N/A for L1, L6
Time Range	Near real time
Time Resolution	1 min
Timeliness/Latency	2 days
Accuracy	0.2
Other Specific	Reference anisotropy to be provided via iterative methods. Use eg Tsyganenko89 or 2000 model, with eg Kp index (or other) and solar wind parameters (bulk velovity, IMF Bz) as inputs
Related CRD Requirement	SWE-CRD-AVI-3268 SWE-CRD-AVI-3129 SWE-CRD-AVI-31052
Justification of the requirements	Support model validation
Comment	A GLE event is registered when there are near-time coincident and statistically significant enhancements of the count rates of at least two differently located neutron monitors, including at least one neutron monitor near sea level, and a corresponding enhancement in the proton flux measured by a space-borne instrument(s)

3.7. DATA ABOUT SPACECRAFT

3.7.1. SC-001-M: Anomalies on Spacecraft Equipment

PRODUCT	Anomalies on Spacecraft Equipment - Monitoring
Product Code	SC-001-M
Input Data required	
Data to be provided and associated units	Anomaly report, date of occurrence, anomaly type, spacecraft, equipment, spacecraft position within orbit, eclipse condition
Dynamic Range	TBD
Physical Range	N/A
Spatial Range	on spacecraft
Spatial Resolution	N/A
Time Range	Continuous coverage
Time Resolution	1 hour
Timeliness/Latency	5 mins
Accuracy	N/A
Other Specific	1) Reliability of the reported facts: The reliability and certainty of the conclusion of the anomaly reports and of the cause investigation reports shall be assessed and provided to the user, in particular when the Anomaly Investigation Board has issued reservations on the conclusions. 2) Representativity of the database: The number of spacecraft in the database, which are in the same kind of orbit as the considered spacecraft, shall be provided to the user, also with a percentage of all spacecraft in this kind of orbit, so as to allow the user to judge the representativity of the database.
Related CRD Requirement	SWE-CRD-SCD-1522 SWE-CRD-SCO-1536 SWE-CRD-SCO-1537 SWE-CRD-SCO-1557
Justification of the requirements	Measurement of component sensitivity with possibly a variety of causes depending on location; Other S/C anomalies may be used as an estimate of risk of user's spacecraft. In practice, the quality of this proxy may be limited by difference of orbits and of manufacturers; Spacecraft anomalies and events can be cross correlated with Space Weather conditions.
Comment	

3.7.2. SC-001-P: Anomalies on Spacecraft Equipment - Archives

PRODUCT	Anomalies on Spacecraft Equipment - Archives
Product Code	SC-001-P
Input Data required	SC-001-M
Data to be provided and associated units	For each anomaly in the data base within the required time span, with the required orbit type(s) and the required component/equipment type: o date(s) of anomaly and number of occurrences, o name of spacecraft, o orbit and spacecraft location at time of anomaly, o symptom and affected equipment or component, o alleged cause
Dynamic Range	TBD
Physical Range	N/A
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	N/A
Timeliness/Latency	5 mins
Accuracy	N/A
Other Specific	1) Reliability of the reported facts: The reliability and certainty of the conclusion of the anomaly reports and of the cause investigation reports shall be assessed and provided to the user, in particular when the Anomaly Investigation Board has issued reservations on the conclusions. 2) Representativity of the database: The number of spacecraft in the database, which are in the same kind of orbit as the considered spacecraft, shall be provided to the user, also with a percentage of all spacecraft in this kind of orbit, so as to allow the user to judge the representativity of the database.
Related CRD Requirement	SWE-CRD-SCD-1522 SWE-CRD-SCO-1536 SWE-CRD-SCO-1537 SWE-CRD-SCO-1557
Justification of the requirements	Measurement of component sensitivity with possibly a variety of causes depending on location; Other S/C anomalies may be used as an estimate of risk of user's spacecraft. In practice, the quality of this proxy may be limited by difference of orbits and of manufacturers; Spacecraft anomalies and events can be cross correlated to the occurrence of Space Weather events. It is required to study cause-effects of space weather events.
Comment	

3.7.3. SC-002-M: Data from Spacecraft Radiation Monitors - Measurement

PRODUCT	Data from Spacecraft Radiation Monitors - Measurement
Product Code	SC-002-M
Input Data required	
Data to be provided and associated units	proton flux in cm-2s^-1sr-1MeV^-1
Dynamic Range	10^8 per channel (min. 0.00001 > 200 MeV; max. 100000 @ 10 MeV)
Physical Range	10 or more channels (nice to have: with a directional resolution of 20 deg for 2 pi)
Spatial Range	L1 or GEO
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	30 s
Timeliness/Latency	10 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1549
Justification of the requirements	Provide local spacecraft radiation data (when available) and information on distribution and propagation of solar particle radiations in space.
Comment	The system shall provide an interface for 3rd party data from existing flying s/c.

3.7.4. SC-002-N: Data from Spacecraft Radiation Monitors - Nowcast

PRODUCT	Data from Spacecraft Radiation Monitors - Nowcast
Product Code	SC-002-N
Input Data required	SC-002-M
Data to be provided and associated units	proton flux in cm-2s-1sr^-1MeV^-1
Dynamic Range	10^8 per channel (min. 0.00001 > 200 MeV; max. 100000 @ 10 MeV)
Physical Range	10 or more channels (nice to have: with a directional resolution of 20 deg for 2 pi)
Spatial Range	L1 or GEO
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	5 mins
Accuracy	0.3
Other Specific	Representativity of the database: The number of spacecraft in the database, which are in the same kind of orbit as the considered spacecraft, shall be provided to the user, also with a percentage of all spacecraft in this kind of orbit, so as to judge the representativity of the database.
Related CRD Requirement	SWE-CRD-SCO-1549
Justification of the requirements	Provide local spacecraft radiation data (when available) and information on distribution and propagation of solar particle radiations in space.
Comment	

3.7.5. SC-002-P: Data from Spacecraft Radiation Monitors - Archives and A Posteriori Reconstruction

PRODUCT	Data from Spacecraft Radiation Monitors - Archives and A Posteriori Reconstruction
Product Code	SC-002-P
Input Data required	SC-002-M
Data to be provided and associated units	proton flux in cm-2s-1sr-1MeV-1
Dynamic Range	10^8 per channel (min. 0.00001 > 200 MeV; max. 100000 @ 10 MeV)
Physical Range	10 or more channels (nice to have: with a directional resolution of 20 deg for 2 pi)
Spatial Range	L1 or GEO
Spatial Resolution	N/A
Time Range	1 hr - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	1 day
Accuracy	0.1
Other Specific	Representativity of the database: The number of spacecraft in the database, which are in the same kind of orbit as the considered spacecraft, shall be provided to the user, also with a percentage of all spacecraft in this kind of orbit, so as to allow the user to judge the representativity of the database.
Related CRD Requirement	SWE-CRD-SCO-1549
Justification of the requirements	Provide local spacecraft radiation data (when available) and information on distribution and propagation of solar particle radiations in space.
Comment	

3.7.6. SC-003-M: Orbital Data of Spacecraft Carrying Space Weather Instruments - Measurement

PRODUCT	Orbital Data of Spacecraft Carrying Space Weather Instruments - Monitoring
Product Code	SC-003-M
Input Data required	
Data to be provided and associated units	for each measurement in the data base within the required time span, with the required orbit type(s) and the required measurement type: o date, o name of spacecraft, o orbit and spacecraft location at time of measurement, o attitude information
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	all (LEO, GEO, MEO, L1, IP, etc.)
Spatial Resolution	variable
Time Range	N/A
Time Resolution	milliseconds to days
Timeliness/Latency	10 min
Accuracy	variable
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1550
Justification of the requirements	Needed to ingest the data in models with spatial information
Comment	

3.7.7. SC-003-N: Orbital Data of Spacecraft Carrying Space Weather Instruments - Nowcast

PRODUCT	Orbital Data of Spacecraft Carrying Space Weather Instruments - Nowcast
Product Code	SC-003-N
Input Data required	SC-003-M
Data to be provided and associated units	for each measurement in the data base within the required time span, with the required orbit type(s) and the required measurement type: o date, o name of spacecraft, o orbit and spacecraft location at time of measurement, o attitude information
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	all (LEO, GEO, MEO, L1, IP, etc.)
Spatial Resolution	variable
Time Range	1 day
Time Resolution	milliseconds to days
Timeliness/Latency	30 s
Accuracy	variable
Other Specific	Provide local spacecraft radiation data (when available) and information on distribution and propagation of solar particle radiations in space.
Related CRD Requirement	SWE-CRD-SCO-1550
Justification of the requirements	Needed to ingest the data in models with spatial information
Comment	

3.7.8. SC-003-P: Orbital Data of Spacecraft Carrying Space Weather Instruments - Archives and A Posteriori Reconstruction

PRODUCT	Orbital Data of Spacecraft Carrying Space Weather Instruments - Archives and A Posteriori Reconstruction
Product Code	SC-003-P
Input Data required	SC-003-M
Data to be provided and associated units	for each measurement in the data base within the required time span, with the required orbit type(s) and the required measurement type: o date, o name of spacecraft, o orbit and spacecraft location at time of measurement, o attitude information
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	all (LEO, GEO, MEO, L1, IP, etc.)
Spatial Resolution	variable
Time Range	Total mission duration
Time Resolution	milliseconds to days
Timeliness/Latency	1 day
Accuracy	variable
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1550
Justification of the requirements	Needed to ingest the data in models with spatial information
Comment	

3.7.9. SC-003-F: Orbital data of spacecraft carrying space weather instruments - Forecast.

PRODUCT	Orbital data of spacecraft carrying space weather instruments - Forecast.
Product Code	SC-003-F
Input Data required	SC-003-M
Data to be provided and associated units	for each measurement in the data base within the required time span, with the required orbit type(s) and the required measurement type: o date, o name of spacecraft, o orbit and spacecraft location at time of measurement, o attitude information
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	all (LEO, GEO, MEO, L1, IP, etc.)
Spatial Resolution	variable
Time Range	1 day
Time Resolution	seconds to days
Timeliness/Latency	5 mins
Accuracy	variable
Other Specific	
Related CRD Requirement	SWE-SRD-10959 SWE-SRD-11038 SWE-SRD-11077
Justification of the requirements	Needed to ingest the data in models with spatial information for forecasts to support operations. Useful to tune models to forecast environment at spacecraft position and forecast (possible) anomalies
Comment	

3.7.10. SC-004-M: Spacecraft Housekeeping Telemetry Data - Measurement

PRODUCT	Spacecraft Housekeeping Telemetry Data - Monitoring
Product Code	SC-004-M
Input Data required	
Data to be provided and associated units	list of TBD parameters in TBD units; for each telemetry in the data base within the required time span, with the required orbit type(s) and the required measurement type: o date, o name of spacecraft, o orbit and spacecraft location at time of measurement
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	N/A
Spatial Resolution	variable
Time Range	N/A
Time Resolution	milliseconds to days
Timeliness/Latency	10 min
Accuracy	variable
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1534 SWE-CRD-SCO-1551
Justification of the requirements	Operators are interested in visual correlation between spacecraft telemetry and space weather environment data; Useful to monitor the S/C health and identify anomalies.
Comment	

3.7.11. SC-004-N: Spacecraft Housekeeping Telemetry Data - Nowcast

PRODUCT	Spacecraft Housekeeping Telemetry Data - Nowcast
Product Code	SC-004-N
Input Data required	SC-004-M
Data to be provided and associated units	list of TBD parameters in TBD units; for each telemetry in the data base within the required time span, with the required orbit type(s) and the required measurement type: o date, o name of spacecraft, o orbit and spacecraft location at time of measurement
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	N/A
Spatial Resolution	variable
Time Range	1 day
Time Resolution	milliseconds to days
Timeliness/Latency	30 s
Accuracy	variable
Other Specific	Representativity of the database: The number of spacecraft in the database, which are in the same kind of orbit as the considered spacecraft, shall be provided to the user, also with a percentage of all spacecraft in this kind of orbit, so as to judge the representativity of the database.
Related CRD Requirement	SWE-CRD-SCO-1534 SWE-CRD-SCO-1551
Justification of the requirements	Operators are interested in visual correlation between spacecraft telemetry and space weather environment data; Useful to monitor the S/C health and identify anomalies.
Comment	

3.7.12. SC-004-P: Spacecraft Housekeeping Telemetry Data - Archives

PRODUCT	Spacecraft Housekeeping Telemetry Data - Archives
Product Code	SC-004-P
Input Data required	SC-004-M
Data to be provided and associated units	list of TBD parameters in TBD units; for each telemetry in the data base within the required time span, with the required orbit type(s) and the required measurement type: o date, o name of spacecraft, o orbit and spacecraft location at time of measurement
Dynamic Range	N/A
Physical Range	N/A
Spatial Range	N/A
Spatial Resolution	variable
Time Range	Total mission duration
Time Resolution	milliseconds to days
Timeliness/Latency	1 day
Accuracy	variable
Other Specific	Representativity of the database: The number of spacecraft in the database, which are in the same kind of orbit as the considered spacecraft, shall be provided to the user, also with a percentage of all spacecraft in this kind of orbit, so as to judge the representativity of the database.
Related CRD Requirement	SWE-CRD-SCO-1534 SWE-CRD-SCO-1551
Justification of the requirements	Operators are interested in visual correlation between spacecraft telemetry and space weather environment data; Useful to monitor the S/C health and identify anomalies.
Comment	

3.7.13. SC-005-M: Dose - Measurement

PRODUCT	Dose - Measurement
Product Code	SC-005-M
Input Data required	
Data to be provided and associated units	Total Ionising Dose (TID) in rads and Non-Ionising Energy Loss (NIEL) in MeV.cm2.g-1. Changes in short circuit current (Isc), open circuit voltage (Voc) and maximum power (Pmax) given in 1 MeV equivalent electron fluences (cm-2). Dose in humans in mSv/year.
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	24 hours
Timeliness/Latency	60 mins
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1520 SWE-CRD-SCO-1533 SWE-CRD-SCO-1567 SWE-CRD-SCH-1595 SWE-CRD-SCH-1596 SWE-CRD-SCH-1603
Justification of the requirements	For spacecraft components the effect of the dose received in selected time periods and the update on the predicted degradation in performance by the end of life is important. For solar arrays ionisation causes 'darkening' of solar cells reducing the transmittance while displacement damage degrades the conductive characteristics of solar cells. In humans, effect measurement for radiation damage including skin dose is key to estimate effects in human cells. The accumulated radiation dose due to ionising radiation must be monitored and forecast. Provision of energetic particle fluxes and doses inside and outside the spacecraft must be provided to model effects.
Comment	

3.7.14. SC-005-N: Dose - Nowcast

PRODUCT	Dose - Nowcast
Product Code	SC-005-N
Input Data required	L1-001-M L1-002-M MR-006-M MR-007-M SC-005-M
Data to be provided and associated units	Total Ionising Dose (TID) in rads and Non-Ionising Energy Loss (NIEL) in MeV.cm2.g-1. Changes in short circuit current (Isc), open circuit voltage (Voc) and maximum power (Pmax) given in 1 MeV equivalent electron fluences (cm-2). Dose in humans in mSv/year.
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	1 day to 24 days
Time Resolution	24 hours
Timeliness/Latency	5 mins
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1520 SWE-CRD-SCO-1533 SWE-CRD-SCO-1567 SWE-CRD-SCH-1595 SWE-CRD-SCH-1596 SWE-CRD-SCH-1603
Justification of the requirements	For spacecraft components the effect of the dose received in selected time periods and the update on the predicted degradation in performance by the end of life is important. For solar arrays ionisation causes 'darkening' of solar cells reducing the transmittance while displacement damage degrades the conductive characteristics of solar cells. In humans, effect measurement for radiation damage including skin dose is key to estimate effects in human cells. The accumulated radiation dose due to ionising radiation must be monitored and forecast. Provision of energetic particle fluxes and doses inside and outside the spacecraft must be provided to model effects.
Comment	

3.7.15. SC-005-P: Dose - Archives and A Posteriori Reconstruction

PRODUCT	Dose - Archives and A Posteriori Reconstruction
Product Code	SC-005-P
Input Data required	L1-001-M L1-002-M MR-006-M MR-007-M SC-005-M
Data to be provided and associated units	Total Ionising Dose (TID) in rads and Non-Ionising Energy Loss (NIEL) in MeV.cm2.g-1. Changes in short circuit current (Isc), open circuit voltage (Voc) and maximum power (Pmax) given in 1 MeV equivalent electron fluences (cm-2). Dose in humans in mSv/year.
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	full time range of radiation and dosimeter measurements
Time Resolution	24 hours
Timeliness/Latency	1 day
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1520 SWE-CRD-SCO-1533 SWE-CRD-SCO-1567 SWE-CRD-SCH-1595 SWE-CRD-SCH-1596 SWE-CRD-SCH-1603
Justification of the requirements	For spacecraft components the effect of the dose received in selected time periods and the update on the predicted degradation in performance by the end of life is important. For solar arrays ionisation causes 'darkening' of solar cells reducing the transmittance while displacement damage degrades the conductive characteristics of solar cells. In humans, effect measurement for radiation damage including skin dose is key to estimate effects in human cells. The accumulated radiation dose due to ionising radiation must be monitored and forecast. Provision of energetic particle fluxes and doses inside and outside the spacecraft must be provided to model effects.
Comment	

3.7.16. SC-006-M: Deep Dielectric Charging - Measurement

PRODUCT	Deep Dielectric Charging - Measurement
Product Code	SC-006-M
Input Data required	
Data to be provided and associated units	Charging current in [nA.m^-2]
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	60 min
Timeliness/Latency	60 min
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1521
Justification of the requirements	Effect measurement for charging hazards
Comment	

3.7.17. SC-006-N: Deep Dielectric Charging - Nowcast

PRODUCT	Deep Dielectric Charging - Nowcast
Product Code	SC-006-N
Input Data required	L1-006-M L1-007-M MR-011-M SC-006-M
Data to be provided and associated units	Charging current in [nA.m^-2]
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 min
Timeliness/Latency	5 min
Accuracy	1.0 - i.e., accuracy within an order of magnitude is required
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1521
Justification of the requirements	Effect nowcast for charging hazards
Comment	

3.7.18. SC-006-P: Deep Dielectric Charging - Archives and A Posteriori Reconstruction

PRODUCT	Deep Dielectric Charging - Archives and A Posteriori Reconstruction
Product Code	SC-006-P
Input Data required	L1-006-M L1-007-M MR-011-M SC-006-M
Data to be provided and associated units	Charging current in [nA.m^-2]
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	1 hr - 27 days & all historical measurements for archive
Time Resolution	30 min
Timeliness/Latency	1 day
Accuracy	0.25
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1521
Justification of the requirements	Effect archive for charging hazards
Comment	

3.7.19. SC-006-F: Deep dielectric charging - Forecast

PRODUCT	Deep dielectric charging - Forecast
Product Code	SC-006-F
Input Data required	L1-006-M L1-007-M MR-011-M SC-006-M
Data to be provided and associated units	Charging current in [nA.m^-2]
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 min
Timeliness/Latency	5 min
Accuracy	1.0 - i.e., accuracy within an order of magnitude is required
Other Specific	
Related CRD Requirement	SWE-SRD-10959
Justification of the requirements	Effect forecast for charging hazards
Comment	

3.7.20. SC-007-M: Surface Charging - Measurement

PRODUCT	Surface Charging - Measurement
Product Code	SC-007-M
Input Data required	
Data to be provided and associated units	Charging current in [nA.m^-2]
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	60 s
Timeliness/Latency	60 s
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1568
Justification of the requirements	Effect measurement for charging hazards
Comment	

3.7.21. SC-007-N: Surface Charging - Nowcast

PRODUCT	Surface Charging - Nowcast
Product Code	SC-007-N
Input Data required	L1-005-M L1-007-M L1-009-M L1-010-M L1-011-M MR-008-M MR-009-M MR-010-M MR-011-M MR-012-M SC-007-M
Data to be provided and associated units	Charging current in [nA.m^-2]
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	5 min
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1568
Justification of the requirements	Effect nowcast for charging hazards
Comment	

3.7.22. SC-007-P: Surface Charging - Archives and A Posteriori Reconstruction

PRODUCT	Surface Charging - Archives and A Posteriori Reconstruction
Product Code	SC-007-P
Input Data required	L1-005-M L1-007-M L1-009-M L1-010-M L1-011-M MR-008-M MR-009-M MR-010-M MR-011-M MR-012-M SC-007-M
Data to be provided and associated units	Charging current in [nA.m^-2]
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	1 hr - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	1 day
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1568
Justification of the requirements	Effect archive for charging hazards
Comment	

3.7.23. SC-007-F: Surface charging - Forecast

PRODUCT	Surface charging - Forecast
Product Code	SC-007-F
Input Data required	L1-005-M L1-007-M L1-009-M L1-010-M L1-011-M MR-008-M MR-009-M MR-010-M MR-011-M MR-012-M SC-007-M
Data to be provided and associated units	Charging current in [nA.m^-2]
Dynamic Range	Highly variable depending on time range and material
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 min
Timeliness/Latency	5 min
Accuracy	1.0 - i.e., accuracy within an order of magnitude is required
Other Specific	
Related CRD Requirement	SWE-SRD-10959
Justification of the requirements	Effect forecast for charging hazards
Comment	

3.7.24. SC-008-M: Floating Spacecraft Potential - Measurement

PRODUCT	Floating Spacecraft Potential - Measurement
Product Code	SC-008-M
Input Data required	
Data to be provided and associated units	Floating potential in Volts
Dynamic Range	-10,000 to + 100 V
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	N/A
Time Resolution	60 s
Timeliness/Latency	60 s
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1526
Justification of the requirements	Effect measurement of spacecraft charging
Comment	

3.7.25. SC-008-N: Floating Spacecraft Potential - Nowcast

PRODUCT	Floating Spacecraft Potential - Nowcast
Product Code	SC-008-N
Input Data required	L1-005-M L1-007-M L1-009-M L1-010-M L1-011-M MR-008-M MR-009-M MR-010-M MR-011-M MR-012-M SC-008-M
Data to be provided and associated units	Floating potential in Volts
Dynamic Range	-10,000 to + 100 V
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 s
Timeliness/Latency	5 mins
Accuracy	0.2
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1526
Justification of the requirements	Effect measurement for charging hazards
Comment	

3.7.26. SC-008-P: Floating Spacecraft Potential – Archives and A Posteriori Reconstruction

PRODUCT	Floating Spacecraft Potential - Archives and A Posteriori Reconstruction
Product Code	SC-008-P
Input Data required	L1-005-M L1-007-M L1-009-M L1-010-M L1-011-M MR-008-M MR-009-M MR-010-M MR-011-M MR-012-M SC-008-M
Data to be provided and associated units	Floating potential in Volts
Dynamic Range	-10,000 to + 100 V
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	1 hr - 27 days & all historical measurements for archive
Time Resolution	30 s
Timeliness/Latency	1 day
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1526
Justification of the requirements	Effect archive of spacecraft charging
Comment	

3.7.27. SC-008-F: Floating spacecraft potential - Forecast

PRODUCT	Floating spacecraft potential - Forecast
Product Code	SC-008-F
Input Data required	L1-005-M L1-007-M L1-009-M L1-010-M L1-011-M MR-008-M MR-009-M MR-010-M MR-011-M MR-012-M SC-008-M
Data to be provided and associated units	Floating potential in Volts
Dynamic Range	-10,000 to + 100 V
Physical Range	N/A
Spatial Range	upon user's request within the limits of set of locations: GEO, LEO, MEO
Spatial Resolution	N/A
Time Range	1 hr - 24 hr
Time Resolution	120 min
Timeliness/Latency	5 min
Accuracy	1.0 - i.e., accuracy within an order of magnitude is required
Other Specific	
Related CRD Requirement	SWE-SRD-10959
Justification of the requirements	Effect forecast of spacecraft charging
Comment	Accuracy strongly depends on whether e.g. a geomagnetic storm, ground level event, Forbush decrease, etc is ongoing, or if the quiescent rate forecasted.

3.7.28. SC-009-M: Dose at aircraft altitudes - Measurement

PRODUCT	Dose at aircraft altitudes - Measurement
Product Code	SC-009-M
Input Data required	L1-001-M L1-002-M MR-006-M MR-007-M SC-005-M
Data to be provided and associated units	Dose in humans in mSv/year, and ambient dose Potentially extend to Total Ionising Dose (TID) in rads and Non-Ionising Energy Loss (NIEL) in MeV.cm2.g-1.
Dynamic Range	Highly variable depending on time range and materials
Physical Range	N/A
Spatial Range	upon user's request within the limits of altitude
Spatial Resolution	N/A
Time Range	full time range of radiation and dosimeter measurements
Time Resolution	1 hour
Timeliness/Latency	10 mins
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-AVI-3056
Justification of the requirements	Monitor radiation impacts on humans (both flight crew and passengers) Potentially extend to avionics at flight altitude
Comment	

3.7.29. SC-009-N: Dose at aircraft altitudes - Nowcast

PRODUCT	Dose at aircraft altitudes - Nowcast
Product Code	SC-009-N
Input Data required	L1-001-M L1-002-M MR-006-M MR-007-M SC-005-M
Data to be provided and associated units	Dose in humans in mSv/year, and ambient dose Potentially extend to Total Ionising Dose (TID) in rads and Non-Ionising Energy Loss (NIEL) in MeV.cm2.g-1.
Dynamic Range	Highly variable depending on time range and materials
Physical Range	N/A
Spatial Range	upon user's request within the limits of altitude
Spatial Resolution	N/A
Time Range	full time range of radiation and dosimeter measurements
Time Resolution	1 hour
Timeliness/Latency	10 mins
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-AVI-3056
Justification of the requirements	Monitor radiation impacts on humans (both flight crew and passengers) Potentially extend to avionics at flight altitude
Comment	

3.7.30. SC-009-P: Dose at aircraft altitudes - Archives and A Posteriori Reconstruction

PRODUCT	Dose at aircraft altitudes - Archives and A Posteriori Reconstruction
Product Code	SC-009-P
Input Data required	L1-001-M L1-002-M MR-006-M MR-007-M SC-005-M
Data to be provided and associated units	Dose in humans in mSv/year, and ambient dose Potentially extend to Total Ionising Dose (TID) in rads and Non-Ionising Energy Loss (NIEL) in MeV.cm2.g-1.
Dynamic Range	Highly variable depending on time range and materials
Physical Range	N/A
Spatial Range	upon user's request within the limits of altitude
Spatial Resolution	N/A
Time Range	full time range of radiation and dosimeter measurements
Time Resolution	1 hour
Timeliness/Latency	10 mins
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-AVI-3056
Justification of the requirements	Monitor radiation impacts on humans (both flight crew and passengers) Potentially extend to avionics at flight altitude
Comment	

3.7.31. SC-009-F: Dose at aircraft altitudes - Forecast

PRODUCT	Dose at aircraft altitudes - Forecast
Product Code	SC-009-F
Input Data required	L1-001-M L1-002-M MR-006-M MR-007-M SC-005-M
Data to be provided and associated units	Dose in humans in mSv/year, and ambient dose Potentially extend to Total Ionising Dose (TID) in rads and Non-Ionising Energy Loss (NIEL) in MeV.cm2.g-1..
Dynamic Range	Highly variable depending on time range and materials
Physical Range	N/A
Spatial Range	upon user's request within the limits of altitude
Spatial Resolution	N/A
Time Range	full time range of radiation and dosimeter measurements
Time Resolution	1 hour
Timeliness/Latency	10 mins
Accuracy	1.0 - i.e., accuracy within an order of magnitude is required
Other Specific	
Related CRD Requirement	SWE-CRD-AVI-3056
Justification of the requirements	Monitor radiation impacts on humans (both flight crew and passengers) Potentially extend to avionics at flight altitude
Comment	

3.8. ALERTS

3.8.1. AL-001-N: All Quiet Alert - Nowcast

PRODUCT	All Quiet Alert - Nowcast	
Product Code	AL-001-N	
Input Data required	SU-005-M SU-015-M SU-019-M SU-020-M SU-022-M SU-023-M SU-024-M SU-025-M SU-026-M SU-027-M	SU-032-M L1-001-M L1-008-M L1-009-M L1-010-M MR-011-M IT-002-M IT-005-M IT-009-M AG-005-M
Data to be provided and associated units	Alert based on solar imaging and magnetospheric/geomagnetic indices	
Dynamic Range	Thresholds to be set per parameter	
Physical Range	All quiet conditions defined separately for the users of each domain	
Spatial Range	N/A	
Spatial Resolution	N/A	
Time Range	upon user's request up to 7 days in advance	
Time Resolution	The alert shall be producible with a resolution of hours	
Timeliness/Latency	The alert shall be provided as soon as calculated, and less than 1 hour after the criteria for producing the alert are met.	
Accuracy	Alert shall be provided with a confidence level applicable to the period covered (alerts covering longer periods e.g. 7 days will have lower confidence level than e.g. next 24 hours).	
Other Specific		
Related CRD Requirement	SWE-CRD-SCO-1532 SWE-CRD-SCH-1594 SWE-CRD-LAU-1616 SWE-CRD-GEN-1680 SWE-CRD-GEN-2642	
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads. Useful also to plan critical orbital manoeuvres including at end of launch operations. Indication of long (~days) periods of low activity applicable to several user domains including spacecraft operators and human spaceflight.	
Comment	Not all data may be applicable for domain specific all quiet alerts. Thresholds and required confidence levels may vary.	

3.8.2. AL-001-P: All Quiet Alert - Archives

PRODUCT	All Quiet Alert - Archives	
Product Code	AL-001-P	
Input Data required	SU-005-M SU-015-M SU-019-M SU-020-M SU-022-M SU-023-M SU-024-M SU-025-M SU-026-M SU-027-M	SU-032-M L1-001-M L1-008-M L1-009-M L1-010-M MR-011-M IT-002-M IT-005-M IT-009-M AG-005-M
Data to be provided and associated units	Alert based on solar imaging and magnetospheric/geomagnetic indices	
Dynamic Range	Thresholds to be set per parameter	
Physical Range	All quiet conditions defined separately for the users of each domain	
Spatial Range	N/A	
Spatial Resolution	N/A	
Time Range	upon user's request up to 7 days in advance	
Time Resolution	The alert shall be producible with a resolution of hours	
Timeliness/Latency	The alert shall be provided as soon as calculated, and less than 1 hour after the criteria for producing the alert are met.	
Accuracy	Alert shall be provided with a confidence level applicable to the period covered (alerts covering longer periods e.g. 7 days will have lower confidence level than e.g. next 24 hours).	
Other Specific		
Related CRD Requirement	SWE-CRD-SCO-1532 SWE-CRD-SCH-1594 SWE-CRD-LAU-1616 SWE-CRD-GEN-1680 SWE-CRD-GEN-2642	
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads. Useful also to plan critical orbital manoeuvres including at end of launch operations. Indication of long (several days) periods of low activity applicable to several user domains including spacecraft operators and human spaceflight.	
Comment	Not all data may be applicable for domain specific all quiet alerts. Thresholds and required confidence levels may vary.	

3.8.3. AL-002-N: End-of-quiet Alert - Nowcast

PRODUCT	End-of-quiet Alert - Nowcast	
Product Code	AL-002-N	
Input Data required	SU-005-M SU-015-M SU-019-M SU-020-M SU-022-M SU-023-M SU-024-M SU-025-M SU-026-M SU-027-M	SU-032-M L1-001-M L1-008-M L1-009-M L1-010-M MR-011-M IT-002-M IT-005-M IT-009-M AG-005-M
Data to be provided and associated units	Alert based on solar imaging and magnetospheric/geomagnetic indices	
Dynamic Range	tbd	
Physical Range	End-of-quiet conditions defined separately for the users of each domain	
Spatial Range	N/A	
Spatial Resolution	N/A	
Time Range	Provided on identification of conditions either ending the all-quiet period or expected to do so in the coming period (e.g. emergence of complex active region)	
Time Resolution	the alert shall be producible with a resolution of hours	
Timeliness/Latency	The alert shall be provided as soon as calculated, and less than 1 hour after the criteria for producing the alert are met.	
Accuracy	Alert shall be provided with a confidence level applicable to the period covered (alerts covering longer periods e.g. 7 days will have lower confidence level than e.g. next 24 hours).	
Other Specific		
Related CRD Requirement	SWE-CRD-SCO-1532 SWE-CRD-SCH-1594 SWE-CRD-LAU-1616 SWE-CRD-GEN-1680 SWE-CRD-GEN-2643	
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads. Useful also to plan critical orbital manoeuvres including at end of launch operations. Indication of long (several days) periods of low activity applicable to several user domains including spacecraft operators and human spaceflight.	
Comment	Not all data may be applicable for domain specific all quiet alerts. Thresholds and required confidence levels may vary.	

3.8.4. AL-002-P: End-of-quiet Alert - Archives

PRODUCT	End-of-quiet Alert - Archives	
Product Code	AL-002-P	
Input Data required	SU-005-M SU-015-M SU-019-M SU-020-M SU-022-M SU-023-M SU-024-M SU-025-M SU-026-M SU-027-M	SU-032-M L1-001-M L1-008-M L1-009-M L1-010-M MR-011-M IT-002-M IT-005-M IT-009-M AG-005-M
Data to be provided and associated units	Alert based on solar imaging and magnetospheric/geomagnetic indices	
Dynamic Range	TBD	
Physical Range	End-of-quiet conditions defined separately for the users of each domain	
Spatial Range	N/A	
Spatial Resolution	N/A	
Time Range	Provided on identification of conditions either ending the all-quiet period or expected to do so in the coming period (e.g. emergence of complex active region)	
Time Resolution	the alert shall be producible with a resolution of hours	
Timeliness/Latency	The alert shall be provided as soon as calculated, and less than 1 hour after the criteria for producing the alert are met.	
Accuracy	Alert shall be provided with a confidence level applicable to the period covered (alerts covering longer periods e.g. 7 days will have lower confidence level than e.g. next 24 hours).	
Other Specific		
Related CRD Requirement	SWE-CRD-SCO-1532 SWE-CRD-SCH-1594 SWE-CRD-LAU-1616 SWE-CRD-GEN-1680 SWE-CRD-GEN-2643	
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads. Useful also to plan critical orbital manoeuvres including at end of launch operations. Indication of long (several days) periods of low activity applicable to several user domains including spacecraft operators and human spaceflight	
Comment	Not all data may be applicable for domain specific all quiet alerts. Thresholds and required confidence levels may vary.	

3.8.5. AL-010-N: Event Based Alarm – Solar Flare Detection

PRODUCT	Event Based Alarm – Solar Flare Detection
Product Code	AL-010-N
Input Data required	SU-027-M
Data to be provided and associated units	Notification of solar 1 - 8 Ang X-ray output crossing pre-defined flare thresholds, plus timing information
Dynamic Range	TBD
Physical Range	Threshold set according to user preferences between B1 and X100 flare level. Default alarm setting at C5.
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	Prompt alert
Time Resolution	Issued only when event detected
Timeliness/Latency	<1 min after detection
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1531 SWE-CRD-SEG-2633 SWE-CRD-GEN-2655
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads.
Comment	

3.8.6. AL-011-N: Event Based Alarm – Solar Flare Detection and Location

PRODUCT	Event Based Alarm – Solar Flare Detection and Location
Product Code	AL-011-N
Input Data required	SU-015-M SU-020-M SU-027-M
Data to be provided and associated units	Notification of solar 1 - 8 Ang X-ray output crossing pre-defined flare thresholds, combined with coordinates on solar disk extracted from solar EUV/X-ray image data, plus timing information
Dynamic Range	TBD
Physical Range	Threshold set according to user preferences between B1 and X100 flare level. Default alarm setting at C5.
Spatial Range	N/A
Spatial Resolution	1 arcmin for flare location
Time Range	Prompt alert
Time Resolution	Issued only when event detected
Timeliness/Latency	<1 min after detection
Accuracy	0.05
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1531 SWE-CRD-SEG-2633 SWE-CRD-GEN-2655
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads
Comment	

3.8.7. AL-012-N: Event Based Alarm – CME Onset

PRODUCT	Event Based Alarm – CME Onset
Product Code	AL-012-N
Input Data required	SU-025-M
Data to be provided and associated units	Notification of CME detection in coronagraph data. Text based alert including timing, angular width, projected speed and position angle.
Dynamic Range	TBD
Physical Range	All CMEs of angular width >10 degress and projected speed >100 km/s.
Spatial Range	N/A
Spatial Resolution	Angular width and position angle should be accurate to within 20%
Time Range	Prompt alert
Time Resolution	Issued only when event detected
Timeliness/Latency	<1 min after detection
Accuracy	10% on speed
Other Specific	Alarm shall be compliant with ISES code
Related CRD Requirement	SWE-CRD-SCO-1531 SWE-CRD-SEG-2633 SWE-CRD-GEN-2655
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads
Comment	

3.8.8. AL-013-N: Event Based Alarm – Halo CME Onset

PRODUCT	Event Based Alarm – Halo CME Onset
Product Code	AL-013-N
Input Data required	SU-015-M SU-025-M
Data to be provided and associated units	Notification of halo CME detection in coronagraph data. Text based alert including timing and projected speed of leading edge
Dynamic Range	TBD
Physical Range	All halo CMEs with projected speed >100 km/s
Spatial Range	N/A
Spatial Resolution	
Time Range	Prompt alert
Time Resolution	Issued only when event detected
Timeliness/Latency	<5 mins after detection
Accuracy	20% on speed at 2-10 solar radii
Other Specific	Alarm shall be compliant with ISES code.
Related CRD Requirement	SWE-CRD-SCO-1531 SWE-CRD-SEG-2633 SWE-CRD-GEN-2655
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads
Comment	

3.8.9. AL-014-N: Event Based Alarm – Coronal Hole Notification

PRODUCT	Event Based Alarm – Coronal Hole Notification
Product Code	AL-014-N
Input Data required	SU-015-M SU-020-M
Data to be provided and associated units	Notification of coronal hole appearance and expected appearance within +/- 10degrees of the central meridian and as indication of high-speed solar wind streams and recurrent activity
Dynamic Range	TBD
Physical Range	
Spatial Range	Latitudinal and longitudinal extent covered by coronal hole.
Spatial Resolution	
Time Range	Prompt alert
Time Resolution	Issued only when event detected
Timeliness/Latency	Produced immediately on detection of threshold being exceeded in nowcast product. Not more than 12 hours after coronal hole enters region of interest.
Accuracy	N/A
Other Specific	Alarm shall be compliant with ISES code.
Related CRD Requirement	SWE-CRD-SCO-1531 SWE-CRD-SEG-2633 SWE-CRD-GEN-2655
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads.
Comment	Relies on coronal hole nowcast product SU-004-N. Nowcast product will also input also to the all quiet alert, giving advanced warning of possible recurrent activity which will also invalidate an all quiet notification.

3.8.10. AL-015-N: Event Based Alarm – CIR Alert

PRODUCT	Event Based Alarm – CIR Alert
Product Code	AL-015-N
Input Data required	SU-015-M SU-020-M L1-008-M L1-009-M L1-010-M
Data to be provided and associated units	Notification of the detection of a corotating interaction region in the solar wind
Dynamic Range	TBD
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	Prompt alert
Time Resolution	Issued only when event detected
Timeliness/Latency	Alert generated with minimum latency as soon as CIR is identified from combination of solar wind and solar disk observations. Provide end-of-alert information.
Accuracy	N/A
Other Specific	Processing time to generate alert should be less than travel time from L1 to Earth.
Related CRD Requirement	SWE-CRD-SCO-1531 SWE-CRD-SEG-2633 SWE-CRD-GEN-2655
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads. Useful also to plan critical orbital manoeuvres including at end of launch operations. Indication of long (several days) periods of low activity applicable to several user domains including spacecraft operators and human spaceflight.
Comment	

3.8.11. AL-016-N: Event Based Alarm – Solar Particle Event Onset

PRODUCT	Event Based Alarm – Solar Particle Event Onset
Product Code	AL-016-N
Input Data required	L1-001-M
Data to be provided and associated units	Notification of >10MeV proton flux crossing pre-defined SEP thresholds, plus timing information
Dynamic Range	Identify according to threshold crossed (cm^-2s^-1sr^-1MeV^-1) and NOAA scale, S1-S5 event
Physical Range	N/A
Spatial Range	Event detection in L1 or GEO
Spatial Resolution	N/A
Time Range	Prompt alert
Time Resolution	Issued only when event detected. Provide end-of-alert information.
Timeliness/Latency	<1 min after detection
Accuracy	0.5
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1531 SWE-CRD-SEG-2633 SWE-CRD-GEN-2655
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads
Comment	

3.8.12. AL-017-N: Event Based Alarm – Geomagnetic Storm Warning / Solar Wind Shock Arrival

PRODUCT	Event Based Alarm – Geomagnetic Storm Warning / Solar Wind Shock Arrival
Product Code	AL-017-N
Input Data required	L1-008-M L1-009-M L1-010-M
Data to be provided and associated units	Notification of shock detection / CME passage in solar wind, plus timing information
Dynamic Range	See related data requirements
Physical Range	N/A
Spatial Range	L1
Spatial Resolution	N/A
Time Range	Prompt alert
Time Resolution	Issued only when event detected
Timeliness/Latency	<1 min after detection
Accuracy	
Other Specific	Processing time to detect shock/identify CME passage and generate alert should be less than travel time from L1 to Earth.
Related CRD Requirement	SWE-CRD-SCO-1531 SWE-CRD-SEG-2633 SWE-CRD-GEN-2655
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads. Useful also to plan critical orbital manoeuvres including at end of launch operations.
Comment	

3.8.13. AL-018-N: Event Based Alarm – Geomagnetic Storm Onset

PRODUCT	Event Based Alarm – Geomagnetic Storm Onset
Product Code	AL-018-N
Input Data required	AG-005-M
Data to be provided and associated units	Notification of geomagnetic indices crossing predefined thresholds defining a geomagnetic storm, plus timing information.
Dynamic Range	Identify according to threshold crossed (dB/dt) and NOAA scale, G1-G5 event
Physical Range	Event detection using ground based data and indices
Spatial Range	Global
Spatial Resolution	Global alert based on global indices and regional measurements
Time Range	Prompt alert
Time Resolution	Issued only when event detected. Provide end-of-alert information.
Timeliness/Latency	<1 min after detection
Accuracy	N/A
Other Specific	Alarm shall be compliant with ISES code.
Related CRD Requirement	SWE-CRD-SCO-1531 SWE-CRD-SEG-2633 SWE-CRD-GEN-2655
Justification of the requirements	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads. Useful also to plan critical orbital manoeuvres including at end of launch operations.
Comment	Inclusion of regional measurement provides the possibility to tailor this alert to users in POW, PPL and RES domains with ground based systems where regional disturbance alerts are critical.

3.8.14. AL-019-N: Event Based Alarm – Ionospheric Disturbance Detection

PRODUCT	Event Based Alarm – Ionospheric Disturbance Detection
Product Code	AL-019-N
Input Data required	IT-002-M IT-009-M
Data to be provided and associated units	Notification of disturbed ionospheric conditions based on measurements.
Dynamic Range	Identify according to threshold crossed (e.g. expected depth of fading and NOAA scale: R1-R5 event, or TECU, or scintillation index)
Physical Range	As a function of latitude/longitude
Spatial Range	Global
Spatial Resolution	100 km
Time Range	Prompt alert
Time Resolution	Issued only when defined thresholds crossed. Provide end-of-alert information.
Timeliness/Latency	<1 min after detection
Accuracy	0.3
Other Specific	Alarm shall be compliant with ISES code.
Related CRD Requirement	SWE-CRD-SCO-1531 SWE-CRD-TIO-1634 SWE-CRD-SEG-2633 SWE-CRD-GEN-2655
Justification of the requirements	To put staff on alert, allowing monitoring of decreased SATCOM/GNSS performance which may result from ionospheric disturbance
Comment	

3.8.15. AL-022-P: Event Based Alarm – All Archive

PRODUCT	Event Based Alarm – All Archive
Product Code	AL-022-P
Input Data required	
Data to be provided and associated units	Storage and retrieval of all alerts for comparison and analysis
Dynamic Range	TBD
Physical Range	Must be compatible with format of all alerts
Spatial Range	N/A
Spatial Resolution	N/A
Time Range	From start of SWE service provision to current.
Time Resolution	TBD
Timeliness/Latency	Retrieval on request
Accuracy	N/A
Other Specific	
Related CRD Requirement	SWE-CRD-SEG-1506 SWE-CRD-SCO-1537 SWE-CRD-SEG-2633
Justification of the requirements	To support user post event analysis and also SWE internal quality control.
Comment	

3.8.16. AL-023-N: Event Based Alarm - Ground Level Enhancement (GLE) Detection

PRODUCT	Event Based Alarm - Ground Level Enhancement (GLE) Detection
Product Code	AL-023-N
Input Data required	
Data to be provided and associated units	Alert based on ratio of count rate increase due to GLE to the background GCR count rate prior to the GLE onset. Notification of 3 separate neutron monitor sites crossing pre-defined threshold for detection of secondary cosmic rays as a result of primary cosmic rays associated with an SEP event interacting with atmospheric constituents.
Dynamic Range	TBD
Physical Range	Threshold established per station based on geographical location. Cut-off rigidity thresholds range approximately between 1 GV and 10 GV.
Spatial Range	Stations are located across a range of geomagnetic latitudes.
Spatial Resolution	N/A
Time Range	Prompt alert
Time Resolution	1 min
Timeliness/Latency	1 min (issued only when detected)
Accuracy	
Other Specific	
Related CRD Requirement	
Justification of the requirements	Important source of real-time information relating to radiation environment at aircraft altitudes coupled with timely information on SEP event onset produced by the arrival of very high energy particles >500MeV.
Comment	

3.8.17. AL-024-N: Event Based Alarm – Solar Radioburst Detection

PRODUCT	Event Based Alarm - Solar Radioburst Detection
Product Code	AL-024-N
Input Data required	SU-026-M
Data to be provided and associated units	Alert based on detection of well-characterised Type I, II, III, IV and V radio burst signatures detected in solar radiospectrographic data
Dynamic Range	Identify according to well-established burst identification criteria and algorithms
Physical Range	Event detection using space- and ground-based observations
Spatial Range	Global
Spatial Resolution	N/A
Time Range	Prompt alert from start of service
Time Resolution	Issued immediately when a burst is detected
Timeliness/Latency	<1 min after detection
Accuracy	0.1
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1699
Justification of the requirements	Type II and IV burst detection can assist prompt flare detection Type I and III burst detection can assist with CME identification and early velocity estimation, and provide inputs to modelling
Comment	Alert to be issued within 1 minute of detection of characteristic signature(s) in the observation dataset(s)