DOCUMENT

Space Situational Awareness - Space Weather PSD

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CHANGE LOG

Reason for change	Issue	Revision	Date
See Appendix C of SWE SRD (SSA-SWE-RS-RD-0001)	1	3	08/07/2013

CHANGE RECORD

Issue	Revision		
Reason for change	**Date**	**Pages**	**Paragraph(s)**

Table of contents:

1 INTRODUCTION

This document has been generated with the following Doors module baseline :
SWE Product Specification: 1.0

1.1 Scope of this Document

This document contains the Product Specifications for the SWE segment of the SSA system. It forms part of the SWE SRD SSA-SWE-RS-RD-0001 and addresses the high-level product definitions derived from the customer requirements.

1.2 Definition of Terms

1.2.1 General Definitions of Terms

The general definition of terms can be found in the SSA General Definition of Terms and Acronyms document SSA-DC-QA-GLO-0001.

1.2.2 SWE Specific Definitions of Terms

The SWE specific definitions of terms can be found in Space Situational Awareness - Space Weather System Requirements Document SSA-SWE-RS-RD-0001.

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.>*

1.3 Acronyms

The general acronyms table can be found in the SSA General Definition of Terms and Acronyms document SSA-DC-QA-GLO-0001 and the SWE specific acronyms table can be found in Space Situational Awareness - Space Weather System Requirements Document SSA-SWE-RS-RD-0001.

1.4 Applicable and Reference Documents

The applicable and reference documents can be found in the Space Situational Awareness - Space Weather System Requirements Document SSA-SWE-RS-RD-0001.

2 SWE PRODUCTS OVERVIEW

The table below gives a summary of the products that will be available from the SWE segment. 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.
Related Services: This is the identifier of the segment service defined in the SRD that is responsible for providing this product to the user. See list of services at the end of this section.
SRD Requirement: This is the numbered requirement in the SRD that specifies that the segment shall generate this product type.

Product ID	Product Name	SRD Requirement
SU-001-P	Solar Flares - Archives and A Posteriori Reconstruction	SWE-SRD-10421
SU-001-N	Solar Flares - Nowcast	SWE-SRD-10438
SU-001-F	Solar Flares - Forecast	SWE-SRD-10631
SU-002-P	CMEs - Archives and A Posteriori Reconstruction	SWE-SRD-10422
SU-002-N	CMEs – Nowcast	SWE-SRD-10523
SU-002-F	CMEs - Forecast	SWE-SRD-10632
SU-004-P	Coronal Holes - Archives and A Posteriori Reconstruction	SWE-SRD-10423
SU-004-N	Coronal Holes - Nowcast	SWE-SRD-10526
SU-004-F	Coronal Holes - Forecast	SWE-SRD-10633
SU-005-P	Solar Disc Magnetic Fields - Archives and A Posteriori Reconstruction	SWE-SRD-10424
SU-005-M	Solar Disc Magnetic Fields - Measurements	SWE-SRD-10320
SU-005-N	Solar Disc Magnetic Fields - Nowcast	SWE-SRD-10527
SU-005-F	Solar Disc Magnetic Fields - Forecast	SWE-SRD-10634
SU-006-P	International Sunspot number (R index)	SWE-SRD-10425
SU-006-N	Solar Index R - Nowcast	SWE-SRD-10524
SU-006-F	Solar Index R - Forecast	SWE-SRD-10635
SU-007-P	Smoothed Sunspot Number (SSN, R12) - Archives and A Posteriori Reconstruction	SWE-SRD-10426
SU-007-N	Smoothed Sunspot Number (SSN, R12) - Nowcast	SWE-SRD-10525
SU-007-F	Smoothed Sunspot Number (SSN, R12) - Forecast	SWE-SRD-10636
SU-008-M	Solar Microwave Index (F10.7) - Measurement	SWE-SRD-10321
SU-008-P	Solar Microwave Index (F10.7) - Archives and A Posteriori Reconstruction	SWE-SRD-10427
SU-008-N	Solar Microwave Index (F10.7) - Nowcast	SWE-SRD-10528
SU-008-F	Solar Microwave Index (F10.7) - Forecast	SWE-SRD-10637
SU-009-P	Solar EUV Index (S10.7) - Archives and A Posteriori Reconstruction	SWE-SRD-10414
SU-009-N	Solar EUV Index (S10.7) - Nowcast	SWE-SRD-10529
SU-009-F	Solar EUV Index (S10.7) - Forecast	SWE-SRD-10638
SU-010-P	Solar EUV Index (E10.7) - Archives and A Posteriori Reconstruction	SWE-SRD-10415
SU-010-N	Solar EUV Index (E10.7) - Nowcast	SWE-SRD-10530
SU-010-F	Solar EUV Index (E10.7) - Forecast	SWE-SRD-10639
SU-011-P	Solar FUV Index (M10.7) - Archives and A Posteriori Reconstruction	SWE-SRD-10416
SU-011-N	Solar FUV Index (M10.7) - Nowcast	SWE-SRD-10531
SU-011-F	Solar FUV Index (M10.7) - Forecast	SWE-SRD-10640
SU-012-P	Solar X-ray & UV Index (Y10.7) - Archives and A Posteriori Reconstruction	SWE-SRD-10417
SU-012-N	Solar X-ray & UV Index (Y10.7) - Nowcast	SWE-SRD-10532
SU-012-F	Solar X-ray & UV Index (Y10.7) - Forecast	SWE-SRD-10641

Product ID	Product Name	SRD Requirement
SU-013-P	Ionospheric Index (IG12) - Archives and A Posteriori Reconstruction	SWE-SRD-10418
SU-013-N	Ionospheric Index (IG12) - Nowcast	SWE-SRD-10533
SU-013-F	Ionospheric Index (IG12) - Forecast	SWE-SRD-10642
SU-015-M	EUV Images of Sun	SWE-SRD-10322
SU-015-P	EUV Images of Sun - Archives and A Posteriori Reconstruction	SWE-SRD-10419
SU-015-N	EUV Images of Sun - Nowcast	SWE-SRD-10534
SU-017-M	White Light Solar Imaging	SWE-SRD-10323
SU-017-P	White Light Solar Imaging - Archives and A Posteriori Reconstruction	SWE-SRD-10420
SU-017-N	White Light Solar Imaging - Nowcast	SWE-SRD-10535
SU-019-M	H-alpha Images of Sun	SWE-SRD-10324
SU-019-P	H-alpha Images of Sun - Archives and A Posteriori Reconstruction	SWE-SRD-10407
SU-019-N	H-alpha Images of Sun - Nowcast	SWE-SRD-10536
SU-020-M	Soft X-ray Images of the Sun	SWE-SRD-10325
SU-020-P	Soft X-ray Images of the Sun - Archives and A Posteriori Reconstruction	SWE-SRD-10408
SU-020-N	Soft X-ray Images of the Sun - Nowcast	SWE-SRD-10537
SU-021-M	Solar EUV Images Outside of Sun-Earth Line	SWE-SRD-10326
SU-021-P	Solar EUV Images Outside of Sun-Earth Line - Archives and A Posteriori Reconstruction	SWE-SRD-10409
SU-021-N	Solar EUV Images Outside of Sun-Earth Line - Nowcast	SWE-SRD-10538
SU-022-M	Solar Coronagraphic Images Outside of Sun-Earth Line	SWE-SRD-10327
SU-022-P	Solar Coronagraphic Images Outside of Sun-Earth Line - Archives and A Posteriori Reconstruction	SWE-SRD-10410
SU-022-N	Solar Coronagraphic Images Outside of Sun-Earth Line - Nowcast	SWE-SRD-10539
SU-023-M	Solar Far-side Maps (using helioseismology technique)	SWE-SRD-10328
SU-023-P	Solar Far-side Maps (using helioseismology technique) - Archives and A Posteriori Reconstruction	SWE-SRD-10411
SU-023-N	Solar Far-side Maps (using helioseismology technique) - Nowcast	SWE-SRD-10540
SU-024-M	Ly-alpha Images (for measure of solar far-side activity)	SWE-SRD-10329
SU-024-P	Ly-alpha Images (for measure of solar far-side activity) - Archives and A Posteriori Reconstruction	SWE-SRD-10412
SU-024-N	Ly-alpha Images (for measure of solar far-side activity) - Nowcast	SWE-SRD-10541
SU-025-M	White-light wide-angle Coronagraph Images	SWE-SRD-10330
SU-025-P	White-light wide-angle Coronagraph Images - Archives and A Posteriori Reconstruction	SWE-SRD-10413
SU-025-N	White-light wide-angle Coronagraph Images - Nowcast	SWE-SRD-10542
SU-026-M	Solar Radiospectrographic Observations (for monitoring of radio bursts)	SWE-SRD-10332
SU-026-P	Solar Radiospectrographic Observations (for monitoring of radio bursts) - Archives and A Posteriori Reconstruction	SWE-SRD-10400
SU-026-N	Solar Radiospectrographic Observations (for monitoring of radio bursts) - Nowcast	SWE-SRD-10543
SU-027-M	Solar X-ray Flux	SWE-SRD-10333
SU-027-P	Solar X-ray Flux - Archives and A Posteriori Reconstruction	SWE-SRD-10401
SU-027-N	Solar X-ray Flux - Nowcast	SWE-SRD-10544
SU-028-M	Solar EUV Integrated Flux	SWE-SRD-10334
SU-028-P	Solar EUV Integrated Flux - Archives and A Posteriori Reconstruction	SWE-SRD-10402
SU-028-N	Solar EUV Integrated Flux - Nowcast	SWE-SRD-10545
SU-028-F	Solar EUV Integrated Flux - Forecast	SWE-SRD-10643
SU-029-M	Solar UV Flux	SWE-SRD-10335

Product ID	Product Name	SRD Requirement
SU-029-P	Solar UV Flux - Archives and A Posteriori Reconstruction	SWE-SRD-10403
SU-029-N	Solar UV Flux - Nowcast	SWE-SRD-10546
SU-029-F	Solar UV Flux - Forecast	SWE-SRD-10644
SU-031-F	Long-term Solar Activity - Forecast	SWE-SRD-10645
SU-032-M	Heliospheric Imaging of Sun-Earth Line (tracking of Earth-directed CMEs)	SWE-SRD-10336
SU-032-N	Heliospheric Imaging of Sun-Earth Line (tracking of Earth-directed CMEs) - Nowcast	SWE-SRD-10547
SU-032-P	Heliospheric Imaging of Sun-Earth Line (tracking of Earth-directed CMEs) - Archive	SWE-SRD-10404
L1-001-P	High Energy >10 MeV Protons in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-10461
L1-001-M	High Energy >10 MeV Protons in Interplanetary Medium - Measurement	SWE-SRD-10339
L1-001-N	High Energy >10 MeV Protons in Interplanetary Medium at L1 - Nowcast	SWE-SRD-10549
L1-001-F	High Energy >10 MeV Protons in Interplanetary Medium at L1 - Forecast	SWE-SRD-10658
L1-002-P	High Energy >10 MeV/nuc Ions in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-10462
L1-002-M	High Energy >10 MeV/nuc Ions in Interplanetary Medium - Measurement	SWE-SRD-10340
L1-002-N	High Energy >10 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast	SWE-SRD-10550
L1-002-F	High Energy >10 MeV/nuc Ions in Interplanetary Medium at L1 - Forecast	SWE-SRD-10659
L1-003-P	1-to-10 MeV Protons in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-10463
L1-003-M	1-to-10 MeV Protons in Interplanetary Medium at L1 - Measurement	SWE-SRD-10341
L1-003-N	1-to-10 MeV Protons in Interplanetary Medium at L1 - Nowcast	SWE-SRD-10551
L1-003-F	1-to-10 MeV Protons in Interplanetary Medium at L1 - Forecast	SWE-SRD-10660
L1-004-P	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-10464
L1-004-M	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Measurement	SWE-SRD-10342
L1-004-N	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast	SWE-SRD-10552
L1-004-F	1-to-10 MeV/nuc Ions in Interplanetary Medium at L1 - Forecast	SWE-SRD-10661
L1-005-P	30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1- Archives and A Posteriori Reconstruction	SWE-SRD-10465
L1-005-M	30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1 - Measurement	SWE-SRD-10343
L1-005-N	30 keV/nuc-to-1 MeV/nuc Ions in Interplanetary Medium at L1 - Nowcast	SWE-SRD-10553
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L1-007-M	E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Measurement	SWE-SRD-10345
L1-007-N	E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Nowcast	SWE-SRD-10555
L1-007-F	E>30 keV-8 MeV Electrons in Interplanetary Medium at L1 - Forecast	SWE-SRD-10664
L1-008-P	Interplanetary Magnetic Field (IMF) at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-10468
L1-008-M	Interplanetary Magnetic Field (IMF) at L1 - Measurement	SWE-SRD-10346
L1-008-N	Interplanetary Magnetic Field (IMF) at L1 - Nowcast	SWE-SRD-10556

Product ID	Product Name	SRD Requirement
L1-008-F	Interplanetary Magnetic Field (IMF) at L1 - Forecast	SWE-SRD-10665
L1-009-P	Solar Wind Bulk Velocity at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-10469
L1-009-M	Solar Wind Bulk Velocity at L1 - Measurement	SWE-SRD-10347
L1-009-N	Solar Wind Bulk Velocity at L1 - Nowcast	SWE-SRD-10557
L1-009-F	Solar Wind Bulk Velocity at L1 - Forecast	SWE-SRD-10667
L1-010-P	Solar Wind Bulk Density at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-10470
L1-010-M	Solar Wind Bulk Density at L1 - Measurement	SWE-SRD-10348
L1-010-N	Solar Wind Bulk Density at L1 - Nowcast	SWE-SRD-10558
L1-010-F	Solar Wind Bulk Density at L1 - Forecast	SWE-SRD-10666
L1-011-P	Solar Wind Temperature at L1 - Archives and A Posteriori Reconstruction	SWE-SRD-10471
L1-011-M	Solar Wind Temperature at L1 - Measurement	SWE-SRD-10349
L1-011-N	Solar Wind Temperature at L1 - Nowcast	SWE-SRD-10559
L1-011-F	Solar Wind Temperature at L1 - Forecast	SWE-SRD-10668
L1-012-F	Activity at L1 - Long-term Forecast	SWE-SRD-10720
IP-001-P	Solar Energetic Particle Events - Archives and A Posteriori Reconstruction	SWE-SRD-10472
IP-001-M	Solar Energetic Particles - Measurement	SWE-SRD-10352
IP-001-N	Solar Energetic Particle Events - Nowcast	SWE-SRD-10560
IP-001-F	Solar Energetic Particle Events - Forecast	SWE-SRD-10688
IP-002-P	Data on Interplanetary Medium Outside L1 - Archives and A Posteriori Reconstruction	SWE-SRD-10473
IP-002-N	Data on Interplanetary Medium Outside L1 - Nowcast	SWE-SRD-10561
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MR-004-N	Geomagnetic Index Dst - Nowcast	SWE-SRD-10565
MR-004-F	Geomagnetic Index Dst - Forecast	SWE-SRD-10672
MR-006-M	High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt – Measurement	SWE-SRD-10354
MR-006-P	High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction	SWE-SRD-10478
MR-006-N	High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt - Nowcast	SWE-SRD-10566
MR-006-F	High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt - Forecast	SWE-SRD-10673
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Product ID	Product Name	SRD Requirement
MR-007-P	High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction	SWE-SRD-10479
MR-007-N	High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Nowcast	SWE-SRD-10567
MR-007-F	High Energy >10MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Forecast	SWE-SRD-10674
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MR-008-P	1-to-10MeV Protons in Earth Magnetosphere and Radiation Beltt - Archives and A Posteriori Reconstruction	SWE-SRD-10480
MR-008-N	1-to-10MeV Protons in Earth Magnetosphere and Radiation Belt - Nowcast	SWE-SRD-10568
MR-008-F	1-to-10MeV Protons in Earth Magnetosphere and Radiation Belt - Forecast	SWE-SRD-10675
MR-009-M	1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Measurement	SWE-SRD-10357
MR-009-P	1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction	SWE-SRD-10481
MR-009-N	1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Nowcast	SWE-SRD-10569
MR-009-F	1-to-10 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Forecast	SWE-SRD-10676
MR-010-M	30 keV/nuc-to-1 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Measurement	SWE-SRD-10358
MR-010-P	30 keV/nuc-to-1 MeV/nuc Ions in Earth Magnetosphere and Radiation Belt - Archives and A Posteriori Reconstruction	SWE-SRD-10482
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MR-012-N	Thermal and Supra-thermal Electron and Ion Energy Spectra in the Range 0 to 30 keV - Nowcast	SWE-SRD-10572
MR-012-F	Thermal and Supra-thermal Electron and Ion Energy Spectra in the Range 0 to 30 keV - Forecast	SWE-SRD-10679
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MR-013-P	Magnetospheric Radiowave Spectra - Archives and A Posteriori Reconstruction	SWE-SRD-10485
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MR-014-N	Thermal Ions Density and Temperature - Nowcast	SWE-SRD-10574
MR-014-F	Thermal Ions Density and Temperature - Forecast	SWE-SRD-10680
MR-015-M	Local Magnetospheric Magnetic Field in Orbit - Measurement	SWE-SRD-10363
MR-015-P	Local Magnetospheric Magnetic Field in Orbit - Archives and A Posteriori Reconstruction	SWE-SRD-10487

Product ID	Product Name	SRD Requirement
MR-015-N	Local Magnetospheric Magnetic Field in Orbit - Nowcast	SWE-SRD-10575
MR-015-F	Local Magnetospheric Magnetic Field in Orbit - Forecast	SWE-SRD-10681
MR-016-M	Plasma Drift Velocity	SWE-SRD-10364
MR-016-P	Plasma Drift Velocity - Archives and A Posteriori Reconstruction	
MR-017-P	Transpolar Electric Field - Archives and A Posteriori Reconstruction	SWE-SRD-10488
MR-017-N	Transpolar Electric Field - Nowcast	SWE-SRD-10576
MR-017-F	Transpolar Electric Field - Forecast	SWE-SRD-10682
MR-018-P	Auroral Particle Precipitation - Archives and Post-event Reconstruction	SWE-SRD-10489
MR-018-N	Auroral Particle Precipitation - Nowcast	SWE-SRD-10577
MR-018-F	Auroral Particle Precipitation - Forecast	SWE-SRD-10683
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MR-019-N	Geomagnetic Index AE, AL and AU - Nowcast	SWE-SRD-10579
MR-019-F	Geomagnetic Index AE, AL and AU - Forecast	SWE-SRD-10684
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NM-001-F	Planetary Atmospheric Properties (other than Earth) - Forecast	SWE-SRD-10705
IT-001-P	Vertical Total Electron Content Map - Archives and A Posteriori Reconstruction	SWE-SRD-10494
IT-001-N	Vertical Total Electron Content - Nowcast	SWE-SRD-10582
IT-001-F	Vertical Total Electron Content - Forecast	SWE-SRD-10691
IT-002-M	Electron density - Measurements	SWE-SRD-10366
IT-002-P	3D Electron Density Grids - Archives and A Posteriori Reconstruction	SWE-SRD-10495
IT-002-N	3D Electron Density Grids - Nowcast	SWE-SRD-10583
IT-002-F	3D Electron Density Grids - Forecast	SWE-SRD-10692
IT-005-M	URSI Ionospheric Parameters - Measurements	SWE-SRD-10370
IT-005-P	URSI Ionospheric Parameters - Archives and A Posteriori Reconstruction	SWE-SRD-10496
IT-005-N	URSI Ionospheric Parameters - Nowcast	SWE-SRD-10584
IT-006-M	Riometer Data - Measurement	SWE-SRD-10369
IT-007-M	Neutral Density in Thermosphere - Measurement	SWE-SRD-10368
IT-007-P	Neutral Density in Thermosphere - Archives and A Posteriori Reconstruction	SWE-SRD-10497
IT-007-N	Neutral Density in Thermosphere - Nowcast	SWE-SRD-10585
IT-007-F	Neutral Density in Thermosphere - Forecast	SWE-SRD-10693
IT-008-M	Neutral Wind Velocity in Thermosphere - Measurement	SWE-SRD-10367
IT-008-P	Neutral Wind Velocity in Thermosphere - Archives and A Posteriori Reconstruction	SWE-SRD-10498
IT-008-N	Neutral Wind Velocity in Thermosphere - Nowcast	SWE-SRD-10586
IT-008-F	Neutral Wind Velocity in Thermosphere - Forecast	SWE-SRD-10694
IT-009-M	Scintillation Parameters Measurements	SWE-SRD-10371
IT-009-P	Scintillation Indices and Parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Archives and A Posteriori Reconstruction	SWE-SRD-10499
IT-009-N	Scintillation Indices and Parameters (S4, sigma_phi, fading depth, fade duration,	SWE-SRD-10587

Product ID	Product Name	SRD Requirement
	time between fades) - Nowcast	
IT-009-F	Scintillation Indices and Parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Forecast	SWE-SRD-10695
IT-010-M	Atomic Oxygen Density - Measurements	SWE-SRD-10372
IT-010-P	Atomic Oxygen Density - Archives and A Posteriori Reconstruction	SWE-SRD-10500
IT-011-P	Ionospheric Disturbances – Archive and a posteriori reconstruction	
IT-011-N	Ionospheric Disturbances - Nowcast	SWE-SRD-10588
IT-011-F	Ionospheric Disturbances - Forecast	SWE-SRD-10696
AG-001-P	Auroral Visible Imaging - Archives	SWE-SRD-10501
AG-001-M	Auroral Visible Imaging - Measurement	SWE-SRD-10374
AG-001-N	Auroral Visible Imaging - Nowcast	SWE-SRD-10589
AG-001-F	Probability of Visible Auroras - Forecast	SWE-SRD-10698
AG-002-P	Auroral UV Imaging - Archives	SWE-SRD-10502
AG-002-M	Auroral UV Imaging - Measurement	SWE-SRD-10375
AG-002-N	Auroral UV Imaging - Nowcast	SWE-SRD-10590
AG-005-P	Local External Magnetic Field on Ground - Archives and A Posteriori Reconstruction	SWE-SRD-10503
AG-005-M	Local External Magnetic Field on Ground - Measurement	SWE-SRD-10376
AG-005-N	Local External Magnetic Field on Ground - Nowcast	SWE-SRD-10591
AG-005-F	Local External Magnetic Field on Ground - Forecast	SWE-SRD-10699
AG-006-P	Local Geomagnetic Induced Geoelectric Field - Archives and A Posteriori Reconstruction	SWE-SRD-10504
AG-006-N	Local Geomagnetic Induced Geoelectric Field - Nowcast	SWE-SRD-10592
AG-006-F	Local Geomagnetic Induced Geoelectric Field - Forecast	SWE-SRD-10700
AG-007-P	Neutral Density and Wind - Archives and A Posteriori Reconstruction	SWE-SRD-10505
AG-007-M	Neutral Density and Wind - Measurement	SWE-SRD-10377
AG-007-N	Neutral Density and Wind - Nowcast	SWE-SRD-10593
AG-007-F	Neutral Density and Wind - Forecast	SWE-SRD-10701
AG-008-P	Atmospheric Neutrons - Archives and A Posteiori Reconstruction	SWE-SRD-10506
AG-008-M	Atmospheric neutrons - Measurement	SWE-SRD-10378
AG-008-N	Atmospheric neutrons - Nowcast	
AG-009-M	Atmospheric muons - Measurement	SWE-SRD-10379
MP-001-M	Micro Particle Flux as a Function of Size, Velocity, Angular Distribution	SWE-SRD-10381
MP-001-P	Micro Particle Flux as a Function of Size, Velocity, Angular Distribution - Archives and A Posteriori Reconstruction	SWE-SRD-10507
MP-001-N	Micro Particle Flux as a Function of Size, Velocity, Angular Distribution - Nowcast	SWE-SRD-10594
MP-001-F	Micro Particle Flux as a Function of Size, Velocity, Angular Distribution - Forecast	SWE-SRD-10701
MP-002-P	Known Periods/events of Increased Microparticle Flux (meteoroid streams, debris clouds) - Archives and A Posteriori Reconstruction	SWE-SRD-10508
MP-002-N	Known Periods/events of Increased Microparticle Flux (meteoroid streams, debris clouds) - Nowcast	SWE-SRD-10595
SC-001-M	Anomalies on Spacecraft Equipment	SWE-SRD-10735
SC-001-P	Database of Anomalies on Spacecraft Equipment	SWE-SRD-10509
SC-002-P	Data from Spacecraft Radiation Monitors - Archives	SWE-SRD-10510
SC-002-M	Data from Spacecraft Radiation Monitors - Measurement	SWE-SRD-10383
SC-002-N	Data from Spacecraft Radiation Monitors - Nowcast	SWE-SRD-10596
SC-003-P	Orbital Data of Spacecraft Carrying Space Weather Instruments - Archives	SWE-SRD-10511

Product ID	Product Name	SRD Requirement
SC-003-M	Orbital Data of Spacecraft Carrying Space Weather Instruments - Measurement	SWE-SRD-10384
SC-003-N	Orbital Data of Spacecraft Carrying Space Weather Instruments - Nowcast	SWE-SRD-10597
SC-004-P	Spacecraft Housekeeping Telemetry Data - Archives	SWE-SRD-10512
SC-004-M	Spacecraft Housekeeping Telemetry Data - Measurement	SWE-SRD-10385
SC-004-N	Spacecraft Housekeeping Telemetry Data - Nowcast	SWE-SRD-10598
SC-005-P	Dose - Archives	SWE-SRD-10513
SC-005-M	Dose - Measurement	SWE-SRD-10386
SC-005-N	Dose - Nowcast	SWE-SRD-10599
SC-006-P	Deep Dielectric Charging - Archives	SWE-SRD-10514
SC-006-M	Deep Dielectric Charging - Measurement	SWE-SRD-10387
SC-006-N	Deep Dielectric Charging - Nowcast	SWE-SRD-10600
SC-007-P	Surface Charging - Archives	SWE-SRD-10515
SC-007-M	Surface Charging - Measurement	SWE-SRD-10388
SC-007-N	Surface Charging - Nowcast	SWE-SRD-10601
SC-008-P	Floating Spacecraft Potential - Archives	SWE-SRD-10516
SC-008-M	Floating Spacecraft Potential - Measurement	SWE-SRD-10389
SC-008-N	Floating Spacecraft Potential - Nowcast	SWE-SRD-10602
AL-001-P	All Quiet Alert - Archives	SWE-SRD-10517
AL-001-N	All Quiet Alert - Nowcast	SWE-SRD-10603
AL-002-P	End-of-quiet Alert - Archives	SWE-SRD-10518
AL-002-N	End-of-quiet Alert - Nowcast	SWE-SRD-10604
AL-010-N	Event Based Alarm – Solar Flare Detection	
AL-011-N	Event Based Alarm – Solar Flare Detection and Location	
AL-012-N	Event Based Alarm – CME Onset	
AL-013-N	Event Based Alarm – Halo CME Onset	
AL-014-N	Event Based Alarm – Coronal Hole Notification	
AL-015-N	Event Based Alarm – CIR Alert	
AL-016-N	Event Based Alarm – Solar Particle Event Onset	
AL-017-N	Event Based Alarm – Geomagnetic Storm Warning / Solar Wind Shock Arrival	
AL-018-N	Event Based Alarm – Geomagnetic Storm Onset	
AL-019-N	Event Based Alarm – Ionospheric Disturbance Detection	
AL-020-N	Event Based Alarm – Micro Particle Flux Warning	
AL-021-N	Event Based Alarm – Debris Cloud/Meteoroid Stream Warning	SWE-SRD-10743
AL-022-N	Event Based Alarm – All Archive	
AL-023-N	Event Based Alarm - Ground Level Enhancement (GLE) Detection	

3 SWE PRODUCT DESCRIPTIONS

3.1 Sun Data

3.1.1 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	

3.1.2 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	

3.1.3 SU-001-F: Solar Flares - Forecast

PRODUCT	Solar Flares - Forecast
Product Code	SU-001-F
Input Data required	SU-005-M SU-017-M SU-021-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	

3.1.4 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	

3.1.5 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	

3.1.6 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
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-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	the data shall be producible with a resolution of 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-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	the data shall be producible with a resolution of 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
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	the data shall be producible with a resolution of 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-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

3.1.11 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	

3.1.12 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

3.1.13 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
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-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.

3.1.15 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.

3.1.16 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-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	5%
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

3.1.18 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	10%
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

3.1.19 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	20%
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-SST-1662 SWE-CRD-SST-1663 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-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-SST-1662 SWE-CRD-SST-1663 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	

3.1.22 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	5%
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-SST-1662 SWE-CRD-SST-1663 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.

3.1.23 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	1 to at least 3 days (up to 27 days is possible with reduced accuracy)
Time resolution	1 day
Timeliness/Latency	5 min
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-SST-1662 SWE-CRD-SST-1663 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	

3.1.24 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-SST-1662 SWE-CRD-SST-1663 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for EUV radiation emitted from the Solar chromosphere/corona imapcting the Earth's thermosphere with a 1-day lag.
Comment	

3.1.25 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	5%
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-SST-1662 SWE-CRD-SST-1663 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for EUV radiation emitted from the Solar chromosphere/corona imapcting 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	100%
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-SST-1662 SWE-CRD-SST-1663 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	Index for EUV radiation emitted from the Solar chromosphere/corona imapcting the Earth's thermosphere with a 1-day lag.
Comment	

3.1.27 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-SST-1662 SWE-CRD-SST-1663 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	same as for F10.7
Comment	

3.1.28 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	5%
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-SST-1662 SWE-CRD-SST-1663 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	100%
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-SST-1662 SWE-CRD-SST-1663 SWE-CRD-GEN-1686 SWE-CRD-GEN-1721
Justification of the requirements	same as for F10.7
Comment	

3.1.30 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-SST-1662 SWE-CRD-SST-1663 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-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	5%
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-SST-1662 SWE-CRD-SST-1663 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	100%
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-SST-1662 SWE-CRD-SST-1663 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-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-SST-1662 SWE-CRD-SST-1663 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-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	5%
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-SST-1662 SWE-CRD-SST-1663 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	100%
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-SST-1662 SWE-CRD-SST-1663 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-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-SST-1662 SWE-CRD-SST-1663 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-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-SST-1662 SWE-CRD-SST-1663 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	TBD
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-SST-1662 SWE-CRD-SST-1663 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	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 2 minutes
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-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	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 2 minutes
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	

3.1.41 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	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 2 minutes
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	

3.1.42 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	the image resolution shall be better than 1 arcsec
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 2 minutes
Timeliness/Latency	<1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1689
Justification of the requirements	Input to calculation of International Sunspot Number (ISN). Classification of sunspot groups.
Comment	

3.1.43 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	the image resolution shall be better than 1 arcsec
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 2 minutes
Timeliness/Latency	1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	TBD
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	the image resolution shall be better than 1 arcsec
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 2 minutes
Timeliness/Latency	<1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	TBD
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-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	the image resolution shall be better than 1 arcsec
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 2 minutes
Timeliness/Latency	<1 hr
Accuracy	S/N > 20 in Quiet Sun
Other Specific	TBD
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	

3.1.46 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	the image resolution shall be better than 1 arcsec
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 2 minutes
Timeliness/Latency	1 hr
Accuracy	S/N > 20 in Quiet Sun
Other Specific	TBD
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	

3.1.47 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	the image resolution shall be better than 1 arcsec
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 2 minutes
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-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 minute 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	the image resolution shall be better than 10 arcsec per pixel
Time Range	Continuous coverage
Time resolution	Goal of 1 image per minutes, threshold of 1 image every 2 minutes.
Timeliness/Latency	<1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1691
Justification of the requirements	Monitor solar activity and input to modelling activities
Comment	

3.1.49 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 minute 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	the image resolution shall be better than 10 arcsec per pixel
Time Range	Continuous coverage
Time resolution	Goal of 1 image per minutes, threshold of 1 image every 2 minutes.
Timeliness/Latency	1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1691
Justification of the requirements	Monitor solar activity and input to modelling activities
Comment	

3.1.50 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 minute 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	the image resolution shall be better than 10 arcsec per pixel
Time Range	Continuous coverage
Time resolution	Goal of 1 image per minutes, threshold of 1 image every 2 minutes.
Timeliness/Latency	<1 hr
Accuracy	S/N > 10 in Quiet Sun
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1691
Justification of the requirements	Monitor solar activity and input to modelling activities
Comment	

3.1.51 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 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.

3.1.52 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.

3.1.53 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 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.

3.1.54 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.

3.1.55 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.

3.1.56 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.

3.1.57 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	TBD
Physical Range	Doppler imaging in photospheric absorption line, e.g. Ni I 6768 A
Spatial range	full disk
Spatial resolution	map resolution shall be better than 2 deg (heliographic coordinates)
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 2 minutes
Timeliness/Latency	1 day
Accuracy	TBD
Other Specific	TBD
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	

3.1.58 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	TBD
Physical Range	Doppler imaging in photospheric absorption line, e.g. Ni I 6768 A
Spatial range	full disk
Spatial resolution	map resolution shall be better than 2 deg (heliographic coordinates)
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 2 minutes
Timeliness/Latency	TBD
Accuracy	TBD
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	

3.1.59 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	TBD
Physical Range	Doppler imaging in photospheric absorption line, e.g. Ni I 6768 A
Spatial range	full disk
Spatial resolution	map resolution shall be better than 2 deg (heliographic coordinates)
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 2 minutes
Timeliness/Latency	TBD
Accuracy	TBD
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	

3.1.60 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	TBD
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	the map resolution shall be better than 0.5 deg
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 12 hours
Timeliness/Latency	TBD
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	

3.1.61 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	TBD
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	the map resolution shall be better than 0.5 deg
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 12 hours
Timeliness/Latency	TBD
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	

3.1.62 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	TBD
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	the map resolution shall be better than 0.5 deg
Time Range	Continuous coverage
Time resolution	the data shall be producible with a cadence of 12 hours
Timeliness/Latency	TBD
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	

3.1.63 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	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	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	

3.1.64 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	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	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	

3.1.65 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	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	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	

3.1.66 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	TBD
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	1 min
Timeliness/Latency	8 mins
Accuracy	
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.

3.1.67 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	TBD
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	1 min
Timeliness/Latency	1 min
Accuracy	TBD
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.

3.1.68 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	TBD
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	TBD
Timeliness/Latency	TBD
Accuracy	1%
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	

3.1.69 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	the data shall be producible with a resolution of 1 minute
Timeliness/Latency	N/A
Accuracy	1%
Other Specific	TBD
Related CRD Requirement	SWE-CRD-GEN-1696
Justification of the requirements	Measure flare activity
Comment	

3.1.70 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	the data shall be producible with a resolution of 1 minute
Timeliness/Latency	1 day
Accuracy	1%
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1696 SWE-CRD-NSO-1769
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	

3.1.71 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	the data shall be producible with a resolution of 1 minute
Timeliness/Latency	1 min
Accuracy	TBD
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1696 SWE-CRD-NSO-1769
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	

3.1.72 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	the data shall be producible with a resolution of 1 minute
Timeliness/Latency	1 min
Accuracy	1%
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	

3.1.73 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	the data shall be producible with a resolution of 1 minute
Timeliness/Latency	1 day
Accuracy	1%
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	

3.1.74 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	the data shall be producible with a resolution of 1 minute
Timeliness/Latency	1 min
Accuracy	1%
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	

3.1.75 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	the data shall be producible with a resolution of 1 day
Timeliness/Latency	1 min
Accuracy	10%
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	

3.1.76 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	the data shall be producible with a resolution of 1 minute
Timeliness/Latency	1 min
Accuracy	1%
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1698
Justification of the requirements	TBD
Comment	

3.1.77 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	the data shall be producible with a resolution of 1 minute
Timeliness/Latency	1 day
Accuracy	1%
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	

3.1.78 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	the data shall be producible with a resolution of 1 minute
Timeliness/Latency	1 min
Accuracy	1%
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	

3.1.79 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	TBD
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	the data shall be producible with a resolution of 1 day
Timeliness/Latency	1 min
Accuracy	10%
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	

3.1.80 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	TBD
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	the data shall be producible with a resolution of 1 month
Timeliness/Latency	TBD
Accuracy	TBD
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1511
Justification of the requirements	Several spacecraft effects exhibit solar cycle variation which has a ~11 years timescale.
Comment	

3.1.81 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	TBD
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 cadence
Timeliness/Latency	<3 hours
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	

3.1.82 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	TBD
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 cadence
Timeliness/Latency	TBD
Accuracy	TBD
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	

3.1.83 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	TBD
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	TBD
Timeliness/Latency	TBD
Accuracy	TBD
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	

3.2 Data on Interplanetary Medium

3.2.1 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	0,1
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1704 SWE-CRD-NSO-1768
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	Post-event radiation data shall be available <2 days following crew dose evaluation. Longer than 2 days is applicable if no activity is observed

3.2.2 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-NSO-1768
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	If measurement is made from GEO the detector must face West.

3.2.3 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	0,3
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1512 SWE-CRD-LAU-1629 SWE-CRD-GEN-1704 SWE-CRD-NSO-1768
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

3.2.4 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
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-NSO-1768
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	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-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 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.

3.2.6 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.

3.2.7 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.

3.2.8 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
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-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-NSO-1768
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-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-NSO-1768
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-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-NSO-1768
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	

3.2.12 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
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-NSO-1768
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-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	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-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.

3.2.15 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.

3.2.16 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
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-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	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-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.

3.2.19 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.

3.2.20 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
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-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	Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed
Comment	

3.2.22 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	

3.2.23 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	

3.2.24 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
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-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	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-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	

3.2.27 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	

3.2.28 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
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-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-NSO-1764
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	

3.2.30 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-NSO-1764
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	

3.2.31 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-NSO-1764
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
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
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-NSO-1764
Justification of the requirements	Shock detection in the solar wind in order to advise of upcoming activity
Comment	

3.2.33 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-GEN-1700 SWE-CRD-NSO-1762
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-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-GEN-1700 SWE-CRD-NSO-1762
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-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-GEN-1700 SWE-CRD-NSO-1762
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	

3.2.36 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
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-GEN-1700 SWE-CRD-NSO-1762
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-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-NSO-1763
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-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-NSO-1763
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-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-NSO-1763
Justification of the requirements	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast 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
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-NSO-1763
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-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	

3.2.42 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	

3.2.43 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	

3.2.44 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
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-017-M SU-023-M SU-024-M L1-008-M L1-009-M L1-010-M L1-011-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	Several spacecraft effects exhibit solar cycle variation which has a ~11 years timescale.
Comment	

3.2.46 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	L4/L5 or other 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	

3.2.47 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	L4/L5 or other away from Earth
Spatial resolution	N/A
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	

3.2.48 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	L4/L5 or other 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	

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
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	L4/L5 or other away from Earth
Spatial resolution	0.01 AU
Time Range	up to 24 days
Time resolution	600 s
Timeliness/Latency	10 min
Accuracy	TBD
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	

3.2.50 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	Preferably significantly sunward of Earth and distributed in solar longitude
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	

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	Preferably significantly sunward of Earth and distributed in solar longitude
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	

3.2.52 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
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	Preferably significantly sunward of Earth and distributed in solar longitude
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	

3.3 Data for Earth Magnetosphere & Radiation Belt

3.3.1 MR-001-P: Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and ring current) - Archives and A Posteriori Reconstruction

PRODUCT	Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and ring current) - 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	Required to predict change in the environment induced by solar eruptive phenomenas and coronal holes
Comment	

3.3.2 MR-001-N: Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and ring current) - Nowcast

PRODUCT	Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and ring current) - 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.

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

PRODUCT	Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and ring current) - 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-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	
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 derived from the linear index Ap via a logarithmic function

3.3.5 MR-002-N: Geomagnetic Indices Kp and K - Nowcast

PRODUCT	Geomagnetic Indices Kp and K - Nowcast
Product Code	MR-002-N
Input Data required	
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 for Ap and A.
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 derived from the linear index Ap via a logarithmic function. There may be no available sources for Kp and K nowcast. 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.

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

PRODUCT	Geomagnetic Indices Kp and K - Forecast
Product Code	MR-002-F
Input Data required	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 derived from the linear index Ap via a logarithmic function. 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-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	N/A
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.

3.3.8 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.

3.3.9 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-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	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	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.

3.3.11 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.

3.3.12 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	The data shall be available with a maximum delay of 5 min. This requirements 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. 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. 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-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.

3.3.15 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.

3.3.16 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	The data shall be available with a maximum delay of 5 min. This requirements 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. 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).

3.3.18 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

3.3.19 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

3.3.20 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	The data shall be available with a maximum delay of 5 min. This requirements 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. 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).

3.3.22 MR-008-P: 1-to-10MeV Protons in Earth Magnetosphere and Radiation Beltt - 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

3.3.23 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

3.3.24 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	The data shall be available with a maximum delay of 5 min. This requirements 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. 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).

3.3.26 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.

3.3.27 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

3.3.28 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	The data shall be available with a maximum delay of 5 min. This requirements 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 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).

3.3.30 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.

3.3.31 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.

3.3.32 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	The data shall be available with a maximum delay of 5 min. This requirements 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 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. 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-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.

3.3.35 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.

3.3.36 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	The data shall be available with a maximum delay of 5 min. This requirements 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 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).

3.3.38 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	

3.3.39 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	

3.3.40 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	The data shall be available with a maximum delay of 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	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).

3.3.42 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	

3.3.43 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	

3.3.44 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	The data shall be available with a maximum delay of 5 min. This requirement can be downgraded to 100 min subject to Customer approval.
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	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-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	

3.3.46 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	

3.3.47 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	The data shall be available with a maximum delay of 5 min. This requirement can be downgraded to 100 min subject to Customer approval.
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	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-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.

3.3.50 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 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.

3.3.51 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 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

PRODUCT	Plasma Drift Velocity
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	The data shall be available with a maximum delay of 5 min. This requirement can be downgraded to 100 min subject to Customer approval.
Accuracy	0,2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712
Justification of the requirements	TBD
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	The data shall be available with a maximum delay of 2 days
Accuracy	0,2
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712
Justification of the requirements	TBD
Comment	

3.3.54 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	TBD
Comment	

3.3.55 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	TBD
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	TBD
Comment	3 days is achievable only through solar wind forecast technique.

3.3.57 MR-018-P: Auroral Particle Precipitation - Archives and Post-event Reconstruction

PRODUCT	Auroral Particle Precipitation - Archives and Post-event 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	

3.3.58 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	

3.3.59 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-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-SST-2682
Justification of the requirements	TBD
Comment	

3.3.61 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	TBD
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	TBD
Comment	3 days is achievable only through solar wind forecast technique.

3.3.63 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-SST-2682
Justification of the requirements	TBD
Comment	

3.3.64 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	TBD
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-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	

3.3.67 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	

3.3.68 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	

3.4 Data for Other Planets

3.4.1 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	

3.4.2 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	

3.4.3 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
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-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	0,1
Other Specific	
Related CRD Requirement	SWE-CRD-SCO-1561 SWE-CRD-TIO-1639 SWE-CRD-NSO-1770
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 minutes.

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-NSO-1770
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 minutes.

3.5.3 IT-001-F: Vertical Total Electron Content - Forecast

PRODUCT	Vertical Total Electron Content - Forecast
Product Code	IT-001-F
Input Data required	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-NSO-1770
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 minutes.

3.5.4 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-SST-1666
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	Possible techniques for 3D density measurements include sensors that allow ionospheric tomography (GNSS, ionosonde, riometer, scattering radar)

3.5.5 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	

3.5.6 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	In the future some GNSS and radio propagation applications may need 3D electron density grids
Comment	

3.5.7 IT-002-F: 3D Electron Density Grids - Forecast

PRODUCT	3D Electron Density Grids - Forecast
Product Code	IT-002-F
Input Data required	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	

3.5.8 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	the data shall be producible with a resolution of one hour with possibility to sample down to 1 minute
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

3.5.9 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	the data shall be producible with a resolution of one hour with possibility to sample down to 1 minute
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

3.5.10 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	the data shall be producible with a resolution of one hour with possibility to sample down to 1 minute
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-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	0.1 dB
Other Specific	
Related CRD Requirement	SWE-CRD-TIO-1636 SWE-CRD-TIO-1647
Justification of the requirements	Detect D region absorption events
Comment	

3.5.12 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 km.m^-3
Physical Range	1-500 x 10^(-16) g/cm3. 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-SST-1655 SWE-CRD-GEN-1715
Justification of the requirements	Monitor for input to spacecraft drag calculations.
Comment	A downgrading for the time resolution to 240 min is sometimes acceptable subject to confirmation from the Customer.

3.5.13 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 km.m^-3
Physical Range	1-500 x 10^(-16) g/cm3. 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-SST-1655 SWE-CRD-GEN-1715
Justification of the requirements	Archive for a posteriori spacecraft drag calculations
Comment	A downgrading for the time resolution to 240 min is sometimes acceptable subject to confirmation from the Customer.

3.5.14 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 km.m^-3
Physical Range	1-500 x 10^(-16) g/cm3. 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-1715
Justification of the requirements	Input to spacecraft drag calculations
Comment	A downgrading for the time resolution to 240 min is sometimes acceptable subject to confirmation from the Customer.

3.5.15 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	1-500 x 10^(-16) g/cm3. 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	

3.5.16 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 - 300 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	Monitor for input to spacecraft drag calculations
Comment	

3.5.17 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 - 300 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	Archive for a posteriori 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.

3.5.18 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 - 300 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	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.

3.5.19 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 - 300 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.

3.5.20 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-NSO-1771
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.

3.5.21 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-TIO-1640 SWE-CRD-NSO-1771
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. 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.

3.5.22 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-NSO-1771
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. 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.

3.5.23 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-NSO-1771
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	

3.5.24 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	400 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	

3.5.25 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	400 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	

3.5.26 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.

3.5.27 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.

3.5.28 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	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.

3.6 Data on Earth Athmosphere and Geomagnetic Environment

3.6.1 AG-001-P: Auroral Visible Imaging - Archives

PRODUCT	Auroral Visible Imaging - Archives
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-NSO-1772
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.

3.6.2 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-NSO-1772
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.

3.6.3 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-NSO-1772
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.

3.6.4 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-NSO-1760 SWE-CRD-NSO-1772
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-P: Auroral UV Imaging - Archives

PRODUCT	Auroral UV Imaging - Archives
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 bandwith 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.

3.6.6 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 bandwith 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.

3.6.7 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 bandwith 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.

3.6.8 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 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-NSO-1761
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.

3.6.9 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 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-NSO-1760
Justification of the requirements	Prerequisite for AG-005-P, AG-005-N, AG-005-F
Comment	

3.6.10 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 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-NSO-1761
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.

3.6.11 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 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	1 hr - 7 days
Time resolution	1 min
Timeliness/Latency	5 min
Accuracy	50%
Other Specific	
Related CRD Requirement	SWE-CRD-NSO-1761
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-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 along the power lines or pipelines
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-NSO-1748 SWE-CRD-NSO-1761 SWE-CRD-NSO-2596
Justification of the requirements	Used in combination with magnetometer measurements to map the spatial variation of the Earth's conductivity.
Comment	Geomagnetically Induced Current nowcasts shall be provided in as close to near real-time as possible. Some historical measurements exist only on photographic media but not in digital form, their accuracy is worse than 10%.

3.6.13 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 along the power lines or pipelines
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	10%
Other Specific	
Related CRD Requirement	SWE-CRD-GEN-1712 SWE-CRD-NSO-1748 SWE-CRD-NSO-1761 SWE-CRD-NSO-2596
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.

3.6.14 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 along the power lines or pipelines
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-1713 SWE-CRD-NSO-1748 SWE-CRD-NSO-1761 SWE-CRD-NSO-2596
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-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	

3.6.16 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	

3.6.17 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	10%
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.

3.6.18 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	20%
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-P: Atmospheric Neutrons - Archives and A Posteiori Reconstruction

PRODUCT	Atmospheric Neutrons - Archives and A Posteiori 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-NSO-1767
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-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-NSO-1767
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%.

3.6.21 AG-008-N: Atmospheric neutrons - Nowcast

PRODUCT	Atmospheric neutrons - Nowcast
Product Code	AG-008-N
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	1 hr - 24 hr
Time resolution	1 min
Timeliness/Latency	5 min
Accuracy	0,01
Other Specific	
Related CRD Requirement	
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 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.

3.6.22 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.

3.7 Microparticle Environment

3.7.1 MP-001-M: Micro Particle Flux as a Function of Size, Velocity, Angular Distribution

PRODUCT	Micro Particle Flux as a Function of Size, Velocity, Angular Distribution
Product Code	MP-001-M
Input Data required	
Data to be provided and associated units	Micro particle flux as a function of mass, velocity, angular distribution, position of spacecraft, season (position of Earth in space) and UT (asymmetries in micro particle arrival due to Earth velocity)
Dynamic Range	Flux:10^3/m2.year to 10^-2/ m2.year for particles within 1 µm to 1 mm
Physical Range	The flux shall be provided within a size domain of [1 µm – 1 mm] and a velocity domain of 0 - 72 km/s
Spatial range	Coverage of GEO, polar LEO, and ISS flight altitude (~400 km)
Spatial resolution	Function of time-tag resolution: with 1s (easily achievable with loose sync with OBT) is 8/10 Km, depending on orbit.
Time Range	Continuous coverage
Time resolution	1 sec
Timeliness/Latency	
Accuracy	Velocity measurement better than 20%; determination of flight direction <5 degrees
Other Specific	
Related CRD Requirement	
Justification of the requirements	TBD
Comment	

3.7.2 MP-001-P: Micro Particle Flux as a Function of Size, Velocity, Angular Distribution - Archives and A Posteriori Reconstruction

PRODUCT	Micro Particle Flux as a Function of Size, Velocity, Angular Distribution - Archives and A Posteriori Reconstruction
Product Code	MP-001-P
Input Data required	MP-001-M
Data to be provided and associated units	Micro particle flux as a function of mass, velocity, angular distribution, position of spacecraft, season (position of Earth in space) and UT (asymmetries in micro particle arrival due to Earth velocity)
Dynamic Range	Flux:10^3/m2.year to 10^-2/ m2.year for particles within 1 µm to 1 mm
Physical Range	The flux shall be provided within a size domain of [1 µm – 1 mm] and a velocity domain of 0 - 72 km/s
Spatial range	Coverage of GEO, polar LEO, and ISS flight altitude (~400 km)
Spatial resolution	Function of time-tag resolution: with 1s (easily achievable with loose sync with OBT) is 8/10 Km, depending on orbit.
Time Range	Continuous coverage
Time resolution	1 sec
Timeliness/Latency	TBD
Accuracy	TBD
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1508 SWE-CRD-SCD-1524 SWE-CRD-SCO-1573 SWE-CRD-LAU-1620 SWE-CRD-GEN-1722
Justification of the requirements	impacts effects
Comment	

3.7.3 MP-001-N: Micro Particle Flux as a Function of Size, Velocity, Angular Distribution - Nowcast

PRODUCT	Micro Particle Flux as a Function of Size, Velocity, Angular Distribution - Nowcast
Product Code	MP-001-N
Input Data required	MP-001-M
Data to be provided and associated units	Micro particle flux as a function of mass, velocity, angular distribution, position of spacecraft, season (position of Earth in space) and UT (asymmetries in micro particle arrival due to Earth velocity)
Dynamic Range	Flux:10^3/m2.year to 10^-2/ m2.year for particles within 1 µm to 1 mm
Physical Range	The flux shall be provided within a size domain of [1 µm – 1 mm] and a velocity domain of 0 - 72 km/s
Spatial range	Coverage of GEO, polar LEO, and ISS flight altitude (~400 km)
Spatial resolution	Function of time-tag resolution: with 1s (easily achievable with loose sync with OBT) is 8/10 Km, depending on orbit.
Time Range	Continuous coverage
Time resolution	1 sec
Timeliness/Latency	TBD
Accuracy	Velocity measurement better than 20%; determination of flight direction <5 degrees
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1508 SWE-CRD-SCD-1524 SWE-CRD-SCO-1573 SWE-CRD-LAU-1620 SWE-CRD-GEN-1722
Justification of the requirements	impacts effects
Comment	

3.7.4 MP-001-F: Micro Particle Flux as a Function of Size, Velocity, Angular Distribution - Forecast

PRODUCT	Micro Particle Flux as a Function of Size, Velocity, Angular Distribution - Forecast
Product Code	MP-001-F
Input Data required	MP-001-M
Data to be provided and associated units	Micro particle flux as a function of mass, velocity, angular distribution, position of spacecraft, season (position of Earth in space) and UT (asymmetries in micro particle arrival due to Earth velocity)
Dynamic Range	Flux:10^3/m2.year to 10^-2/ m2.year for particles within 1 µm to 1 mm
Physical Range	The flux shall be provided within a size domain of [1 µm – 1 mm] and a velocity domain of 0 - 72 km/s
Spatial range	TBD. Depending on range of spacecraft orbits/trajectories
Spatial resolution	Function of time-tag resolution: with 1s (easily achievable with loose sync with OBT) is 8/10 Km, depending on orbit.
Time Range	Continuous coverage
Time resolution	1 sec
Timeliness/Latency	TBD
Accuracy	TBD
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1508 SWE-CRD-SCD-1524 SWE-CRD-SCO-1573 SWE-CRD-LAU-1620 SWE-CRD-GEN-1722
Justification of the requirements	impacts effects
Comment	

3.7.5 MP-002-P: Known Periods/events of Increased Microparticle Flux (meteoroid streams, debris clouds) - Archives and A Posteriori Reconstruction

PRODUCT	Known Periods/events of Increased Microparticle Flux (meteoroid streams, debris clouds) - Archives and A Posteriori Reconstruction
Product Code	MP-002-P
Input Data required	MP-001-M
Data to be provided and associated units	periods of increased micro particle flux
Dynamic Range	Flux:10^3/m2.year to 10^-2/ m2.year for particles within 1 µm to 1 mm
Physical Range	The flux shall be provided within a size domain of [1 µm – 1 mm] and a velocity domain of 0 - 72 km/s
Spatial range	Coverage of GEO, polar LEO, and ISS flight altitude (~400 km)
Spatial resolution	Function of time-tag resolution: with 1s (easily achievable with loose sync with OBT) is 8/10 Km, depending on orbit.
Time Range	Upon user request with the limit of 1 year
Time resolution	1 day
Timeliness/Latency	TBD
Accuracy	Accuracy of time < 1 hr
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1525 SWE-CRD-LAU-1620 SWE-CRD-GEN-1723
Justification of the requirements	Indicate increase risk of impacts by micro-particles
Comment	

3.7.6 MP-002-N: Known Periods/events of Increased Microparticle Flux (meteoroid streams, debris clouds) - Nowcast

PRODUCT	Known Periods/events of Increased Microparticle Flux (meteoroid streams, debris clouds) - Nowcast
Product Code	MP-002-N
Input Data required	MP-001-M
Data to be provided and associated units	periods of increased micro particle flux
Dynamic Range	Flux:10^3/m2.year to 10^-2/ m2.year for particles within 1 µm to 1 mm
Physical Range	The flux shall be provided within a size domain of [1 µm – 1 mm] and a velocity domain of 0 - 72 km/s
Spatial range	Coverage of GEO, polar LEO, and ISS flight altitude (~400 km)
Spatial resolution	Function of time-tag resolution: with 1s (easily achievable with loose sync with OBT) is 8/10 Km, depending on orbit.
Time Range	Upon user request with the limit of 1 year
Time resolution	1 day
Timeliness/Latency	TBD
Accuracy	Accuracy of time < 1 hr
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1525 SWE-CRD-LAU-1620 SWE-CRD-GEN-1723
Justification of the requirements	Indicate increase risk of impacts by micro-particles
Comment	

3.8 Data about Spacecraft

3.8.1 SC-001-M: Anomalies on Spacecraft Equipment

PRODUCT	Anomalies on Spacecraft Equipment
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	

3.8.2 SC-001-P: Database of Anomalies on Spacecraft Equipment

PRODUCT	Database of Anomalies on Spacecraft Equipment
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	

3.8.3 SC-002-P: Data from Spacecraft Radiation Monitors - Archives

PRODUCT	Data from Spacecraft Radiation Monitors - Archives
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	

3.8.4 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.

3.8.5 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	

3.8.6 SC-003-P: Orbital Data of Spacecraft Carrying Space Weather Instruments - Archives

PRODUCT	Orbital Data of Spacecraft Carrying Space Weather Instruments - Archives
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	

3.8.7 SC-003-M: Orbital Data of Spacecraft Carrying Space Weather Instruments - Measurement

PRODUCT	Orbital Data of Spacecraft Carrying Space Weather Instruments - Measurement
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	

3.8.8 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	
Related CRD Requirement	SWE-CRD-SCO-1550
Justification of the requirements	Needed to ingest the data in models with spatial information
Comment	

3.8.9 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	

3.8.10 SC-004-M: Spacecraft Housekeeping Telemetry Data - Measurement

PRODUCT	Spacecraft Housekeeping Telemetry Data - Measurement
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	

3.8.11 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	

3.8.12 SC-005-P: Dose - Archives

PRODUCT	Dose - Archives
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	

3.8.13 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	

3.8.14 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	

3.8.15 SC-006-P: Deep Dielectric Charging - Archives

PRODUCT	Deep Dielectric Charging - Archives
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 measurement for charging hazards
Comment	

3.8.16 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	

3.8.17 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	Accuracy within an order of magnitude is required.
Other Specific	
Related CRD Requirement	SWE-CRD-SCD-1521
Justification of the requirements	Effect measurement for charging hazards
Comment	

3.8.18 SC-007-P: Surface Charging - Archives

PRODUCT	Surface Charging - Archives
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 measurement for charging hazards
Comment	

3.8.19 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	

3.8.20 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 measurement for charging hazards
Comment	

3.8.21 SC-008-P: Floating Spacecraft Potential - Archives

PRODUCT	Floating Spacecraft Potential - Archives
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 measurement of spacecraft charging
Comment	

3.8.22 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	

3.8.23 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 of spacecraft charging
Comment	

3.9 Alerts

3.9.1 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.

3.9.2 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 (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.

3.9.3 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.

3.9.4 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.

3.9.5 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 minute 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	

3.9.6 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 minute 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	

3.9.7 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 minute 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	

3.9.8 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 minutes 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	

3.9.9 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.

3.9.10 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	

3.9.11 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 minute 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	

3.9.12 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 minute 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	

3.9.13 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 minute 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 NSO domain with ground based systems where regional disturbance alerts are critical.

3.9.14 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 minute 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	

3.9.15 AL-020-N: Event Based Alarm – Micro Particle Flux Warning

PRODUCT	Event Based Alarm – Micro Particle Flux Warning
Product Code	AL-020-N
Input Data required	MP-001-M
Data to be provided and associated units	Alert based on periods of increased micro-particle flux
Dynamic Range	TBD
Physical Range	Size domain will cover 1 µm – 1 mm
Spatial range	GEO, polar LEO, ISS orbits
Spatial resolution	
Time Range	Prompt alert
Time resolution	Issued only when defined thresholds crossed
Timeliness/Latency	<1 minute after detection
Accuracy	
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	

3.9.16 AL-021-N: Event Based Alarm – Debris Cloud/Meteoroid Stream Warning

PRODUCT	Event Based Alarm – Debris Cloud/Meteoroid Stream Warning
Product Code	AL-021-N
Input Data required	
Data to be provided and associated units	Alert based on known periods of increased micro-particle flux
Dynamic Range	Alarm triggered when flux rises to (10^3/m2)/year to (10^-2/ m2)/year for particles within 1 µm to 1 mm
Physical Range	Size domain will cover 1 µm – 1 mm
Spatial range	GEO, polar LEO, ISS orbits
Spatial resolution	Function of time-tag resolution: with 1s (easily achievable with loose sync with OBT) is 8/10 Km, depending on orbit.
Time Range	Prompt alert
Time resolution	Issued only when defined thresholds expected to be crossed
Timeliness/Latency	<1 minute after detection
Accuracy	
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	An alarm function based on increased flux of micrometroids/debris will be very difficult to implement and possibly unreliable due to: 1) the large intrinsic fluctuations of the MMOD flux 2) the large experimental uncertainty on the derived flux 3) the large level of noise which typically affects MMOD sensors

3.9.17 AL-022-N: Event Based Alarm – All Archive

PRODUCT	Event Based Alarm – All Archive
Product Code	AL-022-N
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 shall be 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	

3.9.18 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 minute
Timeliness/Latency	1 minute (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	