

ESA
Space Weather
Programme Study

CLRC QinetiQ astrium FINNISH METEOROLOGICAL INSTITUTE ONEBA

Final Presentation

- R1. Overview
- R2. Detailed Rationale
- R3. Benefits
- R4. Market Analysis
- R5. System Requirements
- R6. Space Segment Definition
- R7. Ground Segment
- R8. Prototype**
- R9. Programmatics

Space Weather Prototyping Activity

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Prototyping Activity WP434

Data Retrieval Issues

- ❖ Resource location
- ❖ Access method
- ❖ Data Availability
- ❖ Encoding method
- ❖ Content description
- ❖ Reliability

Data units, instrument specification, error bars,...

Data processing e.g. background correction

GOES-8 Energetic Particle Key Parameters
(Coordinated Data Analysis Web)
<http://cdaweb.gsfc.nasa.gov/pub/...> CDF file

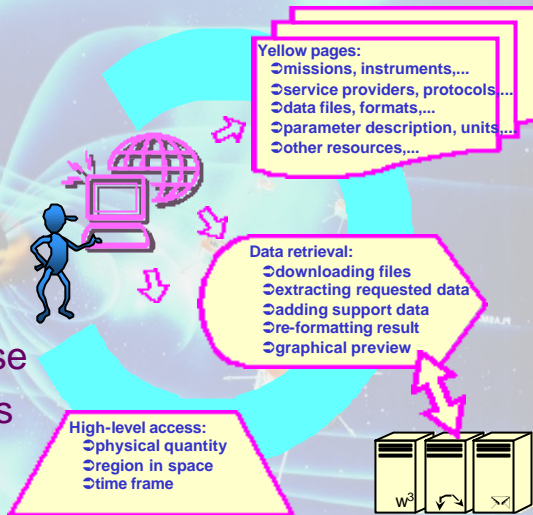
SAMBA Flux Gate Magnetometer data
(CNES French Cluster Data Centre)
[http://csds-fr.cnes.fr:8080/pub-query/...](http://csds-fr.cnes.fr:8080/pub-query/) Web query zipped files

Abisko Intermagnet magnetograms
(Edinburgh Geomagnetic Information Node)
email: e_gin@mail.nmh.ac.uk Email request

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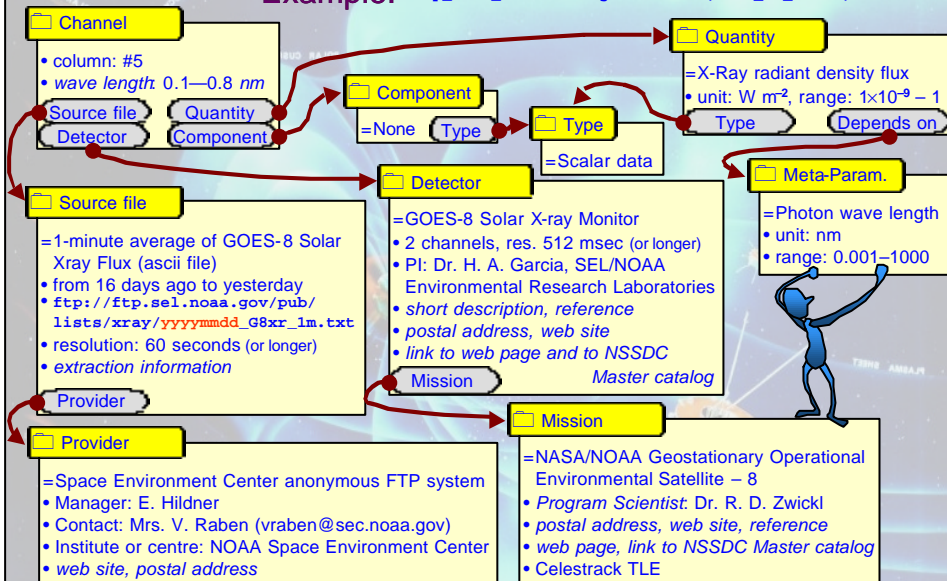
Prototype Approach

- ❖ Three Levels
 - Yellow pages
 - Data retrieval
 - High-level access
- ❖ Main components
 - Web interface
 - Relational database
 - Background scripts



YP Content Description

Example: `Xray_flux_none <Xrs-g8@GOES-8> (G8xr_1m_txt#8)`



Prototyping Activity WP434

YP Sample Screenshot

ESA Space Weather Programme - Netscape
 Location: http://eve.cma.be/ESWS/

SE Models or sensors

4 entries match your request

Entry 5 := Xray_flux_none <Xrs-g8@GOES-8> (G8xr_1m_txt#8)

Sensor or detector	GOES-8 Solar X-ray Monitor
Mission	NASA/NOAA Geostationary Operational Environmental Satellite - 8
Measured quantity	X-Ray radiant density flux W m ⁻² - (Scalar data)
Photon wave length	0.1 - 0.8 [nm]
Source file	1-minute average of GOES-8 Solar X-ray Flux (ascii file) [Space Environment Center anonymous FTP system]

Similar channels for the same sensor
 Similar channels for other sensors
 Similar channels for other missions
 Other channels from the same source file

4 entries match your request

GOES-8 Energetic Particle Monitor
 GOES-8 Ephemeres
 GOES-8 Traxial Fluxgate Magnetometer
 GOES-8 Solar X-ray Monitor

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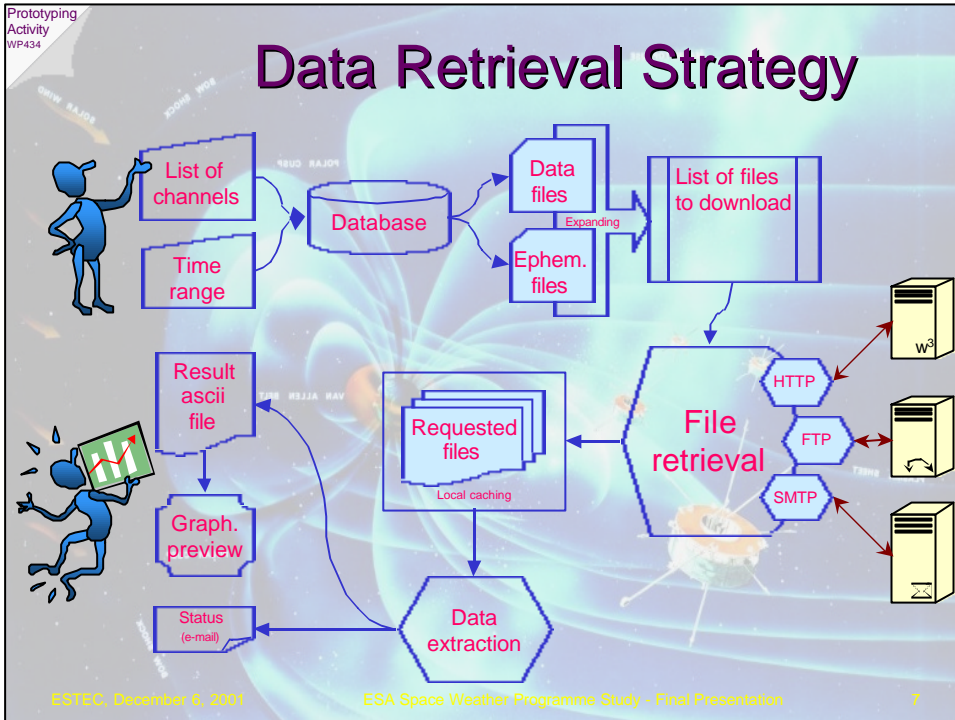
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Sample Yellow Pages Query

- I am looking for information on the SOHO spacecraft and onboard instruments.
- Where can I find more information about the Ulysses spacecraft?
- What is the current location of the Cluster satellites?
- I am looking for information on the SOPA particle analyser onboard the LANL 1994-084 satellite.
- Where can I find data from the EPAM instrument onboard ACE?
- What data is accessible at NOAA Space Environment Center?
- What is the availability of the GOES-8 solar X-ray flux data at NOAA/SEC?
- Which space or ground missions are monitoring the geomagnetic field?
- What kind of magnetic data are recorded at the INTERMAGNET Abisko observatory?

Are there unidirectional proton flux measurements?

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Data Retrieval Sample

Requested channels:

Time_range	<Time_range>=2001-01-01T00:00:00Z-2001-11-03T00:00:00Z
Req_chan	<Req_chan>=GOES08-8-3+3+3
Req_chan	<Req_chan>=ACE01-1+1+3
Req_chan	<Req_chan>=GOES08-8-3+3+3
Req_chan	<Req_chan>=ACE01-1+1+3
Req_chan	<Req_chan>=GOES08-8-3+3+3
Req_chan	<Req_chan>=ACE01-1+1+3
Req_chan	<Req_chan>=GOES08-8-3+3+3
Req_chan	<Req_chan>=ACE01-1+1+3
Req_chan	<Req_chan>=GOES08-8-3+3+3
Req_chan	<Req_chan>=ACE01-1+1+3

Requested status:

Entry: 215

Request status: Completed

Time period: From 1 Nov 2001 until 3 Nov 2001 (23:59:59)

Result: Ascii columns separated by ...

Description:

- Block 1: 6 associated retrieved file(s)
 - DC Magnetic field, z-Component in geocentric coordinate system [channel 8]
- Block 2: 6 associated retrieved file(s)
 - Unidirectional integral proton flux, (Scalar data), 10 - 700 [MeV] [channel 28]
- Block 3: 4 associated retrieved file(s)
 - Unidirectional integral proton flux, (Scalar data), 10 - 100 [MeV] [channel 18]
- Block 4: 4 associated retrieved file(s)
 - Plasma temperature, (Scalar data) [channel 63]

14 files to be retrieved:

- ✓GOES-8: 3+3+3
- ✓ACE: 1+1+3

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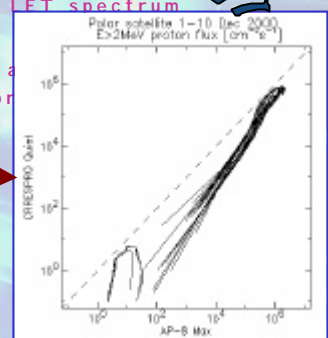
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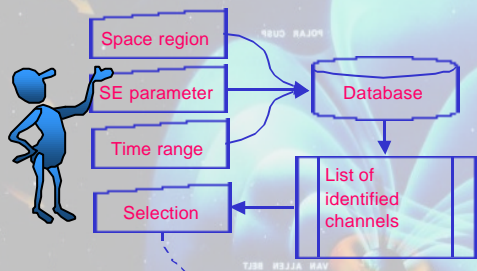
Sample Data Retrieval

- ❖ I want to retrieve 1-hour data from several ACE instruments.
- ❖ I want to retrieve proton flux data from ACE and GOES-8.
- ❖ I want to retrieve magnetic field data from the INTERMAGNET stations
- ❖ I want to evaluate the cosmic ray LET spectrum for XMM.
- ❖ I want to do a remote model evaluation along the AP-8 MAX and CRRES orbits for the Polar or

Remote model evaluation along spacecraft orbit



High-level access



- ❖ I want to retrieve magnetic field data at geostationary orbit
- ❖ ... for a location near Lagrange point L1

Activity Results



❖ Prototype

- ☺ Working demonstration (Yellow pages & Data retrieval)
- ☺ Variety of access types (Ftp, Http, Sntp, Remote models)
- ☹ Maintainability of the database content (need of editors)

❖ Case Study Demonstration

- ➔ Post-event analysis: April 4—10, 2000
- see WP-433: T. Pulkkinen, H. Koskinen, E.I. Kallio, M. Palmroth (FMI)
- 10 ESA spacecraft



Case Study Demonstration



Int. design.	Nesrad nbr.	Name	Source	Launch date	Comments
1990-037B	20580	HST	US	1990-04-24	Mission descr. S.T.Sc.I
1990-090B	20842	ULYSSES	US	1990-10-06	No data found Mission descr.
1995-065A	23726	SOHO	ESA	1995-12-02	No data found Mission descr.
1999-066A	25969	XMM	ESA	1999-12-10	Mission descr. ESA science
		HUYGENS	ESA	2004-11-06	0 records found ESA science
1984-114B	15386	MARECS B2	ESA	1984-11-10	ESA Villafranca
1991-015B	21140	METEOSAT 5	ESA	1991-03-02	ESOC
1993-073B	22912	METEOSAT 6	ESA	1993-11-20	ESOC
1997-049B	24932	METEOSAT 7	ESA	1997-09-02	ESOC
1995-021A	23560	ERS-2	ESA	1995-04-21	ESA earthnet
1987-078B	18351	EUTELSAT 4	EUTE	1987-09-16	Eutelsat

<http://eve.oma.be/ESWS/>