

The diagram illustrates the ESA SSA Space Weather Services - Federated Service Concept. It features a central Earth with several satellite orbits. The Sun is visible in the upper right corner. Satellites shown include SENTINEL 4, two GIOV GALILEO satellites, ENVISAT, ISS, and EDRS. The text 'ESA SSA Space Weather Services - Federated Service Concept' is prominently displayed in the upper center.

ESA SSA Space Weather Services - Federated Service Concept

**Juha-Pekka Luntama
Alexi Glover**

ESA SSA Programme Office

Space Weather Workshop
April 8-11, 2014
Boulder, CO

PURPOSE OF THE SSA PROGRAMME



“The objective of the Space Situational Awareness (SSA) programme is to **support the European independent utilisation** of, and **access to, space** for research or services, through the **provision of timely and quality data**, information, services and knowledge regarding the **space environment**, the **threats** and the sustainable exploitation of the outer space **surrounding our planet Earth.**”



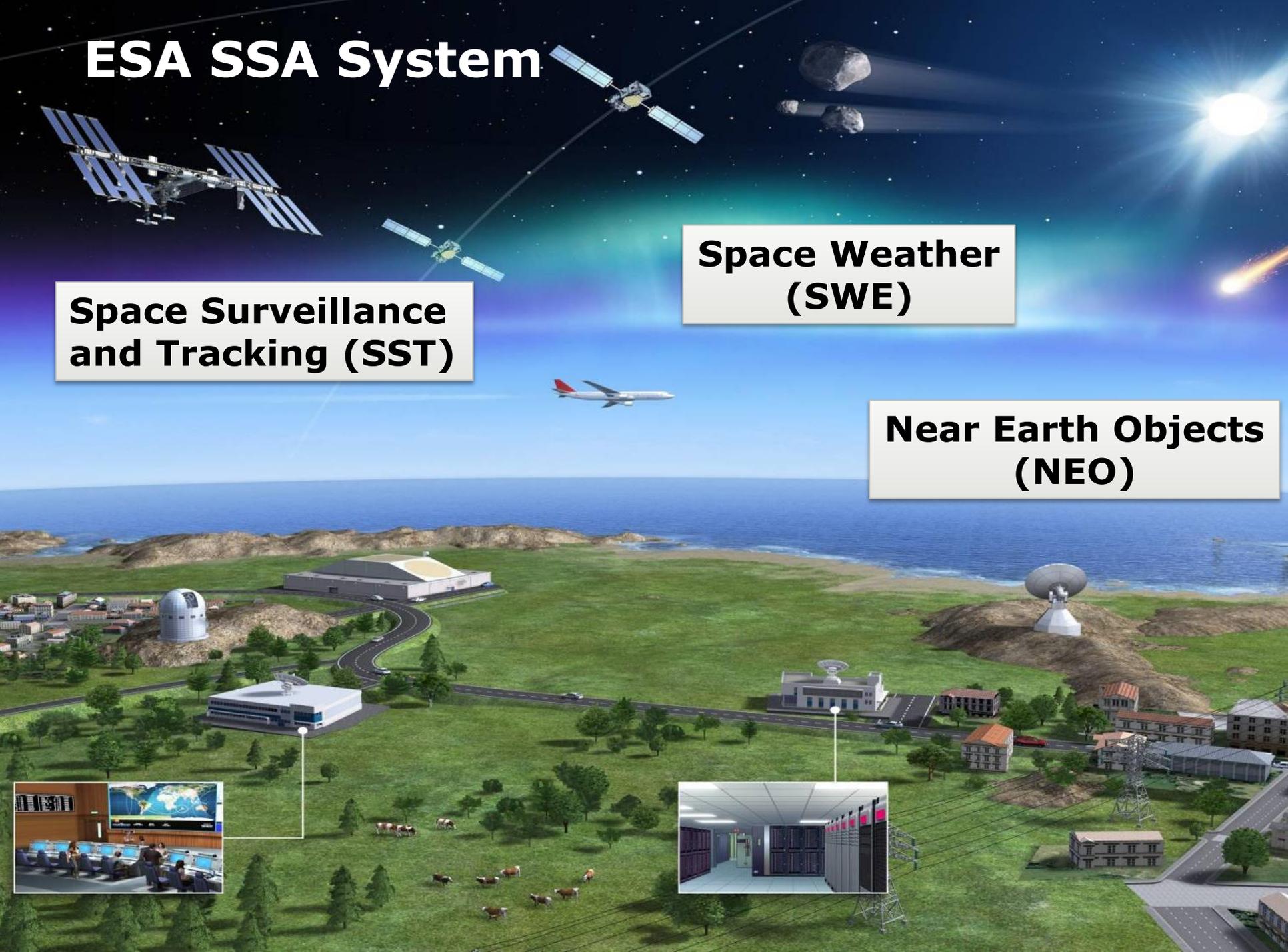
- **ESA Ministerial Council
November 2008**

ESA SSA System

Space Surveillance and Tracking (SST)

Space Weather (SWE)

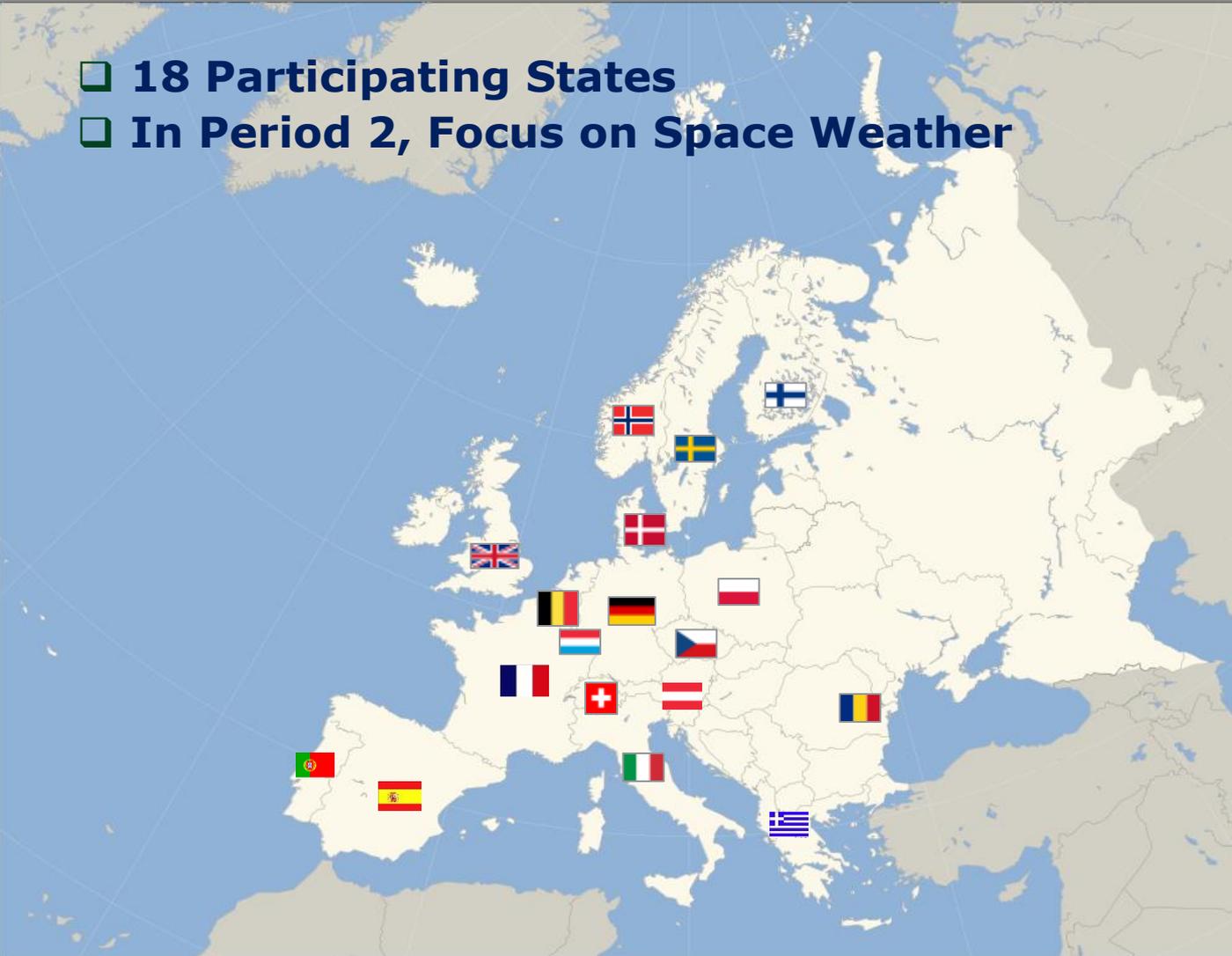
Near Earth Objects (NEO)



SSA Programme Participants



- 18 Participating States
- In Period 2, Focus on Space Weather

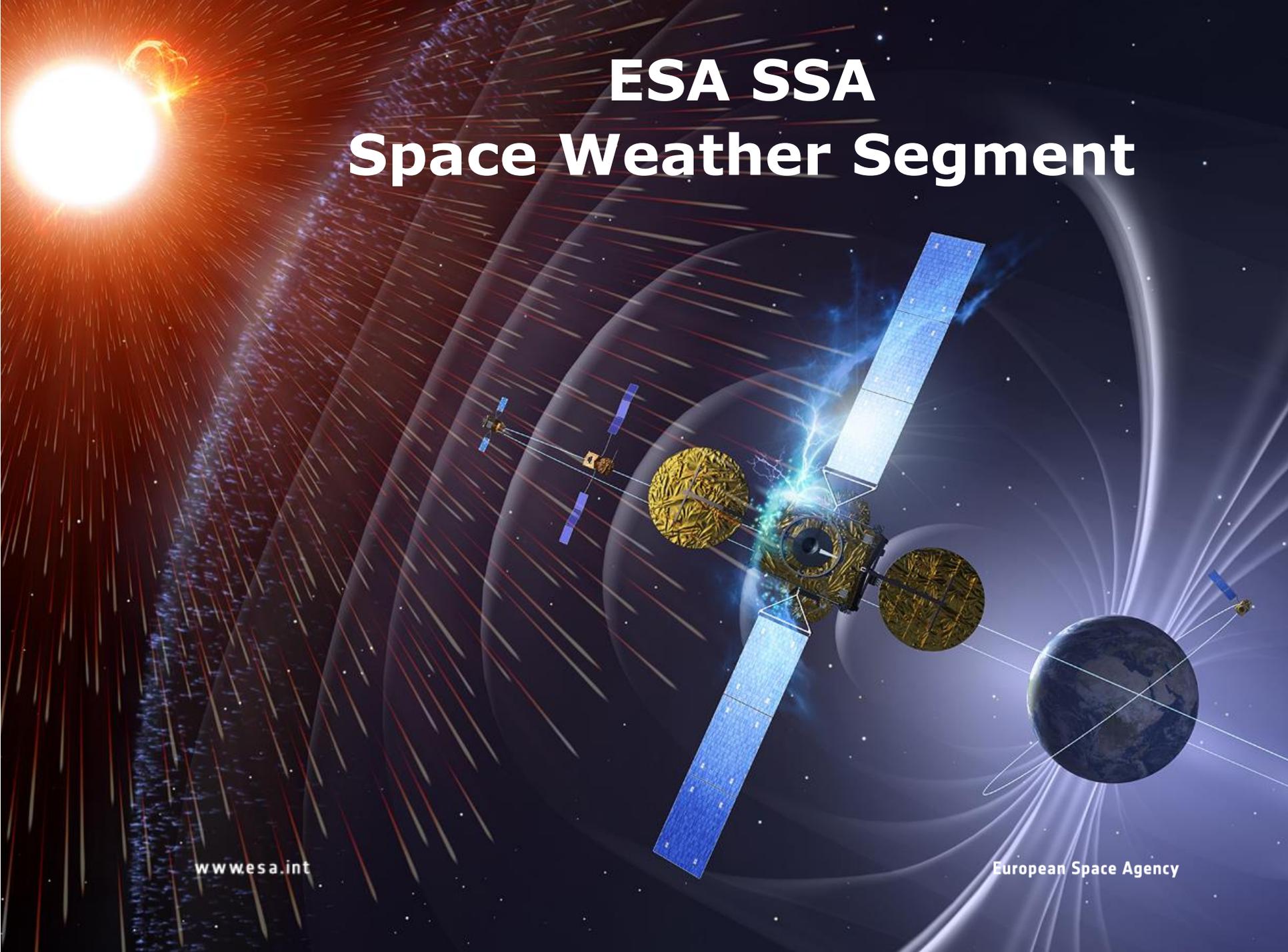


- Austria
- Belgium
- Czech Republic
- Denmark
- Finland
- France
- Germany
- Greece
- Italy
- Luxembourg
- Norway
- Poland
- Portugal
- Romania
- Spain
- Sweden
- Switzerland
- United Kingdom

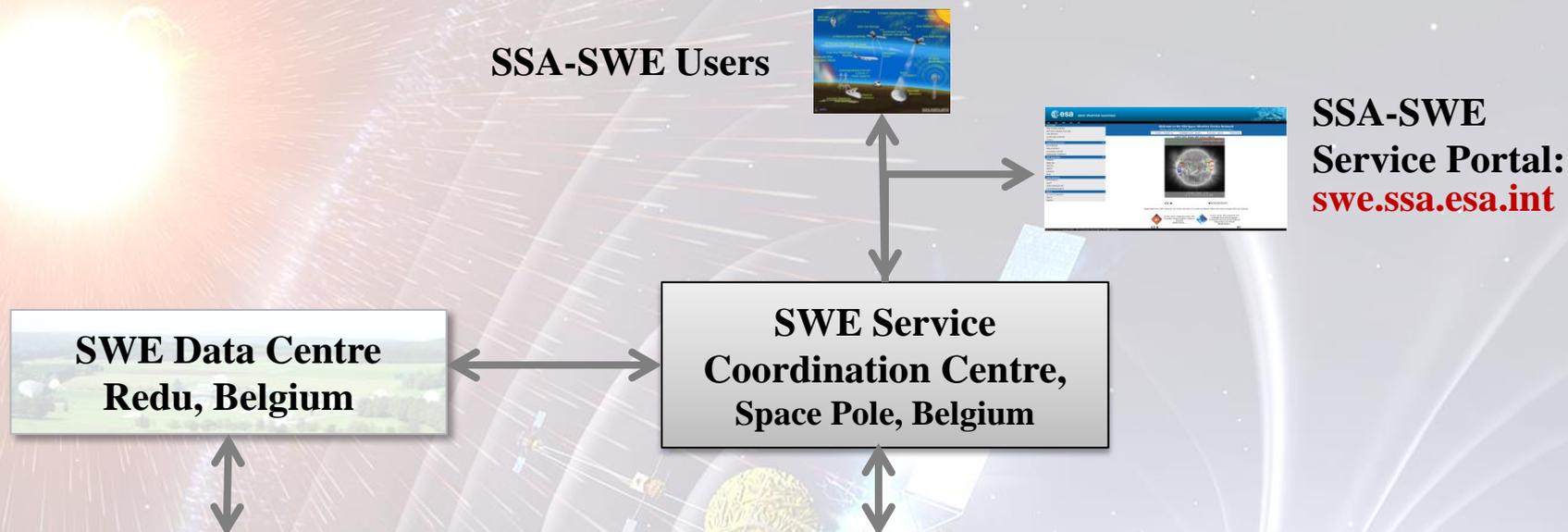
ESA SSA Space Weather Segment

www.esa.int

European Space Agency



SSA/SWE Precursor System in 2013



SWE Expert Service Centres

Solar Weather

ROB, Belgium (coord.)
Uni. Graz, Austria

Ionospheric Weather

DLR, Germany (coord.)
NMA, Norway
NOA, Greece
CLS, France

Space Radiation

BIRA, Belgium (coord.)
AIT, Austria
UOA, Greece

Geomagnetic Conditions

TGO, Norway (coord.)
FMI, Finland

Heliospheric Weather

TBD

SSA SWE Coordination Centre



- SSA Space Weather Coordination Centre (SSCC) was established by the SSA Programme

- Inaugurated **SSA SWE Coordination Centre**

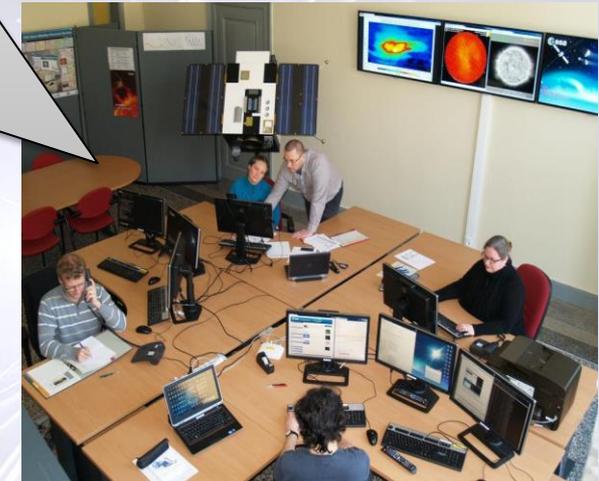
- SSA Space Pole
info Avenue Circulaire, 3 - Ringlaan
use 1180 Uccle - Ukkel (Brussels)
• BELGIUM

- SSA
curr Tel: +32-2-7903-913
Email: helpdesk.swe@ssa.esa.int

=> Support currently provided during normal working hours + dedicated campaigns

- SWE services available from:

<http://swe.ssa.esa.int>



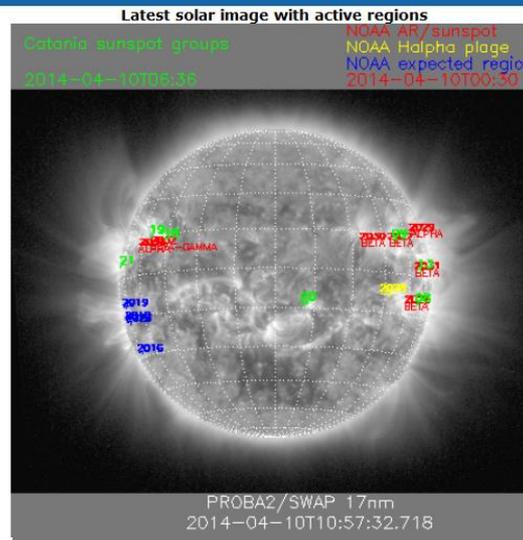


ESA	SSA	SWE	NEO	SST
About SWE				
What is Space Weather				
SSA Space Weather Activities				
User Domains				
Current Space Weather				
Contact				
Expert Service Centres ?				
Solar Weather				
Space Radiation				
Ionospheric Weather				
Geomagnetic Conditions				
SWE Applications ?				
SWENET				
SPENVIS				
SEISOP				
SEDAT				
IONMON				
EDID				
Other Resources				
DOCUMENTS				
SWWT				
SWEN NEWSLETTER				
UPCOMING EVENTS				
Sign-In				
You are not signed in.				
Sign In				
Register				

Welcome to the SSA Space Weather Service Network

Please note that all SSA-SWE Services are under review / construction

SIDC/RWC-Belgium forecast of



Latest data from SWE network. For a full overview of current conditions follow the links to Expert Service Centres.



18 Nov 2013: Opening of the 10th European Space Weather Week in Antwerp
Read more...

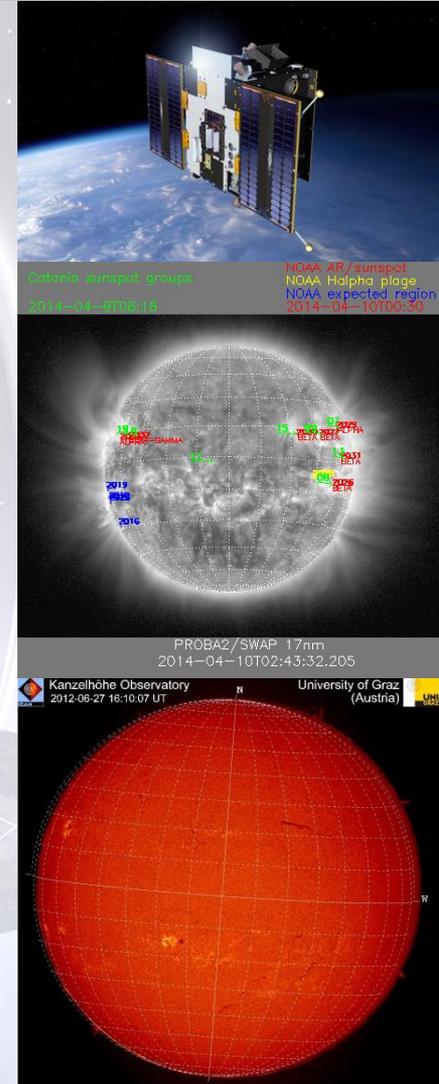


14 Nov 2013: New products are available from the European Ionosonde Service of the National Observatory of Athens
Read more...

Solar Weather ESC



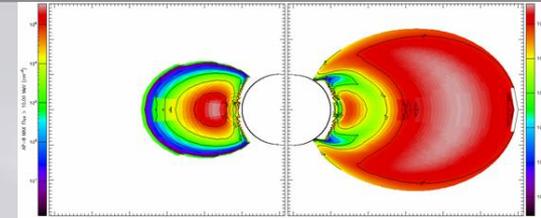
- Coordinator: **Royal Observatory of Belgium, Belgium**
- Participants: **University of Graz, Austria**
- Centralises the expertise on solar drivers of the space weather
- Federated SWE services
 - PROBA2 / SWAP - EUV 17.4 nm and LYRA
 - USET / H-alpha full disk and White-light
 - HUMAIN Radiospectrogram
 - SDO AIA & HMI
 - SIDC-International Sunspot Index and F10.7 index forecast
 - SIDC Daily SWE bulletin
 - CACTus - CME service
 - SIDC fast alerts and all quiet alert
 - Kanzelhöhe / H-alpha full disk movie and flare and filament eruption alerts



Space Radiation Environment ESC



- Coordinator: **Belgian Institute of Space Aeronomie, Belgium**
- Participants:
 - **Seibersdorf Laboratories GmbH, Austria**
 - **National and Kapodistrian University of Athens (UOA), Greece**
- Expertise on radiation environment in space and for aviation
- End user support includes
 - Solar Energetic Particle (SEP) events
 - Trapped radiation particles
 - Cosmic rays
- Applications and services
 - SPENVIS (SPace ENVironment Information System)
 - AVIDOS (AVIation DOSimetry)
 - ANeMoS: (GLE) event alerts and multi-station Neutron Monitor data



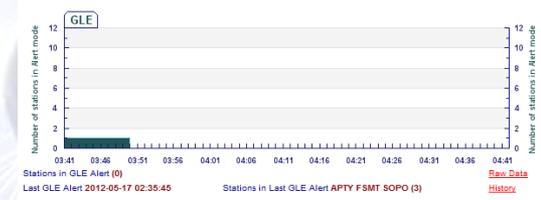
Welcome to AVIDOS
 AVIDOS is an informational and educational software for the assessment of cosmic radiation exposure at flight altitudes.

GLE plus Alert **Real Time GLE ALERT System**
 National & Kapodistrian University of Athens / Cosmic Ray Group
 ISNet Company

DATA UPDATED EVERY MINUTE
 Thu, Apr 10, 2014 at 04:44:22 UTC

Service Description | Disclaimer | Acknowledgement | Archived GLEs | Get GLE E-mail

General Alert Status		Stations Summary	
QUIET	ALERT [00]	Real Time [21]	Total [33]
	WARNING [00]	Near Real Time [02]	
	WATCH [02]	Not in Real Time [10]	
	QUIET [31]		



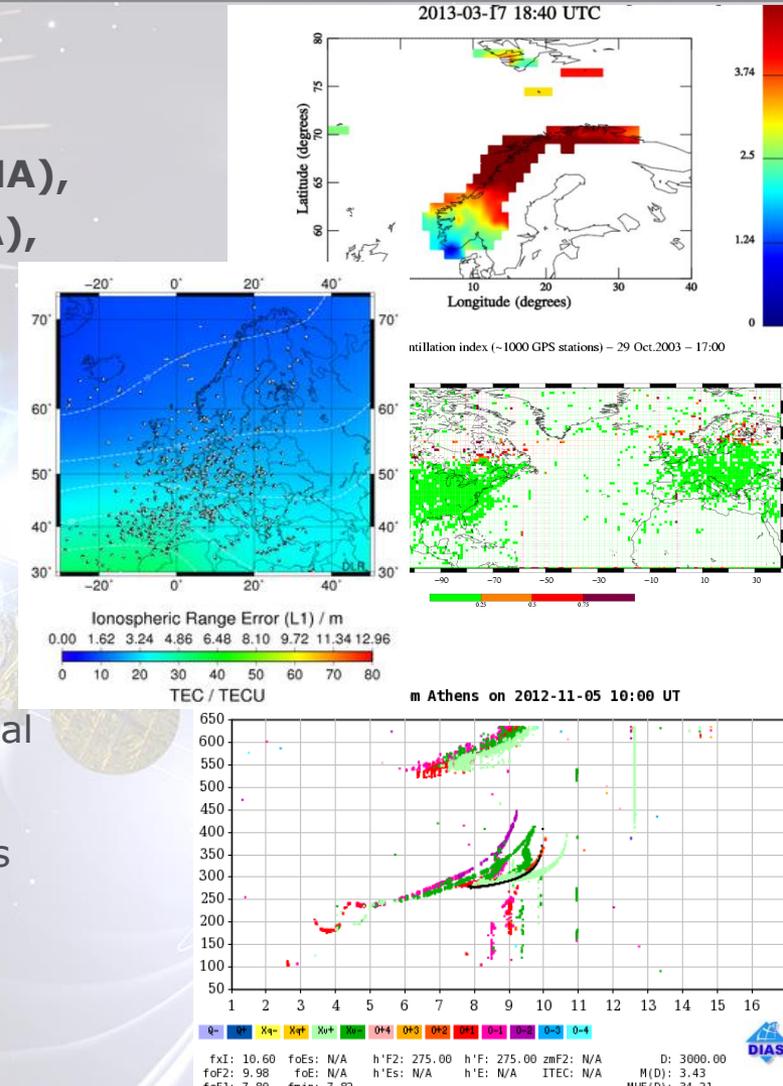
Stations Info

● AATB	● QUIET	● APTY	● QUIET	● ATHN	● QUIET	● BKSN	● QUIET
● BURE	● QUIET	● CALM	● QUIET	● ESOI	● QUIET	● FSMT	● QUIET
● INVK	● QUIET	● IRK2	● QUIET	● IRK3	● QUIET	● IRKT	● QUIET
● JUNG	● QUIET	● JUNG1	● QUIET	● KERG	● QUIET	● KIEL2	● QUIET
● LMKS	● WATCH	● MCMU	● QUIET	● MCRL	● QUIET	● MGDH	● QUIET
● MOSC	● QUIET	● MRNY	● QUIET	● NAIN	● QUIET	● NEWK	● QUIET
● NVBK	● QUIET	● OULU	● QUIET	● PWK	● QUIET	● ROME	● QUIET
● SOPO	● QUIET	● TERA	● WATCH	● THUL	● QUIET	● TBXY	● QUIET
● YTKK	● QUIET						

Ionospheric Weather ESC

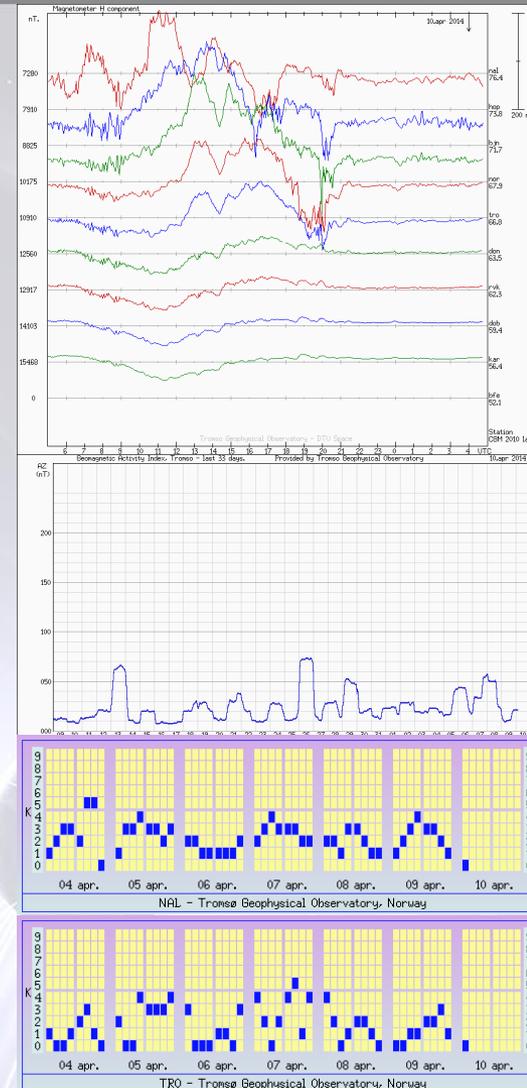


- Coordinator: **Deutschen Zentrums für Luft- und Raumfahrt, Germany**
- Participants: **Norwegian Mapping Authority (NMA), Norway; National Observatory of Athens (NOA), Greece, CLS (France)**
- Expertise on the ionized upper layers of the atmosphere
- Disturbances in the ionosphere impact satellite telecommunication, navigation and VHF/UHF radio communication
- Federated services include:
 - Regional and global maps and forecasts of Total Electron Content (TEC)
 - Ionospheric disturbance information and alerts
 - Ionospheric scintillation information
 - 2D electron density in the plasmasphere



Geomagnetic Conditions ESC

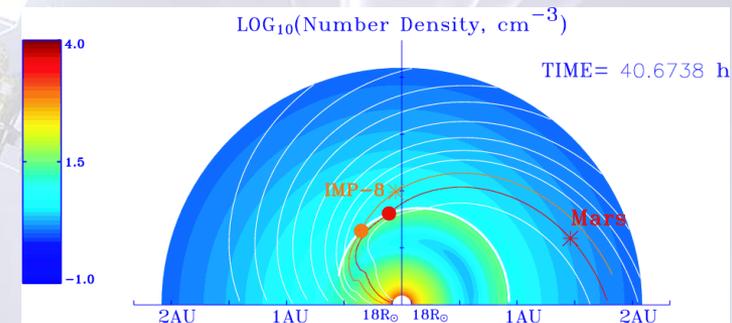
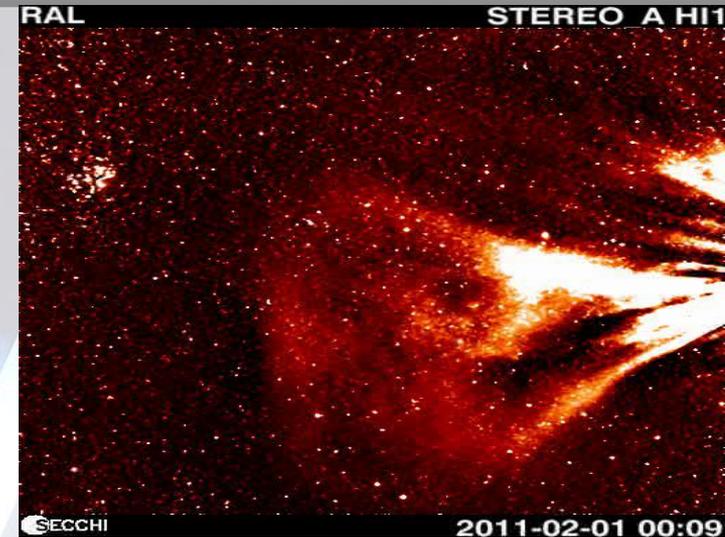
- Coordinator: **Tromsø Geophysical Observatory, Norway**
- Participants: **DTU, Denmark, SIDC, Belgium, FMI, Finland**
- Federated services include
 - Norwegian/Danish station magnetograms
 - Provisional K-index
 - Geomagnetic activity in Auroral Zone
 - Long term geomagnetic activity index
 - Provisional AA-index
 - Aurora visibility forecasts (under development)
 - Geomagnetic services for resource exploitation (under development)



Heliospheric Weather ESC (development starting in 2014)



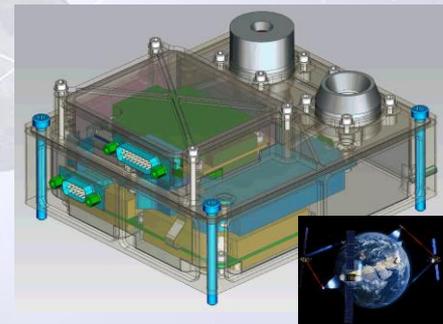
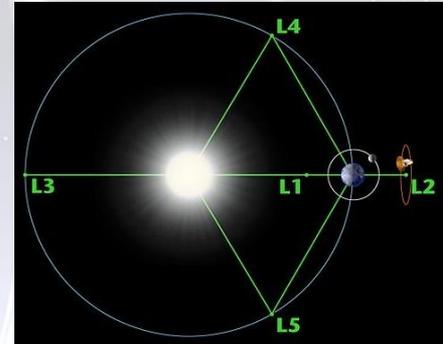
- Focus on magnetospheric response to solar wind disturbances
 - Multi-point remote sensing of heliospheric phenomena
 - Physical modelling of solar wind/CME initiation and evolution, Interaction solar wind/IP CMEs
 - SEP event modelling
 - Nowcast & forecast techniques to be prototyped and tested
- Tasks include space weather at other locations of interest within the heliosphere
- Heliospheric and Solar Weather ESC outputs form key inputs to the ESC network



SSA SWE Space Segment Development



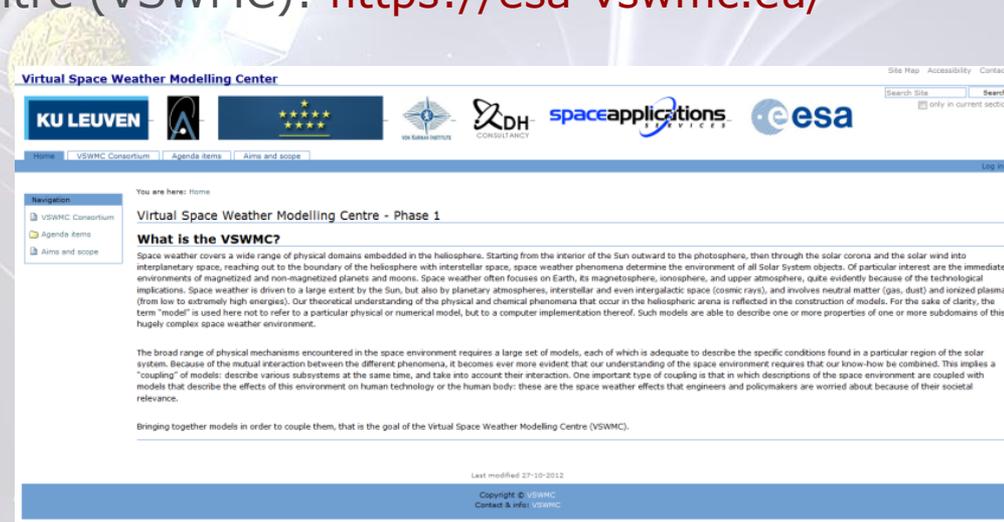
- Objective is to ensure data availability and continuity for the ESA SSA system and collaboration partners
- SSA Period 2 includes activities for
 - Operation of the PROBA-2 spacecraft
 - SWE instruments as Hosted Payload (HP) for GEO, MEO and LEO missions
 - NGRM mission on-board EDRS-C under implementation
 - Other HP missions to GEO and LEO under investigation
 - Phase C/D developments of new SWE instruments for HP missions (e.g. magnetometer, EUV imager, 3D energetic electron spectrometer, ...)
 - Phase 0/A/B1 study of operational missions to L1 + away from Sun-Earth line
 - Prototyping of a compact wide angle coronagraph
 - Phase A/B studies on new space based SWE instruments in ESA technology programmes



SWE G/S technology development



- G/S technology developments include
 - Ground based observation systems
 - Data networking, transfer and processing and ingestion
 - Standardisation of instruments and intercalibration
 - Development of physics based and empirical modelling
 - Virtual, distributed data, modelling and service systems
- Virtual Space Weather Modelling Centre (VSWMC): <https://esa-vswmc.eu/>
 - First European end-to-end modelling effort
 - Prototype under development in ESA GSTP
 - Development to be continued within SSA Programme in 2014





THANK YOU

For more information:

swe.ssa.esa.int

www.esa.int

European Space Agency