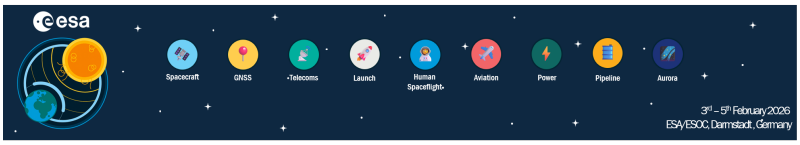
ESA Space Weather Service Network Workshop 2026



Tuesday 3 February 2026 - Thursday 5 February 2026

ESOC

Session List

Session Overview by Time Slot (CET)
Tuesday 3 February
09:00 - 09:30
Welcome Session
Juha-Pekka Luntama (ESA), Alexi Glover (ESA)
09:30 - 10:30

Individual Expert Service Centre Introductions
* Geomagnetic Conditions
* Ionospheric Weather
* Heliospheric Weather
* Solar Weather
* Space Radiation

** Please note: These sessions are restricted. If you are at ESOC during this time, we encourage you to take the opportunity to sign up for an ESOC tour instead.*
11:00 - 12:30

Geomagnetic Conditions Expert Service Centre Products, Development and Future Improvements
This session focuses on existing G-ESC products and ideas for future improvements as well as new development ideas. Contributions are invited that present and discuss ideas to advance the G-ESC's contribution to the SWE Network.
Convenors: Line Drube (DTU), Anna Willer (DTU)

Ionospheric Weather Expert Service Centre Product Developments and Future Improvements
Review of the current I-ESC product portfolio and identify opportunities to enhance product quality, operational relevance, and scientific robustness.
Convenors: Martin Kriegel (DLR), Anna Belehaki (NOA/IAASARS)

Machine Learning in the ESA Space Weather Service Network
Machine learning and AI are increasingly used to detect solar and heliospheric features, classify events, and predict solar activity. This session invites contributions demonstrating how such methods can enhance SWESNET products, automate data processing, or improve short- and medium-term forecasts, while ensuring traceability and integration within SWESNET's operational standards.
Convenors: Lidia Contarino (INAF), Roberto Susino (INAF)
14:00 - 15:30

Exploitation of Energetic Particle Measurements for Space Weather Applications
The number of energetic particle detectors and monitors in space has steadily increased in recent years, covering both Earth's magnetosphere and the inner heliosphere. This trend is expected to continue with upcoming missions. This session will explore how the growing wealth of current and future data can enhance the provision of reliable space weather products. Topics include monitoring the present radiation environment (nowcasting), forecasting near-future conditions, post-event analysis of observed effects, and improving radiation environment models for short-and long-term conditions. The primary goal is to identify development needs in data processing, cross-calibration, infrastructure, and model and product advancements to fully leverage these

datasets and guide future development activities. Potential critical data gaps in time, location, energy, and particle species will also be addressed. This session builds on discussions from the 2022 Network Workshop. It will begin with an overview of ongoing and planned missions from ESA and other agencies, followed by a summary of key points from the previous workshop. While the main objective is an in-depth discussion of the topics outlined above, short contributions in the form of presentations are welcome.
Convenors: Mark Dierckxsens (BIRA-IASB), Melanie Heil (ESA), Ingmar Sandberg (SPARC)

Follow up on TEC Combination and Real-Time Validation in Position Domain
Review of progress and next steps for combined TEC map products and real-time validation capabilities.
Convenors: Alberto Garcia-Rigo (IEEC / UPC-IonSAT), Knut Stanley Jacobsen (NMA)

Heliospheric Weather Expert Service Centre Overview
This session will provide an overview of current H-ESC activities, planning and priorities for future work. It is intended that this be an open session to encourage those not already directly involved in the H-ESC to have an opportunity to get involved.
Convenors: Chris Perry (STFC/RAL Space), David Barnes (STFC/RAL Space)

Solar Weather Expert Service Centre Products, Development and Future Improvements
This session focuses on existing S-ESC products and on strategies to enhance their quality, usability, and scientific impact. Contributions are invited that address product development, validation, user engagement, and ideas to advance the S-ESC's contribution to the SWE Network.
Convenors: Judith de Patoul (ROB), Lidia Contarino (INAF)

Validation and Benchmarking of Geomagnetic Conditions Forecast Products
This session explores effective approaches for validating and benchmarking forecast products, with a focus on G-ESC outputs. We invite contributions on methods, case studies, and discussions including cross-product comparisons, historical data analysis, and ground-truthing techniques.
Convenors: Norah Kaggwa Kwagala (UiB), Peter Wintoft (IRF)
16:00 - 17:30

Improving Geomagnetic Conditions Forecasts: Sun to Earth Perspective
This session focuses on improving space weather forecast accuracy through the integration of solar and heliospheric models and observations. Emphasis is placed on strengthening European capabilities and reducing reliance on non-European data sources. Contributions are invited on methods that connect and combine products from different ESCs into coherent, end-to-end forecasting chains from the Sun to Earth.
Convenors: Chris Perry (STFC/RAL Space), Carlo Scotto (INGV)

Possible New Developments and Validation for the ESA Space Weather Service to Aviation in View of Services Offered by ICAO's SWE Centres
The session will explore potential new developments and validation needs across radiation, GNSS, and communication-related products within the Service to Aviation as one of the Service Domains of the ESA Space Weather Service Network. As aviation operators increasingly emphasise the importance of accurate and timely delivered space-weather information, strengthening the scientific quality, operational robustness, and reliability of results of these diverse products is a natural step forward in their development. The discussion will consider advances in modelling approaches, improved or new input data sources, and harmonised validation methodologies that support confidence in radiation dose estimates, GNSS performance indicators, and HF/VHF communication impact assessments. Emphasis will be placed on identifying next steps for future service evolution.

The session will begin with a few short introductory presentations to establish context and highlight ongoing work in these domains. In parallel, the aim is also to analyse the Service to Aviation in view of services provided by ICAO's global Space Weather Centres. This includes differences in global coverage, service levels, operational availability, product formats, and integration with established aviation information channels. Following the introductory presentations, active engagement from all participants will be encouraged through an open discussion aimed at identifying priorities, sharing operational experiences, and exploring pathways toward improved alignment, interoperability, and service completeness. This interactive format is intended to help shape a clear and realistic vision for the future evolution of SWE services to aviation in support of safe, resilient, and internationally harmonised air operations.
Convenors: Marcin Latocha (SL), Erwin De Donder (BIRA-IASB)
17:30 - 18:00

Performance Assessment Tools and Needs in the SWE Service Network
Discussion
Wednesday 4 February
09:00 - 09:30

Keynote Presentation
Description TBC
Convenors: tbc
09:30 - 11:00

Designing Space Weather Resilient Systems
This session explores strategies for building resilience into Non-Space critical systems, including robust engineering practices and redundancy planning based on post-event analysis data. Participants will gain insights into designing architectures that can withstand disruptions, minimize downtime, and ensure continuity of operations in the face of Space Weather events.
Convenors: Federico Da Dalt (Starion for ESA), Joseph Eggington (EDF)

Preparing for the Vigil Mission and Future Observations
This session will look at the Vigil mission, its payload, how it will contribute to operational space weather forecasting and what work needs to be done to ensure that we are ready to make best use of these additional data.
Convenors: Judith de Patoul (ROB), Matt West (ESA)

Supporting Spacecraft Operations: Simulations, Campaigns, and Lessons Learned
This session showcases recent spacecraft operator focused service campaigns and space weather simulations, highlighting lessons learned and practical outcomes. A moderated discussion will explore evolving operator needs, priorities for future tools, and opportunities to strengthen collaboration across the SWE community.
Convenors: Dave Pitchford (SES), Erwin De Donder (BIRA-IASB)
11:00 - 11:30

Hands on demonstrations for Spacecraft Operations, Space Traffic Coordination and Data Systems & ICT booth
11:30 - 13:00

Improving Space Weather Services for Earth's Radiation Belts
Earth's radiation belts SW services rely heavily on in-situ measurements, whether for services

derived directly from measurements or through data assimilation or AI tools. Unfortunately, data are never perfect. They may suffer from contamination, saturation, outliers ... and do not offer a global coverage of the radiation belts. In this context and to move forward the following challenges will be discussed:
- Can measurement uncertainties be quantified and integrated into space weather products?
- How can we rely on a uniform and clean dataset-free from contamination, saturation, outliers, and properly cross-calibrated?
- While measurements are dense along certain orbits, other regions remain poorly sampled. What constitutes an ideal measurement set (in terms of location and time resolution) to efficiently complement physical and AI models?
Participants are encouraged to contribute (1-2 slides) with new insights addressing these open questions to help advance space weather services dedicated to radiation belts.
Convenors: Sebastien Bourdarie (ONERA/ERS), Ingmar Sandberg (SPARC)

Solar System Exploration Missions
This session examines the current and future use of ESA's space weather services in support of solar system exploration missions. It will address the needs of mission operations teams, science operations, and other end users. The discussions will consider the existing SWESNET solar and heliospheric products and forecasts, as well as the capabilities required in the coming years. A key contribution to the session will be the recent end-user campaigns and tailored mission bulletins developed by the SSA Space Weather Coordination Centre (SSCC).
Convenors: Chris Perry (STFC/RAL Space), Thanassis Katsiyannis (ROB)

Towards a GNSS Performance Indicator for Decision Making
Explore how a standardized GNSS performance indicator could provide operational decision-making and harmonized service delivery based on various service capabilities of the ESA Space Weather Service Network.
Convenors: Jaroslav Urbář (IAP-CAS), Martin Kriegel (DLR)

Validation and Benchmarking of Solar Forecast Products
This session invites contributions on methods and activities for validating and benchmarking forecast products. Emphasis is placed on shared performance metrics, coordinated datasets, and inter-ESC comparisons to enhance the reliability of operational services within SWESNET.
Convenors: Daria Shukhobodskaia (ROB), Veronique Delouille (ROB)
13:00 - 14:30

Hands on demonstrations for Spacecraft Operations, Space Traffic Coordination and Data Systems & ICT booth
14:30 - 15:00

Keynote Presentation
Description TBC
Convenors: tbc
15:00 - 16:30

Integrating Data for Next-Generation Tools in Satellite Drag Calculation and Collision Avoidance
This session examines how new data and updated modelling techniques can improve satellite drag estimation, thermospheric density predictions, and overall orbit forecasting. Using current space-weather data alongside modern analytical methods, as well as state-of-the-art AI forecasting techniques, the discussion focuses on how reducing uncertainty in drag predictions can support

more informed operational decisions, ultimately helping to limit unnecessary collision-avoidance manoeuvres and improve reliability in an increasingly crowded space environment.
Convenors: Myrto Tzamali (ESA), Philippe Yaya (CNES/CLS)

SEP Monitoring and Forecasting on the Moon and Mars
This session will look at current and future challenges, strategies and planning to support SEP forecasting and monitoring at Moon and Mars. These locations have been chosen recognising the importance for accurate SEP forecasting for human exploration of the solar system.
Convenors: Chris Perry (STFC/RAL Space), Mark Dierckxsens (BIRA-IASB)

Space Weather Downstream Commercial Outlook
As space weather service provision matures towards providing operational support for European end users and beyond, the increasing range of tools and data available offer numerous opportunities for the commercial sector. This session aims to stimulate dialogue around business development needs and opportunities developing within the space weather community. We welcome participants from all areas of the space weather community from established service providers to end users. The session will include discussion of ESA tools available to support new and emerging enterprises along with presentation of recently initiated ESA Enabling Studies which are currently assessing the market landscape for space weather services targeting non-space user domains prior to presenting prototype solutions.
Convenors: Alexi Glover (ESA), Chris Frost-Tesfaye (ESA)
Thursday 5 February
09:00 - 09:30

Protect Space Weather Demonstrator Phase 1&2 Results & Recommendations for the ESA Space Weather Service Network
09:30 - 11:00

ESA Space Weather Portal Presentation Improvements
The session is aimed at bringing together network members and end users of the ESA SWE Network to discuss the ongoing developments designed to improve the portal presentation. The aim of the session is to gather feedback, focus on synergies and discuss the user requirements of possible future improvements including an updated portal front page, service pages, and future concept map developments.
Convenors: Robbe Vansintjan (ROB), Elisabeth Dom (ROB)

Space Weather Service Infrastructure and Operations: Standardization and Inter-ESC Collaboration - part 1
This session brings together space weather product and data providers, service consumers, and tool developers to explore common operational challenges and opportunities for collaboration across infrastructure, applications, and systems. As institutions develop and maintain infrastructure for running models, processing data, managing tools, and delivering alerts, significant overlaps exist in deployment, API design, notification systems, and Research-to-Operations & Operations-to-Research (R2O2R) workflows. We aim to identify shared requirements and discuss pathways toward unified approaches - including common gateways for SWE data/product access, standardised model and tool pipeline execution, shared storage and computing resources.
The session comprises two parts.
** The first slot will feature presentations on current operational tools and systems across ESA's Space Weather ecosystem, including the Space Weather Service Network (SWESNET), Network of Models (NoM), SPace ENVironment Information System (SPENVIS), Virtual Space Weather Modelling Centre (VSWMC), Radiation Belt Forecast And Nowcast (RB-FAN), and the emerging Space Weather Payload Data Centre (SWE PDC).*

Convenors: Zafar Iqbal (SPARC), Ralf Keil (Starion for ESA)

Towards a Space Weather GIS: Standardized Geospatial Information Access for Expert Users
Assess the feasibility and value of a GIS-based framework for unified geospatial representation and access to space- weather-related data.
Convenors: Martin Kriegel (DLR), Paul David (DLR)
11:30 - 13:00

Forecasters and Scientists as End Users
This session focuses on enhancing the relevance, accessibility, and usability of services across the ESA Space Weather Service Network. Emphasis is placed on harmonized data visualization and integrated access to products from the S-ESC and other ESCs to better support both scientific and operational forecasting needs.
Convenors: Judith de Patoul (ROB), Alfredo Micera (ROB)

Improving End User Experience
This session explores approaches to enhancing end-user experience across the SWESNET products. Topics will include, among others, the standardization of data visualizations, concepts for high-level overview products, and ideas for combining related products.
Convenors: Ricardo Gafeira (Univ Coimbra), Lars Henrik Snow (IRF)

ESA Space Weather Service Network Workflows and Tools
The ESA Space Weather Service Network is evolving its procedures, workflows and tools are continuously needing to evolve in order to be able to support the operational activity. This working session aims to summarise the different tools, interfaces and procedures currently available for the use of the network members, how these could be used to help streamline the tasks of the network members.
Convenors: Jennifer O'Hara (ROB), Corentin Liber (BIRA-IASB)

Space Weather Service Infrastructure and Operations: Standardization and Inter-ESC Collaboration - part 2
This session brings together space weather product and data providers, service consumers, and tool developers to explore common operational challenges and opportunities for collaboration across infrastructure, applications, and systems. As institutions develop and maintain infrastructure for running models, processing data, managing tools, and delivering alerts, significant overlaps exist in deployment, API design, notification systems, and Research-to-Operations & Operations-to-Research (R2O2R) workflows. We aim to identify shared requirements and discuss pathways toward unified approaches - including common gateways for SWE data/product access, standardised model and tool pipeline execution, shared storage and computing resources.
The session comprises two parts.
** The second slot will showcase demonstrations of new technologies and approaches that could simplify deployment, improve interoperability, and strengthen the European R2O2R framework - ultimately enabling more timely, reliable, and user-tailored space weather services.*
Convenors: Zafar Iqbal (SPARC), Ralf Keil (Starion for ESA)
14:00 - 15:00

Individual Expert Service Centre wrap ups
* Geomagnetic Conditions

| * Ionospheric Weather |
| * Heliospheric Weather |
| * Solar Weather |
| * Space Radiation |

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15:00 - 16:30

Network wrap up and discussion