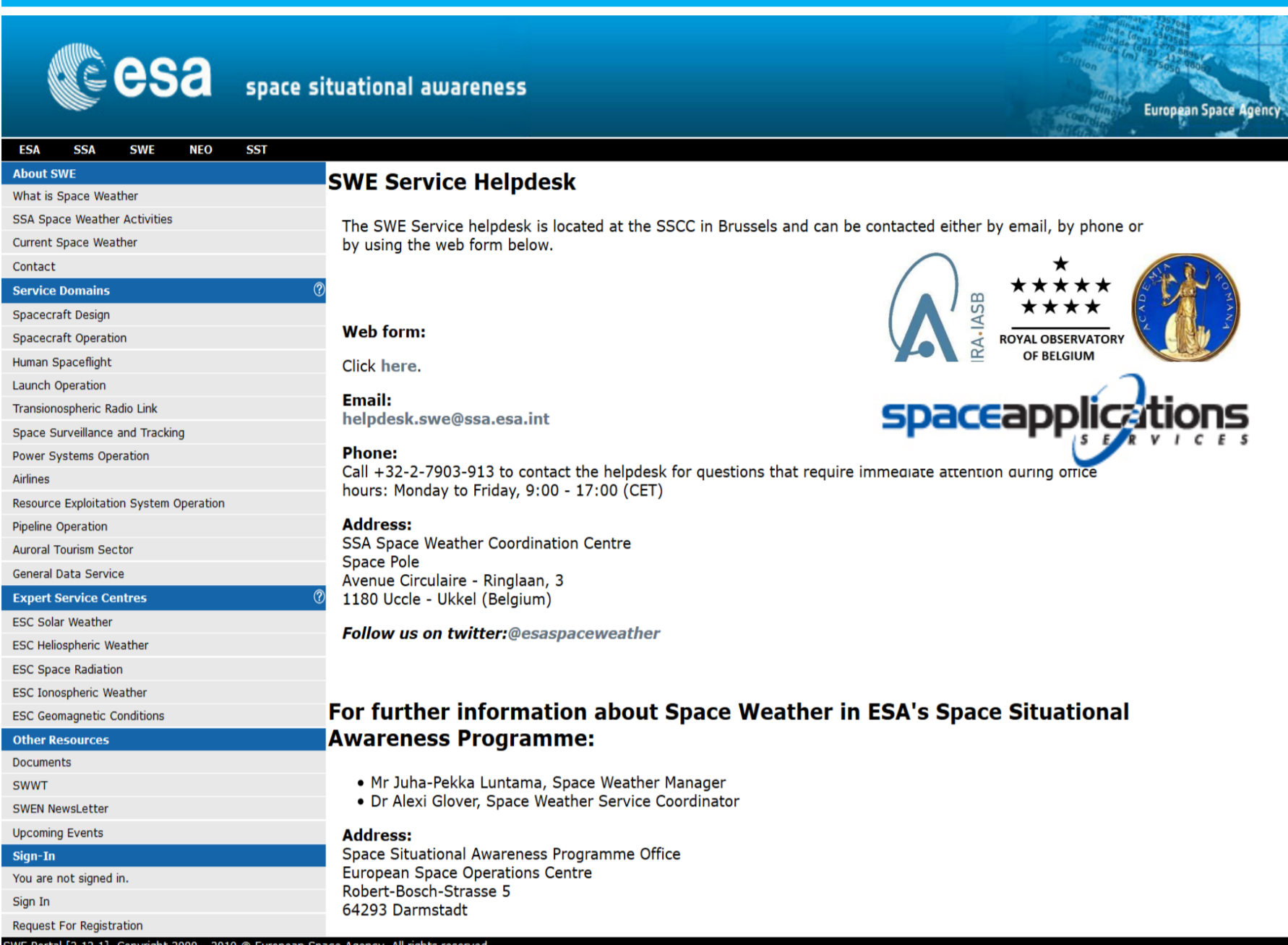


Space Weather Bulletins as part of a User Test Campaign for Aviation

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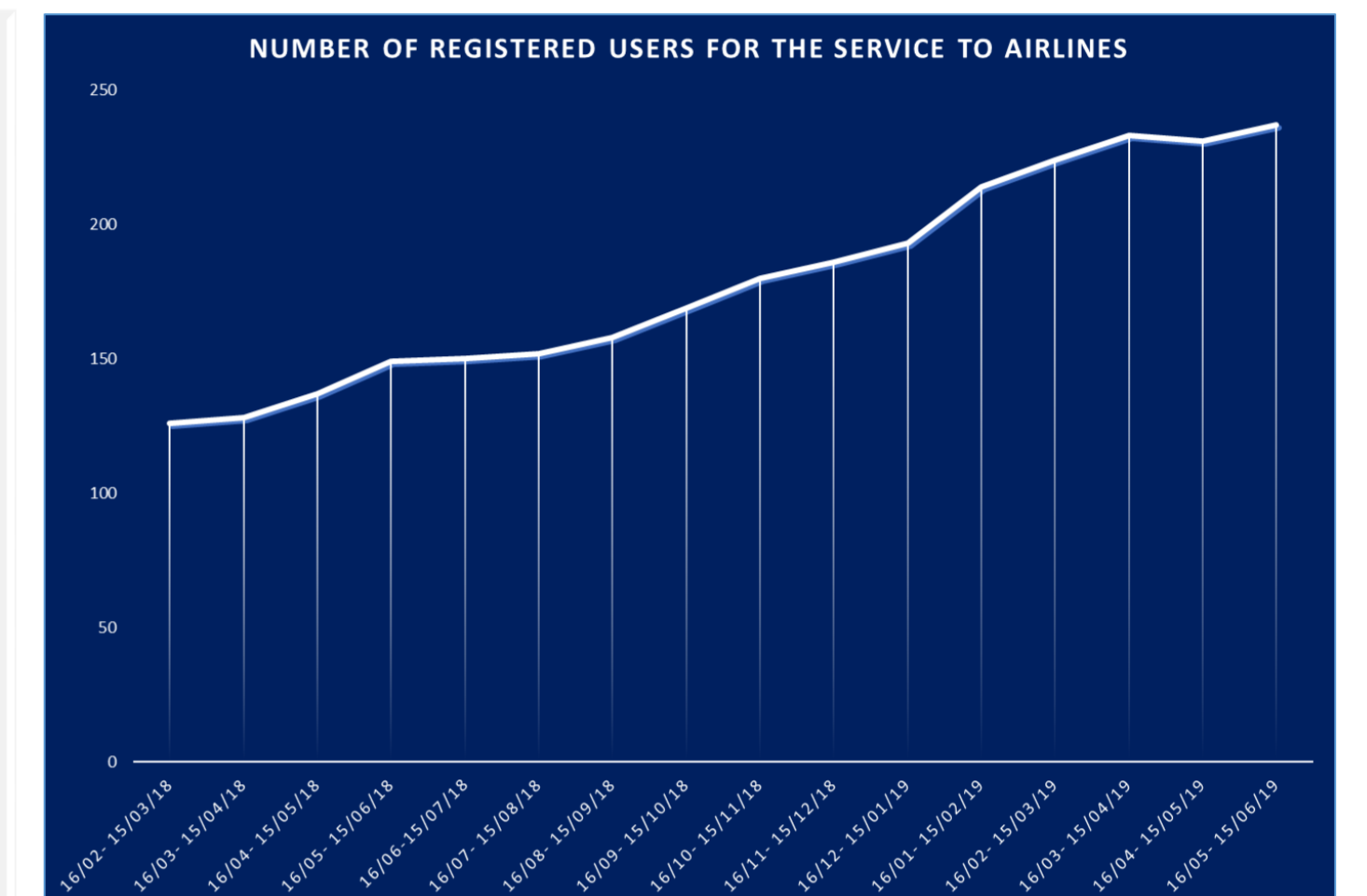
Abstract. In the frame of its Space Situational Awareness (SSA) programme, the European Space Agency (ESA) is establishing a Space Weather Service Network to support end users, in a wide range of affected sectors, in mitigating the effects of space weather on their systems, reducing costs and improving reliability. In building this network space weather products/tools are developed and federated in services, that are suitable for operational implementation and importantly that meet the end user needs. This poster describes an end user test campaign, organised on a test and demonstration basis in order to demonstrate current space weather capabilities to an identified group of test users working in the industry and gain further understanding of this community's requirements for space weather information, with the aim to help guide future development activities. In the approach to establish a close relationship with the end users of space weather services, the SSA Space Weather Coordination Centre (SSCC) — which provides the user helpdesk and first line user support for the SWE Service Network, organizes user support campaigns to build tailored space weather bulletins. During each campaign, the SSCC works with the end user in order to define the bulletin format and content, and to agree on a delivery schedule. Products/tools from the SWE Service Network are tailored to address the specific end user needs and are combined and displayed in a dashboard from which dedicated space weather forecast notifications are generated. We highlight here the SSCC user support campaign for a group of test users within the aviation community.

SSA Space Weather Coordination Centre - SSCC



In the approach to establish a close relationship with the end users of space weather services, the SSCC conducts the following actions:

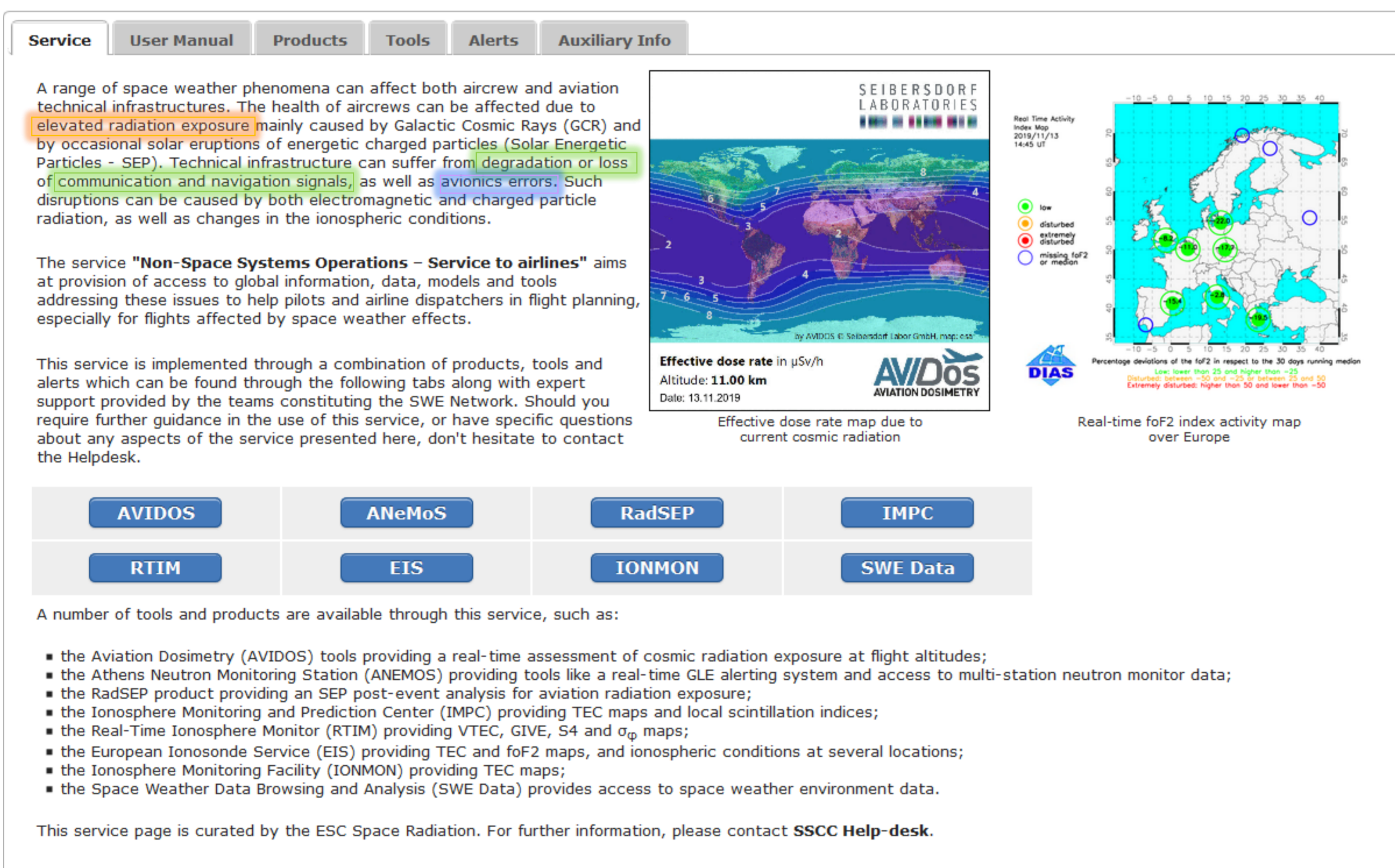
- Visiting end users
- Participation in (dedicated) conferences
- Organising end user – space weather expert/service provider dialogues
- Performing SWE Service Network training courses and webinars
- Running user support test campaigns, e.g.
 - ESA mission operations (Gaia, Venus Express, LPF, Rosetta, ...)
 - Spacecraft Operation services (user group: SES)
 - GNSS services (user group: BNGI, Fugro, ESSP)
 - **Aviation (user group: ECA, VC, Lufthansa, Brussels Airlines)**



Within the SSA SWE Service Network the service to airlines counts more than 200 users. The service offers a mix of products providing information related to the radiation environment at flight altitude and ionospheric conditions.

SSA Space Weather Service Network – Service to Airlines

Non-Space Systems Operations – Service to airlines http://swe.ssa.esa.int/nso_air



'Some high level service requirements (SSA SWE Customer Requirements Document)'

- cosmic ray dose forecasts of up to one year for a given airline flight defined by the user
- forecast of radiation storms with energies affecting crew and passengers (6, 12, 18 hours ahead)
- short term (<30mins) warnings of radiation storms with energies affecting crew and passenger
- post-event information on radiation levels on a series of pre-defined routes used by commercial airlines (<1 week delay if significant activity)
- a graphical forecast including intensity, onset, duration and boundary of degraded communications for polar routes (12-24 hours) in accordance with international standards
- global ionospheric scintillation maps, nowcast and forecast alerts and data
- global near real-time and forecast TEC maps
- statistical information on the radiation environment at aircraft altitude for avionics
- radiation and ionospheric data for post-event analyses for aircraft operators

'Some specific end-user requirements (SSCC user feedback reports)'

- timely, concise reports and forecasts for radiation and ionospheric conditions
- continuous access to information, available on the ground and in the air
- information content available in text format and easy to grasp, graphical format
- space weather app
- playback capability for all information

'SSCC user support test campaign'

In agreement with the test users a SWE notification is sent 2x/day by SMS including a link to the aviation dashboard that provides graphical and background information. At the same time the text message is also sent by email with a snapshot of the dashboard tabs attached to it.

Aviation Dashboard and SMS (text) messages

