

space situational awareness



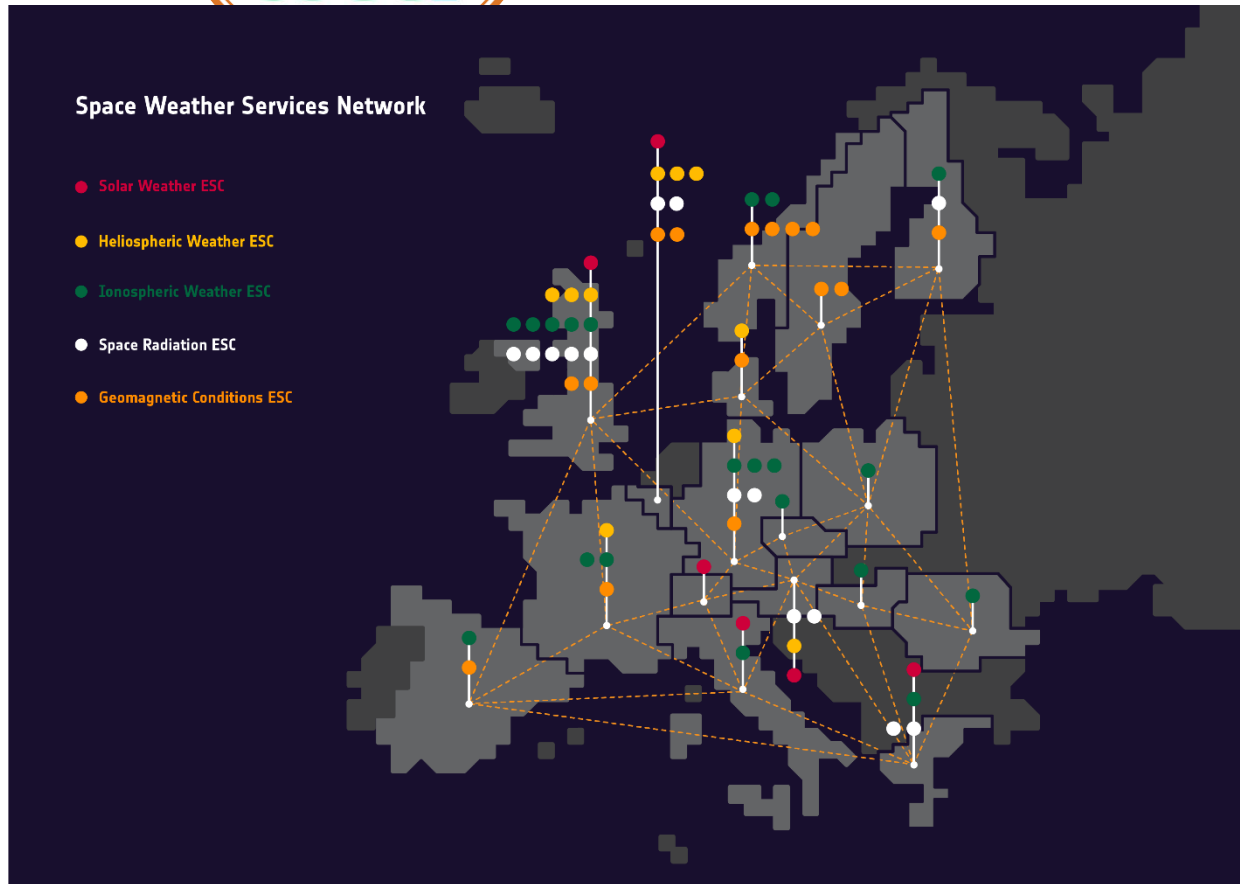
European Space Weather Symposium 2020

A General Space Weather Dashboard in Support of Spacecraft Operations





The Space Weather Service Network



SSA Space Weather Network Morphology © ESA

- **The Space Weather Service Network** aims to provide timely and reliable space weather information to end users.
- **SSA Space Weather Coordination Centre (SSCC)**
 - Operate a helpdesk providing first line support
 - Monitor the SWE network
 - User engagement activities
- **User engagement activities:**
 - User meeting or visits
 - User training sessions
 - User support campaigns



The Space Weather Service Network

URL: <https://swe.ssa.esa.int/>

CURRENT SPACE WEATHER	Service Domains /
SPACE WEATHER AT ESA	
SERVICE DOMAINS	SSA Space Weather services
Spacecraft Design	The SSA Space Weather service network is organised in order to provide 39 services distributed over 8 service domains targeting its specific groups of end users. The service domains are: Spacecraft Design (SCD), Spacecraft Operation (SCO), Human Space Flight (SCH), Launch Operation (LAU), Trans-ionospheric Radio Link (TIO), Space Surveillance & Tracking (SST), Non-space System Operation (NSO), and General Data Services (GEN).
Spacecraft Operation	The NSO domain groups diverse sub-domains including auroral tourism, aviation, resource exploitation, power system and pipeline operation. These services appear separately in the left hand menu.
Human Spaceflight	The following section provides an initial presentation of 29 of these services. Other services will be added as they continue to be developed by the Network.
Launch Operation	Each service is implemented through a combination of derived data products, software tools, technical reports and associated user support addressing the high-level requirements of the associated group of end-users. Each available service is presented on a dedicated page offering in different tabs a service dashboard, some user guidance, the list of relevant products, tools and alerts, and suitable references. The different products listed on a service page may be displayed in a viewer using the eye icon button (👁) or may be accessed from a thematic product page (blue button). Products under maintenance are marked by a wrench icon (🔧). The warning icon (⚠) indicates products that can only be accessed from their thematic product page.
Transionospheric Radio Link	The service pages are established with expert support provided by the teams constituting the SSA Space Weather Service Network. Should you require further guidance in the use of one of the services, or have specific questions about any aspects of a service, don't hesitate to contact the Helpdesk.
Space Surveillance and Tracking	You can find all the available services and the applications they can offer in this table
Power Systems Operation	
Aviation	
Resource Exploitation System Operation	
Pipeline Operation	
Auroral Tourism	
General Data Service	
EXPERT SERVICE CENTRES	
OTHER RESOURCES	
CONTACT	
REQUEST FOR REGISTRATION	

ESA SSA Space Weather Network

For a detailed overview of the current conditions, as well as access to forecasts, archives, alerts and interactive tools, we encourage you to register as a user and explore the full range of products and data available in our different Service Domains:



The Space Weather Service Network

CURRENT SPACE WEATHER
SPACE WEATHER AT ESA
SERVICE DOMAINS
Spacecraft Design
Spacecraft Operation
Human Spaceflight
Launch Operation
Transionospheric Radio Link
Space Surveillance and Tracking
Power Systems Operation
Aviation
Resource Exploitation System Operation
Pipeline Operation
Auroral Tourism
General Data Service
EXPERT SERVICE CENTRES
OTHER RESOURCES
CONTACT

- Spacecraft Design (SCD)
- **Spacecraft Operation (SCO)**
- Human Space Flight (SCH)
- Launch Operation (LAU)
- Trans-ionospheric Radio Link (TIO)
- Space Surveillance & Tracking (SST)
- Power Systems Operation (NSO)
- Aviation (NSO)
- Resource Exploitation System (NSO)
- Pipeline Operation (NSO)
- Auroral Tourism (NSO)
- General Data Services (GEN)



Spacecraft user support campaigns

- Gaia (*Dec. 2013, July 2019*)
- Venus Express (*July 2014*)
- Rosetta (*Aug. 2015 – Sept. 2016*)
- Lisa Pathfinder (*Dec. 2015 – Jan. 2016*)

- Mars Express (*2019 - ...*)
- BepiColombo (*2020 - ...*)
- EUMETSAT (*2020 - ...*)
- General mission (*2019 - ...*)



General dashboard for Spacecraft operations

- Divided into:
 - General conditions
 - Low Earth Orbit (LEO)
 - Medium Earth orbit (MEO)
 - Geosynchronous Equatorial Orbit (GEO)
 - Highly Elliptical Orbit (HEO)
- Current Date and Time in UT
- Update: refreshes the page and products.
- Print: Creates a snapshot in PDF format.

ESA SSA SWE Test Dashboard Spacecraft Operations

General Conditions
LEO
MEO
GEO
HEO

🕒 2020-09-29 15:22:46 UT
Update
Print
Next update in 02:58

SIDC daily bulletin summary Hide full version

SOLAR FLARES	M-class flares expected (probability >=50%)	Issue date	2020-10-29 01:00:00 UT
GEOMAGNETISM	Quiet	Geospace and Geomagnetism	The speed of the solar wind decreased from 500 to 465 km/s in the past 24 hours. The Earth is leaving the influence zone of a high speed stream coming from a positive polarity coronal hole. Bz was never below -5 nT and B reached 5 nT. The solar wind speed is expected to decrease in the next 24 hours. The geomagnetic conditions were unsettled at planetary levels (Kp = 3) and reached active conditions locally at Dourbes (KDourbes = 4). Mostly unsettled conditions can be expected in the next 24 hours.
SOLAR PROTONS	Quiet	Solar Weather	A new region emerged to the north east of NOAA AR 2778 (beta-gamma magnetic field configuration), it was numbered by NOAA as AR 2779 (beta configuration). Four C-class flares were observed from these ARs, the largest is a (estimated) C4 flare currently ongoing with peak around 11:50 UT (more precise data to be given when the flare ends). More C-class are highly likely and M-class flares can be expected. Related to C-class flaring activity in the ARs 2778-2779 around 22:00 UT on 28 October, an eruption is visible (dimmings, EIT wave), but no CME has been identified in coronagraph data yet. An update will be given if necessary when more data become available. The greater than 10 MeV proton flux was at background levels over the past 24 hours. It is expected to stay at background levels for the next 24 hours. The greater than 2 MeV electrons are above the 10 ³ pfu threshold, they are expected to decrease over the next 24 hours.

General Conditions

Real time alerts

Name	Date latest alert	Text
SIDC All Quiet alert	2020-10-21T12:38:49Z	Not active
SIDC Solar GOES-flare alert	2017-09-10 18:50:06 UT	No alert
SIDC Human operator alert moderation	2020-10-19 20:41:56 UT	No alert
COMESSEP Alert System	2017-09-11 04:40:01 UT	No alert
SIDC/CACTus Automated halo CME alert	2018-05-04 16:44:04 UT	No alert

Forecasts

SIDC flare forecast

Issue Date	C+	M+	X+
2020-10-29 12:30:10 UT	0.70	0.40	0.15

DISCLAIMER

This dashboard contains products and information extracted from the [ESA SSA SWE Portal](#) and is produced for test and validation purposes only.

The following [Terms and Conditions](#) apply.



General dashboard for Spacecraft operations

- The SIDC Daily space weather bulletin – Color coded for Spacecraft operations
- A combination of Human made and automatically generated alerts.

ESA SSA SWE Test Dashboard Spacecraft Operations

General Conditions
LEO
MEO
GEO
HEO

🕒 2020-09-29 15:22:46 UT

SIDC daily bulletin summary Hide full version

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General dashboard for Spacecraft operations

ESA SSA SWE Test Dashboard Spacecraft Operations

General Conditions | **LE...**

SIDC daily bulletin summ...

SOLAR FLARES

GEOMAGNETISM

SOLAR PROTONS

COMESSEP Alert System

The COMESSEP (Coronal Mass Ejections and Solar Energetic Particles: forecasting the space weather impact) project developed tools for forecasting geomagnetic storms and solar energetic particle (SEP) radiation storms, which were validated and implemented into an operational space weather alert system that runs without human intervention. When a solar flare or CME is automatically detected, the different modules of the system communicate in order to exchange information. The system displays alerts online and provides notifications for the space weather community.

Solar proton events or Solar Energetic Particles (SEP) events can cause single event upsets in GEO and HEO orbits.

Provider: BIRA-IASB Space Weather Services (BIRA-IASB)

General Conditions

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SIDC flare forecast

Issue Date	C+	M+	X+
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General dashboard for Spacecraft operations

ESA SSA SWE Test Dashboard Spacecraft Operations

General Conditions
LEO
MEO
GEO
HEO
🕒 2020-09-29 15:35:01 UT

SIDC daily bulletin summary		Issue date
Hide full version		2020-10-29 01:00:00 UT
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GEOMAGNETISM	Quiet	Solar Weather
SOLAR PROTONS	Quiet	

Geospace and Geomagnetism
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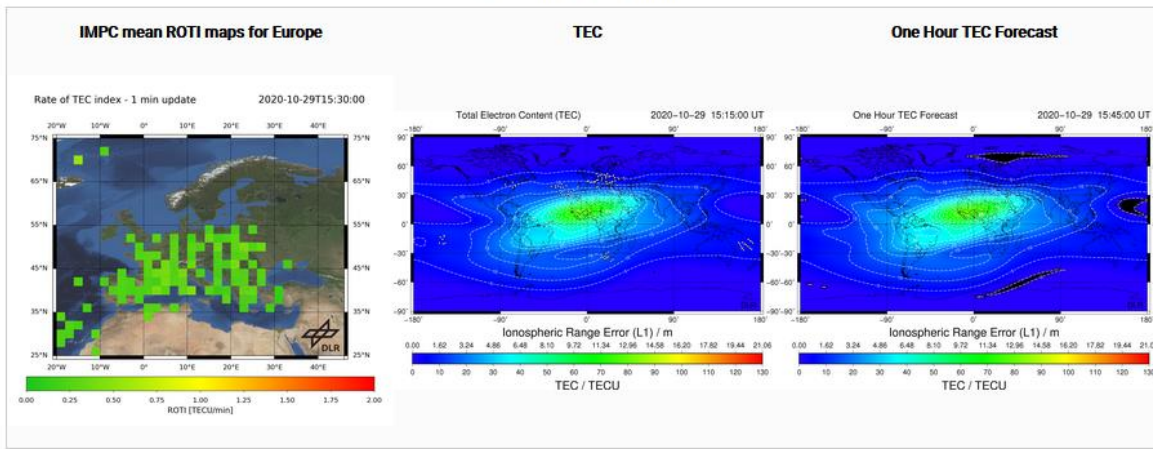
Solar Weather
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Update
Print

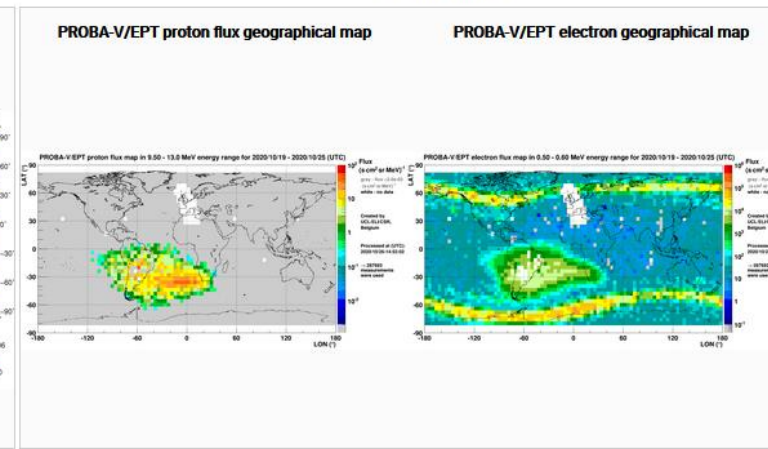
Next update in 00:55

Low Earth Orbit

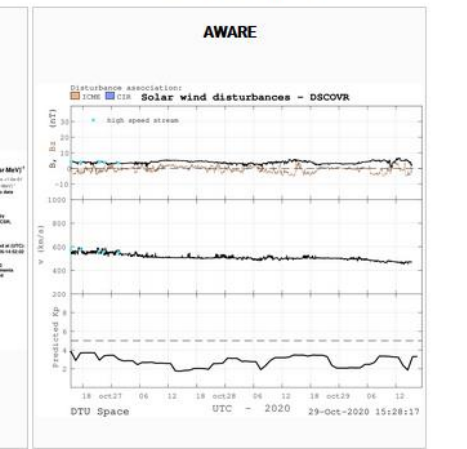
Ionospheric Conditions



Radiation Environment



Solar Wind Conditions



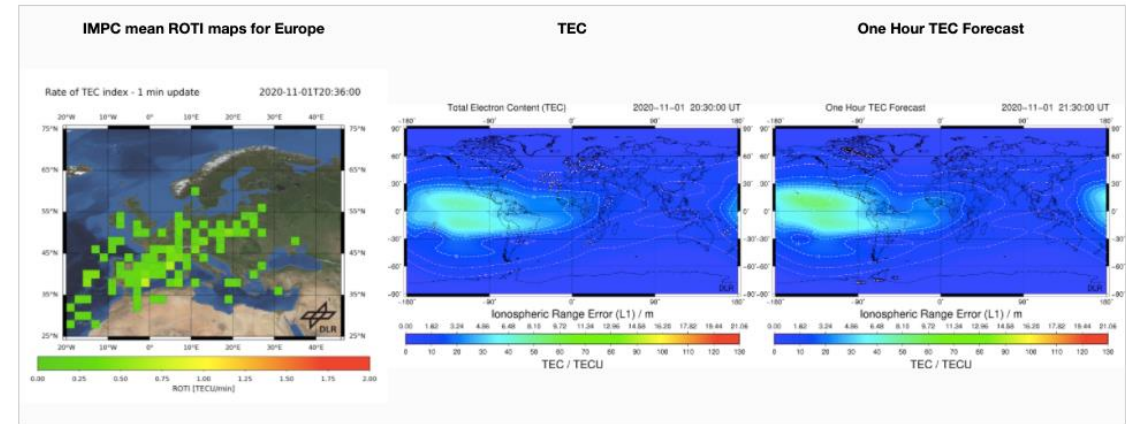


General dashboard for Spacecraft operations

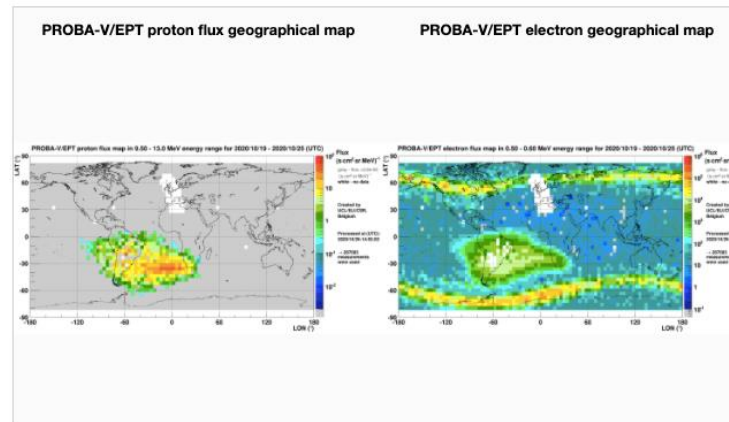
Low Earth Orbit (LEO)

- Ionospheric conditions:
 - ROTI map for EUROPE
 - Global TEC map
 - Global one hour TEC forecast
- Radiation environment:
 - PROBA-V/EPT electron flux map
 - PROBA-V/EPT proton flux map
- Solar Wind Conditions:
 - Automated WARNings of Earth arrivals (AWARE)

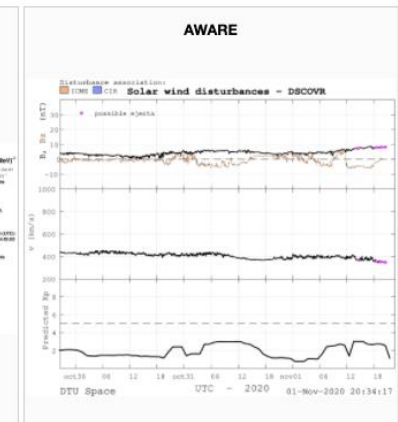
Ionospheric Conditions



Radiation Environment



Solar Wind Conditions



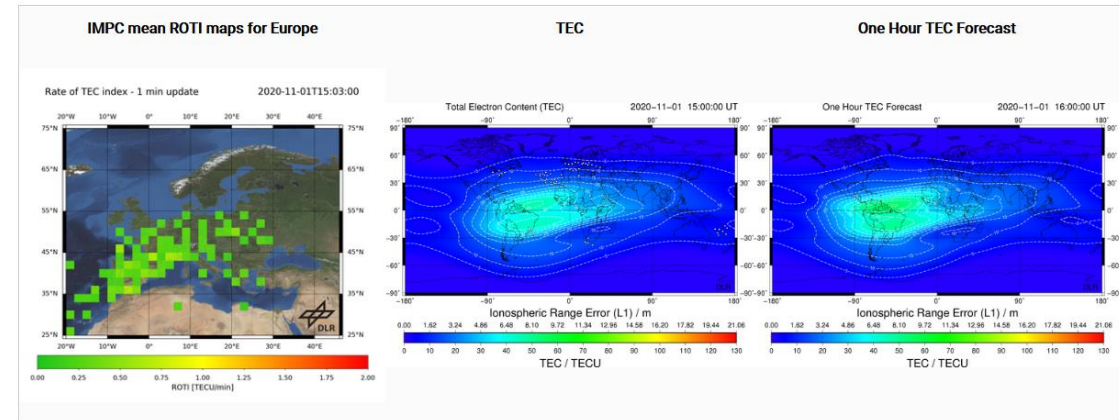


General dashboard for Spacecraft operations

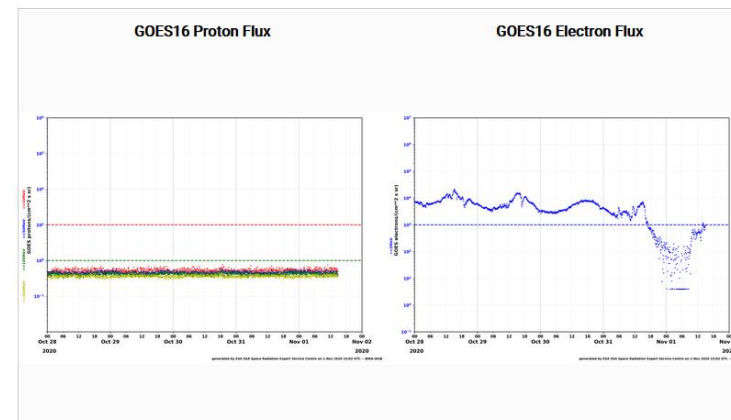
- Ionospheric conditions:
 - ROTI map for EUROPE
 - Global TEC map
 - Global one hour TEC forecast
- Radiation environment:
 - GOES-16 proton flux
 - GOES-16 electron flux
- Solar Wind Conditions:
 - Automated WARNings of Earth arrivals (AWARE)

Medium Earth orbit (MEO) & Geosynchronous Equatorial Orbit (GEO)

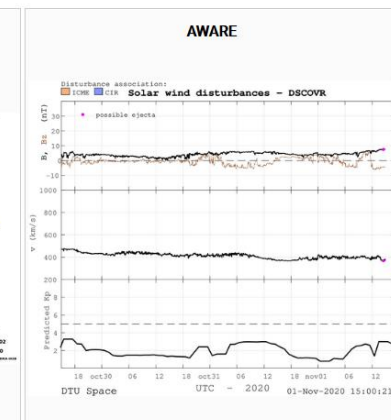
Ionospheric Conditions



Radiation Environment



Solar Wind Conditions

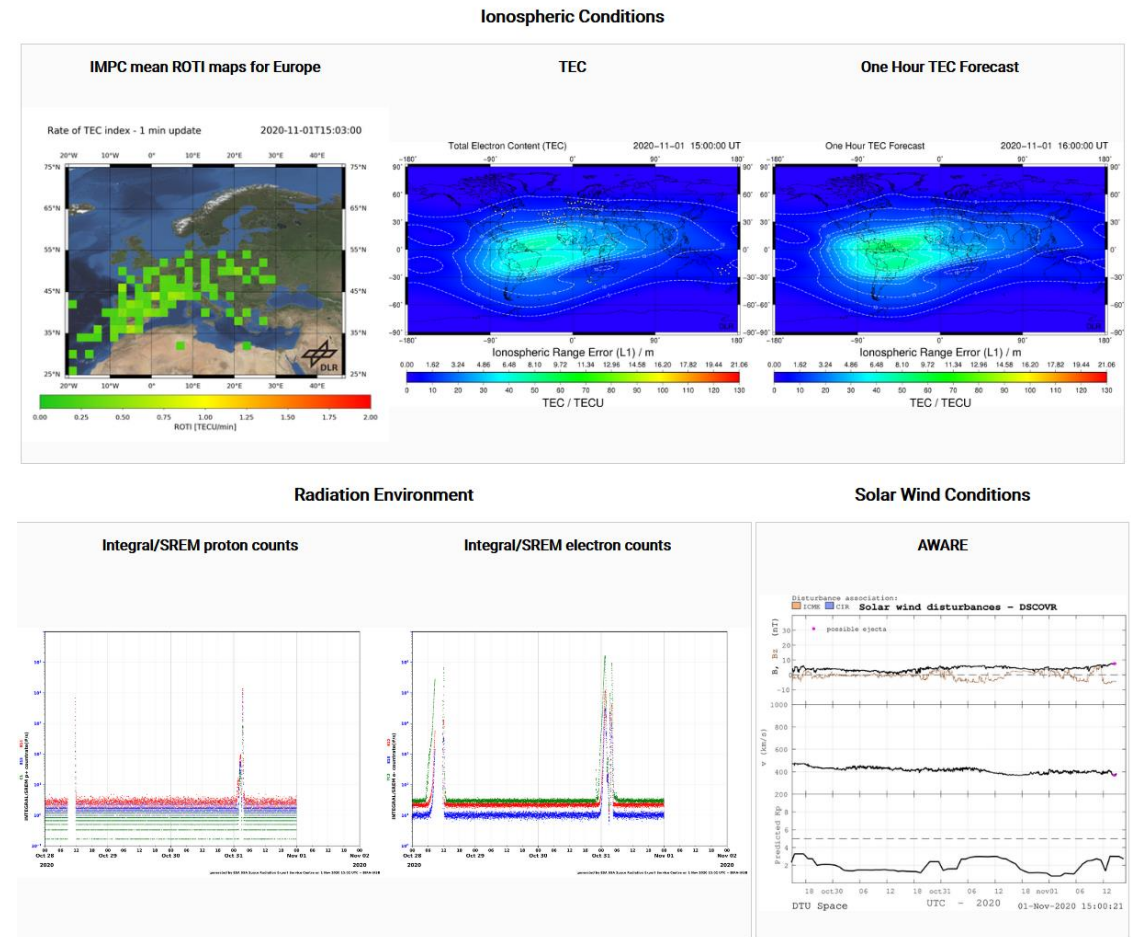




General dashboard for Spacecraft operations

Highly Elliptical Orbit (HEO)

- Ionospheric conditions:
 - ROTI map for EUROPE
 - Global TEC map
 - Global one hour TEC forecast
- Radiation environment:
 - Integral/SREM proton counts
 - Integral/SREM electron counts
- Solar Wind Conditions:
 - Automated WARNings of Earth arrivals (AWARE)





THANK YOU!
MORE INFO?

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

helpdesk.swe@ssa.esa.int