Access to multi-instrument data with focus on the ionosphere using different ESPAS data sources

ESWW11, Nov. 17 - 21, 2014
Liege, Belgium

Jens Berdermann for the ESPAS consortium

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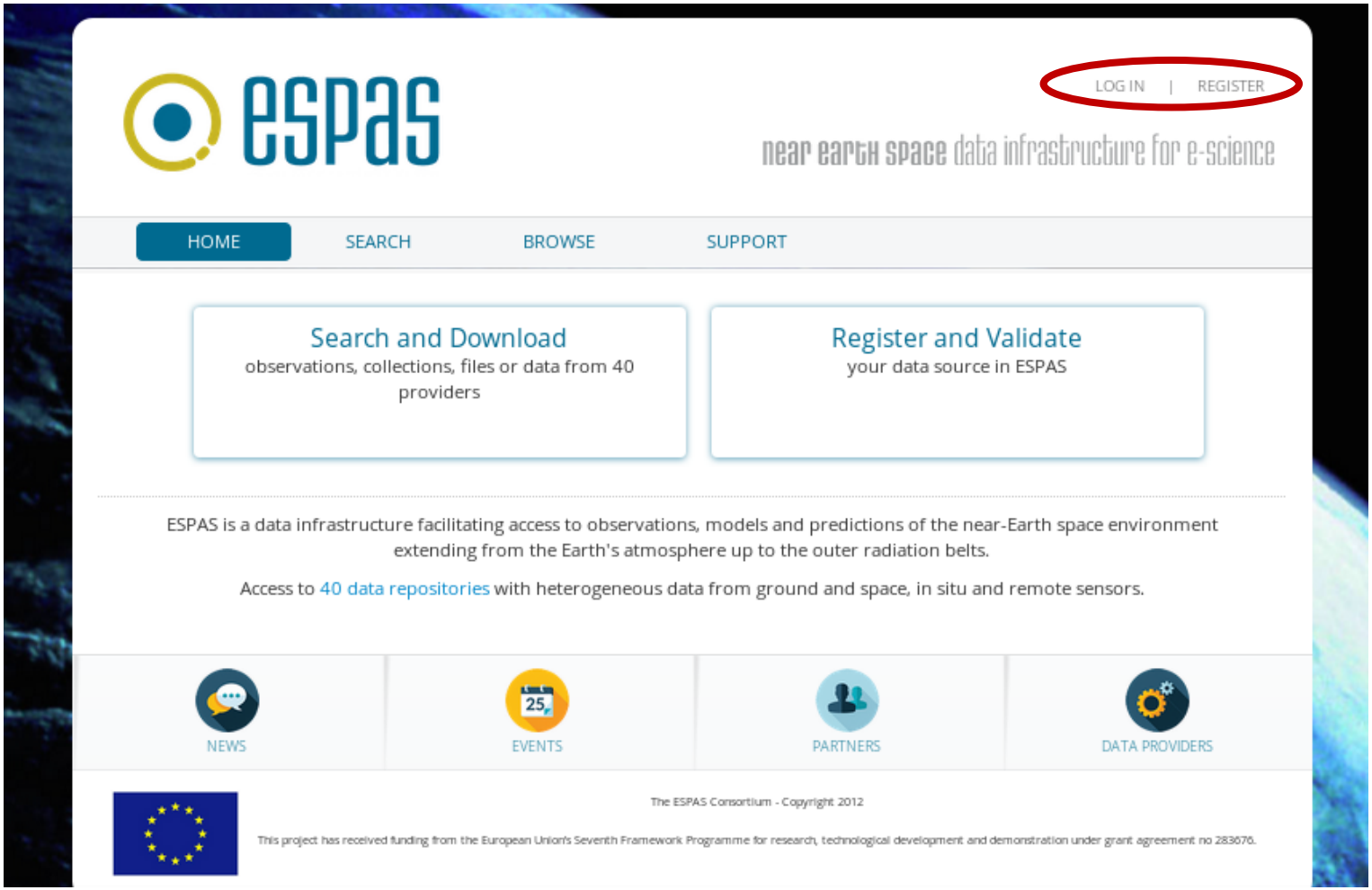
ESPAS Front Page (https://www.espas-fp7.eu/portal/)



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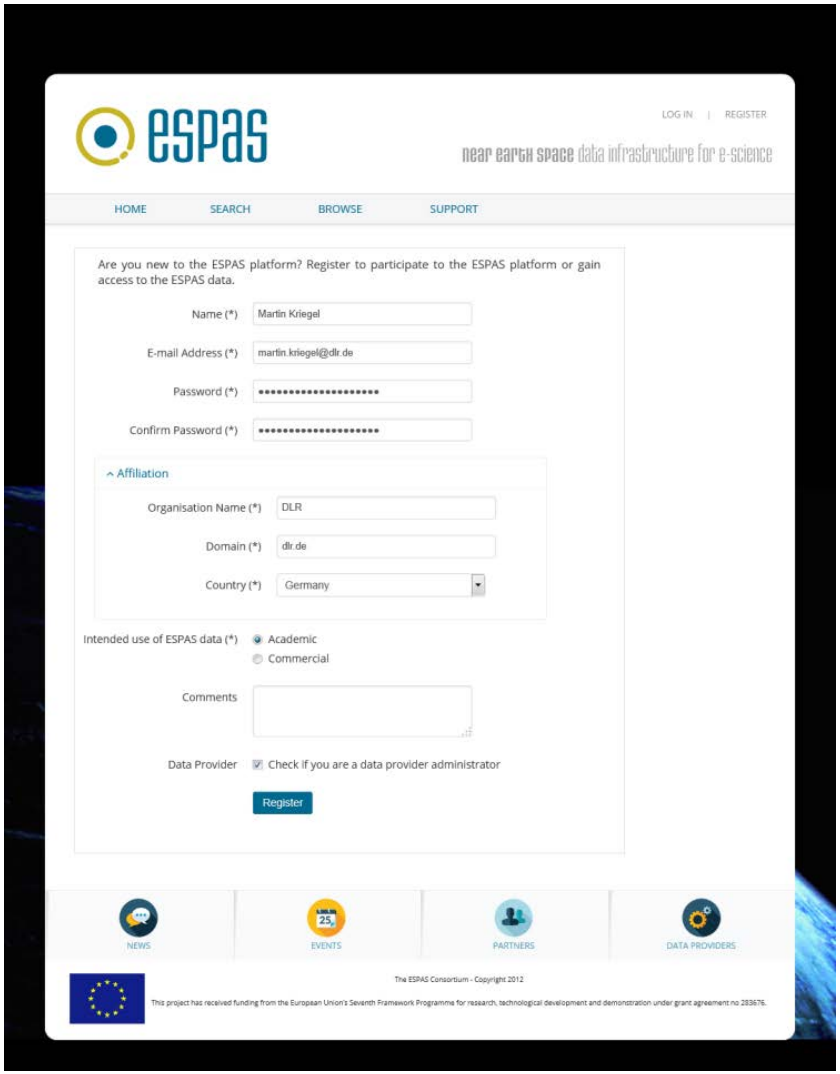
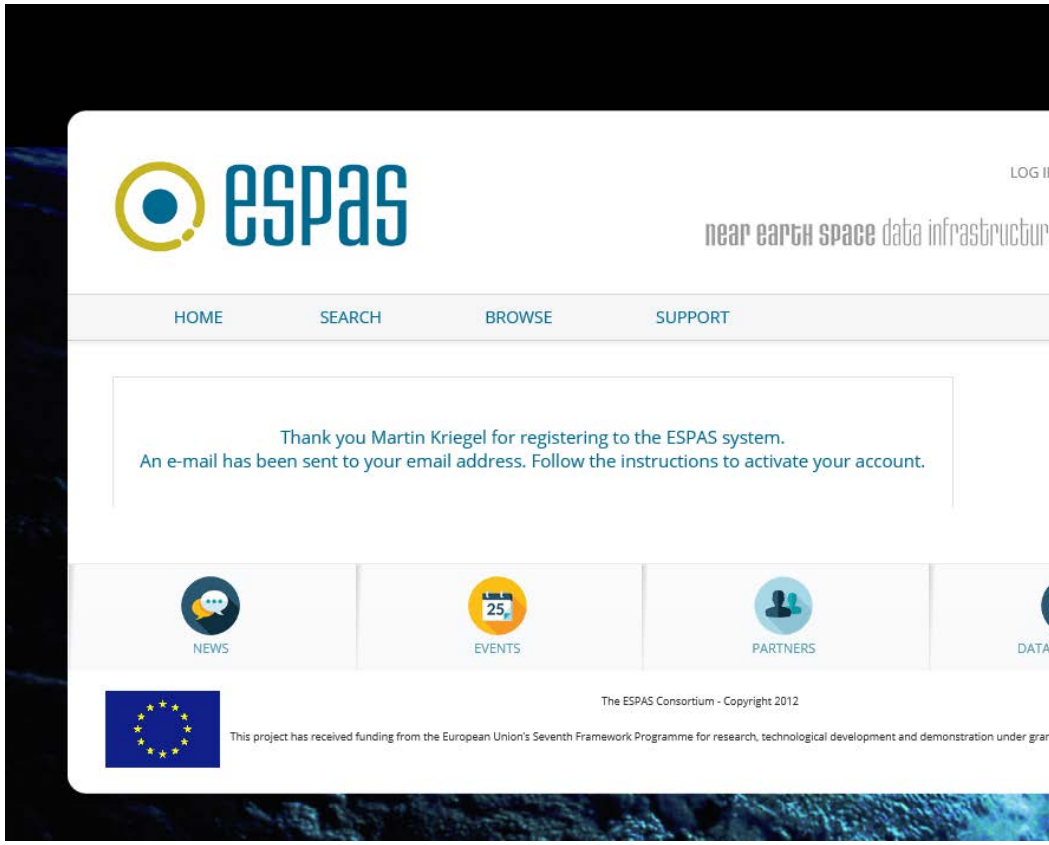
ESPAS - Registration





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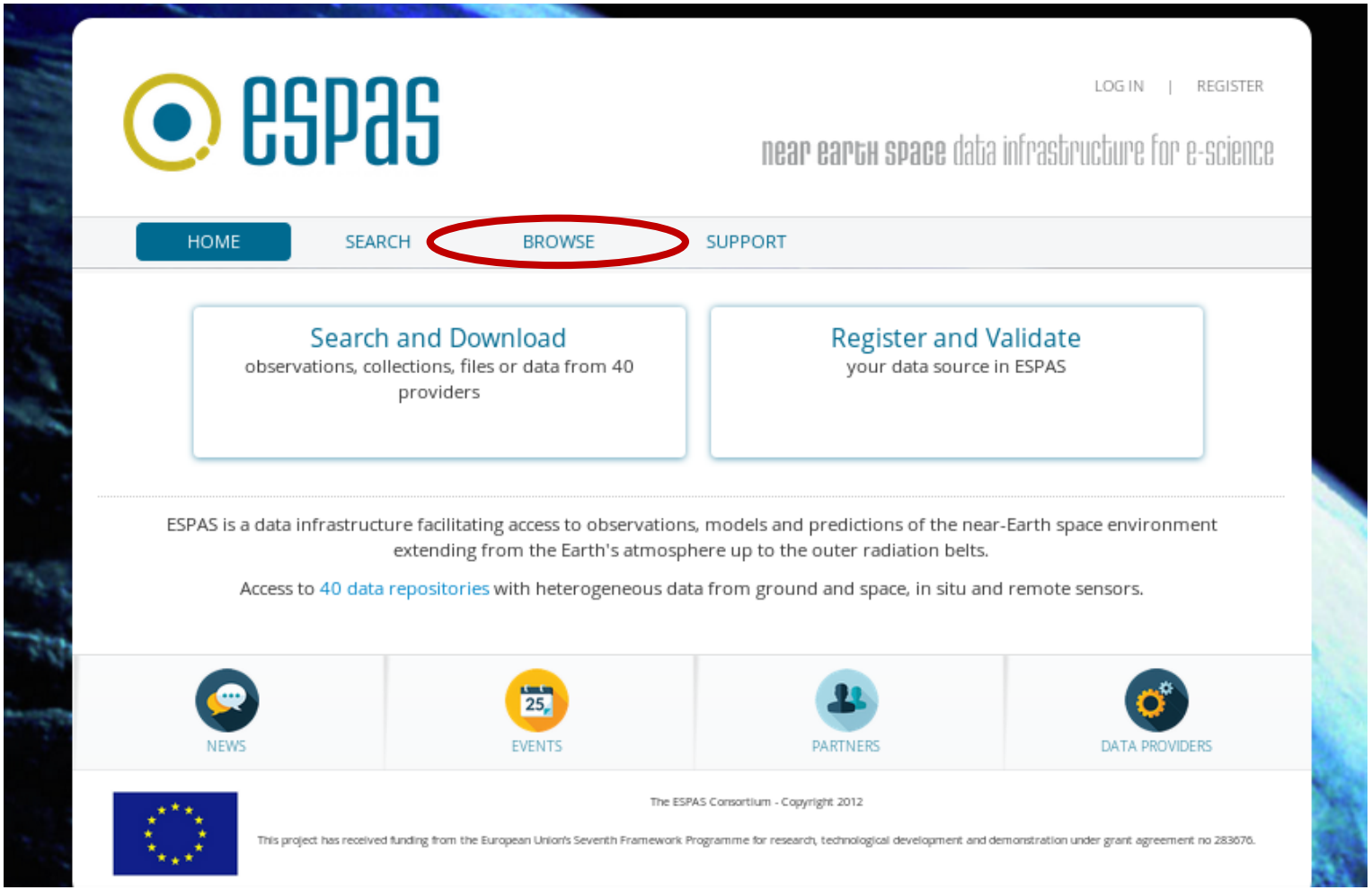
ESPAS Front Page – Start browse the Metadata



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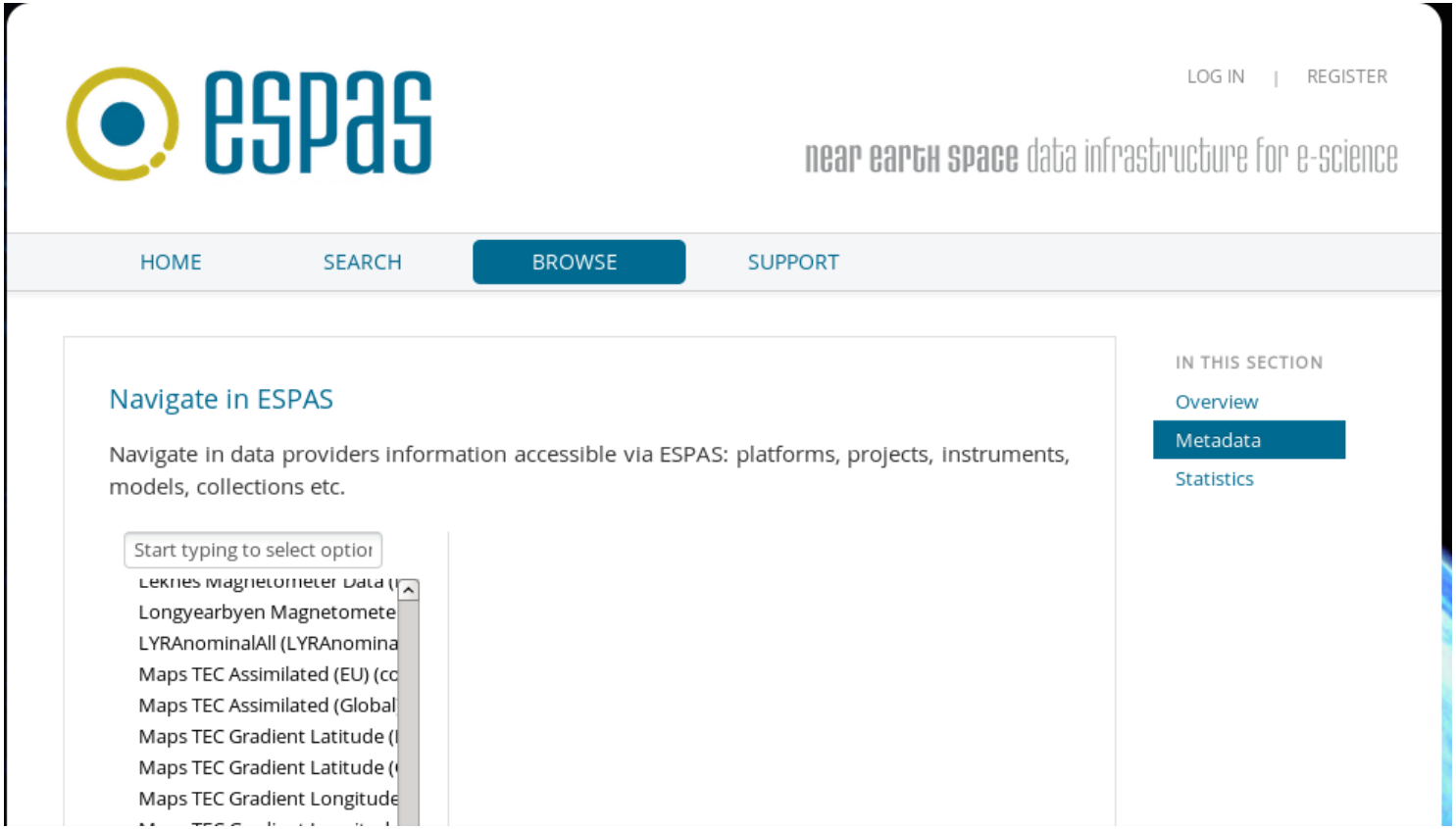
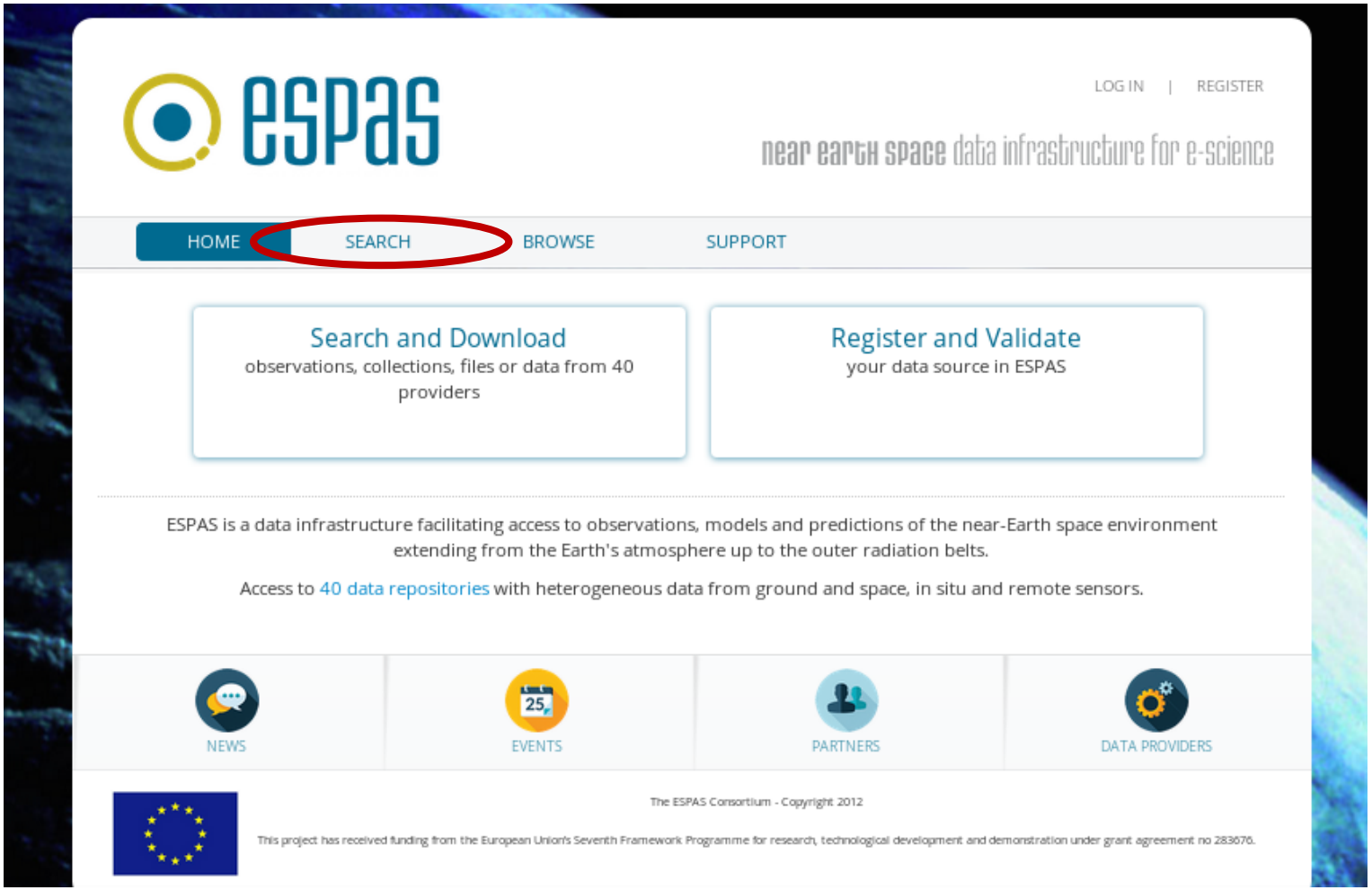
ESPAS Front Page – Start browse the Metadata



ESPAS Front Page – Start data search



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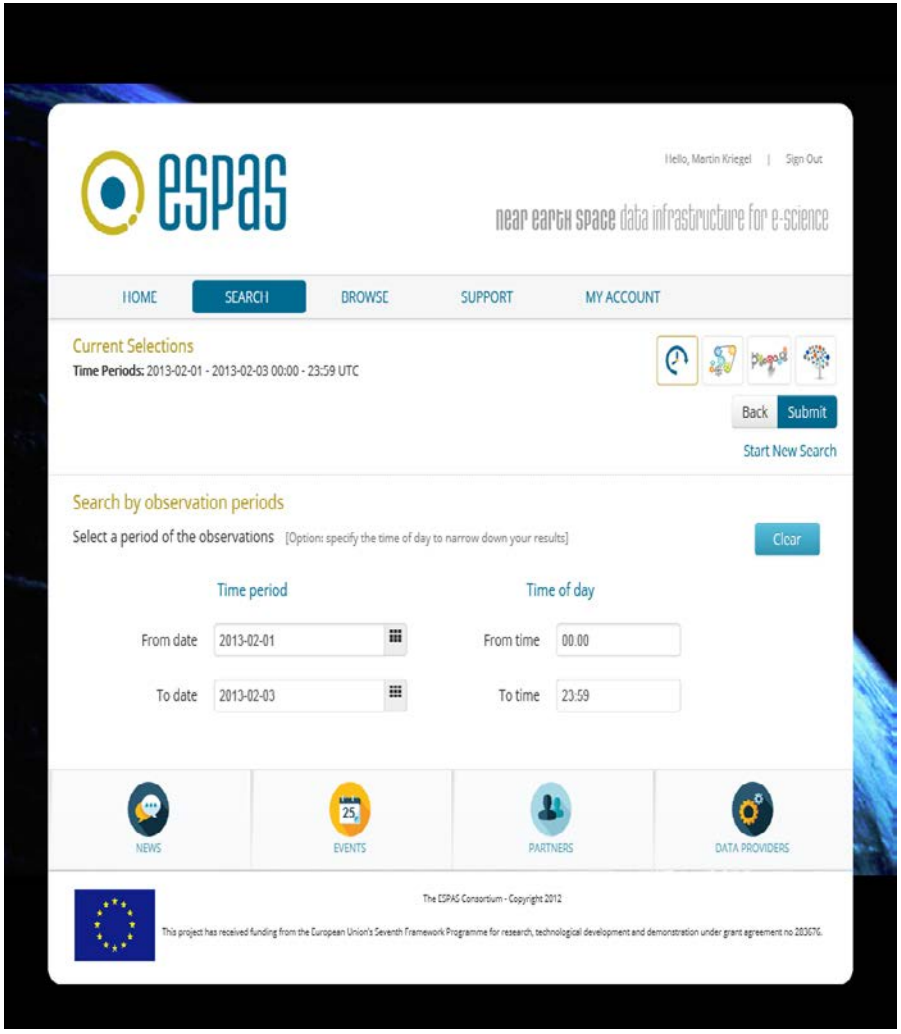
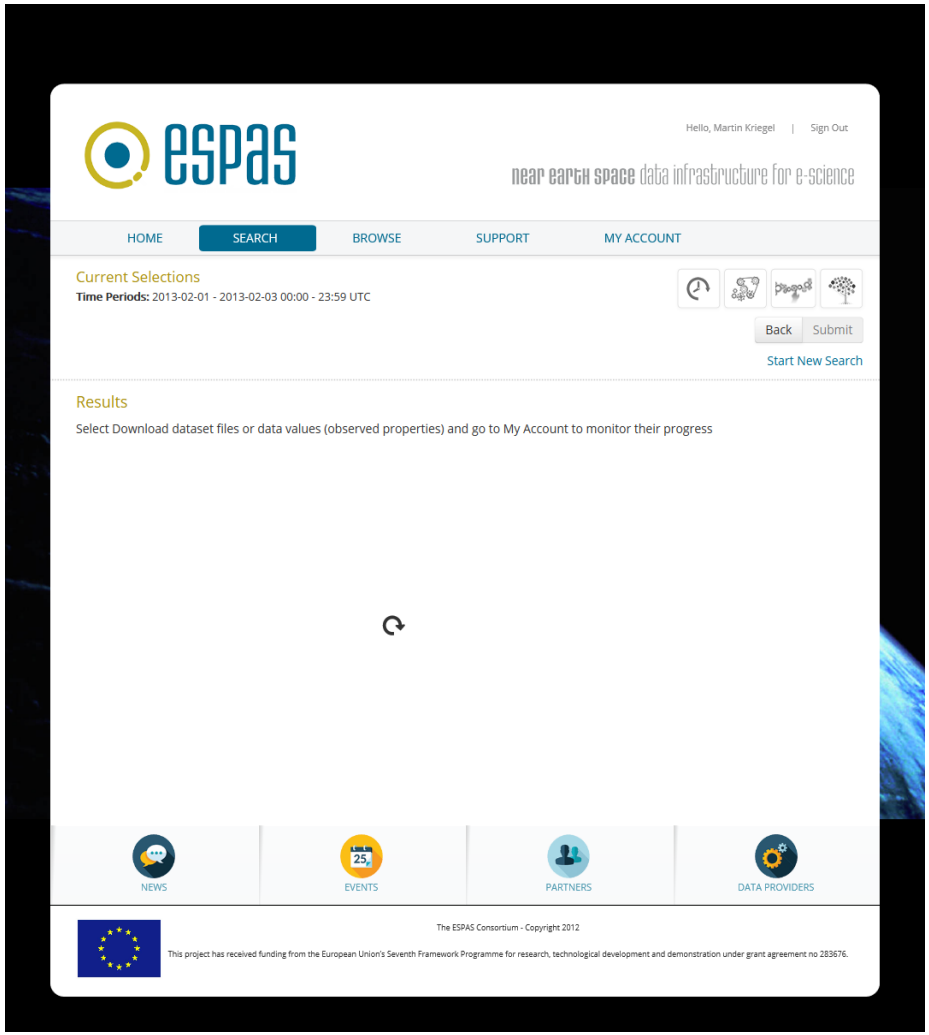
Data search using time period





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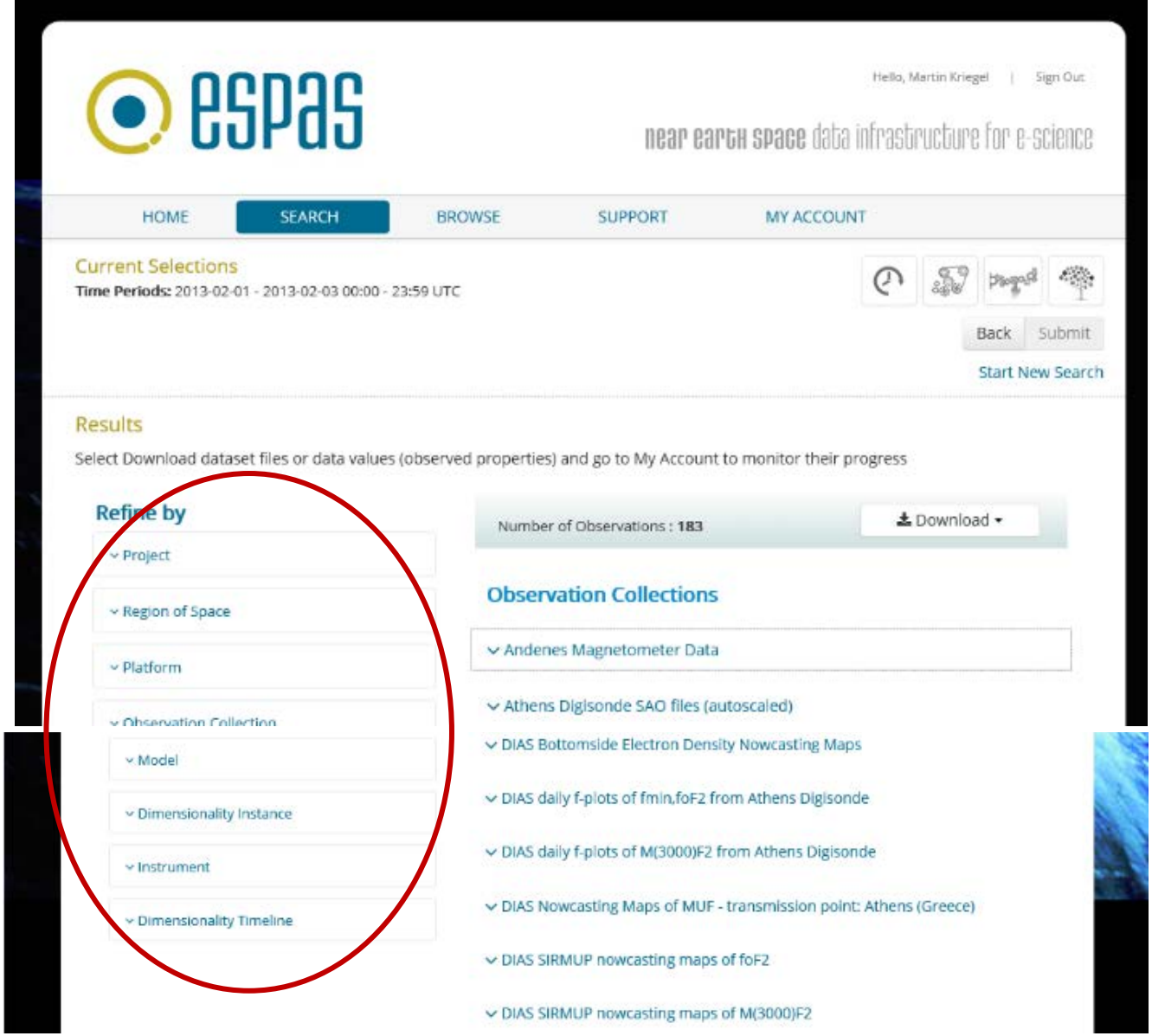
Refine search



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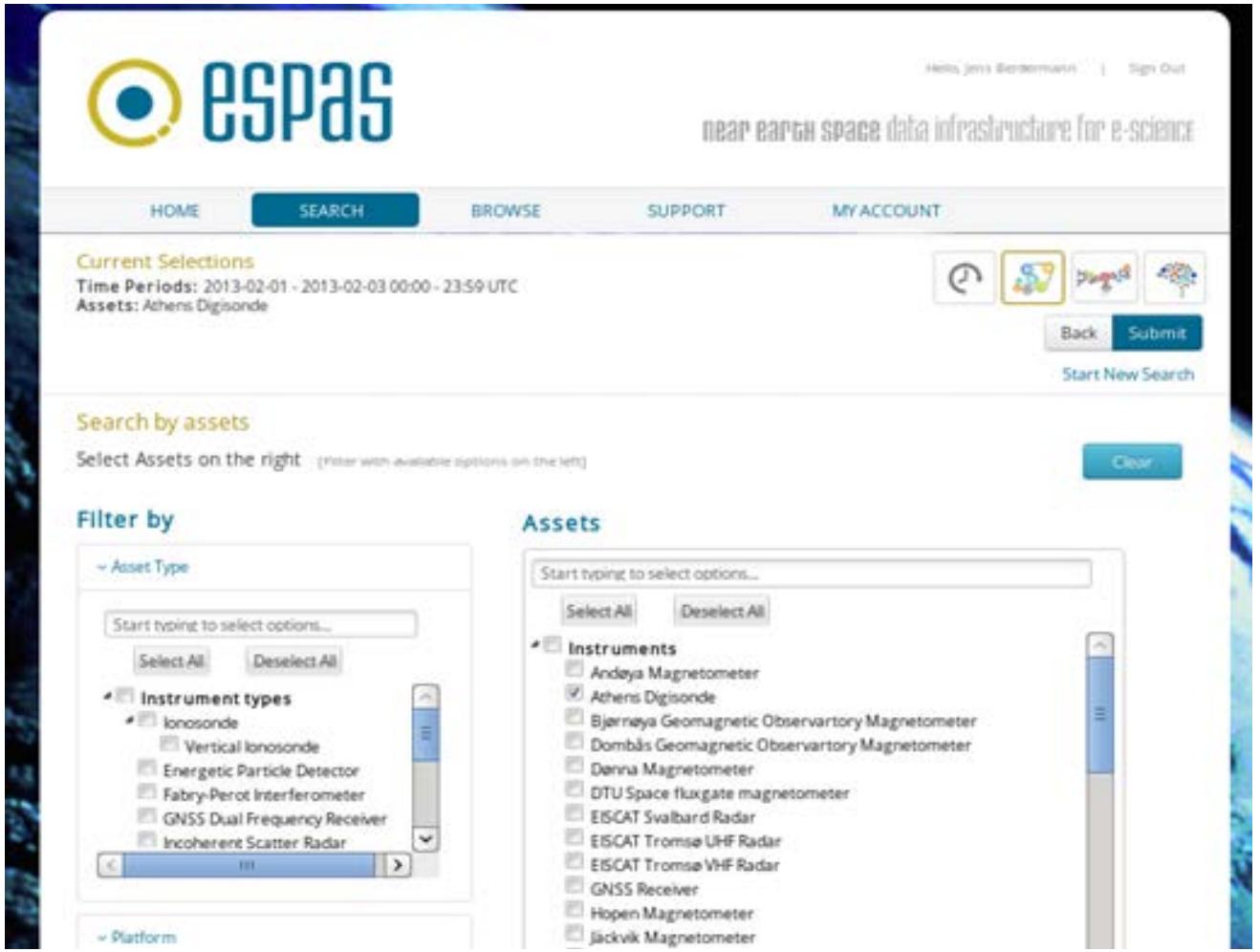
Data search: Add Asset



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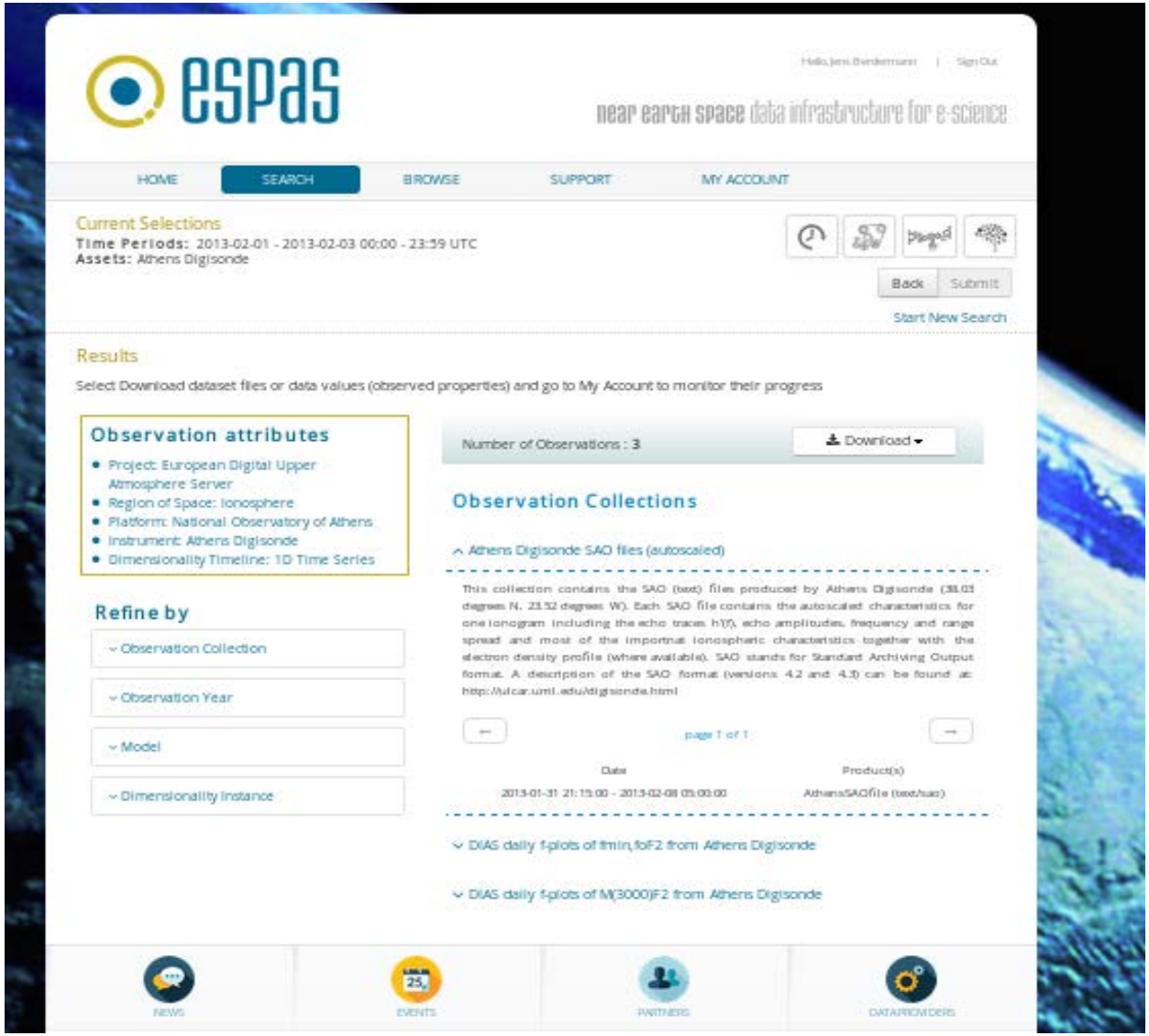
Data search: Add Asset



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Data search: Project

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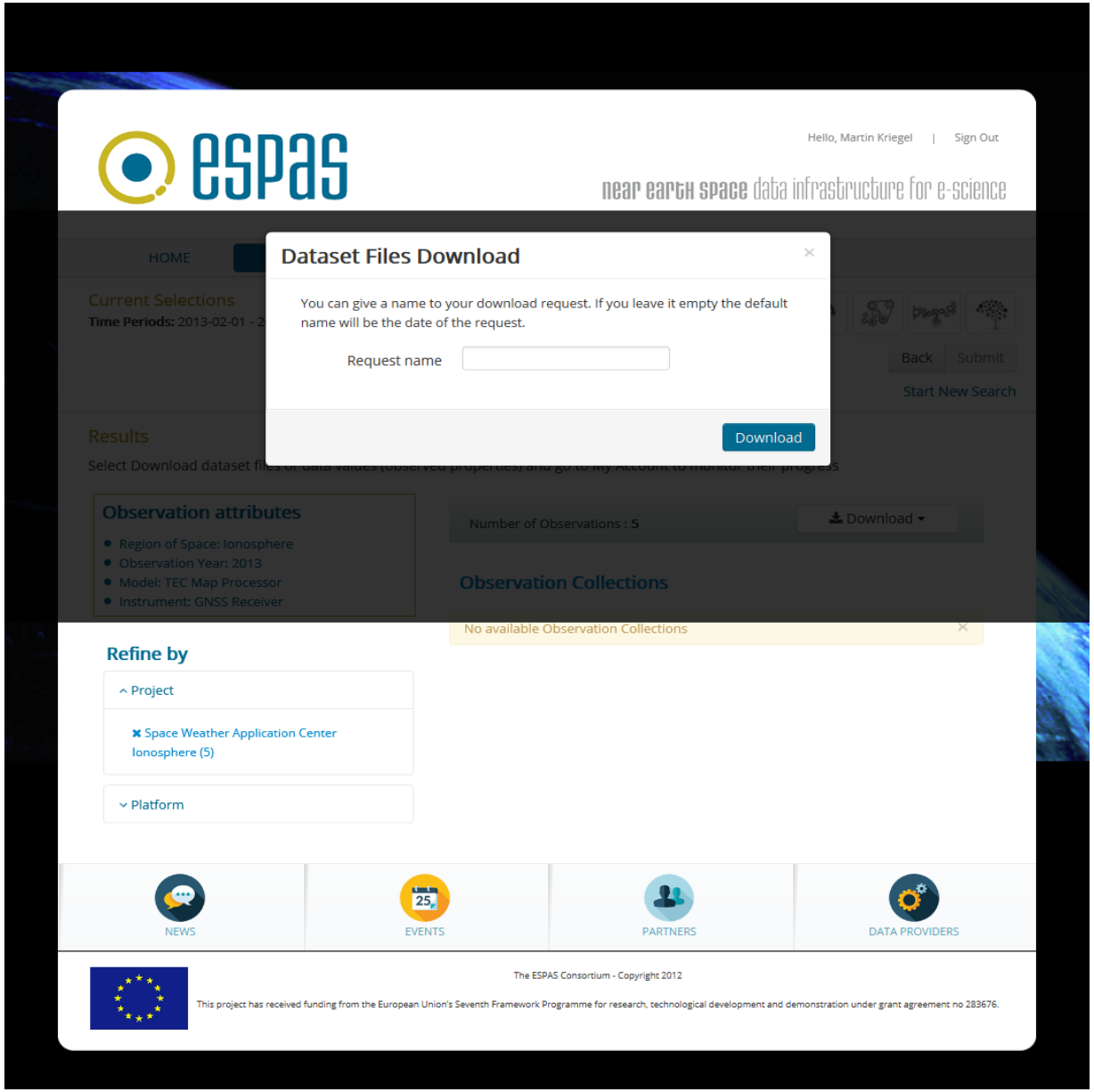
Add name for download



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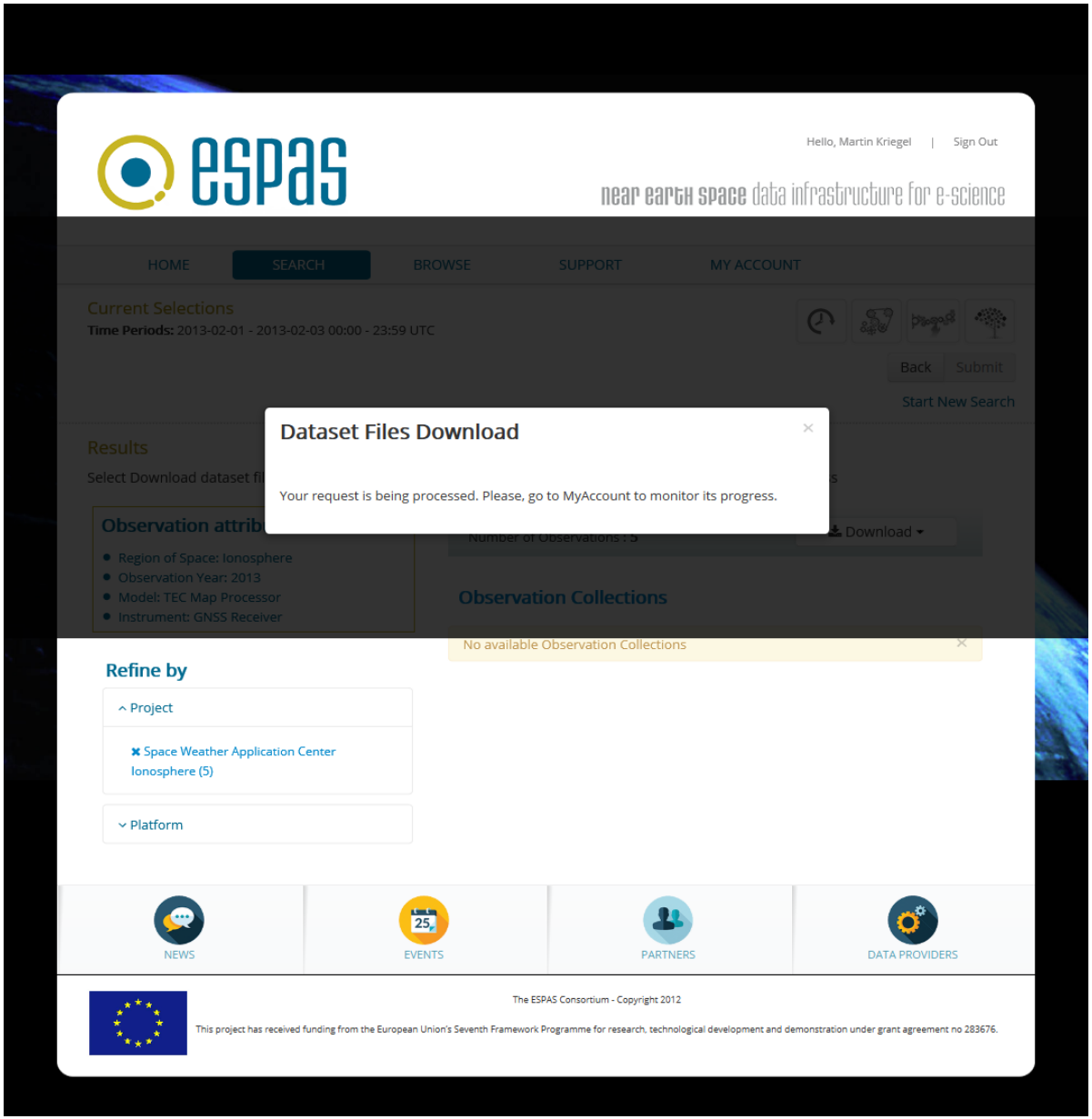
Start download



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Check My Account for progress

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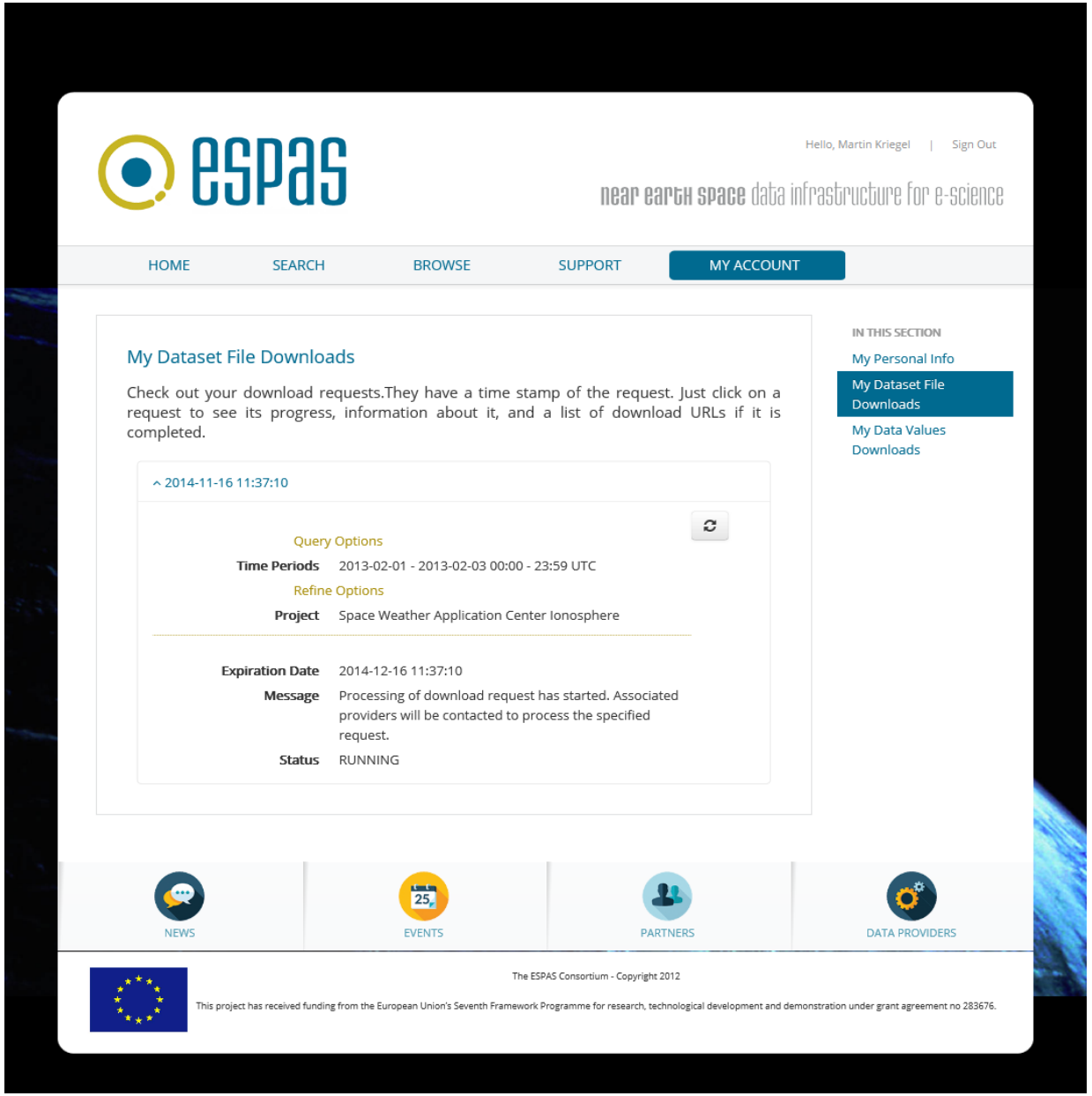

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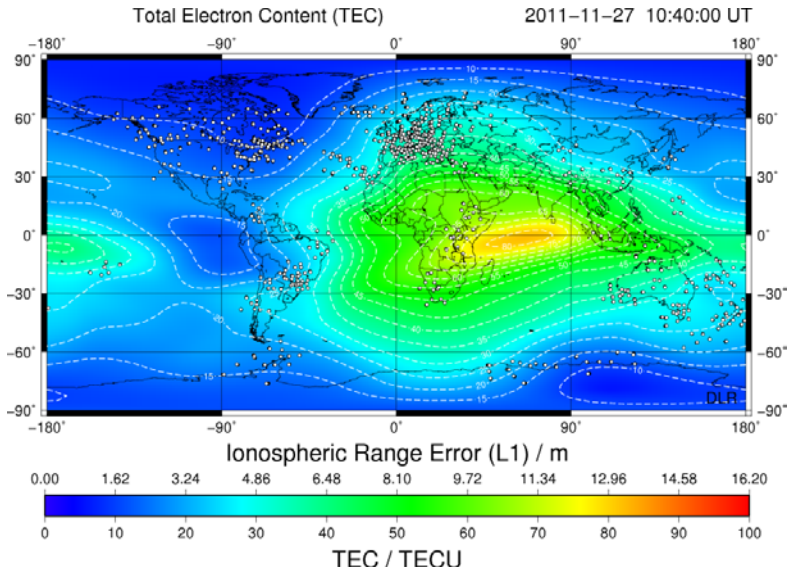
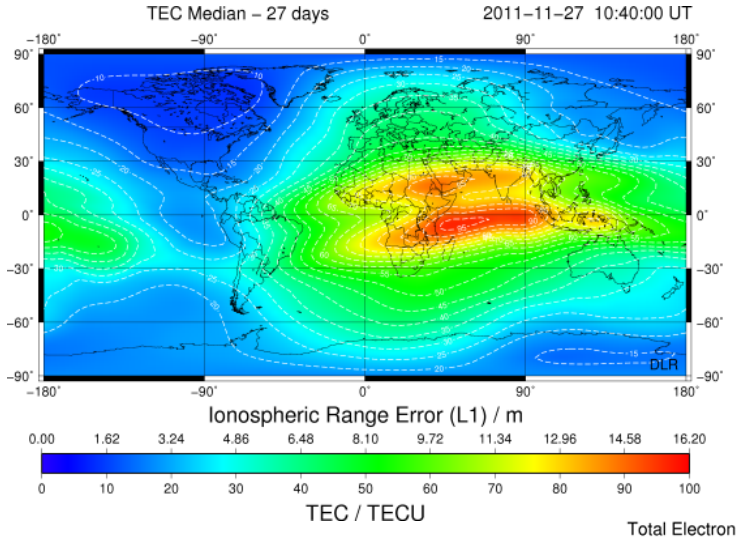
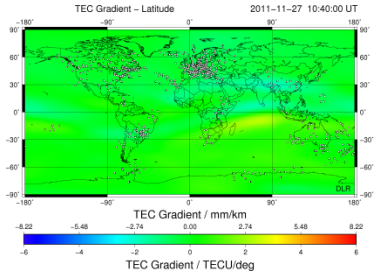
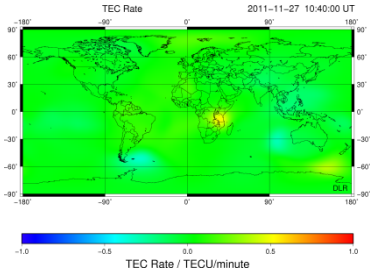
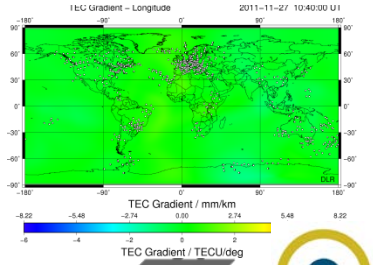
TEC Products

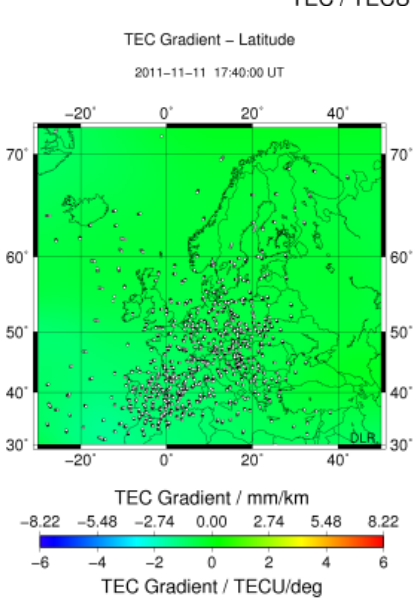


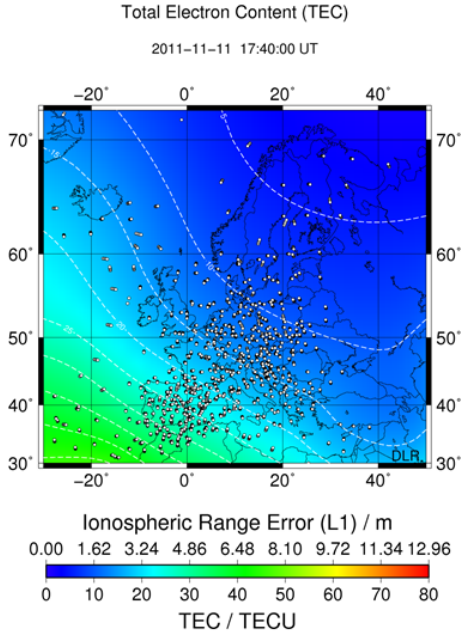












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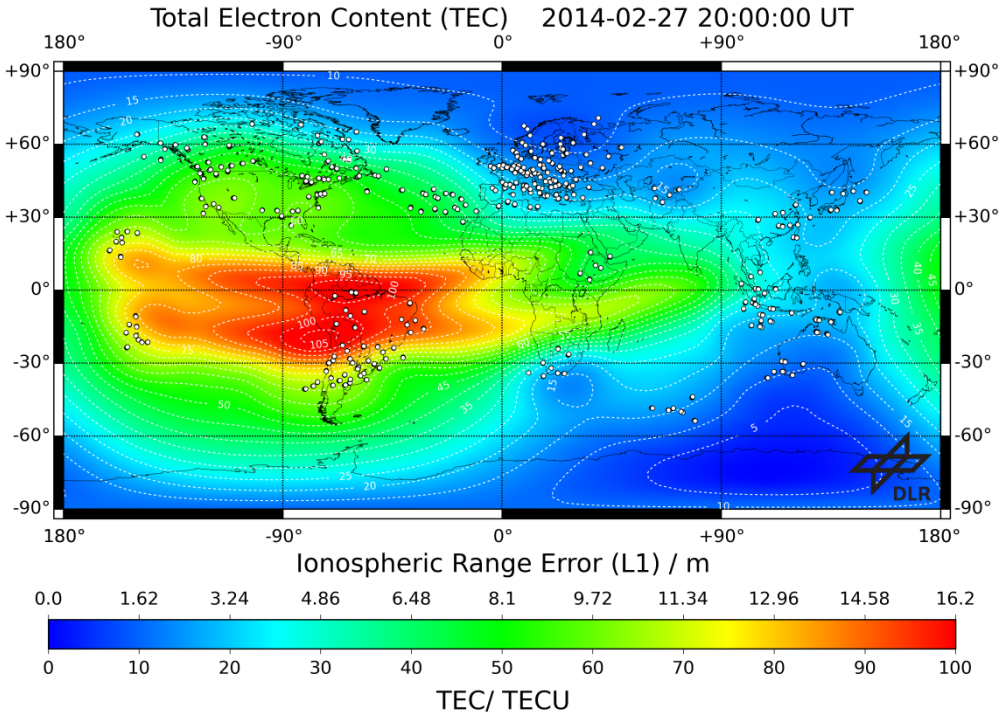
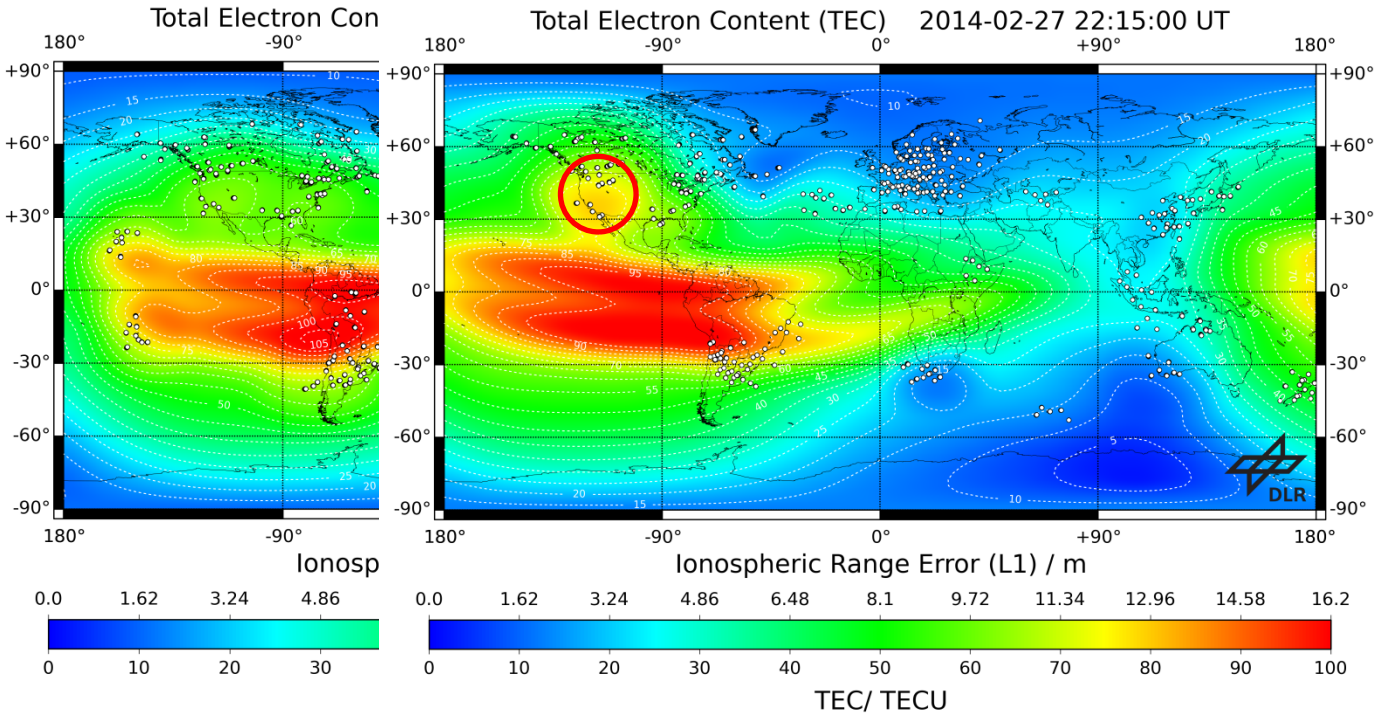
Monitoring of the ionospheric state- TEC reconstruction



The global Total Electron Content (TEC) Map updated every 15 min for monitoring the actual state of the Ionosphere. Example from the **27th February 2014 at 8 pm and 10 pm** shows ionospheric disturbances above North America caused by a medium size geomagnetic storm. Such disturbances can have effects on the performance of Space Based Augmentation Systems (SBAS) such as the American WAAS or the European EGNOS system.

Monitoring of the ionospheric state- TEC reconstruction



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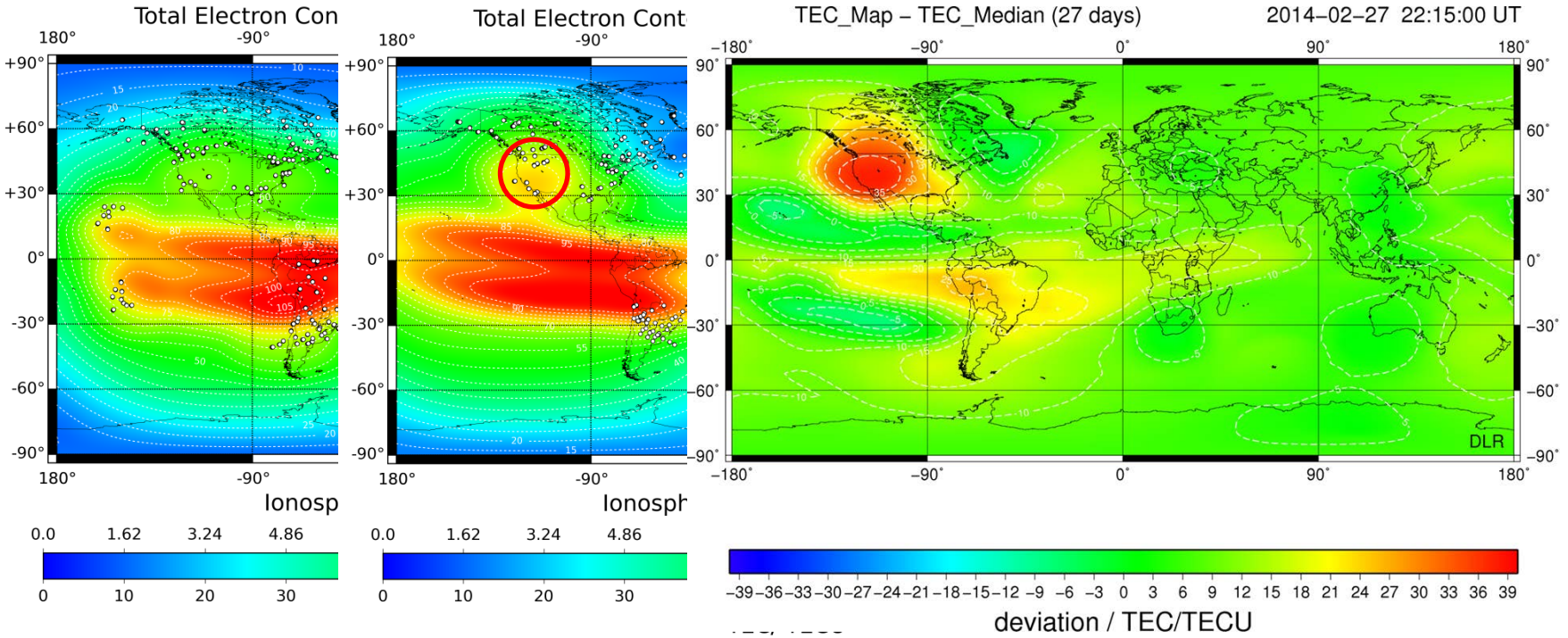

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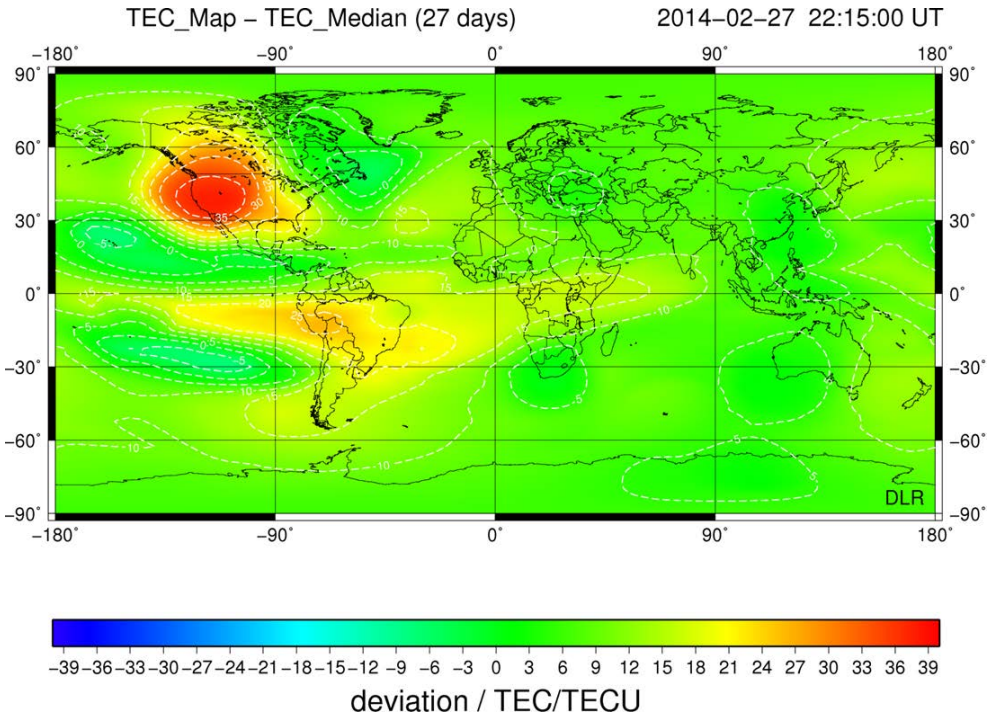
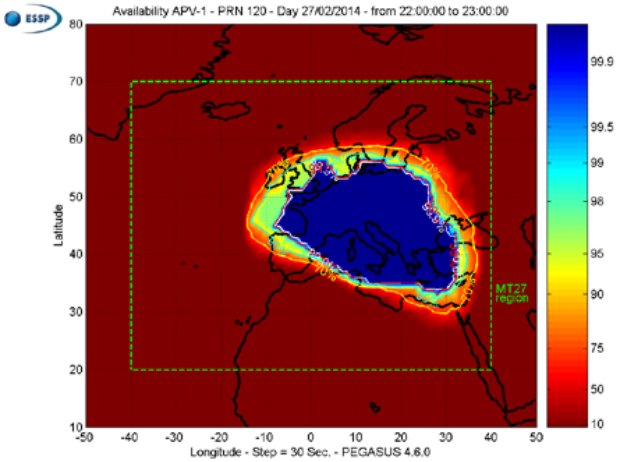
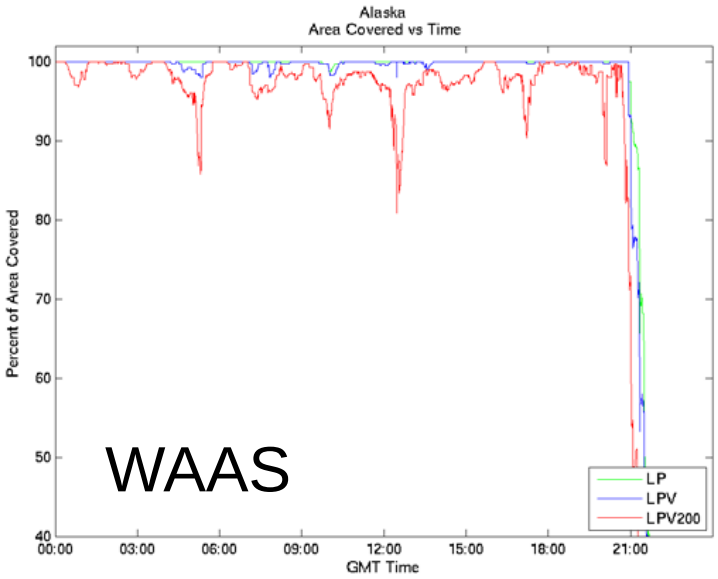
Moderate ionospheric Storm on 27./28. February 2014



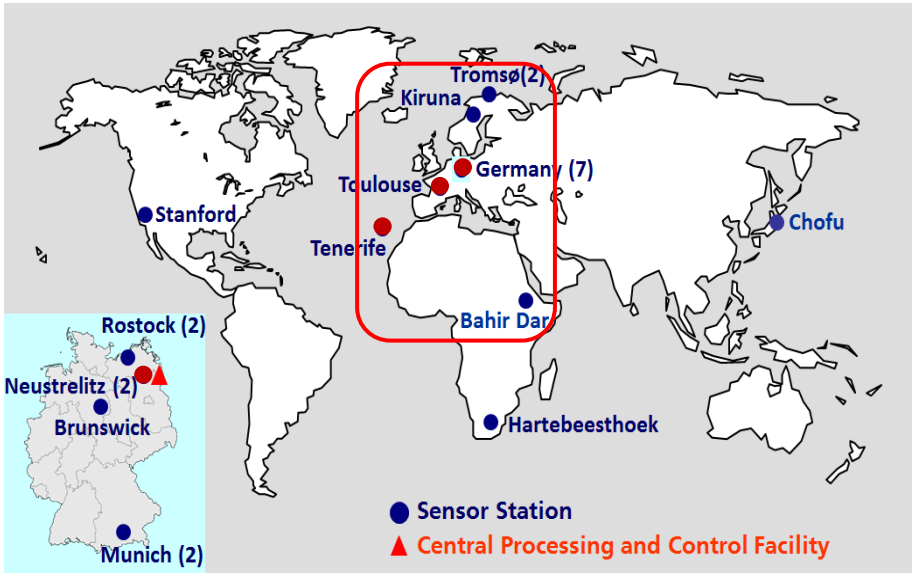
EGNOS

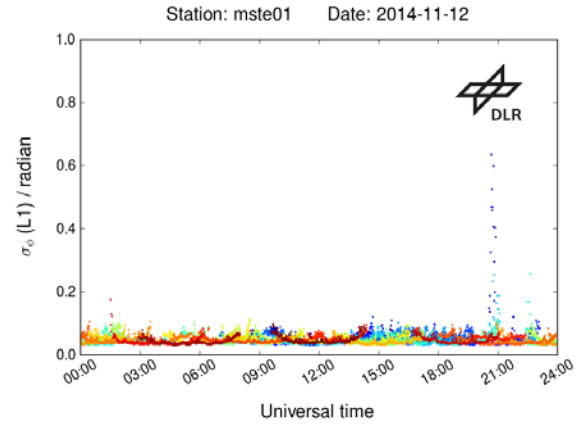


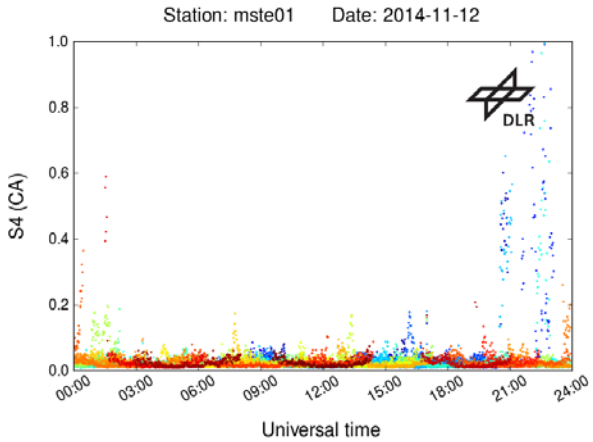


LPV availability of WAAS over Alaska on 27th February 2014.
(**L**ocalizer **P**erformance with **V**ertical Guidance)

GNSS scintillation







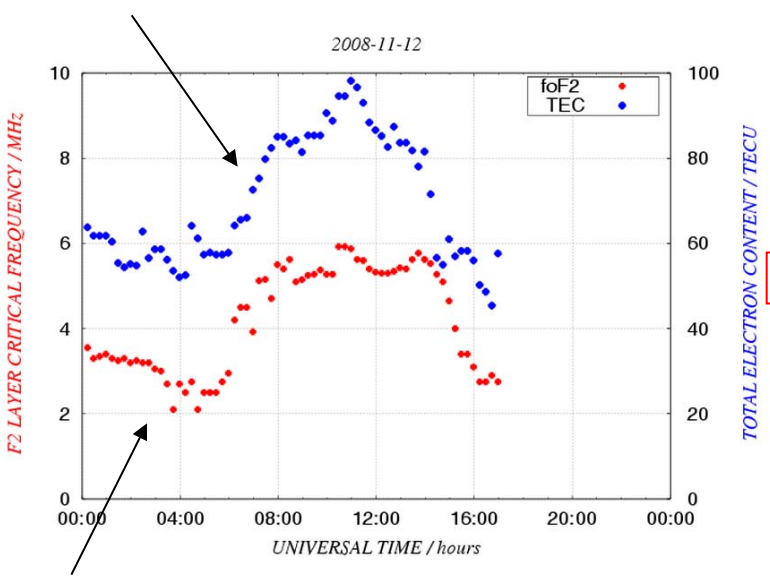
Origin: Equatorial plasma flow reverses around twilight, driving Rayleigh-Taylor instability (RTI) and bubble creation

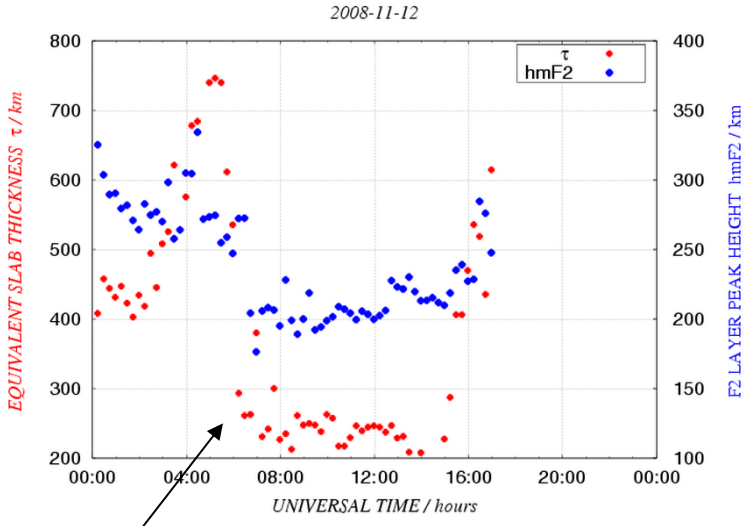
Causes: Amplitude Scintillation

Equivalent Slab Thickness provided by SWACI

Slab thickness over Juliusruh/IAP and corresponding ionosonde data of the IAP Kuehlungsborn (54.4° N;13.4° E).

SWACI - TEC



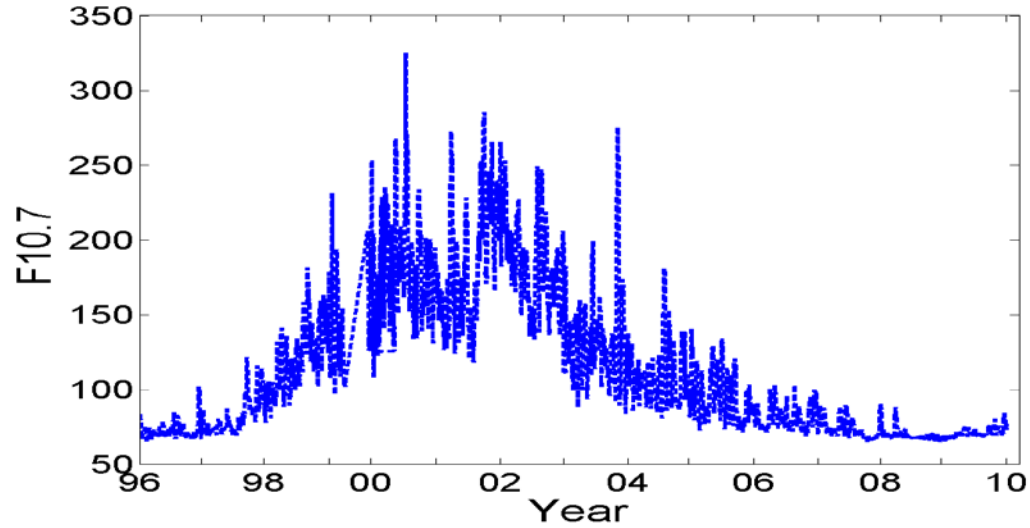


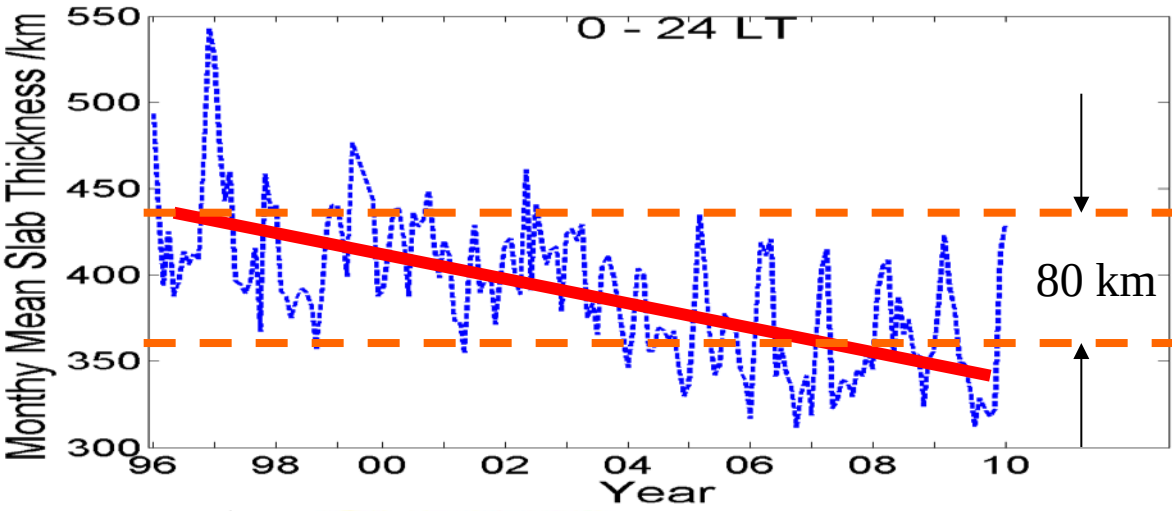
IAP foF2

Slab thickness τ

- Measure of the width of the shape of the vertical electron density profile
- Defined by the ratio of the total electron content (TEC) and the peak electron density of the local ionosphere.
- To compute the peak electron density, vertical sounding data from different ionosonde stations are used.
- The corresponding TEC data are extracted from the SWACI TEC maps.

Climatology of daily averaged slab thickness





- Strong decrease of monthly and daily averaged slab thickness over Juliusruh during solar cycle 23
- No significant correlation of averaged slab thickness values with F10.7 index
- No clear seasonal variation
- **Is this a long-term trend indicating a long-term contraction, i.e. cooling of the thermosphere ?**

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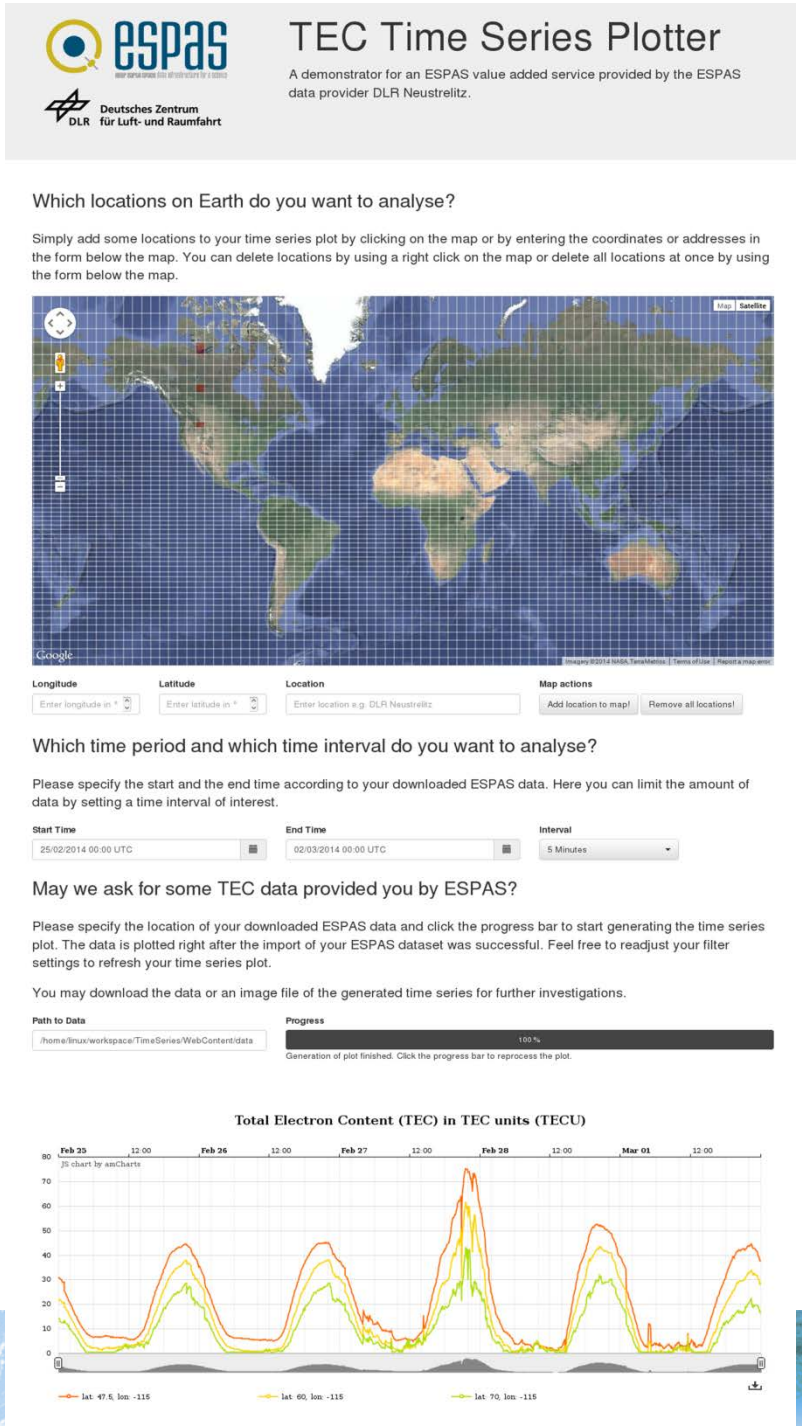
- The TEC Time Series Plotter is a demonstrator for an ESPAS value added service generated by the ESPAS data provider DLR.
- It allows to plot and analyse the time series of Total Electron Content (TEC) values and the corresponding range errors for different radio frequencies at selected locations worldwide for a given time period.
- It supports the detection of space weather effects and the related influence on navigation systems.

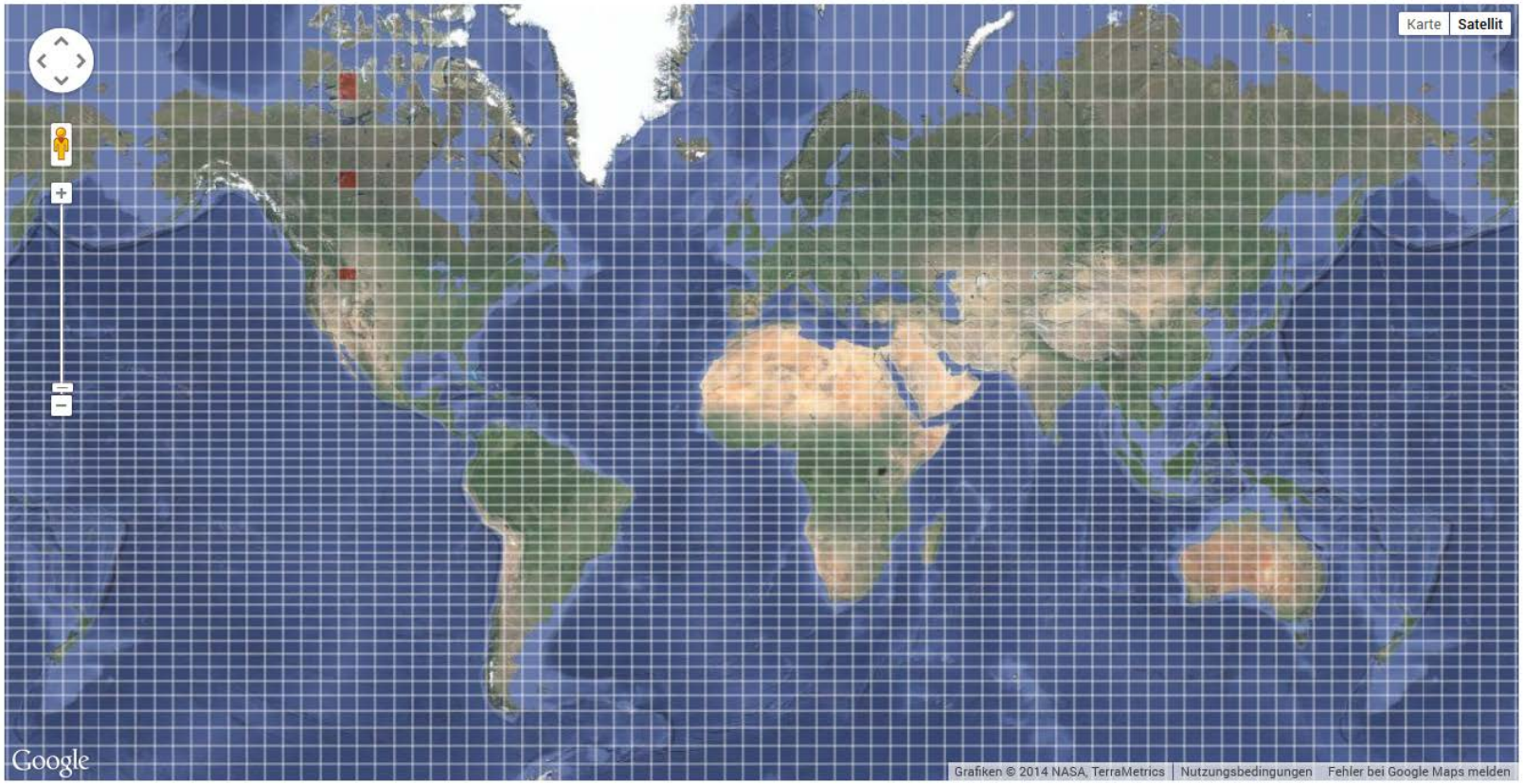
Poster:
"Value added services within the ESPAS system"
Open Session on Recent Advances in
Space Weather Science
Wednesday 19 November



Step 1: Location

Which locations on Earth do you want to analyse?

Simply add some locations to your time series plot by clicking on the map or by entering the coordinates or addresses in the form below the map. You can delete locations by using a right click on the map or delete all locations at once by using the form below the map.



Longitude

Enter longitude in °

Latitude

Enter latitude in °

Location

Enter location e.g. DLR Neustrelitz

Map actions

Add location to map! | Remove all locations!

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Step 2: Time period selection

Which time period and which time interval do you want to analyse?

Please specify the start and the end time according to your downloaded ESPAS data. Here you can limit the amount of data by setting a time interval of interest.

Start Time

25/02/2014 00:00 UTC

End Time

02/03/2014 00:00 UTC

Interval

5 Minutes

Step 3: Start processing

May we ask for some TEC data provided you by ESPAS?

Please specify the location of your downloaded ESPAS data and click the progress bar to start generating the time series plot. The data is plotted right after the import of your ESPAS dataset was successful. Feel free to readjust your filter settings to refresh your time series plot.

You may download the data or an image file of the generated time series for further investigations.

Path to Data

data

Progress

17 %

Extracting the data of your interest from data/TEC_GB/2014/056/DLRNZ-GNSS-GCG-R-2-TCAV-NC-GB-M05-D-2014-056-20-05-00.json ...

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Step 4: Results

May we ask for some TEC data provided you by ESPAS?

Please specify the location of your downloaded ESPAS data and click the progress bar to start generating the time series plot. The data is plotted right after the import of your ESPAS dataset was successful. Feel free to readjust your filter settings to refresh your time series plot.

You may download the data or an image file of the generated time series for further investigations.

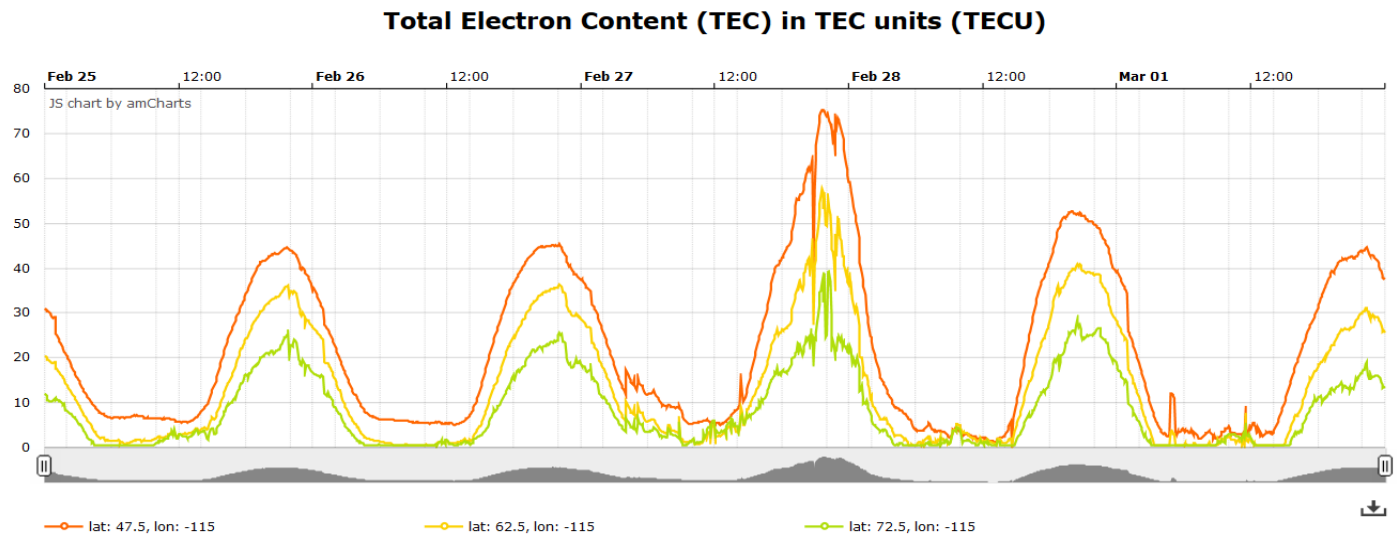
Path to Data

data

Progress

100 %

Generation of plot finished. Click the progress bar to reprocess the plot.



Poster: “Value added services within the ESPAS system” Open Session on Recent Advances in Space Weather Science Wednesday 19 November

Thanks for your attention!

Contact:
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Institute of Communication and Navigation

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fax: +49 3981 480 123
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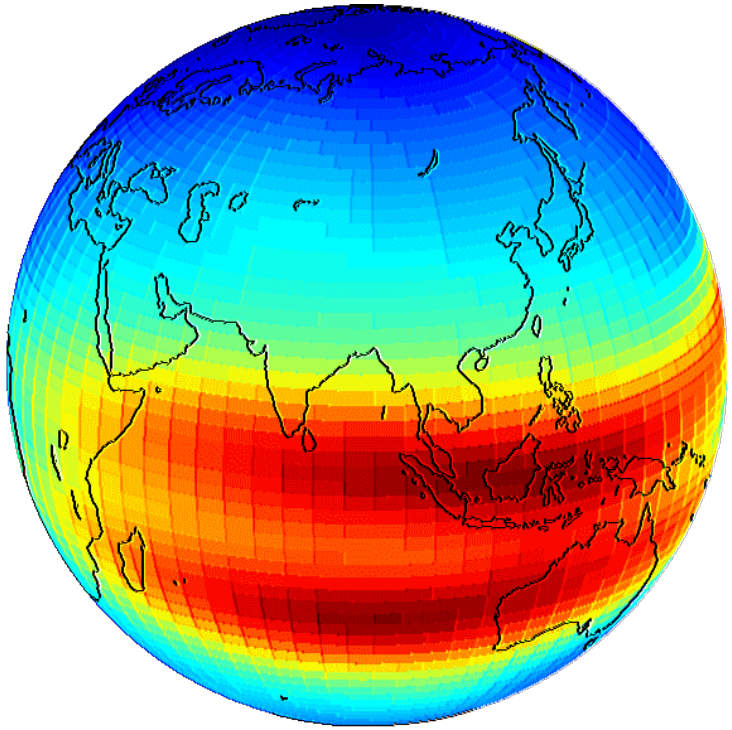

Acknowledgments:

The work leading to these results has received funding from the European Commission's Seventh Framework Programme (FP7/2011-2015) under the grant agreement number RI-283676.