# VirES for Swarm v2.0

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Layers

Layers widget provides the possibility to select the specific data to be visualized. It can be activated by clicking on the "Layers" button on the dashboard.

Available layers:
- Cartographic layers: Coastlines and Countries, Graticule, Magnetic Graticule, visualized on the map.
- Swarm products: data of the selected type and satellite are visualized on the map and in the analytic view.
- Magnetic Models: models representations are visualized on the map.
- Kp and Dst indices are visualized in the analytic view.
- Raster textures are visualized on the map.

In case of Swarm products, magnetic models, Kp and Dst indices, once the layer is activated, the data availability is shown in the time bar.
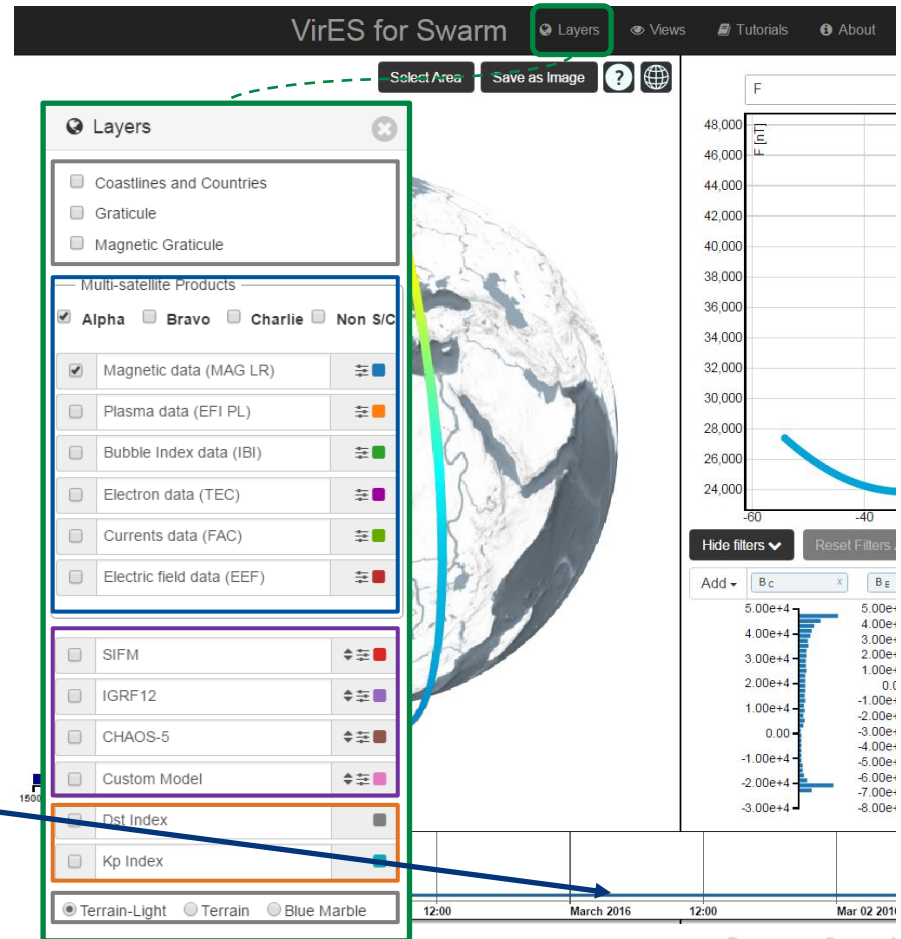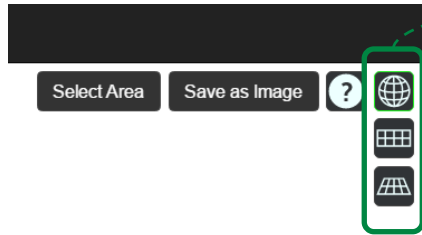
Views
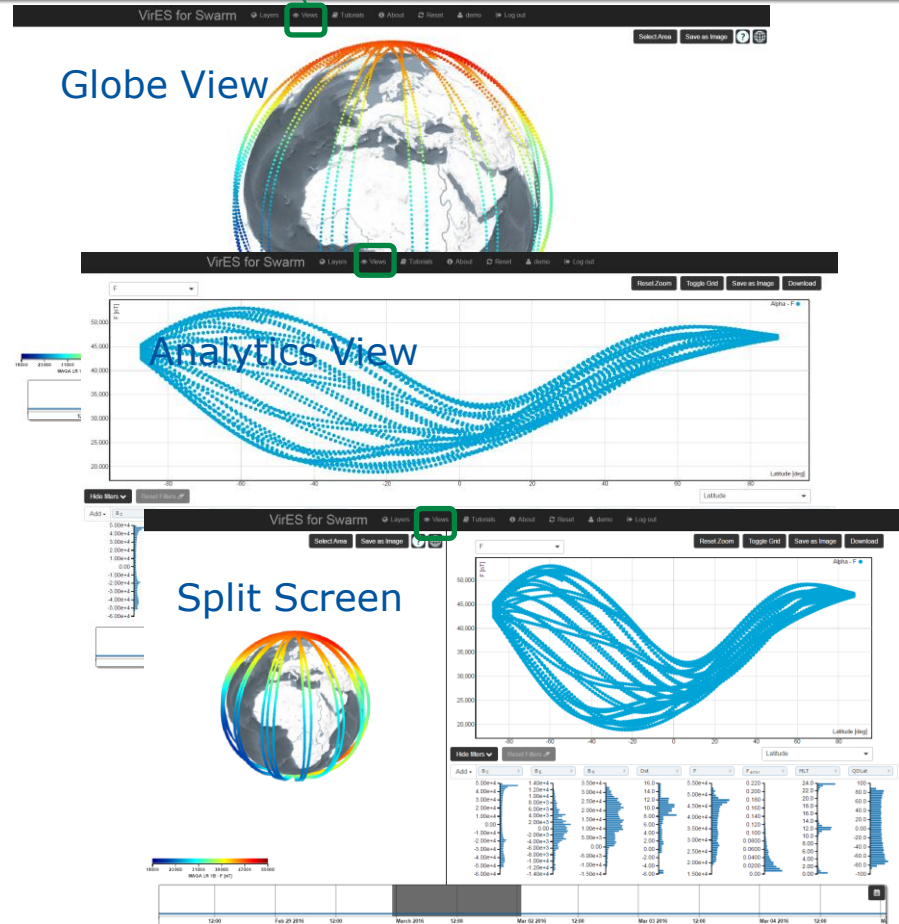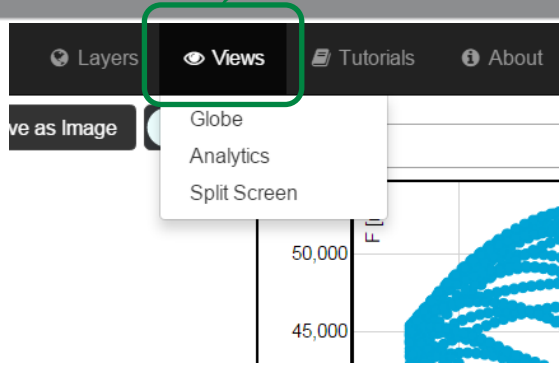
It is possible to change the active view by clicking on the "Views" button on the dashboard. The available views are:

- Globe View: world map
- Analytics View: scatter plot and histograms
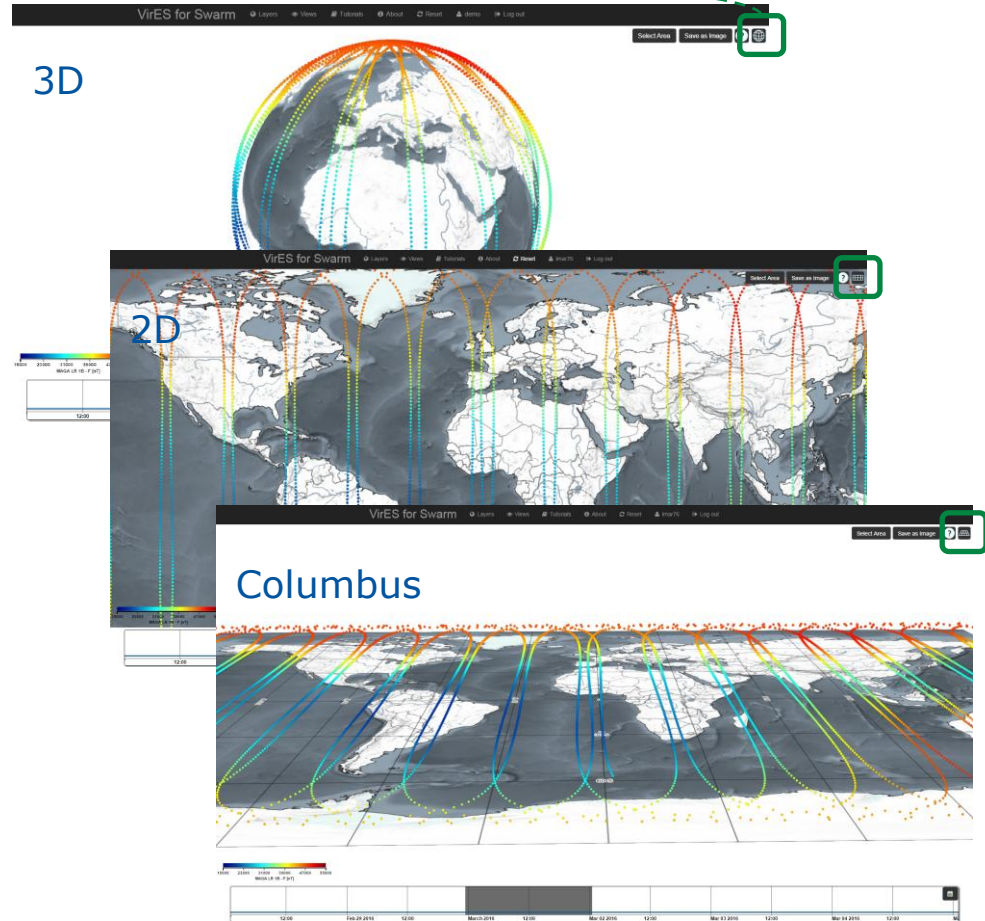- Split Screen: combination of world map and scatter plot.

Globe View

Analytics View

Split Screen

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View Projections

In the Globe View, the map projection can be changed between:

- Globe View (3D)
- Cartesian Grid (2D)
- Columbus View

The "Save as Image" button allows to save the map into a file.

3D

2D

Columbus

# Product parameters and settings

Settings widget can be activated clicking on the button near the product's name.
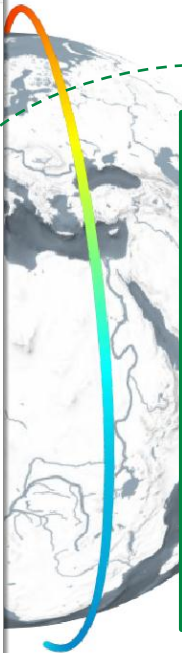
Available settings:
- Satellite: select between satellite Alpha, Bravo, Charlie or Not spacecraft specific data (currently used to select FAC combined products).
- Parameter to be visualized on the map. It depends on the product type (e.g. "Magnetic field intensity" for Magnetic data, "Plasma density" for plasma data).
- Colours style and scale range of the parameter visualized on the map.
- Opacity: opacity of the plot over the map
- Outlines: activate/deactivate outlines.
- Legend: activate/deactivate legend.
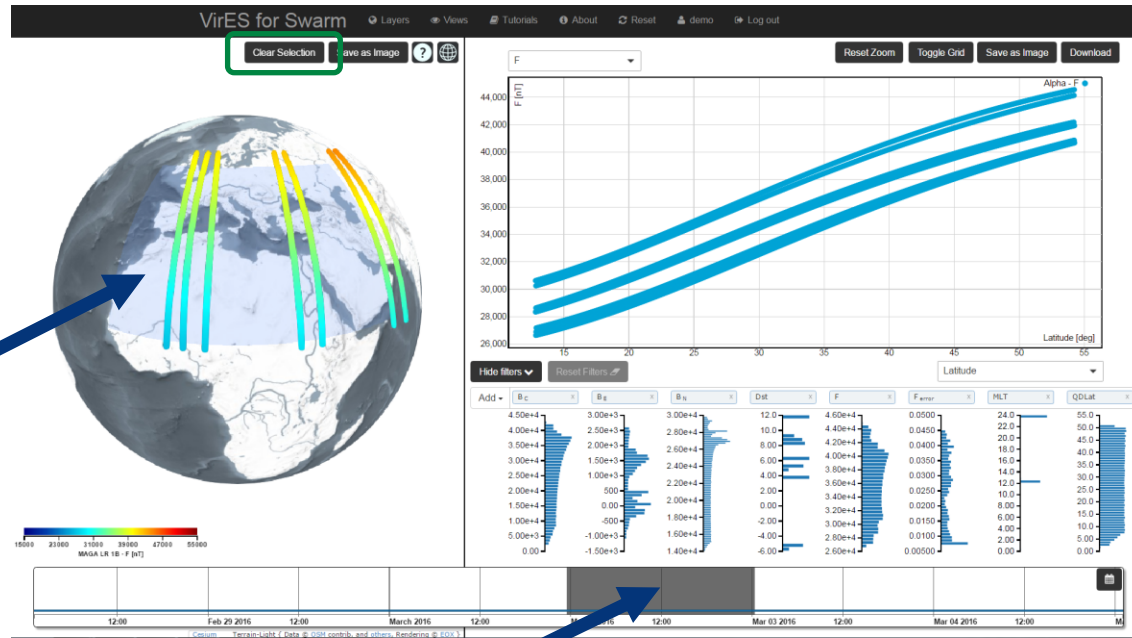
E.g.: change the opacity and outlines:
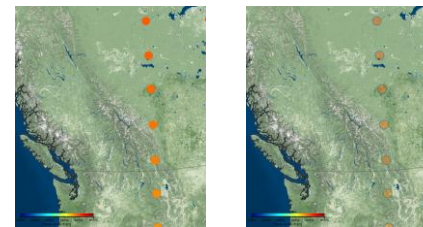
Spatial and Temporal Data Selection

It is possible to select a specific area of interest by clicking on the "Select Area" button and drawing a rectangle on the map.

The area can be de-selected with the "Clear Selection" button.

It is possible to select the desired time-span by clicking and dragging an area on the time slider.

The line visualized over the time slider represents the data availability and depends on the selected layer.

Plot and histograms are automatically updated according to the spatial and temporal selections.
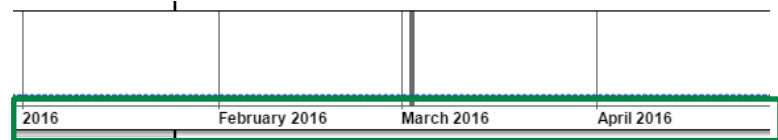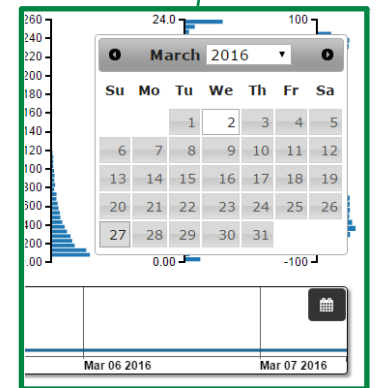
Time Slider: date selection
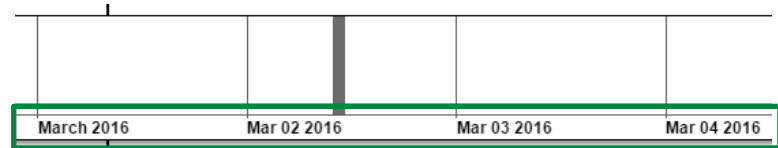
Left button + drag left/right: change date

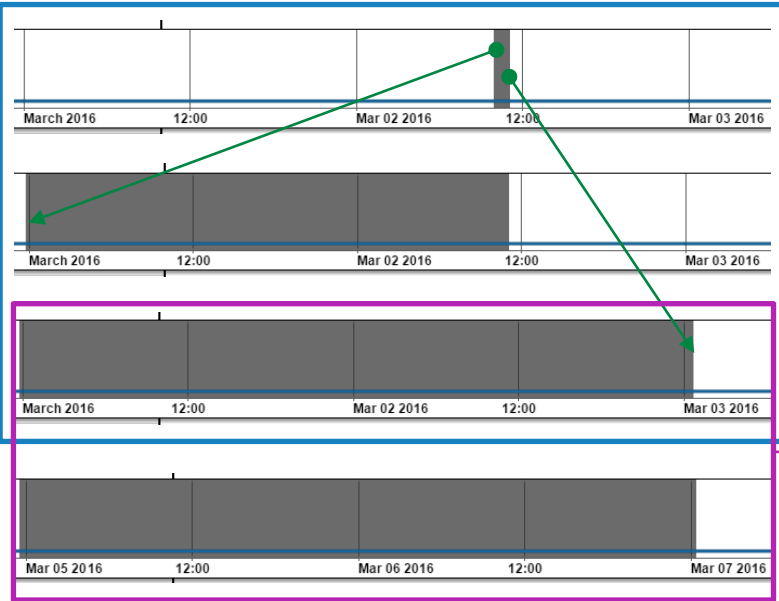Jump to date: click the button on the top right corner of the time slider to easily select the date
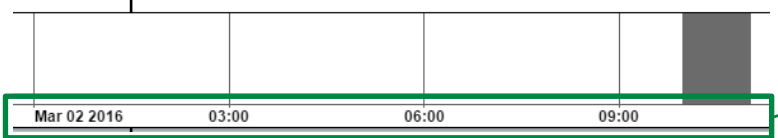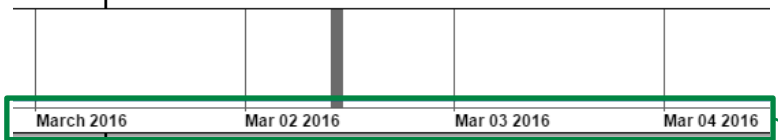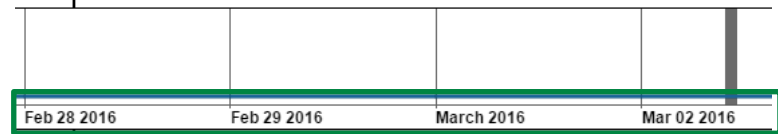
Wheel mouse: zoom in/out time scale
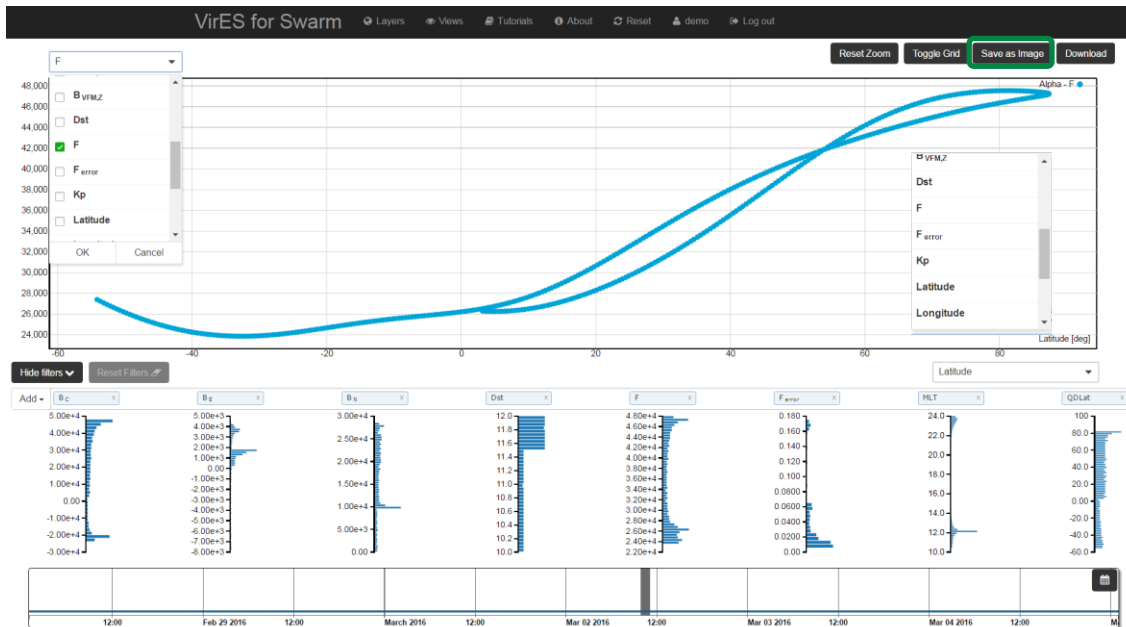
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Time window update

Click and drag the time window borders to increase/decrease size

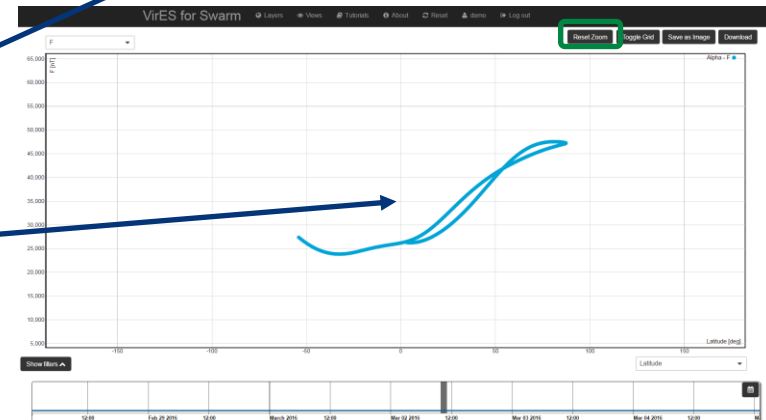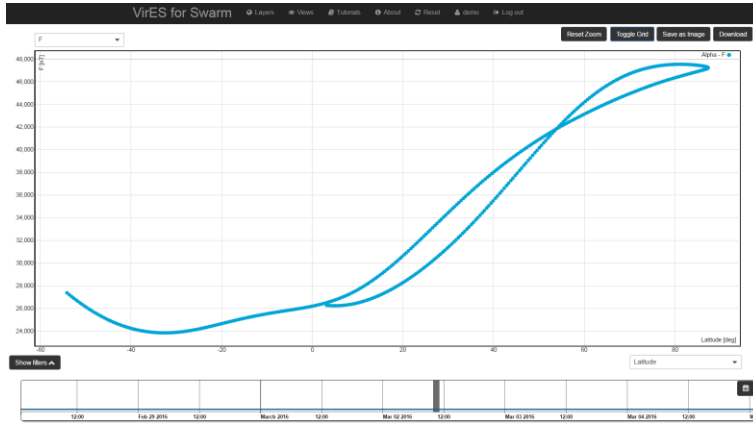Click and drag the time window to move it leaving its size unchanged

Analytics View: parameters selection

Scatter Plot can be customized selecting the parameters to be represented on the X-axis and Y-axis

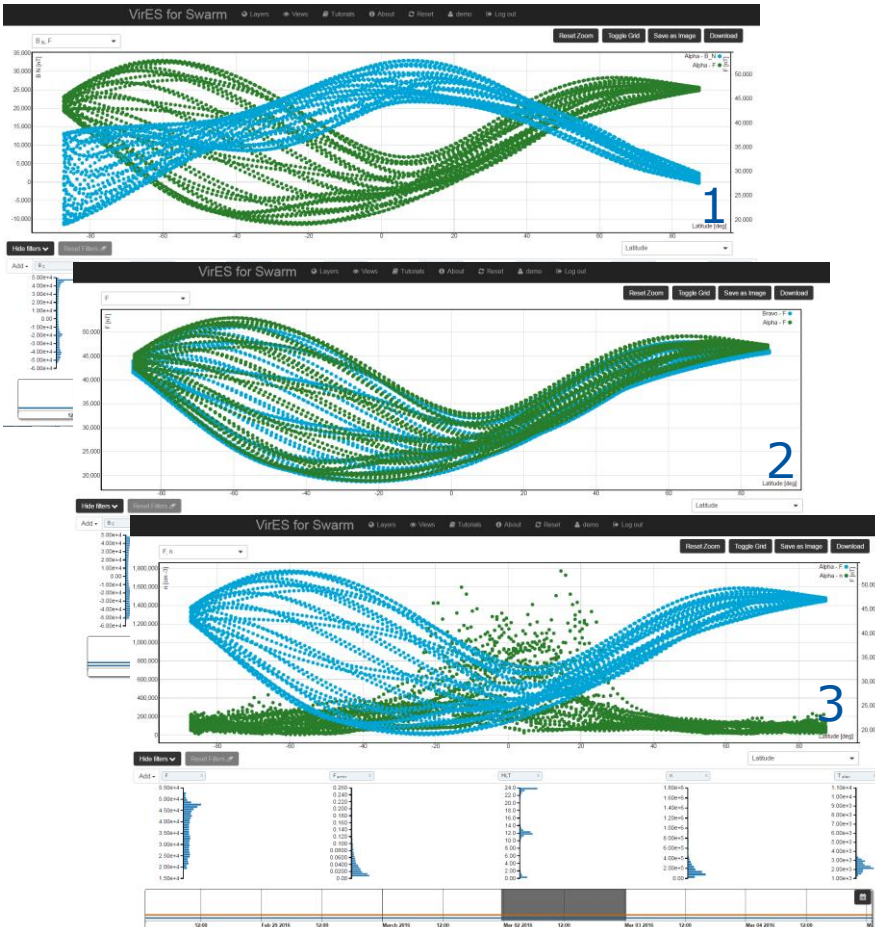The "Save as Image" button can be used to save the plot into a file.

Analytics View: zoom

Changing the zoom level:

- Mouse pointer over one axes + mouse wheel: change zoom level on a single axes
- Mouse pointer on the scatter plot + mouse wheel: change zoom level on both axis
- Reset Zoom button: resume the original plot

Data over-plotting

Selecting different combinations of layers and/or spacecrafts it is possible to visualize more parameters in the same plot. E.g.:
1. Same product, same spacecraft, different parameters
2. Same product, different spacecrafts, same parameters
3. Different products, different parameters, same spacecraft

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Data Filtering
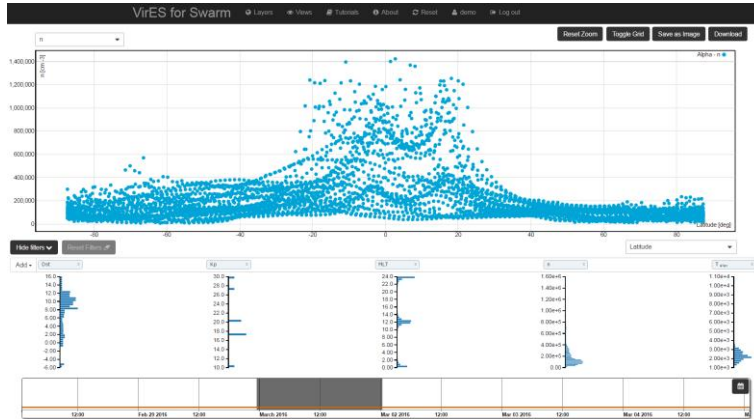
It is possible to filter data according to a specific parameter by clicking and dragging with the mouse over the desired histogram.

If the parameter is not present in the histograms list, it can be added clicking on the "Add" button.
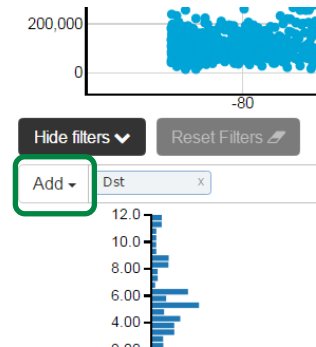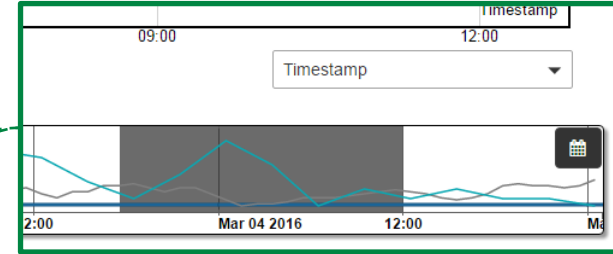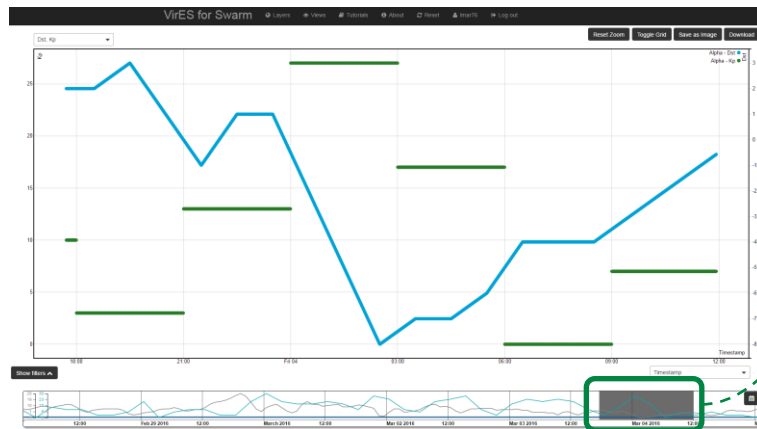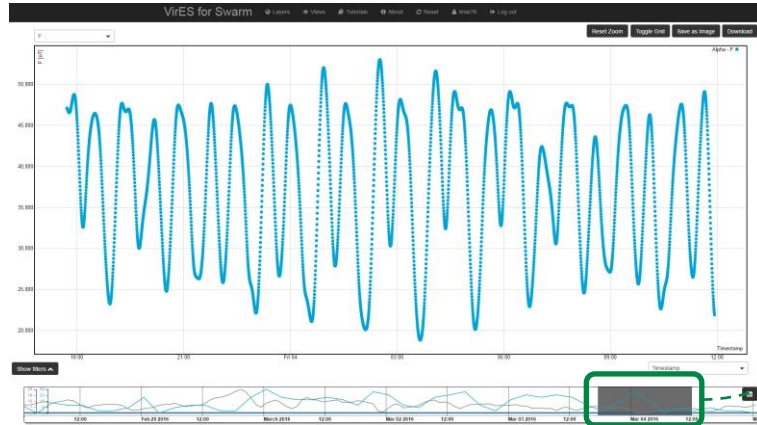
Original data visualization can be resumed clicking on the "Reset Filters" button.

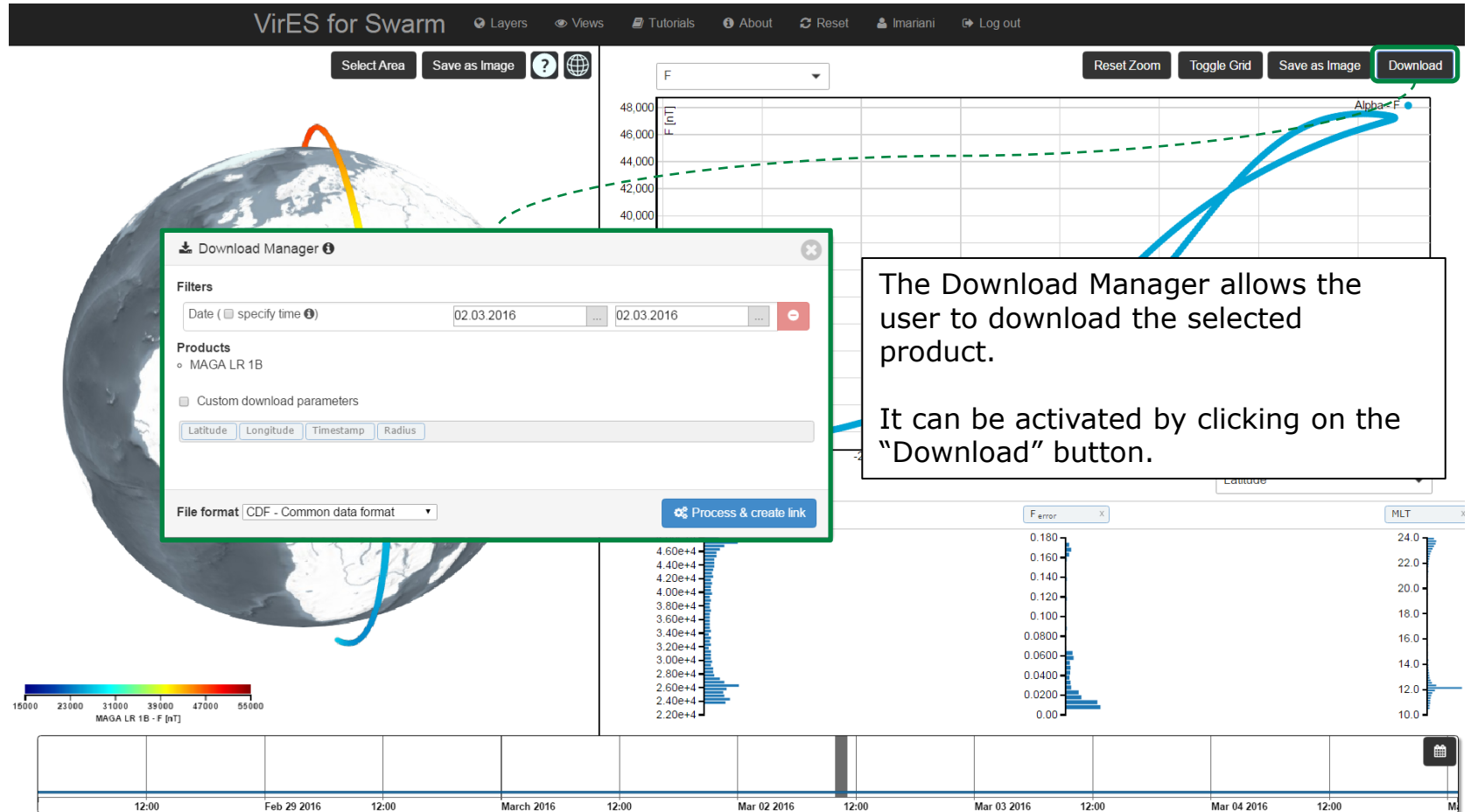Histograms can be hidden by clicking on the "Hide Filters" button.
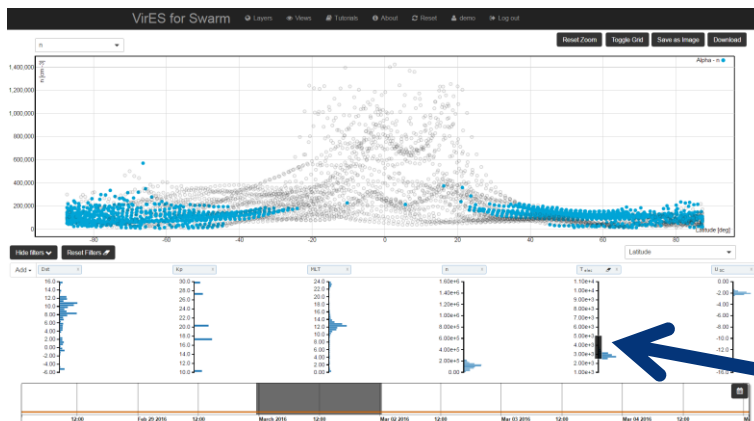
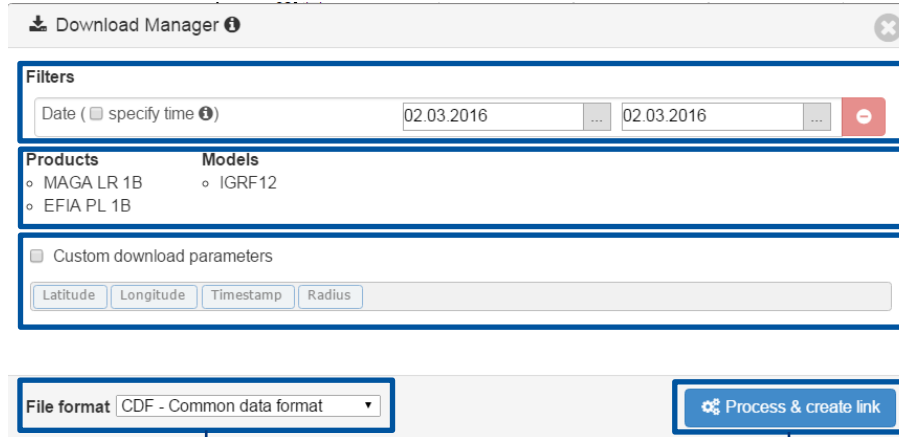E.g.: 2.5 e3 K ≤ Telec ≤ 5 e3 K

Kp and Dst Visualization

Kp and Dst indices are visualized on the time bar. These representation can be used to select a time window having particular Kp and Dst values.

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Data Download

Download Manager: settings

Filters section reports, by default, the currently selected start and stop dates (it can be modified), the selected area of interest (if any) and any selected filter on the histograms.

Products/Models section reports the currently selected products and models.

Custom download parameters section allows the user to select a specific subset of the parameters to be included in the output product.

File format allows the user to select the output file format: CDF (default) or CSV.

Process & create link button allows the user to start the creation of the selected product file. Once the file is ready to be download, a download button appears.

Download Manager: filters

Start and stop dates are initially set to the start and stop dates of the selected time window.

It is possible to specify the start and stop time selecting the "specify time" checkbox.

Any filter applied on the histograms is reported indicating the parameter and the minimum and maximum values.

If an area of interest is selected, the latitude and longitude information is reported

With the exception of dates, it is possible to remove the filters clicking on the red button.
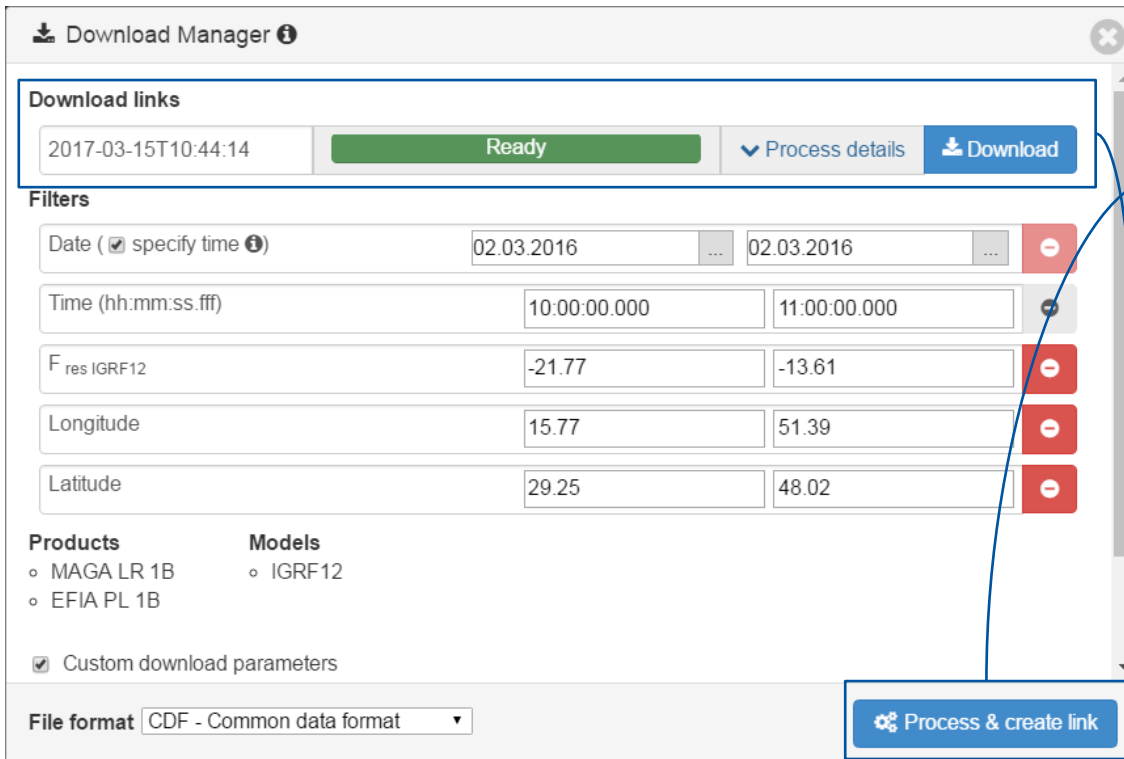
Download Manager: custom download parameters

The product's content can be customised by selecting the "Custom download parameters" checkbox and adding the desired parameters from the list. In this way, only the selected parameters will be included in the output product.

Download Manager: product preparation and download

After having customized the date and time ranges, the area of interest, the filtering parameters and the output parameters, the product can be processed by clicking on the "Process & create link" button.

The download link appears with a progress indicator. Once the product is ready, it can be downloaded by clicking on the "Download" button.

View of magnetic field models: SIFM, IGRF12, CHAOS-5

Three predefined models: SIFM, IGRF12, CHAOS-5

Model parameters and settings

Settings widget can be activated clicking on the button near the model's name.

Available settings:
- Parameter to be visualized on the map (e.g. "Total field intensity", "Fieldlines", etc.)
- Colours style and scale range of the parameter visualized on the map.
- Opacity: opacity of the field map.
- Coefficients range of the spherical harmonics expansion.
- Height: reference height.
- Legend: activate/deactivate legend.

E.g.: coefficients range: [10, 13], height: 0 Km
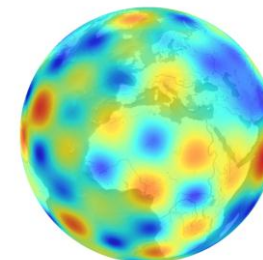
Magnetic field lines
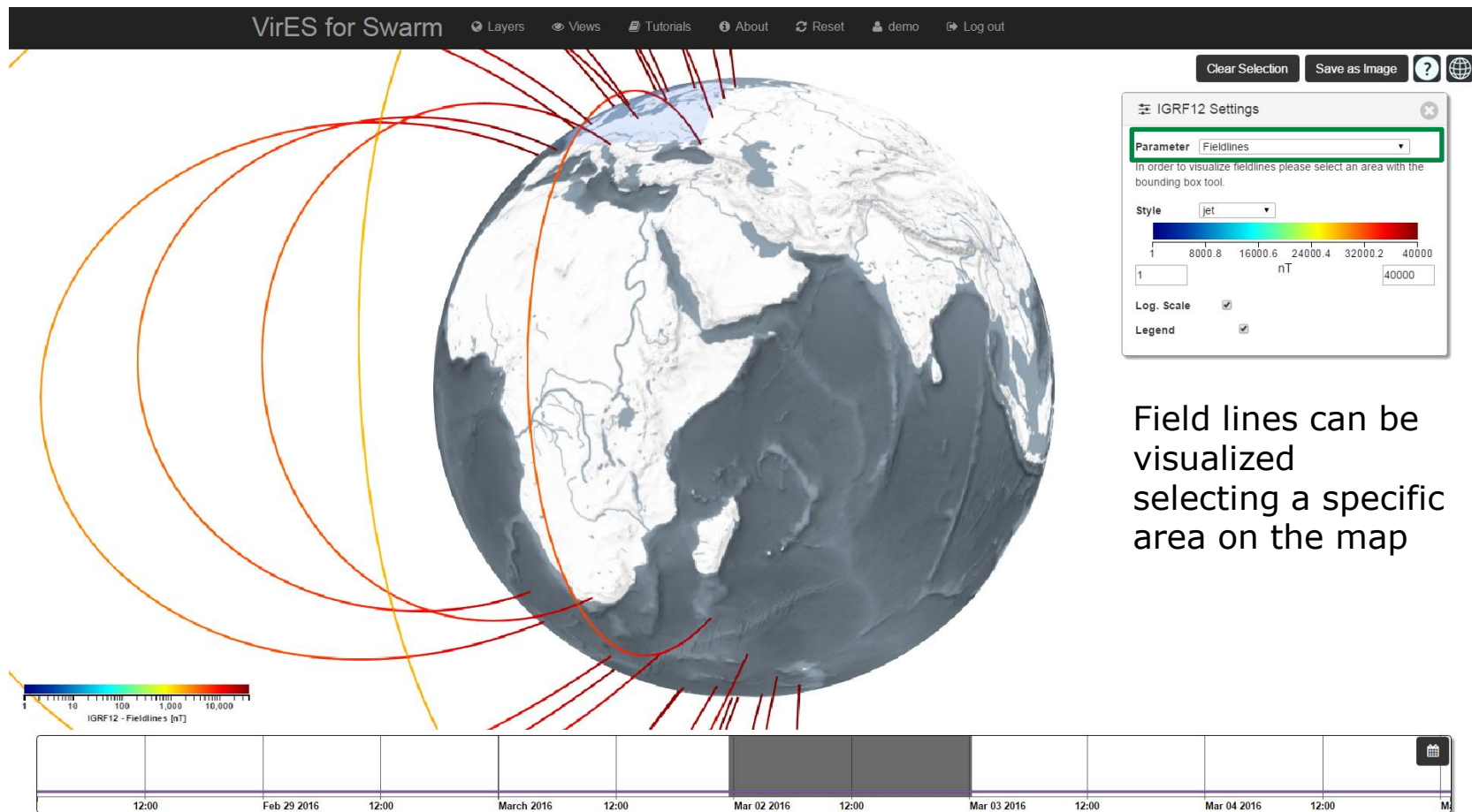
Field lines can be visualized selecting a specific area on the map

Upload of custom model

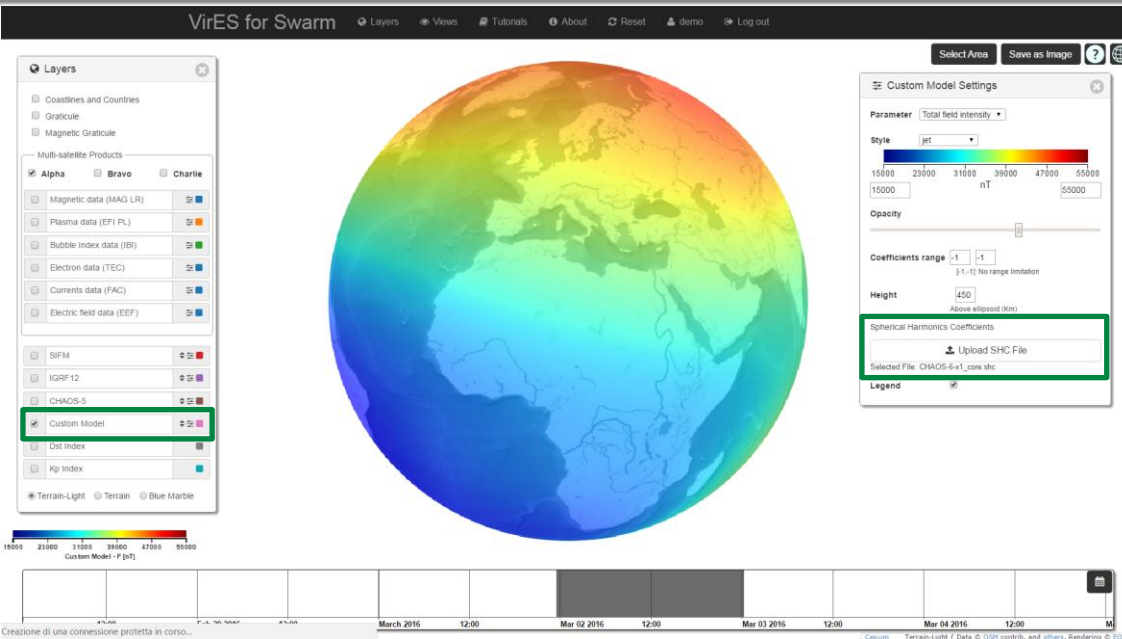In addition to the predefined models, it is also possible to visualize a custom model by uploading a Spherical Harmonic Expansion coefficients file (SHC) [1].

In the example, CHAOS-6 SHC file has been used [2].

[1] Description of SHC file format: http://www.spacecenter.dk/files/magnetic-models/CHAOS-5/SHC-Format-Decsription.pdf

[2] CHAOS-6 SHC file: http://www.spacecenter.dk/files/magnetic-models/CHAOS-6/CHAOS-6-x1_core.shc

Residual visualization and analysis
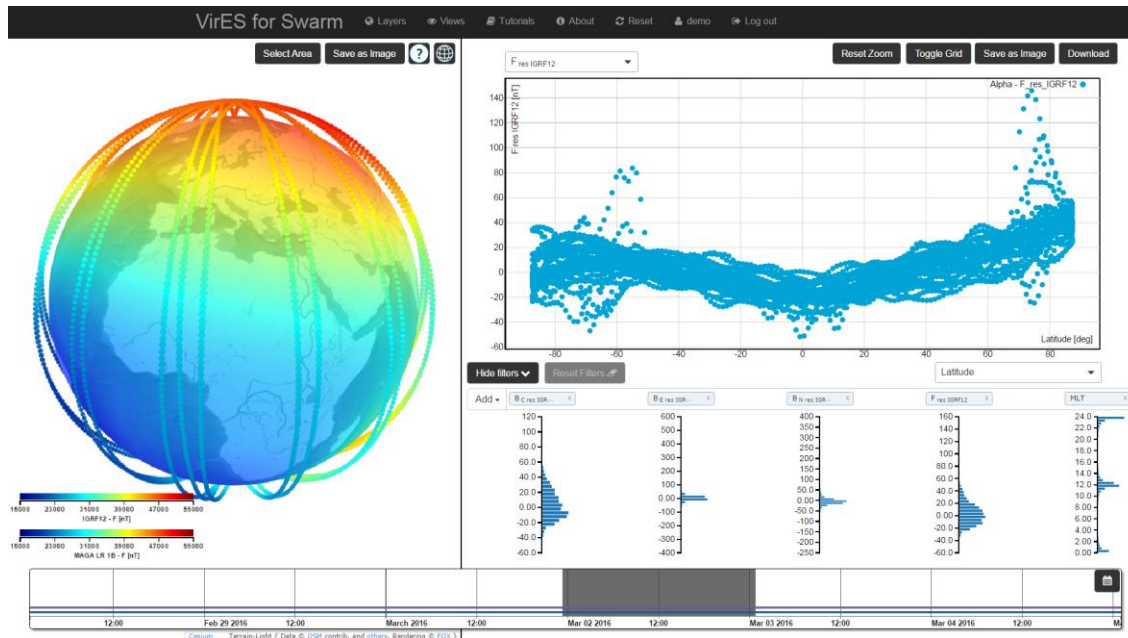
Selecting Magnetic Data and a magnetic field model it is also possible to visualize, in the analytic view, the residual between the measured parameter and the one calculated with the model.

In the example you can see the residual between the measured F and the field intensity calculated with IGRF12 model.