

# RADAR ALTIMETRY TUTORIAL & TOOLBOX



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## ABSTRACT

The universal altimetry toolbox BRAT (Broadview Radar Altimetry Toolbox) is a collection of tools and tutorial documents designed to facilitate the processing of radar altimetry data. It can read all previous and current altimetry missions' data. It now incorporates the capability to read the Sentinel-3 L1 and L2 products. ESA endeavoured to develop and supply this new capability to support the users of the recently launched Sentinel-3 mission.

This project started in 2005 from the joint efforts of ESA (European Space Agency) and CNES (Centre National d'Études Spatiales). The toolbox is freely available at <http://earth.esa.int/brat>. The BRAT suite is mostly made of command line tools, of which the BratGUI is the front-end. BRAT can be used in conjunction with MATLAB/IDL (via reading routines) or C/C++/Python/Fortran via a programming API, allowing users to obtain the desired data, bypassing the data-formatting hassle. BRAT can also be used to simply visualise data quickly, or to translate the data into other formats such as NetCDF, ASCII text files, KML (Google Earth) and raster images from the data (JPEG, PNG, etc.).

Several kinds of computations can be done within BRAT, involving both user defined combinations of data fields that can be saved for posterior use and BRAT's predefined formulas from oceanographic altimetry. BRAT also includes the Radar Altimeter Tutorial, which contains an extensive introduction to altimetry, showing its applications in different fields such as Oceanography, Cryosphere, Geodesy and Hydrology, among others. Use cases are also available, with step-by-step examples, covering the toolbox usage in the different contexts.

Currently, a SAR Altimetry tutorial is available online, which benefits of new contents, specifically use cases for SAR altimetry, in order to train users and make them aware of the great potential of BRAT, especially for coastal and inland applications. Moreover, BRAT 4.2.0 beta is already available and it offers a new and improved GUI. As for any open source framework, contributions from users having developed their own functions are welcome.

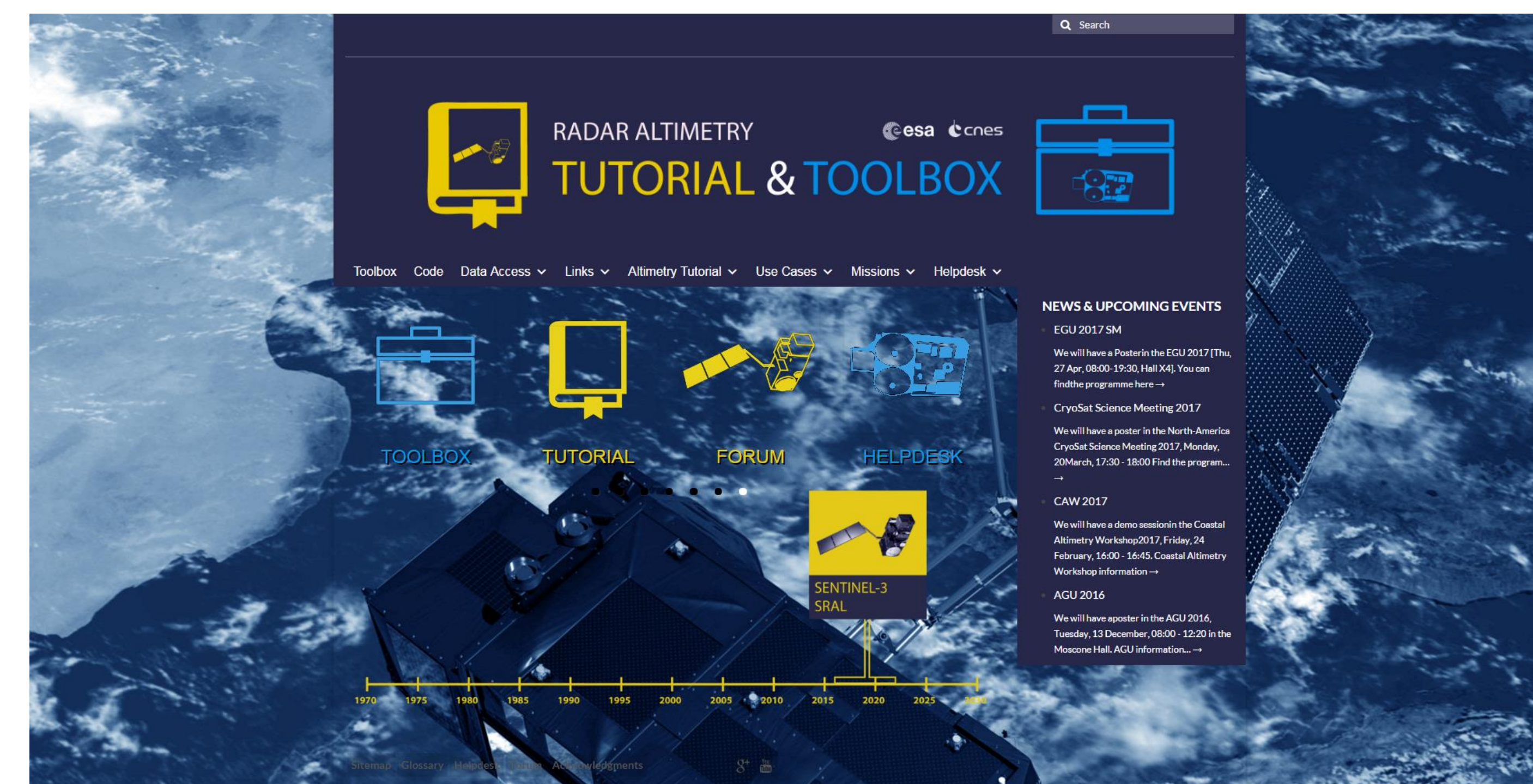
## TUTORIAL AND TOOLBOX WEBSITE

## NEW GUI

## NEW FEATURES

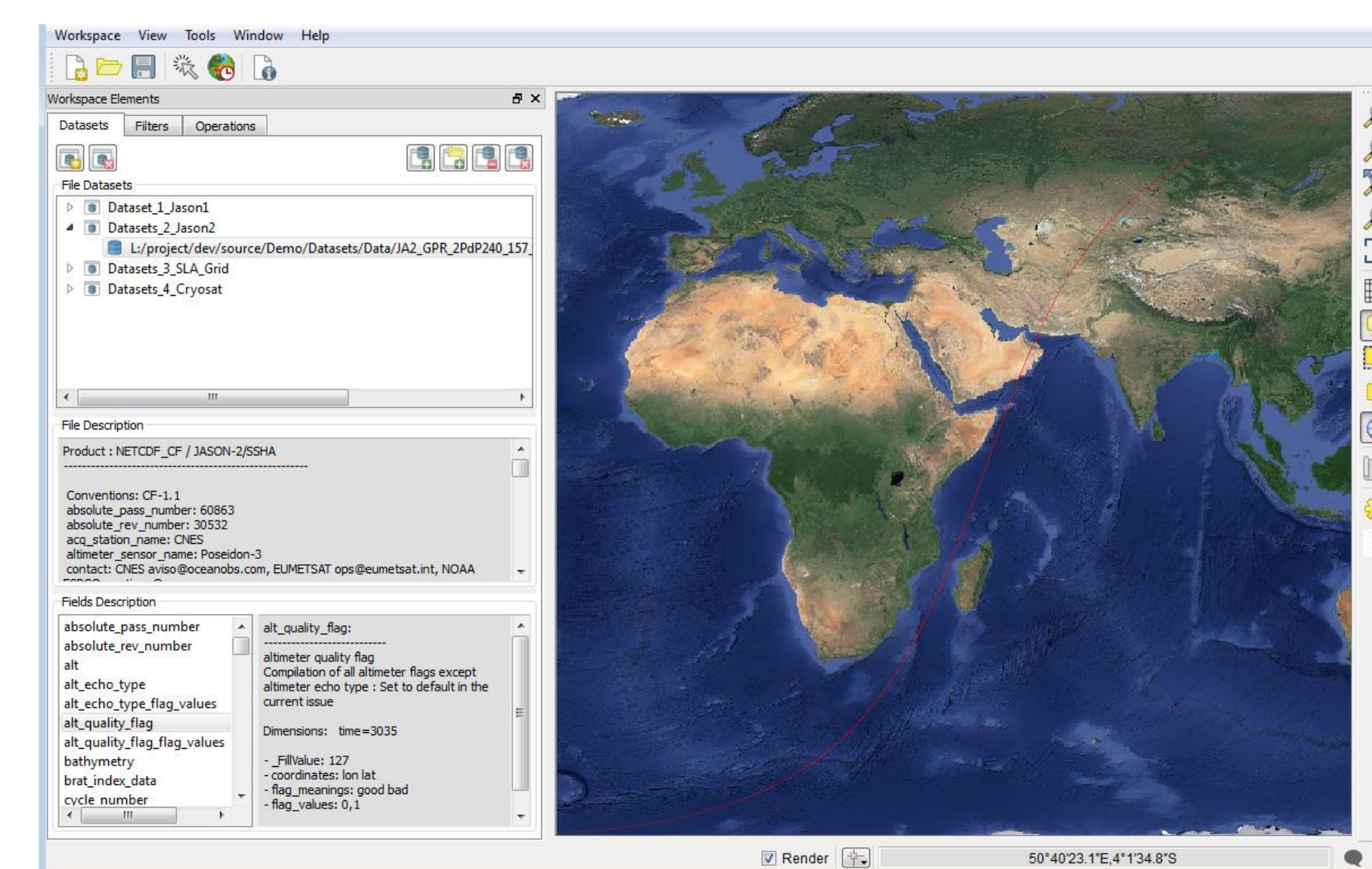
## NEW DATASETS

## OUTREACH

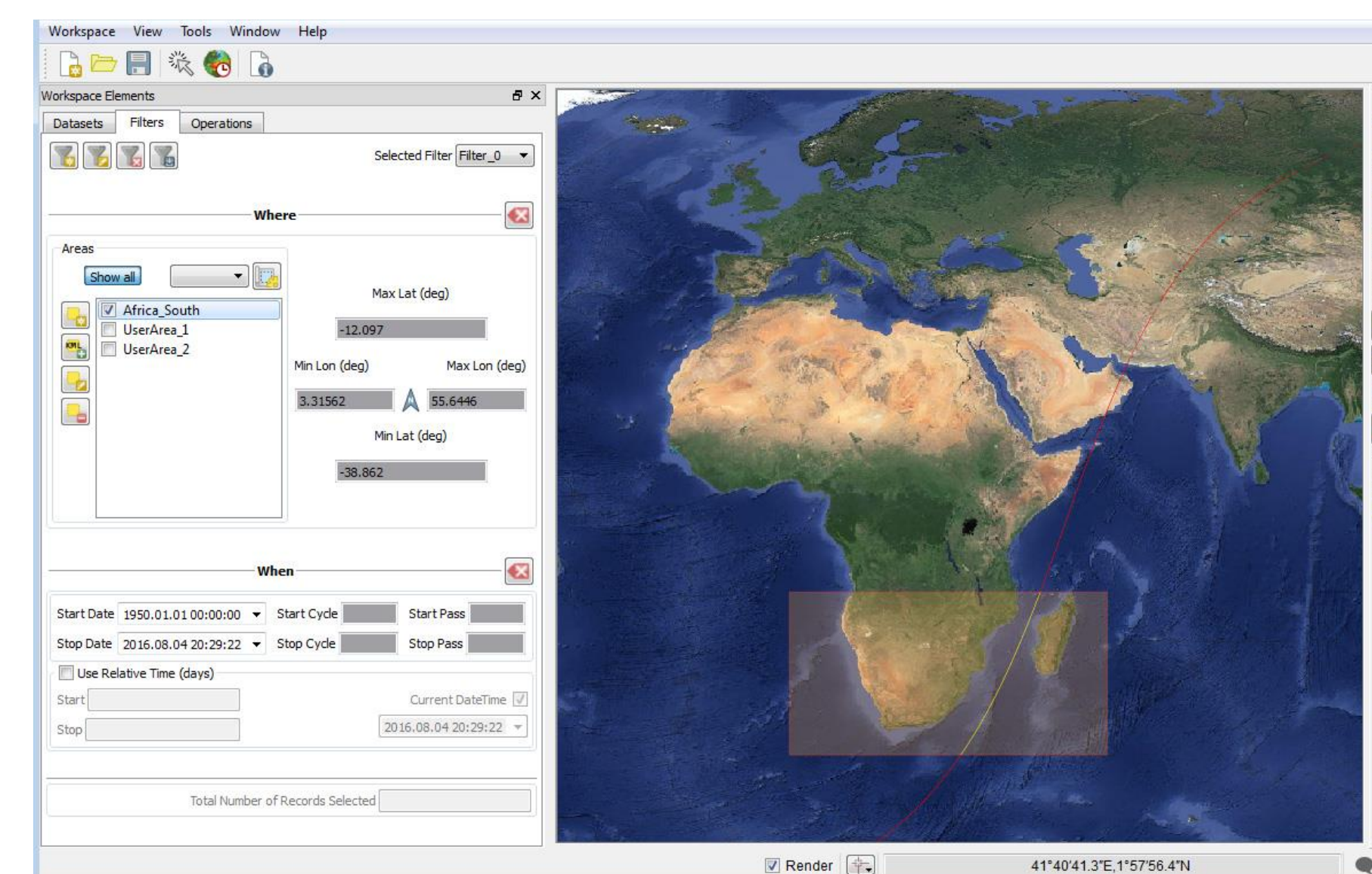


This is the final setup and look of the GUI. The **final user interface** was defined with the inputs from the users' community.

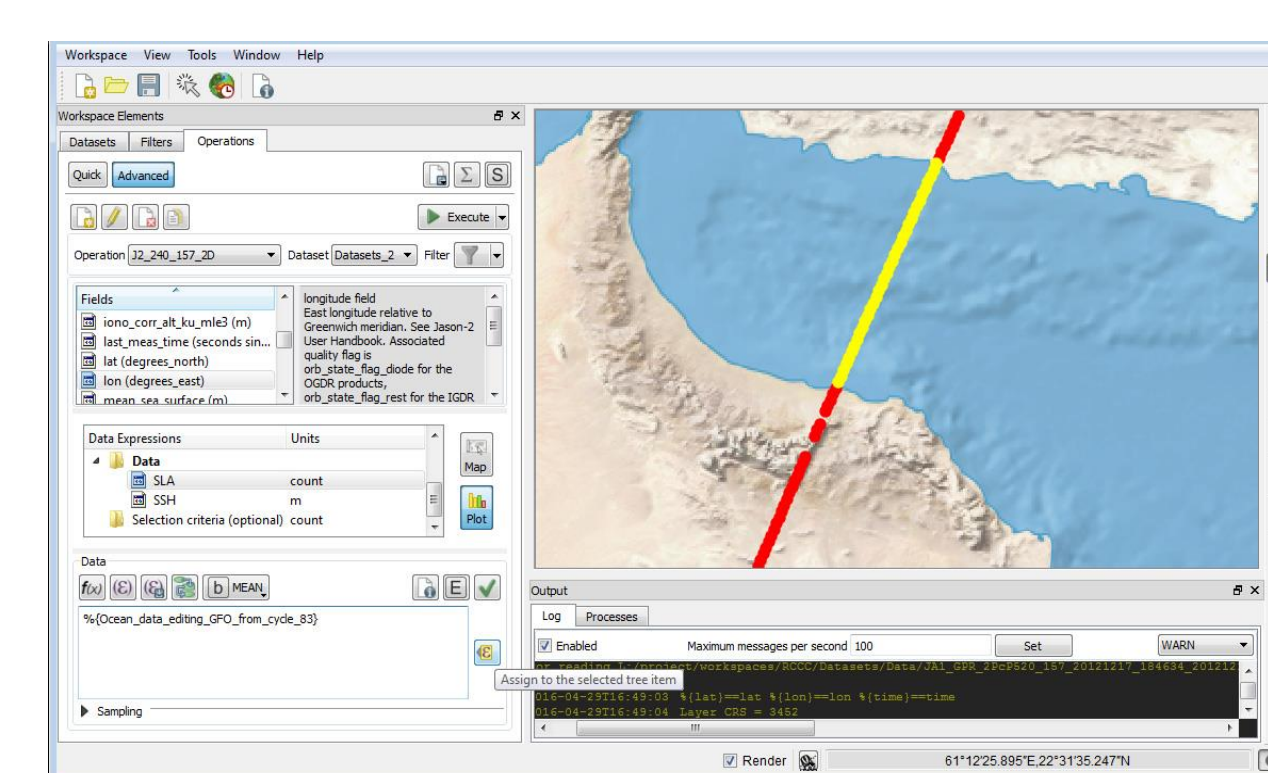
Workspace and Datasets



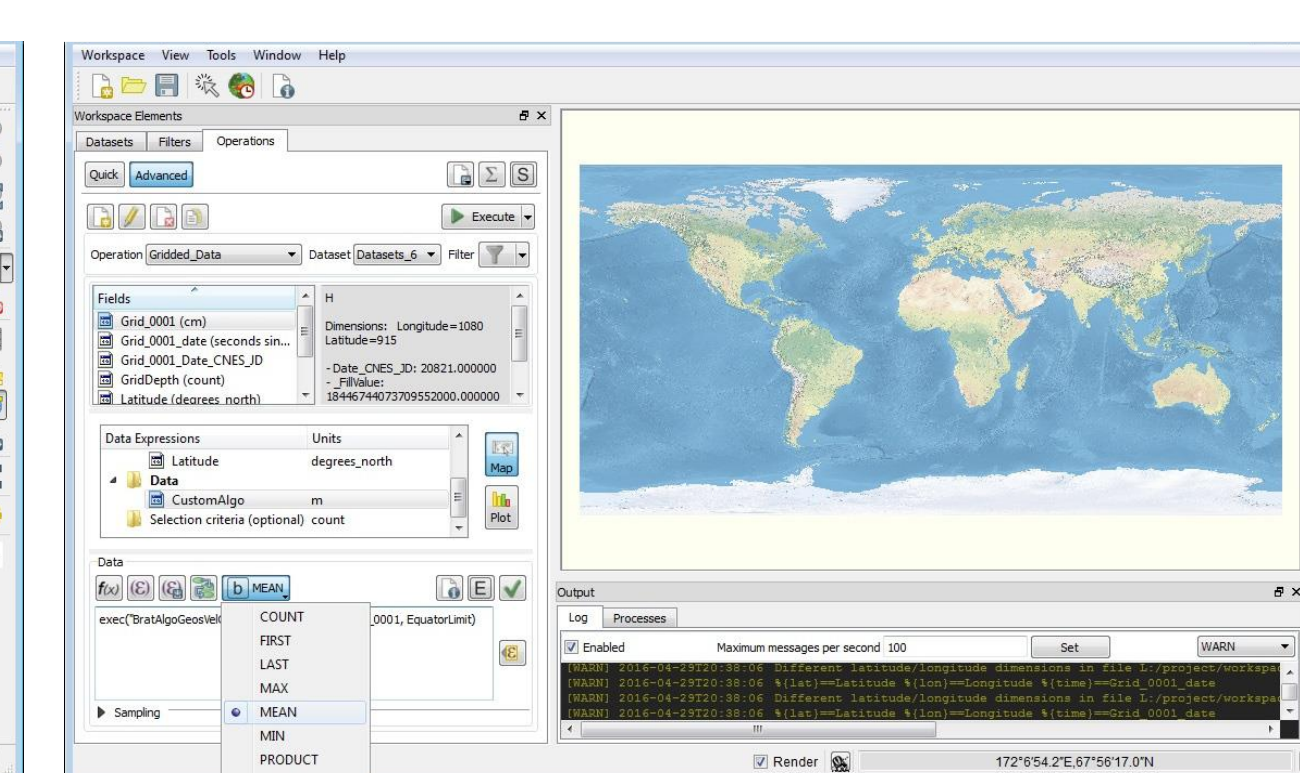
Filters



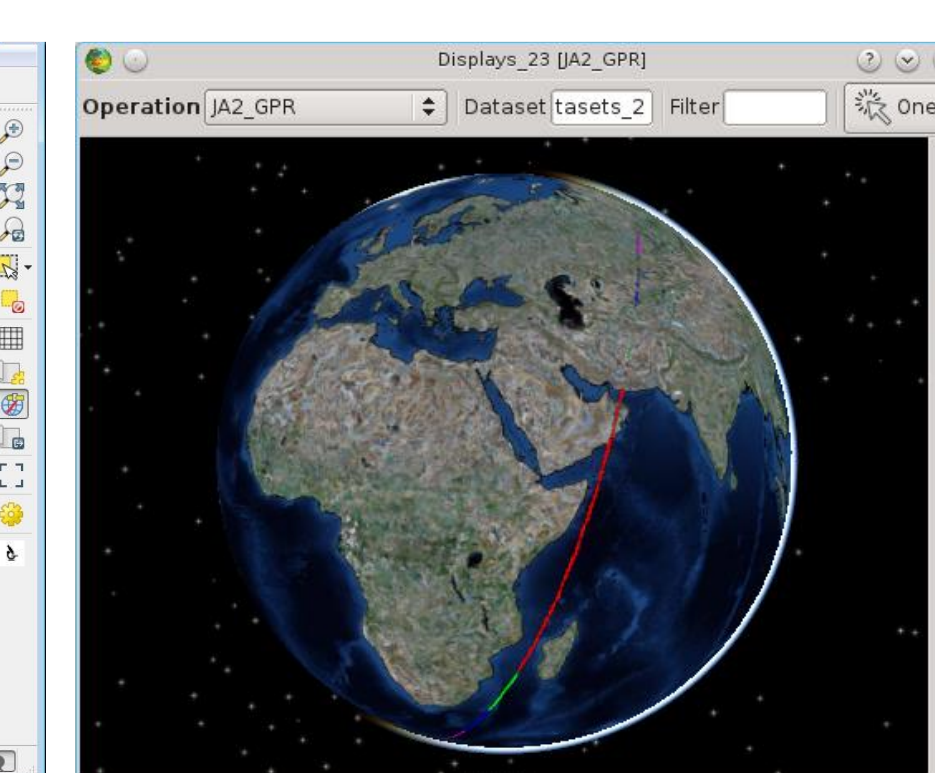
Operations – Data editing



Operations – Data computation



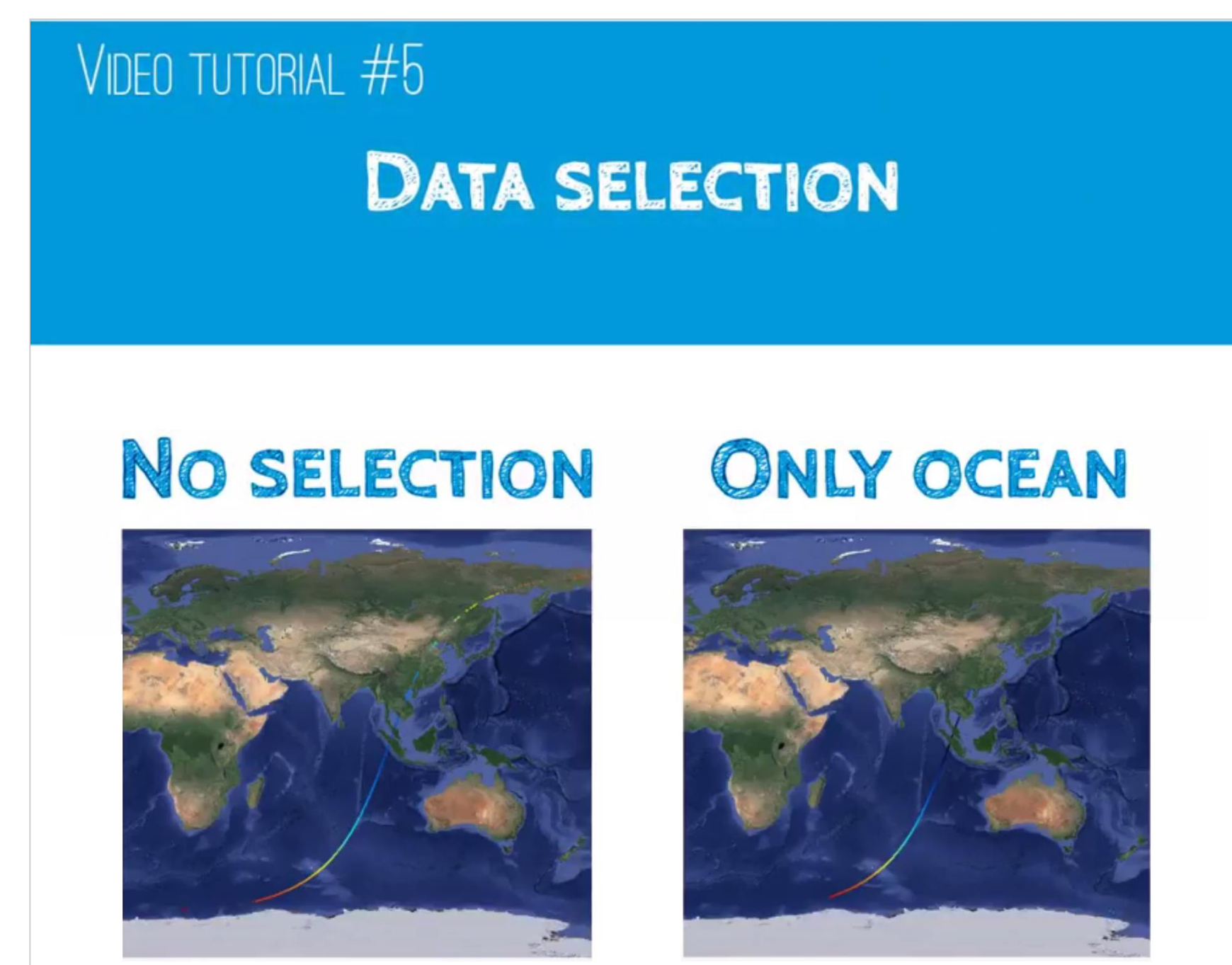
Visualisation



BRAT was used to provide a basic introduction to dynamics of sea level change and state-of-the-art tools to measure it during the TU Delft Summer School for Ph.D. students and junior scientists.



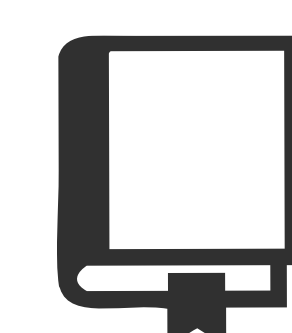
BRAT 4.2.0 beta toolbox includes video tutorials.



A series of short video tutorials, from basic to advanced level of difficulty, can be found in our youtube channel: <http://bit.ly/1OUYYuW>

- A new altimetry website is being created with:
- **Toolbox.** Main page, for download and docs.
  - **Code Access.** Code download, [github](#) repository.
  - **Data Access.** How to access to altimetry data.
  - **Webs/Documents.** Catalogue of all ESA main reference documents and websites of all ESA altimetry missions.
  - **LRM and SAR tutorials.**
  - **Use Cases.** Practical examples of the application of altimetry data.
  - **Helpdesk / Forum.** Interaction between the users and the toolbox developers to answer questions and propose improvements.

- The Altimetry Tutorial and Toolbox website is available in [www.altimetry.info](http://www.altimetry.info). Through the Portal, users will be able to:
- **Download the Toolbox** and its user manual
  - Have **access to data**
  - **Download the Toolbox open source code**
  - **Propose modifications and/or new contributions** (in <https://github.com/BRAT-DEV/main>)
  - **Contact** the consortium through [brat.helpdesk@esa.int](mailto:brat.helpdesk@esa.int)
  - Watch **video tutorials** (both internal and external to the project)



WWW.ALTIMETRY.INFO

