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Sentinel-3 SAR Altimetry Toolbox - Scientific Exploitation of Operational Missions (SEOM) Program Element

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The prime objective of the SEOM (Scientific Exploitation of Operational Missions) element is to federate, support and expand the large international research community that the ERS, ENVISAT and the Envelope programmes have build up over the last 20 years for the future European operational Earth Observation missions, the Sentinels.

Sentinel-3 builds directly on a proven heritage pioneered by ERS-1, ERS-2, Envisat and CryoSat-2, with a dual-frequency (Ku and C band) advanced Synthetic Aperture Radar Altimeter (SRAL) that provides measurements at a resolution of ∼300m in SAR mode along track. Sentinel-3 will provide exact measurements of sea-surface height along with accurate topography measurements over sea ice, ice sheets, rivers and lakes. The first of the Sentinel-3 series is planned for launch in early 2015.

The current universal altimetry toolbox is BRAT (Basic Radar Altimetry Toolbox) which can read all previous and current altimetry mission's data, but it does not have the capabilities to read the upcoming Sentinel-3 L1 and L2 products. ESA will endeavour to develop and supply this capability to support the users of the future Sentinel-3 SAR Altimetry Mission.

BRAT is a collection of tools and tutorial documents designed to facilitate the processing of radar altimetry data. This project started in 2005 from the joint efforts of ESA (European Space Agency) and CNES (Centre National d'Etudes Spatiales, the French Space Agency), and it is freely available at http://earth.esa.int/brat.

The tools enable users to interact with the most common altimetry data formats, the BratGUI is the front-end for the powerful command line tools that are part of the BRAT suite. BRAT can also be used in conjunction with Matlab/IDL (via reading routines) or in C/C++/Fortran via a programming API, allowing the user to obtain desired data, bypassing the data-formatting hassle. BRAT can be used simply to visualise data quickly, or to translate the data into other formats such as netCDF, ASCII text files, KML (Google Earth) and raster images (JPEG, PNG, etc.). Several kinds of computations can be done within BRAT involving combinations of data fields that the user can save for posterior reuse or using the already embedded formulas that include the standard oceanographic altimetry formulas.

The Radar Altimeter Tutorial, that contains a strong introduction to altimetry, showing its applications in different fields such as Oceanography, Cryosphere, Geodesy, Hydrology among others. Included are also "use cases", with step-by-step examples, on how to use the toolbox in the different contexts.

The Sentinel-3 SAR Altimetry Toolbox shall benefit from the current BRAT version. While developing the Sentinel-3 SAR Altimetry Toolbox we will revamp of the Graphical User Interface and provide, among other enhancements, support for reading the upcoming S3 datasets and specific "use-cases" for SAR altimetry in order to train the users and make them aware of the great potential of SAR altimetry for coastal and inland applications. As for any open source framework, contributions from users having developed their own functions are welcome. The ITT is expected to be launched in Q1 2014 and have the 1st version available before the launch of Sentinel-3.