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The BRAT and GUT Couple: Broadview Radar Altimetry and GOCE User Toolboxes

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The scope of this work is to showcase the BRAT (Broadview Radar Altimetry Toolbox) and GUT (GOCE User Toolbox) toolboxes.

The Broadview Radar Altimetry Toolbox (BRAT) is a collection of tools designed to facilitate the processing of radar altimetry data from all previous and current altimetry missions, including Sentinel-3A L1 and L2 products. A tutorial is included providing plenty of use cases on Geodesy & Geophysics, Oceanography, Coastal Zone, Atmosphere, Wind & Waves, Hydrology, Land, Ice and Climate, which can also be consulted in http://www.altimetry.info/radar-altimetry-tutorial/.

BRAT's last version (4.2.1) was released in June 2018. Based on the community feedback, the front-end has been further improved and simplified whereas the capability to use BRAT in conjunction with MATLAB/IDL or C/C++/Python/Fortran, allowing users to obtain desired data bypassing the data-formatting hassle, remains unchanged. Several kinds of computations can be done within BRAT involving the combination of data fields, that can be saved for future uses, either by using embedded formulas including those from oceanographic altimetry, or by implementing ad-hoc Python modules created by users to meet their needs. BRAT can also be used to quickly visualise data, or to translate data into other formats, e.g. from NetCDF to raster images.

The GOCE User Toolbox (GUT) is a compilation of tools for the use and the analysis of GOCE gravity field models. It facilitates using, viewing and post-processing GOCE L2 data and allows gravity field data, in conjunction and consistently with any other auxiliary data set, to be pre-processed by beginners in gravity field processing, for oceanographic and hydrologic as well as for solid earth applications at both regional and global scales. Hence, GUT facilitates the extensive use of data acquired during GRACE and GOCE missions.

In the current version (3.2), GUT has been outfitted with a graphical user interface allowing users to visually program data processing workflows. Further enhancements aiming at facilitating the use of gradients, the anisotropic diffusive filtering, and the computation of Bouguer and isostatic gravity anomalies have been introduced. Packaged with GUT is also GUT's Variance/Covariance Matrix (VCM) tool, which enables non-experts to compute and study, with relative ease, the formal errors of quantities – such as geoid height, gravity anomaly/disturbance, radial gravity gradient,

vertical deflections – that may be derived from the GOCE gravity models.

On our continuous endeavour to provide better and more useful tools, we intend to integrate BRAT into SNAP (Sentinel Application Platform). This will allow our users to easily explore the synergies between both toolboxes. During 2020 we will start going from separate toolboxes to a single one.

BRAT and GUT toolboxes can be freely downloaded, along with ancillary material, at https://earth.esa.int/brat and https://earth.esa.int/gut.