

-> GOCE +

This activity is part of the Support To Science Element (STSE), a new element of the ESA's Earth Observation Envelope Programme aiming to reinforce the scientific component of the ESA Living Planet programme. It is motivated by potential scientific development and applications that may emerge from the new ESA "Gravity field and steady-state Ocean Circulation Explorer" (GOCE) mission. This activity focuses on the following Themes:

Height system unification

The overall objective of this study is to demonstrate the feasibility of calculating heights and connecting height systems with GOCE products. There following objectives are to be addressed in this study:

To collect information and review the state-of-the-art in height systems and local/regional/global initiatives to unify height systems.

To quantify the currently known differences (without a precise GOCE geoid) between height systems in Europe and other parts of the world based on available literature and existing results.

To review, evaluate and improve methodology and/or existing algorithms for height determination and height system unification.

To attempt global height unification and tide gauge unification for those parts of the world where the data sets are available.

To select two test regions for height system unification and to demonstrate the benefit of using GOCE data for this purpose (to the resolution and accuracy of the new data).

To assess the impact of a unified height system on local gravity information (systematic errors in local gravity anomalies and altim) and topographic heights and vice versa.

To geophysically interpret height differences (compared to the GOCE geoid) at one or more tide gauges in terms of ocean dynamic topography and currents and to compare the results to altimetry.

To involve local/national organisations maintaining height systems.

To provide a roadmap for future work required to define a world height system and vertical datum exploiting GOCE data.

Heterogeneous gravity data combination for Earth interior and geophysical exploration research

The overall objective of this study is to combine GOCE gravity gradients with heterogeneous other satellite gravity information to arrive at a combined set of gravity gradients complementing (near)-surface data sets spanning scales from global down to 5 km useful for various geophysical applications and demonstrate their utility to complement additional data sources (e.g., magnetic, seismic) to enhance geophysical modelling and exploration. There objectives to be addressed in this activity are:

To make an inventory of currently available and future gravity data/models on global, regional and local scale and compare, visualise and investigate methods to highlight the advantages and disadvantages of this heterogeneous data in relation to GOCE gravity gradient data.

To review, evaluate and improve existing algorithms for gravity gradient combination and heterogeneous gravity data combination based upon data at satellite altitude and near the Earth surface.

To develop and test suitable methods to combine heterogeneous gravity data together with GOCE/GRACE gravity gradient data.

To produce combined gravity gradient data along the GOCE orbit based upon satellite information only and at a suitable grid near satellite altitude including their errors.

To produce combined gravity gradient data near or at the Earth Surface from a combination of satellite information and terrestrial/airborne/shipborne gravity or gravity gradients including their errors.

Demonstration over different application areas where the data sets shall be employed complementing others that are already used for geophysical modelling (like topography, seismic, magnetic data etc.).

Air density and wind retrieval using GOCE data

The main objective of this study is to derive algorithms to retrieve thermospheric density and winds using GOCE common-mode accelerations and DFAC data. Furthermore the algorithms shall be used to generate air density and wind products along the GOCE orbit and on grids. The objectives of this Theme are as follows:

To review the state-of-the-art in thermospheric density and wind retrieval using existing missions with accelerometers (such as GRACE and CHAMP).

To determine an aerodynamic macro-model for GOCE using precise drawings and surface properties of the satellite.

To define the required data sets from the satellite, including official GOCE Level 1b data sets and drag-free control actuation data, needed for the optimal determination of air density and wind profiles, along with all related algorithms and processing models.

To derive insitu air density/winds along the GOCE orbit using the sum of DFAC data and GOCE common-mode accelerations (a generic side-output will be a check of accelerometer calibration parameters by calculating biases and scales).

To derive calibrated state-of-the-art air density/wind models along the orbit by using GOCE air density data, e.g. to calibrate NRLMSISE-00 model and HWM-93 model.

To derive a GRACE/CHAMP calibrated air density/wind model and validate the GOCE air density/wind product at GOCE altitude and orbit position.

To make geophysical interpretations of the data and results.

Small Innovative Feasibility Studies

To investigate and explore at feasibility level the full potential of GOCE data in the context of novel and innovative scientific areas and application domains beyond the GOCE mission objectives (e.g. time-variable gravity field modelling and applications using GOCE data; innovative science and applications making use of data with an extended GOCE mission life time; probing the ionosphere using GOCE data);

To develop novel products and obtain scientific results, which indicate where GOCE data could provide a significant innovative contribution;

To develop a scientific roadmap and formulate requirements for the full development of the proposed novel scientific areas, applications or products.

End of bidding period for the ITT is 16 July 2010. More information on <http://emits.esa.int>

