

SC 2.4a: Gravity and Geoid in Europe

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Terms of Reference

The primary objective of the sub-commission is the development of improved regional geoid and quasigeoid models for Europe, which can be used for applications in geodesy, oceanography, geophysics and engineering, e.g., height determination with GNSS techniques, vertical datum definition and unification, dynamic ocean topography estimation, geophysical modelling, and navigation. Another emerging field is related to the development of new optical clocks in physics with projected relative accuracies at the level of 10^{-18} , as in accordance with the laws of general relativity, such clocks are sensitive to the gravity potential at the level of $0.1 \text{ m}^2/\text{s}^2$, equivalent to 1 cm in height.

The geoid and quasigeoid modelling will be based mainly on terrestrial gravity and terrain data in combination with state-of-the-art global geopotential models. In this context, upgraded terrestrial data sets as well as the utilization of new GRACE and GOCE based global geopotential models led to significant improvements. The evaluation of the latest European Gravimetric Geoid 2015 (EGG2015) by GNSS and levelling data indicates an accuracy potential of 1 – 2 cm on a national basis, and 2 – 4 cm at continental scales, provided that high quality and resolution input data are available within the area of interest. Further improvements can be expected from the inclusion of upgraded gravity field data sets, especially in areas with hitherto insufficient input data.

Program of Activities

- Utilization of state-of-the-art global geopotential models.
- Identification and acquisition of new terrestrial data sets, including gravity, terrain, and GPS/levelling data.
- Merging and validation of all data sets.
- Investigation of refined mathematical modelling techniques and numerical tests.
- Computation of new geoid and quasigeoid models.
- Evaluation of the results by GNSS/levelling data.
- Study of applications, such as vertical datum definition and unification, dynamic ocean topography estimation, ground truth for optical clocks, etc.

Delegates

The regional sub-commission for Europe SC2.4a cooperates with national representatives from most of the countries in Europe and reports to sub-commission 2.4. The existing contacts and successful cooperation with the respective persons and national and international agencies shall be continued and extended.