

SC 2.2: Spatial and Temporal Gravity Field and Geoid Modeling

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Terms of Reference

Sub-Commission 2.2 (SC2.2) promotes and supports scientific research on modeling the Earth's gravity field, including determination of the geoid which is partially inside the Earth's topography.

In today's satellite age, satellite gravity missions deliver very accurate long to medium wavelength of the gravity field, and the Global Positioning System provides positions with cm or better accuracy anywhere on planet Earth. On the other hand, gravity and other related data have been collected and monitored by using airplanes, moving vehicles, relative/absolute gravity projects and networks, and other means. The SC2.2 aims at bringing together scientists concerned with all aspects of the diverse areas of geodetically relevant theory and its applications. Its goal is to advance theories and computational methods to ensure that the static and time varying gravity fields are modeled with the required accuracy.

Objectives

Research related to gravity field determination, e.g., studies of the geodetic boundary value problem (free and fixed boundary value problems); development and refinement of gravity/topographic reduction theories; exploration and implementation of numerical methods of partial differential equations for Earth's gravity field determination (e.g., domain decomposition, spectral combination and others).

In more details, this includes:

- Studies of the effect of topographic density variations on the Earth's gravity field, including the geoid.
- Rigorous yet efficient calculation of the topographic effects, refinement of the topographic and gravity reductions.
- Studies on harmonic downward continuations.
- Non-linear effects of the geodetic boundary value problems on geoid determination.
- Optimal combination of global gravity models with local gravity data.
- Exploration of numerical methods in solving the geodetic boundary value problem (domain decomposition, finite elements, and others).
- Studies on data requirements, data quality, distribution and sampling rate, for a cm- accurate geoid.
- Studies on the interdisciplinary approach for marine geoid determination, e.g., research on realization of a global geoid consistent with the global mean sea surface observed by satellite altimetry.
- Studies on airborne, shipborne gravimetry and the application of satellite altimetry in geodesy.

- Studies on W_0 determination, and on global and regional vertical datum realization.
- Studies on ocean, solid-Earth and polar tides.
- Studies on time variation of the gravity field due to postglacial rebound and land subsidence.
- Studies on geocenter movement and time variation of J_n and its impact on the geoid.

Program of Activities

- Organizing meetings and conferences.
- Inviting the establishment of Special Study Groups on relevant topics.
- Reporting activities of SC2.2 to the Commission 2.