JWG 2.1.1: Development of the International Terrestrial Gravity Reference Frame

(joint with IGFS, BGI, IGETS)

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Terms of Reference

One task of IAG's Commission 2 “Gravity Field” is the establishment of the International Terrestrial Gravity Reference System and Frame (ITGRF). These activities are motived by the IAG Resolutions No. 2 of 2015 (IUGG General Assembly Prague), No. 4 of 2019 (IUGG General Assembly Montreal) and No. 1 of 2023 (IUGG General Assembly Berlin). The IAG Sub-Commission 2.1 “Terrestrial gravimetry for the needs of geosciences and metrology” promotes consistency and compatibility of gravity and gravity gradient datasets and assessment of their accuracy. The International Gravity Field Service IGFS coordinates the servicing of the geodetic and geophysical community with gravity field related data, software and information. The infrastructure of IGETS, specifically stations operating superconducting gravimeters, provides a basis for reference stations of the ITGRF. The ITGRF as a modern and precise absolute gravity reference frame will not only contribute to the establishment of the Global Geodetic Reference Frame (GGRF) of the UN, but will also serve as a long-term and precise gravity reference for the IAG Global Geodetic Observing System (GGOS).

Objectives

Within IAG Sub-Commission 2.1 “Terrestrial gravimetry for the needs of geosciences and metrology” the realization of the International Terrestrial Gravity Reference Frame (ITGRF) will be continued. The ITGRF is the realization of the International Terrestrial Gravity Reference System (ITGRS). According to IAG Resolution No. 1 of 2023, the ITGRS is defined by the observation of the instantaneous acceleration of free fall, the traceability of these observations to the International System of Units (SI), and a set of conventional corrections for the time independent components of gravity effects. The ITGRF as the realization of the ITGRS is based on observations with absolute gravimeters (AG) which are monitored at reference stations, and during comparisons. The ITGRF further recommends a set of conventional models for the correction of temporal gravity changes. Finally, the ITGRF demands a compatible infrastructure accessible to end-users, as expressed by IAG Resolution No. 4 of 2019.

The JWG focuses on the establishment of such infrastructure in cooperation with IGFS, GGOS, international and national institutions, agencies, and governmental bodies. This infrastructure should consist of reference stations on the national level for the monitoring of AGs. On the international level, comparison stations will provide the facilities to check the compatibility of AGs, and core stations will link to space geodetic techniques (ITRF) and the International Height Reference Frame (IHRF).

The absolute gravity database “AGrav” which is a permanent component of the BGI (International Gravimetric Bureau) services will be developed to a central inventory to document all ITGRF stations and related AG observations.

A close cooperation with the International Geodynamics and Earth Tide Service (IGETS) supports the continuous monitoring at the gravity reference stations. The collaboration with the Working Group on Gravimetry of the Consultative Committee on Mass and Related Quantities (CCM-WGG) at BIPM establishes a link to metrology and supports the traceability of the AG observations.

The activities should be further aligned with the JWG on the Implementation of the International Height Reference Frame.