

JWG 2.2: Absolute Gravimetry and Absolute Gravity Reference System

(Joint with the IGFS)

Chair: Herbert Wilmes (Germany)

Terms of Reference and Objectives

IAG Sub-Commission 2.1 “Gravimetry and Gravity Networks” promotes scientific investigations of gravimetry and gravity networks and terrestrial, airborne, shipboard and planetary gravity measurements. One of the outputs of the SC 2.1 activities is the result of gravity measurements, i.e. the gravity data.

The International Gravity Field Service IGFS coordinates the servicing of the geodetic and geophysical community with gravity field related data, software and information.

The IAG’s scientific community demands more detailed information on the Earth’s gravity field and its changes, and precise terrestrial absolute gravity (AG) observations are an important contribution to monitoring and understanding mass transports e.g. by hydrological and atmospheric variations or by changes in the solid Earth’s geometry.

The role of absolute gravimetry increases with the growing number of absolute ballistic gravimeters and the rising number of AG measurements worldwide. The philosophy of gravity measurements has changed from rare AG determinations at a few principal network stations to repeated absolute gravity observations at global networks in combination with geometric geodetic observations. At selected sites, the AG observations are complemented by the high sensitivity of continuously observing superconducting (relative) gravimeters.

GGOS, the IAG Global Geodetic Observing System integrates different geodetic techniques, models and approaches to ensure a long-term, precise monitoring of the Earth’s shape, the Earth’s gravity field and the Earth’s rotational motion. Consistent and precise absolute gravity measurements from a global network would be a valuable contribution to the GGOS infrastructure.

Up until now the Working Group of Absolute Gravimetry has been contributing to the development of the absolute gravity database AGrav which reached operational status and became a fixed part of the BGI (International Gravimetric Bureau) services. The database provides an overview of existing AG stations, observations, instruments and institutions, and facilitates the cooperation. Multidisciplinary cooperation and the combination of gravity data with other geodetic observation types is going to be essential for our future work.

The realisation of a global gravimetric reference relies upon well calibrated instruments and standards which in the case of absolute gravity determination is realized by the repeated comparison of the measuring instruments. Comparisons are

carried out as four-yearly International Comparisons of Absolute Gravimeters (ICAGs) and as additional Regional International Comparisons of Absolute Gravimeters (RICAGs). Whereas these comparisons are prepared and carried out by JWG 2.1 this project at hand makes use of the comparison results and the data of the calibrated instruments. Triggered by BIPM’s decision to close the comparison site at its premises, future ICAG and RICAG sites will develop to a distributed network with global distribution. Together with additional absolute gravity reference and comparison sites such a network gains the potential to build up a new International Gravity Reference System where the precise gravity reference is available and gravity field variations are monitored. This working group will contribute to this realisation and to the establishment of the necessary standards. The new International Gravity Reference System will be developed to replace the former IGSN71 (International Gravity Standardization Network 1971).

The proposed Working Group on Absolute Gravimetry will focus upon the following objectives:

- Continue the operation and improvement of the AGrav database for global absolute gravity measurements
- Provide AG metadata and data for GGOS to be used for the combination of AG measurements with geometric measurements (GNSS, SLR, VLBI) and for specific investigations
- Extend the AG database to store the comparison results from ICAG and RICAG sites
- Establish a new International Gravity Reference System based upon a distributed network of AG comparison and reference sites which can replace IGSN71
- Contribute to the agreement about the necessary standards and corrections
- Contribute to the Global Geodynamics Project GGP by the storage of repeated AG observations necessary for the determination of superconducting gravimeter drift and calibration parameters

Membership

- Chair: Herbert Wilmes (Germany)
- Jonas Ågren (Sweden)
- Martine Amalvict (France)
- Henri Baumann (Switzerland)
- Nicholas Dando (Australia)
- Mark Eckl (USA)
- Reinhard Falk (Germany)
- Domenico Iacovone (Italy)
- Jan Krynski (Poland)
- Jacques Liard (Canada)
- Jaakko Mäkinen (Finland)
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- Diethardt Ruess (Austria)
- Victoria Smith (UK)
- Gabriel Strykowski (Denmark)
- Ludger Timmen (Germany)
- Michel van Camp (Belgium)
- Leonid Vitushkin (Russia)
- Hartmut Wziontek (Germany)

Corresponding Members

- Mauro Andrade de Sousa (Brazil)
- Roger Bayer (France)
- In-Mook Choi (Korea)
- Andreas Engfeldt (Sweden)
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- Jose Manuel Serna Puente (Spain)
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