

IC-WG 2.1 Absolute Gravimetry

Joint with IGFS)

Chair: **Herbert Wilmes** (Germany)

Terms of Reference and Objectives

The Sub-Commission 2.1 “Gravimetry and Gravity Networks”, promotes scientific investigations of gravimetry and gravity networks, terrestrial, airborne, ship-board 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 scientific community of IAG demands more detailed information about the Earth gravity field by precise terrestrial absolute gravity (AG) observations in an evenly distributed station network and with an improved timely coverage by repeated AG measurements and/or additional superconducting gravity (SG) observations. This is accentuated by the Global Geodetic Observing System GGOS. For consistent evaluation and combination of gravimetric and geometric observations, the applied correction models, parameters and constants need to be compared and standardized.

Currently the role of absolute gravimetry increases which is related to a growing number of absolute ballistic gravimeters (ABG) and the rising number of AG measurements worldwide. The philosophy of gravity measurements is changing from the rare AG determinations at a few principal network stations to repeated absolute observations at hundreds of sites accompanied in some cases by measurements of temporal gravity variations using superconductive (relative) gravimeters.

Absolute ballistic gravimetry is based on the primary method of measurement of free-fall acceleration. The accuracy of ABGs is determined in the international comparisons. The set of ABG with the determined uncertainty in the measurements provides the can we use valuable means to establish a gravity network of global scale with well-maintained stations where the gravity field variations can be monitored. Several ABGs with the determined metrological characteristics may be used for monitoring the gravity variations related, in particular, to changes of the solid Earth’s geometry and mass distribution, hydrology or atmosphere variations, etc.

Considering the role of absolute gravity measurements for the knowledge of the gravity field and its temporal variations, the requests from IGFS and the results of

the discussions at the round table during the IGFS Symposium in Istanbul (2006) and at the 2nd (2006) and 3rd (2007) Joint Meetings of CCM Working Group on Gravimetry and SC 2.1 Study Group 2.1.1 on Comparisons of Absolute Gravimeters the President of Sub-Commission 2.1 “Gravimetry and Gravity Networks” lead to the decision to establish a new “Working Group on Absolute Gravimetry”.

This group will be the inter Sub-Commission 2.1 and IGFS working group which will report to SC 2.1 and IGFS. In reality, this WG 2.1.1 should be even more integrating because of the wide requests for the absolute gravity data from other sub-commissions and projects of Commission 2.

The proposed Working Group on Absolute Gravimetry will have following objectives and tasks:

1. Design and promotion of a worldwide network of AG stations, repeated absolute observations and improved measurement procedures:

The group should

- encourage station providers to repeat their observations (and even help to enable repeated occupations),
 - establish a worldwide network of AG stations, which should partly coincide with the regional sites for the comparisons of AGs.
 - encourage the combined AG and SG measurements and determination of precise gravity time series. This should be carried out in close cooperation with the Global Geodynamics Project GGP.
2. Enable the combination of AG measurements with geometric measurements (GNSS, SLR, VLBI) and the development of the methods for the identification of mass changes and the methods for specific investigations.
 3. Work with already observed data, advance and test a database tool in close cooperation with BGI, work on standardization of absolute gravity data presentation, establish and promote the AG meta-database for storage and worldwide distribution of AG data, compile and fix parameters and models for the homogeneous evaluation of AG measurements. This database should improve the visibility of AG measurements and support cooperation of partners working in gravity and other disciplines.

This document was prepared by Leonid Vitushkin and Herbert Wilmes (BKG, Germany). Herbert Wilmes’ candidacy to chair a new WG 2.1.1 is proposed by L.Vitushkin and R. Forsberg.