



Minutes of the Meeting of IAG JWG 2.1.1 Establishment of a global absolute gravity reference system

**EGU General Assembly in Vienna, Austria
Thursday, 27 Apr, 10:30–12:00 room 2.83**

**Chair: H. Wziontek (Germany)
Vice-chair: Sylvain Bonvalot (France)**

The meeting was opened by a presentation of H. Wziontek and S. Bonvalot. The discussion was following the presentation. A short overview about the objectives of the working group and the role of international comparisons of absolute gravimeters and its link to metrology and IAG Resolution No. 2 (2015) was given. Then the two main aspect of the realization were highlighted:

1. A long term stable reference, based on absolute gravimeters monitored at reference stations,
2. An infrastructure, which ensures accessibility of the system by a global set of stations, compatible with the reference level, to any user, including those not operating an AG.

While aspect 1) is already a central part of the resolution 2 (2015), the second item must be considered as well in order to establish a replacement for IGSN 71.

Reference stations:

A reference station should provide an absolute gravity value by repeated absolute gravity measurements with an accuracy at the microgal level. It should allow a direct comparison with another gravimeter at any time. Temporal (residual) variations of absolute gravity should be monitored continuously by a superconducting gravimeter (SG), or in future, by an absolute quantum gravimeter. Stations with repeated (conventional) absolute gravity measurements should be considered as well, e.g. station Matera/Italy, where FG5 observations are carried out on a weekly basis and which was discussed in particular. A recommendation on the minimum number of observations per year should at least cover seasonal variations, which would require e.g. 6 observations per year. Further, a reference station needs not to be maintained or occupied permanently, if easy access is granted.

A comparison site is a reference station which provides extended facilities to allow the comparison of several absolute gravimeters. Monitoring of temporal gravity changes during the comparison is mandatory.

A core station is a reference site where at least one space geodetic technique, e.g. permanent GNSS, is established.

GGOS core sites should be linked to the global absolute gravity reference system by continuous monitoring of gravity changes and repeated absolute gravity observations.

All reference stations should be documented in the AGrav database.

To define a global set of reference stations, it is proposed to re-evaluate the positive response and update the results of the survey of 2011, addressed to the absolute gravity community and the Global Geodynamics Project (GGP, today IGETS). At this time, 36 stations were proposed.

Regional comparisons of absolute gravimeters were announced:

Regional comparison at Wettzell in 2018 for about 3 weeks from mid April (after EGU) until mid May. This comparison will be as EURAMET comparison together with VUGTK / Pecny observatory, Czech Republic as pilot.

Comparisons in South America were proposed: In Rio de Janeiro, Brasil 2019 at MCTIC-Observatório Nacional, as indicated recently by Mauro Andrade de Sousa. Another option would be the newly established gravity lab at AGGO/La Plata, Argentina. Here three stable pillars are available and the superconducting gravimeter SG038 is running since Dec 2015 and BKG plans to deploy FG5-227 this year.

Infrastructure:

To replace the IGSN71, an infrastructure must be established. There was a consensus among the participants, that it is not feasible to comprehensively re-observe or evaluate the IGSN71. As IGSN71 has served as a reference for a large number of relative gravity surveys, such evaluation may be very important for e.g. regional purposes, but is best performed by, say, the pertinent national institutions.

Instead, a new infrastructure based on absolute gravity observations, e.g. by field absolute gravimeters should be set up. It was emphasized that the gravimeters should participate in comparisons to ensure compatibility and traceability with the absolute gravity system.

Absolute gravity stations should be divided into different levels depending on the uncertainty of the gravity observations, e.g. from field –level like A10, to the lab-level of a few microgal by FG5-type instruments.

National agencies should be encouraged to establish compatible first order networks, if necessary in international cooperation with institutions operating absolute gravimeters. As an example, the Absolute gravity network of Argentina (RAGA) in Argentina was mentioned. Here Instituto Geográfico Nacional (IGN) of Argentina established 35 stations measured with A10 meters in cooperation with Universidade de Sao Paulo (USP), Brazil and Institute de Recherche pour le Développement (IRD), France.

Generally all relevant data should centrally archived and documented in the AGrav database, which is currently extended and updated with a new web application. The data should be accessible to any user.

Standard models and corrections

Current practice on the correction of time variable gravity effects was discussed. A set of standard correction models should be proposed for less experienced users. In particular, for ocean tide loading, most recent models like FES2014 should be used, the coefficients can be obtained from the ocean tide loading providers of M.S. Bos and H.-G. Scherneck. However, this would result in an inconsistency with the current IERS conventions which recommends FES2004.

A homogenization of gravity corrections in post processing is only possible, if at least set-, better drop-files are provided and archived in the AGrav database. It should checked, if such functionality could be implemented into AGrav and if the users accepting to contribute these data.

Further activities

A summary on main objectives should be published at the BGI/IGETS web page.

A workshop was discussed. It should not be organized together with a comparison. The colleagues from station Matera kindly offered to host a workshop, possibly in November. Details should be discussed soon as well as possible financial support of IAG.