

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

**EGU General Assembly in Vienna, Austria
Wednesday, 10 Apr. 2019, 14:00-15:45, room 2.83**

Chair: Hartmut Wziontek (Germany)

Vice-chair: Sylvain Bonvalot (France)

Agenda

1. Presentation of NIM China
2. Update and definition of processing standards
3. *Site requirements: Update of document CCW-WGG/06-24*
4. *Site classification, site selection*
5. *Publication*

After the agreement on the definition of the International gravity reference system and frame (IGRS/IGRF) at the meeting held at International Symposium Gravity, Geoid and Height Systems 2 in Copenhagen, Denmark, the focus was set on the processing standards in absolute gravimetry.

1. Presentation of NIM China

A summary of the first CIPM Comparison of Absolute Gravimeters in Asia in 2017 at the National Institute of Metrology (NIM) China, prepared by Wu Shuqing, was presented by H. Wziontek. The gain of importance of quantum technology in absolute gravimetry, the calibration facilities for lasers and clocks and the low noise site conditions were highlighted. The site will be available for future comparisons, e.g. a comparison in Asia under the Asia Pacific Metrology Programme (APMP) and will be an essential part of the IGRF.

2. Update of IAGBN 1992 Processing Standards

Updates of the IAGBN 1992 Processing Standards were discussed. In general, the units need to be unified.

The sign of the speed of light correction should be adjusted, depending on the position of the interferometer. A more general formulation is proposed

$$\delta t = k \cdot z(t)/c$$

where for classical free fall gravimeters $k=1$ if the interferometer is positioned below the test mass and $k=-1$ otherwise. The correction in general and the value of k in particular needs to be investigated further for quantum gravimeters.

For Earth tides, the tide generating potential (TGP) of Tamura (1983) is recommended, higher order developments are possible. For the elastic response, the model of Dehant et.al. (1999) (DDW) should be applied, preferably with observed tidal parameters.

For ocean tide loading the best possible model should be applied. As a minimum FES2004 is recommended. This will be subject to change in the future.

For the permanent tide, a closed formula as given by J. Mäkinen was adopted. The transformation from tide free to zero tide system is irrelevant for practical purposes and is included in the proposed formulation.

For the effect of polar motion, an ellipsoidal approximation was discussed by replacing the mean radius by the radius of curvature in the prime vertical N . A final agreement needs to be drawn.

The vertical gravity gradient (VGG) and its impact on the processing has been discussed in detail, especially with regard to the evaluation of the equation of motion. A presentation on the effective height was given by V. Pálinkáš, suggesting to define the gradient insensitive point relative to the top of drop, while the reference height should be related to the benchmark. A section for the processing standards covering this aspect will be prepared.

The gradient measurement scheme was discussed. A minimum requirement is a measurement at 3 height levels with the recommended range: 1.20m, 0.80 m and close to the marker, defining a linear VGG. Higher order polynomials are possible if required by the local site conditions. No recommendation on the relative gravimeter used for the gradient determination was given.

A final version of the processing standards will be circulated among the participants.

Due to time constraints, an update of the site requirements was only shortly discussed. It was agreed that for comparisons the construction of several individual pillars instead of one large monument should be recommended as well. A reinforcement seems not necessary, but would have no negative impact.

Point 4 and 5 of the agenda were not discussed to the limited time.

The Symposium on Terrestrial Gravimetry held from Oct. 1st to 4th was announced, including the extended deadline.

It was the last meeting of JWG 2.1.1. during the current period. All the various contributions of the members are greatly acknowledged.

Participants

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Participants of the meeting.