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On the realization of the absolute gravity reference system

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Following the IAG Resolution No. 2 (2015) for the establishment of a global absolute gravity reference system, major aspects of its realization, the global absolute gravity reference frame, are presented and discussed. Absolute gravimeters (AG) monitored at reference stations and in international comparisons will provide the basis and the needed long term stability. A global set of stations, compatible with the reference level, makes the new system accessible to all users, including those not operating an AG.

The realization is planned to be based solely on absolute gravity sites which are categorized by the number of station occupations and the monitoring capabilities. A reference station is proposed to provide an absolute gravity value at the microgal level by repeated absolute gravity measurements. Further it should allow a direct comparison with another AG. A comparison site should then be defined as a reference station where the absolute gravity value at the microgal level is available at any time by the combination of traceable repeated absolute gravity measurements with continuous observations of temporal gravity variations, monitored either by a superconducting gravimeter or in future by an absolute quantum gravimeter. Extended facilities should allow for the comparison of several AGs. The link to the terrestrial reference frame is planned to be provided by core stations, where at least one space geodetic technique is established. GGOS core sites should be linked by continuous monitoring of gravity changes and repeated absolute gravity observations.

A new infrastructure based on absolute gravity observations should replace IGSN71. This new infrastructure needs the support and collaboration with National agencies, who are encouraged to establish compatible first order networks. The meters used here need to participate in comparisons to ensure traceability of measurements. Absolute gravity stations should be divided into different levels depending on the uncertainty of the gravity observations, from field to the laboratory level. All relevant data will be centrally archived and documented at the Bureau Gravimetrique International in the AGrav (BGI/BKG) database which will be accessible to any user.

To ensure a common reference level and traceability to the SI, repeated regional comparisons under the auspices of regional metrology organizations and additional comparisons organized by geoscience community will complement international key comparison at the CIPM level. All comparison results will be made available by the AGrav database. To ensure the traceability to SI units an AG can also be calibrated by the National metrology institutes with the calibration and measurement capabilities (CMC) in absolute gravimetry.

Finally, a set of standard models correction of time variable gravity effects will be proposed and discussed.