



Gravity change in Finland from comparison of new measurements using the outdoor absolute gravimeter A10 with legacy relative measurements – first results

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Finland belongs to the Fennoscandian postglacial rebound (PGR) area, with vertical velocities of up to 1 cm/yr and corresponding surface gravity rates as large as -2 microgal/yr. Knowledge of the secular gravity change in Finland comes so far from three sources:

- (i) repeated absolute gravity measurements at a limited number of indoor laboratory-type sites, made by various teams and instruments (1976–),
- (ii) repeated relative measurements on the Fennoscandian Land Uplift Gravity Lines (1966–2003) which run in East-West direction along the approximate latitudes 61, 63 and 65 degrees N,
- (iii) satellite gravimetry with the GRACE (2002–).

We are about to add a fourth source: In 2009 the Finnish Geodetic Institute (FGI) together with the Institute of Geodesy and Cartography (IGiK) started the re-measurement of the Finnish First Order Absolute Gravity Network (FOGN), using the A10 No. 020 outdoor absolute gravimeter of the IGiK. The FOGN consists of 50 outdoor stations, typically on the stairs of churches and other monumental buildings. The purpose of the FOGN (or its re-measurement) is not geodynamic research but the provision of easily-accessible reference sites for tasks of practical relative gravimetry, say gravity mapping for geodesy, geology and applied geophysics.

However, as the FOGN was first measured in 1962–63 (with a Worden gravimeter) and re-surveyed in 1988 (with two LCR gravimeters), the time span of more than 45 years to 2009 provides the opportunity to extract a signal of gravity change from the comparison of the three campaigns. While the accuracy of the 1962–63 measurements is limited, at some FOGN stations additional data is provided by North-South traverses measured from 1966 onwards for calibration of LCR gravimeters.

During the 2009 campaign with the A10-020 altogether 19 stations in the FOGN were occupied, and about 10 of them are sufficiently well-preserved from 1962–63 to make a gravity comparison meaningful. The experience with the A10 and the accuracy achieved is discussed. A first estimate of the gravity changes, and their comparison with estimates from other sources and from PGR models is then made. The remaining FOGN stations shall be occupied in 2010 after which a more complete evaluation can be done.