Geophysical Research Abstracts
Vol. 20, EGU2018-6907, 2018
EGU General Assembly 2018

New national gravity reference frame in Sweden – RG 2000

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Sweden is located in the middle of the Fennoscandian postglacial rebound area. The postglacial rebound, or glacial isostatic adjustment (GIA), induces a temporal change in the gravity field varying from -0.1 to -1.7 μGal/yr on the Swedish mainland. This secular, GIA-induced gravity change has been studied since the 1960s, first by means of repeated relative observations and since the 1990s by repeated absolute gravity observations.

In early 2018, Sweden released the new gravity reference frame RG 2000. It is based on a large number of absolute and relative gravity observations. The foundation is 14 points where 190 repeated absolute gravity observations with two FG5 gravimeters (FG5-220 and FG5-233) have been conducted since 2004. In addition to that 95 points have been measured with an A10 gravimeter (A10-020). All absolute gravimeters participated in international comparisons.

Here we describe the realization of the new gravity reference frame; how the absolute gravity observations can be traced to international standards and conventions; how all gravity observations have been reduced, in terms of a linear relation between the land uplift model NKG2016LU and the gravity rate of change, to the reference epoch 2000.0; how all absolute and relative gravity observations have been adjusted to estimate gravity for a network consisting of the above mentioned absolute points and some 200 additional relatively connected points; how RG 2000 is related to older national gravity reference frames.

We also discuss the role of the gravity reference frame in an era of commercial, and relatively easy-to-use absolute gravimeters; how new absolute gravity observations will be related to the national gravity reference frame.