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Realization of an international gravity reference frame on national level - experiences from finalizing the new Swedish gravity reference frame RG 2000

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When establishing an international gravity reference frame (IGRF), it is of greatest importance that each country can accurately and conveniently realize its national gravity reference frame to it. Recently the new Swedish gravity reference frame, RG 2000, was finalized. A challenge in Sweden is that the land is still rising due to glacial isostatic adjustment (GIA), which means that g is constantly getting less. We have therefore developed a land uplift model to adjust our observations.
The gravity points in the network are observed by three different types of gravimeters and therefore divided into three different classes. The 17 Class A points are regularly observed by FG5 absolute gravimeters (2004-16), the 96 Class B points are observed by A10 absolute gravimeters (2011-15) and the 181 Class C points are observed only by LaCoste and Scintrex relative gravimeters (1980-2017). Most of the FG5 observations are performed by our own instrument and after it was purchased in 2006, we have attended all International Comparisons of Absolute Gravimeters (ICAGs) (except in 2017) and European Comparisons of Absolute Gravimeters (ECAGs). Due to a suspected jump in the time series, all our FG5-observations in Sweden have been corrected based on the results from ICAG/ECAG.
All Class C points, 42 Class B points and 1 Class A point were included in one of the two former gravity reference systems in Sweden, RG 62 and RG 82, which means that we have good connections between the different systems. That is very important since there are still end users using both the old systems and which are about to change to the new frame. Everything is adjusted applying our new in-house developed gravity software and no point has been regarded as free from errors in the adjustment.
Despite a modern IGRF does not exist yet, we regard RG 2000 somehow already as a best practice realization. We suggest that RG 2000 could serve as study area for the IGRF for the parts of the world affected by GIA and as testbed for a gravity reference frame based on combination of points observed by different kinds of gravimeters. During such study, it would be helpful to discuss whether IGRF points should be situated very close to a superconducting gravimeter (to take care of g in time) and whether the g-values should be referred to somewhere close to the sensor height of the used absolute gravimeter or on the ground. If the latter is considered, free air gradient determinations are needed and to harmonize them through guidelines for how to observe and calculate them would be beneficial. This would facilitate the IGRF implementation in future.