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Continuous GPS observations and absolute gravity network in Dronning Maud Land, Antarctica

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The solid Earth is deformed by present and past changes of the ice mass. Continuous GPS (CGPS) senses the deformation. Repeated absolute gravity is sensitive to the vertical component of the deformation. It is also sensitive to the associated variation in density of the solid Earth, and to the direct attraction of the ice mass. Additional insights into the processes at hand can thus be gained by combining the two types of observations.

Finnish Geodetic Institute maintains a research program combining repeated absolute gravity and CGPS in Dronning Maud Land. In 2003 a CGPS receiver was installed at Finnish Antarctic Research Station Aboa (73.05 S, 13.4 W). It has so far collected three years of uninterrupted data at this summer-only base.

In 1994 FGI made the first absolute gravity measurement at the Aboa. The measurement was repeated in 2001. In 2004 the gravity project was extended also to the South African station Sanae IV (which is the International GPS Service site VESL) and at the Russian station Novolazarevskaya. During the field season 2005-2006 we intend to repeat the gravity measurements at Aboa, Sanae IV, and Novolazarevskaya. All work is performed under the auspices of the Finnish Antarctic Research Program FINNARP.

We describe the work, show the results obtained so far, and discuss the key phenomena present in the time-variable gravity signal and in the CGPS.