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COMBINING ABSOLUTE GRAVITY AND PERMANENT GPS OBSERVATIONS AT DRONNING MAUD LAND ANTARCTICA

J. Mäkinen, H. Koivula, J. Ahola, M. Poutanen

Finnish Geodetic Institute, Masala, Finland

Reconstructions of the last glacial cycle in the Antarctic are not well constrained by observational evidence, and differ appreciably both in ice volumes and in the timing of the deglaciation. Neither is the present-day mass balance well known. Thus there is considerable interest in collecting new observations related to past or present changes of the Antarctic ice mass.

The solid Earth is deformed by both past and present changes of the ice mass. CGPS is sensitive to present day deformations when repeated absolute gravity is sensitive to both deformation and mass change. The mechanism of the mass change and thus the influence on gravity change differs if it caused by the present day or past changes of the ice mass. By combining the CGPS and repeated absolute gravity measurement it is in principle possible to separate these two.

Finnish Geodetic Institute has started a gravity/CGPS research program at Dronning Maud Land (DML). In 1994 the first absolute gravity measurement at the Finnish Antarctic Research Station Aboa (73.05 S, 13.4 W) was performed with JILAg-5 gravimeter. The measurement was repeated in 2001. In 2003 a permanent geodetic CGPS station was installed to Aboa. In 2004 the project was extended to other stations in DML as well. We measured absolute gravity with a new FG5 gravimeter at South African Sanae IV (which has also a CGPS station called VESL) and at Russian Novolazarevskaya, and at Aboa. During the field season 2005-2006 we intend to repeat the gravity measurements at Sanae IV, Novolazarevskaya and Aboa. All work is performed under the auspices of the Finnish Antarctic Research Program FINNARP. We also participate the POLENET consortium as a part of an IPY programme.

We describe the work, show the results up today, and discuss the key phenomena, which are present in the time-variable gravity signal and CGPS.