Geophysical Research Abstracts
Vol. 14, EGU2012-9658-1, 2012
EGU General Assembly 2012

Vertical uplift rates measured by different geodetic techniques at GARS O'Higgins, Antarctic Peninsula

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The German Antarctic Receiving Station (GARS) O'Higgins is the only place on the Antarctic continent where the different geodetic techniques VLBI, GNSS, absolute gravity and tide gauge measurements are deployed. The combination of the data yield reliable results of crustal motions and mass changes and provide a good base for interpretations with respect to postglacial rebound processes.

While GNSS observations at two IGS sites yield continuous time series, the VLBI experiments using the 9 m radio telescope and gravity measurements using a FG5 absolute gravimeter are performed campaign-wise. Sea level observations using a pressure and a radar gauge and meteorological measurements complement the data set.

The data from all geodetic techniques point to a vertical uplift of the region. The resulting displacements obtained by the geometric techniques VLBI and GNSS coincide within the range of error and yield uplift rates of 4-5 mm/y. The absolute gravity measurements performed in 1997 and 2011 show a decrease in gravity by roughly 16 microgal, which is consistent with the observed geometrical uplift rates.

A pressure gauge is in operation since 1999. However, a continuous time series is not available, since floating ice shifted or even destroyed the installation several times. In order to obtain absolute, space referenced sea level data, an additional radar gauge referenced by a GNSS antenna has been installed in 2011. Although this installation is operated campaign-wise, the well defined reference will allow the determination of long term trends in future.