Geophysical Research Abstracts
Vol. 16, EGU2014-10739, 2014
EGU General Assembly 2014

GARS O'Higgins as a core station for geodesy in Antarctica

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The German Antarctic Receiving Station GARS O'Higgins at the northern tip of the Antarctic Peninsula is a dual purpose facility for Earth observation since more than 20 years. It serves as a satellite ground station for payload data downlink and telecommanding of remote sensing satellites as well as a geodetic observatory for global reference frames and global change. Both applications use the same 9m diameter radio telescope.

For space geodesy and astrometry the radio telescope significantly improves the coverage on the southern hemisphere and plays an essential role within the global Very Long Baseline Interferometry (VLBI) network. In particular the determination of the Earth Orientation Parameters (EOP) and the sky coverage of the International Celectial Reference Frame (ICRF) benefit from the location at high southern latitude.

Further geodetic instrumentation includes different permanent GNSS receivers (since 1995), two SAR corner reflectors (since 2013) and in the past a PRARE system (1996 - 2004). In addition absolute gravity measurements were performed in 1997 and 2011. All geodetic reference points are tied together by a local survey network. The various geodetic instrumentation and the long time series at O'Higgins allow a reliable determination of crustal motions. VLBI station velocities, continuous GNSS time series and absolute gravity measurements consistently document an uplift rate of about 5 mm/a.

A pressure gauge and a radar tide gauge being refererenced to space by a GNSS antenna on top allow the measurement of sea level changes independently from crustal motions, and the determination of the ellipsoidal height of the sea surface, which is, the geoid height plus the mean dynamic topography.

The outstanding location on the Antarctic continent makes GARS O'Higgins also in future attractive for polar orbiting satellite missions and an essential station for the global VLBI network. Future plans envisage a development towards an observatory for environmentally relevant research.