

# German Antarctic Receiving Station (GARS) O'Higgins

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## Abstract

In 2006 the German Antarctic Receiving Station (GARS) in O'Higgins contributed to the IVS observing program with 8 observation sessions. Mark 5A systems replaced the tape drive systems. Control software and hardware was improved towards observing remotely. A local survey was carried out to determine the local ties and the telescope axes. A radar tide gauge was set up for testing.

## 1. General Information

The German Antarctic Receiving Station (GARS) is jointly operated by the Federal Agency of Cartography and Geodesy (BKG) and the German Aerospace Center (DLR). The Institute for Antarctic Research Chile (INACH) coordinated the preparatory activities and logistics prior to a campaign. The 9m radiotelescope at O'Higgins is used for geodetic VLBI and for downloading remote sensing images from satellites. The access to the station is organized campaignwise during the Antarctic spring and summer. In 2006 the station was occupied from January to March and from October to December. DLR and BKG jointly sent engineers and operators for the campaigns together with a team which maintained the infrastructure such as the provision of power etc.

Over the last years, special flights with "Hercules"-aircrafts and small TwinOtters-aircrafts were organized by INACH in close collaboration with the Chilean Army, Navy and Airforce in order to transport the staff, the technical material and also the food for the entire campaign from Punta Arenas via station Frei on King George Island to the station O'Higgins on the Antarctic Peninsula. Only a few times, the staff and material were transported by ship to O'Higgins. Due to the fact that the conditions for landing on the glacier became unpredictable, requiring a lot of security precautions, the employment of ships for transportation to O'Higgins became more and more important. As a consequence of the global warming, the glacier was melting. During the summer period, landing with TwinOtters airplanes became impossible. Arrival time and departure time was strongly dependent on the weather conditions and on the general logistics. Today more time to travel from Punta Arenas to O'Higgins has to be considered.

After the long Antarctic winter usually the equipment at the station has to be initialized; damages, which result from the strong winter period, have to be identified and repaired. Shipment of spare parts or material for upgrades from Germany needs careful preparation in advance.

In co-location with the 9m radiotelescope for VLBI

- two GPS receivers are operated in the frame of IGS all over the year, an Alan Osborn ACT (OHI2), which has a long and stable history and a JAVAD receiver (OHI3) for GPS and GLONASS tracking.
- a tide gauge is installed, which has been operating for several years with some interruptions caused by destroyed cables from the scratching ice on the rocks.
- a meteorological station providing pressure, temperature and humidity and wind information, as long as the extreme conditions outside did not disturb the sensors.

- an H-Maser, an atomic Cs-clock, a GPS time receiver and a Total Accurate Clock (TAC) are employed for the provision of the time and frequency.

The 9m radiotelescope is designed for dual purpose: for performing geodetic VLBI and for receiving the remote sensing data from ERS 2, JERS and ENVISAT and in future from TerraSAR-X. Different antenna tracking modes and different receivers have to be activated depending on the application.



Figure 1. View to GARS O'Higgins

## 2. Technical Staff

The staff members for operating, maintaining and improving the GARS VLBI component and the geodetic devices are summarized in Table 1.

Table 1. Staff – members

Name	Affiliation	Function	Working for
Christian Plötz	BKG/FESG	electronic engineer	O'Higgins (responsible), RTW
Reiner Wojdiak	BKG	software engineer	O'Higgins, IVS Data Center Leipzig
Andreas Reinhold	BKG	geodesist	O'Higgins, BKG-Leipzig

## 3. Observations in 2006

During the Antarctic summer campaign (January-March 2006) and during the Antarctic spring campaign (October-December 2006) GARS participated in the following sessions of the IVS observing program:

- 4 sessions during the period January - February (OHIG42, T2043, OHIG43, OHIG44)
- 4 sessions during the period October- December (OHIG45, OHIG46, OHIG47, T2047)

The observations were recorded on disks with Mark 5A. The data were shipped from O'Higgins to Punta Arenas with the earliest possibility after they were recorded. From Punta Arenas, the disks were shipped by regular air transports to the correlator.

#### **4. Maintenance**

The extreme conditions in the Antarctic require special maintenance and repair of the GARS telescope and of the infrastructure. The effect of corrosion, problems with connectors and capacitors need to be detected; the H-Maser has to be set up into its operation mode as soon as the operators arrive. The antenna, S/X-band receiver and the data acquisition system has to be activated properly. Those components, which were damaged during the previous campaign, usually were replaced. Work to maintain the containers had been started in 2005 and was finalized in 2006. This concerned the installation of a new roof and new windows, as well as the extension of the air conditioning system.

#### **5. Technical Improvements**

At the beginning of the campaign 2006 the rack with the tape drive was removed. As the Mark 5 system was implemented in 2005, the complete tape drive rack became obsolete. As already reported, in 2005 the Antenna Control Unit (ACU) was replaced by a complete new system built by VERTEX. Due to some inconsistencies in the operations, it was decided to employ the old ACU for the observations in order to avoid failures during the VLBI experiments. Final testing of the new ACU is planned for the first campaign in 2007. At the beginning of the campaign in 2006, the fieldsystem was upgraded to Version 9.7.7.

#### **6. Miscellaneous**

A new local survey was carried out during the first campaign in the period from January to March 2006 in order to control the local ties and to confirm the intersection of the antenna axes. A radar tide gauge was tested to investigate features for a permanent installation. The radar tide gauge will be employed for the calibration of the existing tide gauge.

#### **7. Upgrade Plans for 2007**

For 2007 it is planned to expand the observing capabilities, in particular by extending the period of observations by employing the remote control facilities. Such an upgrade will become possible in close collaboration with DLR. The Internet capabilities will be improved at least by a factor of two (256kbps), but with respect to the upcoming remote sensing missions 30Mbps links might become reality. The upgrade to Mark 5B is also planned for 2007.