

German Antarctic Receiving Station (GARS) O'Higgins

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Abstract

In 2007 the German Antarctic Receiving Station (GARS) in O'Higgins contributed to the IVS observing program with eight observation sessions. Control software and hardware have been improved with the goal of implementing remote observations.

1. General Information

The German Antarctic Receiving Station (GARS) is jointly operated by the Federal Office 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 the campaigns. The 9m radiotelescope at O'Higgins is used for geodetic VLBI and for downloading of remote sensing images from satellites such as ERS and TerraSAR. The access to the station is organized campaignwise during the Antarctic spring and summer. In 2007 the station was occupied from January to March and from October to December. DLR and BKG jointly send engineers and operators for the campaigns together with a team which maintains the infrastructure, such as the provision of power.

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 and with the Brazilian Airforce in order to transport the staff, the technical material and also the food for the entire campaign from Punta Arenas via station Frei at 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 have become unpredictable, requiring a lot of security precautions, the employment of ships for transportation to O'Higgins has become more and more important. As a consequence of global warming, the glacier is melting. During the summer period, landing with TwinOtters airplanes has become impossible. Arrival time and departure time is strongly dependent on the weather conditions and on general logistics. Today more time to travel from Punta Arenas to O'Higgins has to be considered.

At the end of 2007, the cruiseliner "Explorer" sank approximately 50 miles away from O'Higgins. This disaster affected the second campaign dramatically, as all the means of transportation were employed for the rescue of the passengers. The staff had to stay more than 10 days longer at O'Higgins.

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. During the second campaign 2007 the ACT receiver was replaced by a second JAVAD receiver in order to provide redundancy for the 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. During 2007 the system failed. A replacement by a radar tide gauge system is planned.
- a meteorological station provides pressure, temperature, humidity and wind information, as long as the extreme conditions outside do not disturb the sensors,
- a 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 purposes:

- for performing geodetic VLBI and
- for receiving the remote sensing data from ERS 2, JERS, and ENVISAT.

In the second campaign 2007, remote sensing data from TerraSAR were recorded with highest priority.



Figure 1. View to GARS O'Higgins



Figure 2. Transport to Base Frei at King George Island with Hercules C-130



Figure 3. Bridge to Base O'Higgins

2. Technical Staff

The staff members who operate, maintain, and upgrade 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

3. Observations in 2007

GARS participated in the following sessions of the IVS observing program during the Antarctic summer campaign (January-March 2007)

- IVS T2049 06.-07. February 2007
- IVS OHIG48 07.-08. February 2007
- IVS OHIG49 13.-14. February 2007
- IVS OHIG50 14.-15. February 2007

and during the Antarctic spring campaign (October-December 2007)

- IVS OHIG51 11.-12. November 2007
- IVS OHIG52 12.-13. November 2007
- IVS OHIG53 18.-19. November 2007
- IVS OHIG54 19.-20. November 2007

The observations were recorded with Mark 5A. The data were carried from O'Higgins to Punta Arenas by the staff when they returned home. From Punta Arenas, the disks were shipped by regular air transports to the correlator.

4. Maintenance

The extreme conditions in the Antarctic require special attention to the GARS telescope and to the infrastructure. Corrosion results in problems with connectors and capacitors, which need to be detected. The H-Maser has to be set up into its operation mode as soon as the operators arrive. The antenna, the S/X-band receiver, the cooling system, and the data acquisition system have to be activated properly. Those components that were damaged during the previous campaign usually are replaced. In 2007 two new containers were shipped to O'Higgins to replace worn out systems and to improve the infrastructure, in particular renewing the personal cabins.

5. Technical Improvements

As already reported, the Antenna Control Unit (ACU) was replaced by a completely new system built by VERTEX. Due to some inconsistencies in the operations, the old ACU was still used in 2006 for the observations in order to avoid failures during the VLBI experiments. At the beginning of the first campaign 2007, final tests of the new ACU were successfully carried out. Consequently the new ACU replaced the old system. Thanks to the new ACU and the Mark 5 recording system, remote control of the antenna became more realistic. New software developments that make use of direct access to shared memory following the server–client principle were made. This requires less data transmission via Internet, making the software much more robust. Tests were carried out at the end of the field campaign, during the wait for the transport to the mainland. Such a remote system will support the remote monitoring of GARS in the future.

6. Upgrade Plans for 2008

During 2008 it is planned to increase the observing capabilities, in particular by extending the period of observation, employing the remote control facilities. Such an upgrade will be realized in close collaboration with DLR, which will make use of the facilities throughout the year for the acquisition of data from the planned TerraSAR-Tandem mission. The Internet capabilities will be improved. The upgrade to Mark 5B and the installation of Digital Baseband Converters (DBBC) is planned for 2008.