German Antarctic Receiving Station (GARS) O'Higgins

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Abstract

In 2004 the German Antarctic Receiving Station (GARS) in O'Higgins contributed to the IVS observing program with 10 observation sessions. Mark 5 system has been used. Remote Control Software and Hardware has been installed and successfully used.

1. General Information

The German Antarctic Receiving Station (GARS) is jointly operated by the Federal Office of Cartography and Geodesy (BKG), the German Aerospace Center (DLR) and the Institute for Antarctic Research Chile (INACH). The 9m radiotelescope at O'Higgins is used for geodetic VLBI and for Remote Sensing. The access to the station is organized campaign-wise during the Antarctic spring and summer. In 2004 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 etc. 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 Island Frey to the station O'Higgins on the Antarctic Peninsula. Conditions and time schedule are unpredictable and requires a lot of security precautions. Arrival time and departure time is strongly dependent on the weather conditions and the general logistics.

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, nevertheless the arrival of material in O'Higgins is mostly delayed.

In collocation with the 9m Radiotelescope for VLBI

- two GPS receivers are operated all over the year, an Alan Osborn ACT (OHIG 2), which has a long and stable history and a JAVAD receiver (OHIG3), which was installed during the summer campaign 2004 replacing the previous Ashtech Z18 receiver for GPS and GLONASS tracking.
- a tide gauge is installed, which was operated 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 purposes: for performing geodetic VLBI and for receiving the remote sensing data from ERS 2, JERS and ENVISAT. Different antenna tracking modes and different receivers have to be activated depending on the application.

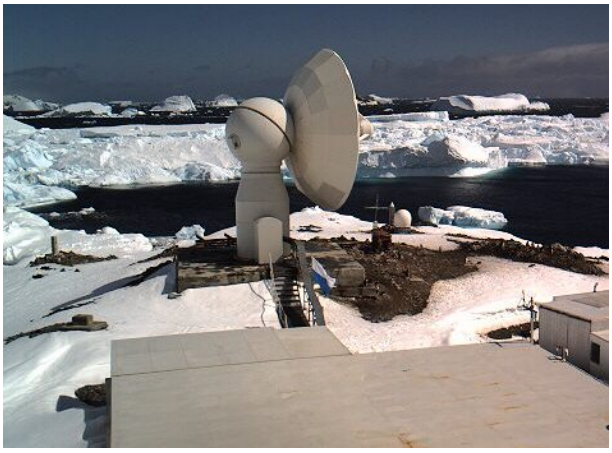

Figure 1. GARS O'Higgins

2. Technical Staff

The staff members for operating, maintaining and improving the GARS VLBI component and the geodetic devices are summarized in Table 1. The University of Concepción, which collaborates with BKG in the TIGO project, supported the observations at O'Higgins by sending an engineer for the term from October to December.

Table 1. Staff – members

Name	Affiliation	Function	Working for
Christian Plötz	BKG/FESG	electronic engineer	O'Higgins (responsible), RTW
Walter Schwarz	BKG	electronic engineer	RTW, O'Higgins
Reiner Wojdiak	BKG	software engineer	O'Higgins, IVS Data Center Leipzig
Cristobal Jara	UdeC	electronic engineer	TIGO, O'Higgins

3. Observations in 2004

During the Antarctic summer campaign (January-March 2004) and during the Antarctic spring campaign (October-December 2004) GARS participated in the following sessions of the IVS observing program:

- 4 sessions during the period January–February (OHIG29, OHIG30, OHIG31, and T2026)
- 6 sessions during the period October–December (OHIG32, OHIG33, OHIG34, OHIG35, T2035 and T2036)

The observations in January-February were stored on tapes while the observations during the second period were recorded on disks with Mark 5A. OHIG32 and OHIG33 were recorded on both data media, tapes and disks. The data were shipped from O'Higgins to Punta Arenas with the earliest possibility after they were recorded. They already are available for correlation. A pre-correlation did not indicate any technical problems and confirmed the successful operation of Mark 5A at O'Higgins.

4. Maintenance

The extreme conditions in the Antarctic require special maintenance and repair of the GARS telescope and of the infrastructure. We have to consider the effect of corrosion; problems with connectors and capacitors need to be detected; the H-Maser has to be set up into operation mode as soon as the operators arrive; the antenna, the S/X-band receiver and the data acquisition system have to be activated properly. Those components which were damaged during the previous campaign usually have to be replaced.

5. Technical Improvements

The transition from the Mark IV to the Mark 5A has been successfully performed. Data were already recorded since October 2004 with the Mark 5A.

A new computer has been prepared and modified for the implementation of the new Field System version 9.6.9. The Field System was adapted to the O'Higgins VLBI system and the observations were already run with the new version. An additional computer was implemented to monitor the H-Maser status. The Maser monitoring data are made available for remote control from Wettzell Observatory.

Remote control extensions have been set up, allowing access of the VLBI control system in O'Higgins from Wettzell. The observations T2036, carried out on December 7/8 and the observations OHIG 35, carried out on December 8/9 were completely operated from Wettzell. Due to the unpredictable transportation conditions to and from O'Higgins, the BKG staff had to leave on December 7. By using the remote control capability the observations were successfully performed. The remaining local work was taken over by DLR staff, as the shipment of the disk packages.

During the 1st campaign in February 2004, a new power generator with 120kVA including UPS was installed, replacing an old worn-out system that did not provide sufficient power for the increasing activities. The air conditioning in the operation containers was significantly improved by a complete replacement of the old devices. The temperature can now be kept stable within 2 degrees Kelvin in the operation rooms, which improved the overall stability of all electronic components.

All computers for operating the geodetic devices and all servers were replaced with the new PC generation. The 128kbps Internet link via satellite to Santiago was used for data transmission of the continuous observations such as GPS, tide gauges etc. during the year. The capacity allows the remote access, but a faster link with more capacity is strongly required.

6. Upgrade Plans for 2005

During 2005 it is planned to expand the observing capabilities in particular by extending the period of possible observations. This requires to improve the remote control capabilities and to increase the Internet capabilities by at least a factor of two (256kbps). The upgrade to Mark 5B is planned as soon as the devices or the upgrade kits are available.

Some restoration work will be done, in order to maintain the antenna as corrosion has to be prevented. It is also planned by DLR to replace the first Antenna Control Unit by the latest development of VERTEX.