German Antarctic Receiving Station (GARS) O'Higgins

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Abstract A new firmware of the antenna control unit (ACU) with an enhanced remote operations capability was installed and tested in the 9 meter radio telescope. The operational parameters of the VLBI receiver are monitored automatically. The thermal stability of the hydrogen maser EFOS-50 was improved by an enclosing box, which lowers the impact of ambient temperature variations. The workflow and the integration of the VLBI observations into the Satellite Monitor and Control Software (SMCS) of our partner institution DLR is now seamlessly implemented.

1 General Information

The German Antarctic Receiving Station (GARS) is jointly operated by the German Aerospace Center (DLR) and the Federal Agency for Cartography and Geodesy (BKG, belonging to the duties of the Geodetic Observatory Wettzell (GOW)). The Institute for Antarctic Research Chile (INACH) coordinates the logistics. The 9-meter radio telescope at GARS O'Higgins is mainly used for downloading of remote sensing data from satellites such as TanDEM-X and for the commanding and monitoring of spacecraft telemetry. DLR operating staff and a Chilean team for maintaining the infrastructure (e.g., power and freshwater generation, technical support) attend the station the entire year. BKG staff was on site from the end of January to mid-March 2017 and from the end of October until mid-December 2017. During these two campaigns, a total of seven 24-hour IVS sessions were scheduled. In addition, the O'Higgins VLBI radio telescope participated in four 24-hour BKG sessions by remote control.

Carriage of passengers and cargo by air and by ship was organized by the Chilean Antarctic Institute (INACH) in close collaboration with the Chilean Army, Navy, and Airforce and with the Brazilian Airforce. All technical material and food for the entire stay are delivered from Punta Arenas via Base Frei on King George Island to O'Higgins on the Antarctic Peninsula. The conditions for landing on the glacier are strongly weather dependent. In general, transport of staff and cargo is always a challenging task. Arrival and departure times strongly depend on the current meteorological conditions and on the logistic circumstances.

The VLBI system is continuously operational, and maintenance and potential repair work is only possible when BKG staff is present. Frequent damages resulting from the rough climate conditions and strong storms have to be identified and repaired, e.g., damages to wind sensors. Shipment of each kind of material, such as special tools, spare parts, or upgrade kits, has to be carefully prepared in advance. The most important station and system parameters are permanently monitored remotely.

2 Activities during the Past Years 2017–2018

The hydrogen maser EFOS-50 had a stability problem with variable ambient temperature. The installation of

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Fig. 1 View of the 9-m radio telescope, GNSS sites, and corner cube.

a specially designed housing box solved this problem. The mounting adapter for the GNSS site OHI2 was replaced with a new adapter for an improved mechanical stability. The wind sensor on top of the neighboring station was replaced twice due to the impact of strong storm winds. The VLBI receiver monitoring was completely automatized. The antenna control unit (ACU) of the 9-meter radio telescope was upgraded with a new firmware version, specially enhanced for remote operations. The command interface is now completely accesible by TCP/IP interface. The existing sea level gauge was uninstalled, and the complete equipment was prepared for sending back.

3 Staff

The staff members responsible for the operation, maintenance, and upgrade of the VLBI system and other geodetic devices are summarized in Table 1.

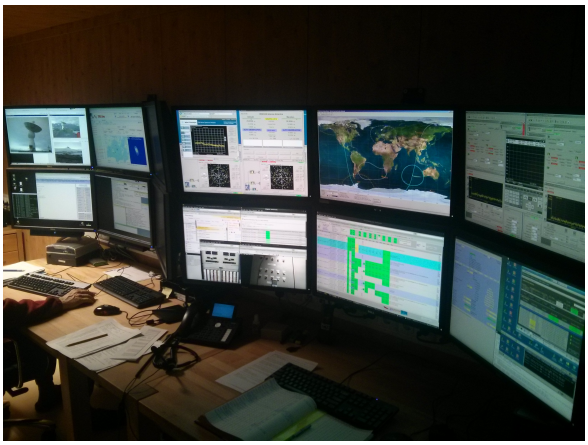

Fig. 2 Integrated VLBI and satellite operations.

4 Current Status

Besides the 9-m VLBI antenna, which is used for the dual purposes of receiving data from and sending

Table 1 Staff members.

Name	Affiliation	Function	Mainly working for
Torben Schüler	BKG	head of the GOW	GOW
Thomas Klügel	BKG	deputy head of the GOW	administration laser gyro/ local systems Wettzell
Christian Plötz	BKG	electrical engineer (chief engineer RTW)	O'Higgins, RTW, TTW
Reiner Wojdziak	BKG	software engineer	O'Higgins, IVS Data Ctr Leipzig
Theo Bachem	BKG	electrical engineer	SLR Wettzell, operator O'Higgins
Swetlana Mähler	BKG	geodesist	survey, SLR Wettzell, logistics O'Higgins
Olaf Lang	BKG	electrical engineer	local systems/ SLR Wettzell, logistics O'Higgins
Alexander Neidhardt	FESG	head of the microwave group, VLBI chief	RTW, TTW
Gerhard Kronschnabl	BKG	electrical engineer (chief engineer TTW)	TTW, RTW

commands to remote sensing satellites and performing geodetic VLBI, other geodetic-relevant instruments are also operated on site:

- currently two H-masers (EFOS-11 and EFOS-50), an atomic Cs-clock, a GPS time receiver, and a Total Accurate Clock (TAC) offer time and frequency.
- two GNSS receivers, OHI2 and OHI3, operating in the frame of the IGS network, while both are Galileo enabled. The receivers worked without failure.
- a meteorological station providing pressure, temperature, humidity, and wind information, as long as the temporarily extreme conditions did not disturb the sensors.
- two SAR corner reflectors, which were installed in March 2013 as part of a network to evaluate the localization accuracy of the TerraSAR-X mission.

Fig. 3 VLBI receiver monitoring using Zabbix.

5 Future Plans

The cold head of the VLBI receiver needs to be replaced, after more than two years of continuous operation. This maintenance is planned within the first presence of BKG staff beginning 2019. A new UPS for buffering the power supplies of the masers EFOS-11 and EFOS-50 is foreseen to replace the old one. The buffer batteries of the old one have no more electrical capacity to provide support for power interruptions.

References

1. D. Behrend, "Coordinating Center Report", In K. D. Baver, D. Behrend, and K. Armstrong, editors, International VLBI Service for Geodesy and Astrometry 2012 Annual Report, NASA/TP-2013-217511, pages 55–57, 2013.