

The Bonn Geodetic VLBI Operation Center

A. Nothnagel, A. Müskens

Abstract The IGGB Operation Center has continued to carry out its tasks of organizing and scheduling various observing sessions of the IVS-T2, IVS-OHIG, IVS-INT3, and EUROPE series.

1 Center Activities

The IGGB VLBI Operation Center is part of the Institute of Geodesy und Geoinformation of the University of Bonn, Nußallee 17, D-53115 Bonn, Germany. It has been organizing and scheduling VLBI observing sessions for almost 30 years. The work of the Operation Center is closely related to the Bonn Correlator. For this reason, distribution of media (Mark 5 disk units) to the stations after correlation is still the most costly part of the operations since network capacity has remained constant at 1 Gb/s for financial reasons.

- **Measurement of Vertical Crustal Motion in Europe by VLBI (EUROPE)**

Since the late 1980s, a series of special sessions is regularly being scheduled in Europe for precise determination of station coordinates and for long term stability monitoring. This year, six network observing sessions with Ny-Ålesund (six sessions), Onsala (four sessions), Metsahovi (one session), DSS65a (one session), Svetloe (four sessions), Zelenchukskaya (four sessions), Badary (three sessions), Effelsberg (two sessions), Wettzell (five sessions), Simeiz (five sessions), Medicina

(three sessions), Matera (two sessions), Noto (six sessions), and Yebes (YEBES40M) (two sessions) were scheduled employing the frequency setup of 16 channels and 4 MHz bandwidth (identical to the setup of the IVS-T2 sessions).

- **IVS-T2 series**

This series was observed roughly every second month (seven sessions in 2013) primarily for maintenance and stabilization of the VLBI terrestrial reference frame as well as for Earth rotation monitoring as a by-product. Each station of the global geodetic VLBI network is planned to participate in the T2 sessions at least once per year. In view of the limitations in station days, priority was given to strong and robust networks with many sites over more observing sessions. Therefore, generally 15 to 24 stations have been scheduled in each session. The scheduling of these sessions has to take into account that a sufficient number of observations is planned for each baseline of these global networks. The recording frequency setup is 16 channels and 4 MHz channel bandwidth.

- **Southern Hemisphere and Antarctica Series (OHIG):**

In February 2013, three sessions of the Southern Hemisphere and Antarctica Series with the Antarctic stations Syowa (Japanese) and O'Higgins (German) plus Fortaleza, HartRAO, and Kokee have been organized (OHIG82-83-84). Furthermore, O'Higgins was also included successfully in the T2088 session. The (southern) winter O'Higgins burst (OHIG85-86-87) was scheduled, but it had to be observed without O'Higgins for

various reasons. Other participating stations were Fortaleza, HartRAO, Kokee, Syowa, HOBART12, KATH12M, Kokee, WARK12M, TIGOCONC, and YARR12M. The purpose of these sessions is the maintenance of the VLBI terrestrial reference frame (TRF) and the monitoring of Earth rotation as a by-product. The recording frequency setup is 16 channels and 4 MHz channel bandwidth. Due to the fact that Syowa is not able to deliver the recorded data for nearly one year after the observations, the correlation and the generation of the databases is always delayed considerably.

- **UT1 determination with near-real-time e-VLBI (INT3):**

The so-called INT3 sessions were originally set up for the telescopes of Ny-Ålesund, Tsukuba, and Wettzell for weekly UT1 determinations aiming at very quick delivery of results. The sessions are always scheduled to start on Monday morning at 7:00 a.m. UT.

Due to maintenance activities at Tsukuba, Ny-Ålesund, and Wettzell, one or more of these stations sometimes had to be replaced by other suitable telescopes. From May to December, Seshan replaced Tsukuba in 26 sessions. Since then, Seshan has taken part in the INT3 sessions on a monthly basis. Svetloe replaced Wettzell and Ny-Ålesund during June to September, and Yebes replaced them during August. No suitable observing configuration could be established for 17 sessions, which had to be canceled entirely.

The operations part of the INT3 sessions also includes rapid data transmission and correlation. The raw VLBI observation data of four sites is transferred to the Bonn Correlator by Internet connections directly after the session is completed in order to speed up delivery of the results. The transmission rate is about 400-600 Mb/s from Tsukuba and Wettzell, 300 Mb/s from Seshan, and 100 Mb/s for Ny-Ålesund. For the latter, the data rate is limited due to the use of a radio link for the first part of the distance. All transmissions share the “last mile” which is limited to 1 Gb/s due to financial limitations.

Altogether, 33 INT3 sessions were observed and transmitted successfully in 2013. 96% of the sessions were correlated and the databases delivered

within the first four hours after the end of the observations. A further 2% were completed within ten hours. The rest took between ten and 48 hours due to difficulties with networking hardware and/or station and processor problems.

2 Staff

Table 1 Personnel at IGGB Operation Center.

Arno Muskens	+49-228-525264	mueskens@mpifr.de
Axel Nothnagel	+49-228-733574	nothnagel@uni-bonn.de