

3.4.3 International VLBI Service (IVS)

IVS Organization and Activities

As of 2002, IVS changed from the institution-driven observing programs and related products to its own programs and products which are expected from the IVS as an IAG and IAU service. As a direct result of the IVS Working Group 2 document, which in 2001 reviewed the products and proposed related observing programs, IVS started in January 2002 its own observing program (see Network Station section of this report for details).

In February 2002 IVS held its second General Meeting in Tsukuba, Japan, generously hosted by the Communications Research Laboratory and the Geographical Survey Institute. Proceedings of the meeting were published in April 2002. The third IVS Analysis Workshop was also held in Tsukuba, with major topics being the SINEX extension for VLBI and the Platform Independent VLBI Exchange Format (PIVEX). Two IVS Directing Board meetings were held, one in February in Tsukuba, and the other in October at Haystack Observatory, USA. The first e-VLBI Workshop was held at Haystack Observatory, bringing together geodetic/astrometric and astronomical users and experts in wideband networks. IVS published its 2001 Annual Report in March 2002 and published three newsletter issues which keep the community informed about IVS activities.

Network Stations

A total of 1130 station days were used in 183 geodetic sessions during the year. Observing sessions coordinated by IVS increased from an average of 3.0 to 3.5 days per week, compared to 2001. The number of station days increased by 25%. The major observing programs during 2002 were:

IVS-R1, IVS-R4

Weekly (Mondays and Thursdays) 24-hour, rapid turnaround measurements of EOP. Data bases are available within 15 days after each session. These sessions, coordinated by NASA Goddard Space Flight Center (R1) and the U. S. Naval Observatory (R4), are the descendents of the former CORE and NEOS sessions.

Intensive

Daily 1-hour UT1 Intensive measurements were made on four days of the week on the baseline Wettzell (Germany) to Kokee Park (Hawaii, USA). A test intensive series using the Japanese K4 technology with weekly 1.5-hour sessions was observed during the second half of the year.

IVS-T2

Monthly sessions coordinated by the Geodetic Institute of the University of Bonn, observed monthly to monitor the TRF.

IVS-E3

Monthly sessions using the Canadian S2 technology, coordinated by Natural Resources, Canada, designed to measure EOP and

monitor TRF. The Canadian mobile antenna occupied locations at St. John's (Newfoundland) and Shirley's Bay (near Ottawa).

- VLBA** The Very Long Baseline Array (VLBA), operated by the National Radio Astronomy Observatory (NRAO), continued to allocate six observing days for astrometry/geodesy. These sessions included the 10 VLBA stations plus up to 10 geodetic stations, providing state-of-the-art astrometry as well as information for mapping ICRF sources. An additional five sessions were scheduled for maintenance of the ICRF in the southern hemisphere.
- Europe** The European geodetic network, coordinated by the Geodetic Institute of the University of Bonn, continued with four sessions in 2002.
- APSG** The Asia-Pacific Space Geodynamics (APSG) program operated two sessions.
- JADE** The Japanese Dynamic Earth observation by VLBI (JADE) had seven sessions. These sessions included the dedicated 32-m dish at Tsukuba and are designed to monitor the domestic network within the ITRF.
- Syowa** The National Institute for Polar Research (NIPR) continued its sessions that included the Syowa station in Antarctica. The data were recorded with K4 and S2 and processed at the Mitaka (Japan) correlator.
- CONT02** A 15-day continuous campaign observed in October, 2002 with eight stations, designed to demonstrate the state-of-the-art in geodetic VLBI.
- IVS-R&D** Seven sessions were observed with ultra-high SNR targets with the goal of enabling investigations of instrumental effects which dominate VLBI error sources.

The Network Coordinator's data base of station performance showed data loss of about 12%. The most significant problem in 2002 continued to be RFI (radio frequency interference), which occurs mostly at S-band and is becoming more severe and widespread as expected.

- Correlators** The Mark IV correlators at Haystack Observatory (USA), the U.S. Naval Observatory (USA), and at Max Planck Institute for Radioastronomy (Germany) continued operation. Two significant software bugs were fixed during 2002 resulting in less re-processing and improved processing factors.

Data Centers

The IVS Data Centers continued to receive data bases throughout the year and make them available for analysis within one day of correlation. The Data Centers also continued to receive solutions from Analysis Centers. All data and results holdings are mirrored several times per day among the three primary IVS Data Centers.

Analysis Coordinator

Routine analysis and combination of the EOP series submitted by the six IVS Analysis Centers has continued. Due to a change in the general IVS observing program two sessions per week are now being observed and processed in a rapid turnaround mode. As a consequence the IVS Analysis Centers are now able to produce EOP twice per week for the IVS combined EOP product. The EOP of both days are included in the IVS Rapid EOP Series (e.g. ivs02r1e.eops).

As of summer 2002 the IVS Analysis Coordinator's office has started to regularly compute a combined EOP series containing all VLBI network sessions suitable for the determination of EOP from 1979 onwards. This combined series is updated quarterly with all sessions processed by the IVS Analysis Centers at that time (ivs02q1e.eops). Currently combined EOP are still listed by session even though there may be more than one on a single day.

Technology Development Centers

The major effort in 2002 was deployment and testing of Mark 5P disk-based recording systems as a direct replacement for the Mark IV/VLBA tape recorders. The new recorders enable e-VLBI, in which data is transmitted electronically from the stations to the correlator. Full deployment of the Mark 5 systems is planned by mid-2004. Demonstration e-VLBI experiments were conducted on single baselines between stations in the USA, Japan, and Finland. The VSI-S (software) specification was completed; the document will be published in the 2002 IVS Annual Report. Separate experiments were conducted in the US and in Japan demonstrating 1 Gb/s and 2 Gb/s data rates. These high data rates are expected to be employed regularly by 2004.

Nancy Vandenberg, Axel Nothnagel, Chopo Ma