

The U.S. Naval Observatory VLBI Program: Operations in 1998 and 1999

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Abstract

As part of its participation in the National Earth Orientation Service (NEOS) the U.S. Naval Observatory (USNO) operates a program in Very Long Baseline Interferometry (VLBI) data acquisition and analysis to monitor changes in the orientation of the Earth on a regular basis. This report provides details both of recent NEOS VLBI operations and intensive operations.

1. VLBI Operations

Current NEOS operations consist of one 24-hour duration NEOS-A observing session, on Tuesday-Wednesday of each week, for Earth orientation, together with daily one-hour duration “intensives” for UT1 determination. The operational NEOS-A network currently includes the VLBI stations at Gilmore Creek (Alaska), Kokee Park (Hawaii), Wettzell (Germany), Fortaleza (Brazil), Ny-Ålesund (Norway), Algonquin Park (Canada), and Green Bank (West Virginia), although at most six stations observe in any one observing session. Nominal operations divide the NEOS since NEOS-A-193 on January 7th, 1997, into “even” NEOS and “odd” NEOS sessions on alternate weeks. (These names arise from the parity of the sequential numbers of these sessions.) The Kokee Park, Wettzell, Fortaleza, and Green Bank stations nominally participate in all NEOS sessions, while Ny-Ålesund participates in the even sessions, and Gilmore Creek participates in the odd sessions, as does Algonquin Park on a roughly once per month basis. The principal reason for this division is to enable the scheduling of simultaneous CORE-A sessions by the NASA Goddard VLBI group, which are always scheduled during even NEOS sessions. All NEOS sessions are routinely processed in time for the next *IERS Bulletin A* on the following Thursday. The databases from these sessions are freely shared with the VLBI community and are contributed to the IVS data centers as soon as they are processed.

The NEOS VLBI data are correlated at the Washington Correlator, which is located at the U.S. Naval Observatory and run by the NEOS. After correlation, fringe fitting, and the removal of any remaining bandwidth synthesis delay ambiguities, data from all available multiple baseline VLBI sessions are used in a series of weighted least-squares solutions to define a USNO VLBI reference frame and to estimate the Earth orientation within that reference frame. An empirically adjusted station velocity model is used in order to adequately model the tectonic motion of the stations over the 20 years of available data, and antenna axis offsets are also adjusted. Details of previous VLBI operations at the USNO are given in the IERS Annual Report for 1997 [1].

2. UT1 Intensive Operations

The USNO has operational responsibility for the IRIS / NEOS UT1 Intensive Series. These short-duration single-baseline observations are being continued using the same scheduling and observing procedures as before to ensure continuity with previous results. A nominal intensive session during 1998 and 1999 involved 20 delay observations conducted on the Green Bank NRAO20

to Wettzell baseline. These observations are conducted at the same sidereal time each day, except during the NEOS 24-hour sessions and on Sunday. Starting in 1996, roughly every two months the sidereal time of the intensives is shifted to keep their solar times between 1400 and 1800 UTC. Sunday intensives are not presently observed due to budget restraints; however, two intensives are observed on Saturday. The second Saturday intensive uses the schedule intended for the next intensive series, four hours later in sidereal time, in order to provide a set of overlapping, nearly simultaneous, intensives for each pair of intensive schedules. All of the Intensive data is reduced rapidly, typically within four to seven days of the time of acquisition of data, and the NEOS/IRIS UT1 Intensive files produced by the USNO now extend back to 1984 in one homogeneous solution.

References

- [1] The USNO Annual Report for 1997 is obtainable from
ftp://casa.usno.navy.mil/navnet/iers_report.97 .