

# CORE Operation Center Report

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## Abstract

This report gives a synopsis of the activities of the CORE Operation Center from January 2002 to December 2002. The report forecasts activities planned for the year 2003.

## 1. Changes to the CORE Operation Center's Program

The continuous observations of the rotation of the Earth (CORE) program was initiated by the geodetic very long baseline interferometry (VLBI) community in 1997. The program was carried out using geodetic VLBI stations for data acquisition and VLBI analysis centers for data processing and analysis. The CORE program became the IVS program during 2002.

The Earth orientation parameter goal of the IVS program is to attain precision at least as good as  $3.5 \mu\text{s}$  for UT1 and  $100 \mu\text{as}$  in pole position.

The IVS program was started in 2002 and used the Mark IV recording mode for each session. The following are the network configurations for the sessions for which the CORE Operation Center was responsible:

- IVS-R1: 51 sessions, scheduled weekly on Mondays, six station network
- RDV: 6 sessions, scheduled evenly throughout the year, 18 to 20 station network
- IVS-R&D: 10 sessions, scheduled monthly, seven station network
- IVS-CONT02: 15-day campaign scheduled in mid October, eight station network

## 2. IVS Sessions January 2002 to December 2002

This section displays the purpose of the IVS sessions for which the CORE Operations Center is responsible.

- IVS-R1: In 2002, the IVS-R1s were scheduled weekly with a six station network. The stations that participated in the IVS-R1 sessions were Ny Alesund, Westford, Matera, Onsala, Fairbanks, Wettzell, HartRAO, Tsukuba, Medicina, and Tigo. There was a core network for each day plus one or two other stations. Tigo did not start observing until May 2002.

The purpose of the IVS-R1 sessions is to provide weekly EOP results on a timely basis. These sessions provide continuity with the previous CORE series. The "R" stands for rapid turnaround because the stations, correlators, and analysts have a commitment to make the the time delay from the end of recording to results as short as possible. The time delay goal is a maximum of 15 days. Participating stations are requested to ship tapes to the correlator as rapidly as possible. The "1" indicates that the sessions are on Mondays.

- RDV: There are six bi-monthly coordinated astrometric/geodetic experiments each year that use the full 10-station VLBA plus up to 10 geodetic stations.

These sessions are being coordinated by the geodetic VLBI programs of three agencies: 1. USNO will perform repeated imaging and correction for source structure.; 2. NASA will analyze this data to determine a high accuracy terrestrial reference frame.; and 3. NRAO

will use these sessions to provide a service to users who require high quality positions for small numbers of sources. NASA (the CORE Operation Center) prepares the schedules for the RDV sessions.

- **IVS-R&D:** The goal of this set of experiments was to investigate instrumental errors by scheduling observations with very high SNR. The high SNR was necessary in order to allow phase delay ambiguities to be resolved. With the much more precise phase delay observables one can then investigate possible systematic variations. For instance, we have seen subdaily cycles in the time variation of solution residuals. If these systematic variations can be identified, it may be possible to introduce corrections for them. Additionally, we investigated intra-scan variations of residual fringe phase. Usually VLBI experiments are scheduled with target minimum SNRs of 20 at X-band and 15 at S-band. To resolve phase delays, we chose a much higher minimum of 80 at X-band and 60 at S-band.
- **IVS-CONT02:** A 15 day continuous VLBI session was scheduled during mid October 2002, called CONT02, similar in concept to the extremely successful CONT94 and CONT96 sessions. The purpose of the campaign was to provide a long series of the highest quality data that VLBI can provide. More information about the IVS-CONT02 campaign can be found at <http://ivscc.gsfc.nasa.gov/cont02>.

The CORE Operations Center provided fringe test schedules to test equipment at the stations and special sessions.

### 3. Current Analysis of the CORE Operation Center's IVS Sessions

The first of the IVS sessions were correlated this year. Table 1 gives the average X-pole, Y-pole, and UT1 formal errors for the resulting products after analysis. The CONT02 average includes the first 10 correlated sessions.

Table 1. Average EOP Formal Uncertainties

Session Type	X-pole ( $\mu$ as)	Y-pole ( $\mu$ as)	UT1 ( $\mu$ s)
IVS-R1	62	64	2.2
RDV	31	33	1.5
R&D	94	70	3.2
CONT02	51	40	1.8

### 4. The CORE Family

Table 2 lists the key technical personnel and their responsibilities so that everyone reading this report will know whom to contact about their particular question.

Table 2. Key Technical Staff of the CORE Operations Center

Name	Responsibility	Agency
Tom Buretta	Recorder and electronics maintenance	Haystack
Brian Corey	Analysis	Haystack
Irv Deigel	Maser maintenance	Honeywell
Frank Gomez	Software engineer for the Web site	Raytheon/GSFC
David Gordon	Analysis	Raytheon/GSFC
Ed Himwich	Network Coordinator for CORE stations	NVI, Inc./GSFC
Chuck Kodak	Receiver maintenance	Honeywell
Cindy Villiard	Analysis	Raytheon/GSFC
Dan MacMillan	Analysis	NVI, Inc./GSFC
Leonid Petrov	Analysis	NVI, Inc./GSFC
Dan Smythe	Tape recorder maintenance	Haystack
Cynthia Thomas	Coordinate master observing schedule and prepare CORE experiments observing schedules	NVI, Inc./GSFC
Nancy Vandenberg	Organizer of CORE program	NVI, Inc./GSFC
William Wildes	Procurement of materials necessary for CORE operations	GSFC/NASA

## 5. Planned Activities during 2003

The CORE Operation Center will continue to be responsible for the following IVS sessions during 2003.

- The IVS-R1 sessions will be observed weekly and recorded in a Mark IV mode. We will schedule some stations to use Mark 5 recorders as determined by the Coordinating Center.
- The IVS-R&D sessions will be observed 10 times during the year. The purpose of the R&D sessions in 2003 as determined by the IVS Observing Program Committee is to address the difference in EOP results between the IVS-R1 and IVS-R4 sessions. The R&D networks are configured with the IVS-R4 network and the recording mode of the IVS-R1 sessions.
- The RDV sessions will be observed 6 times during the year.