

CORE Operation Center Report

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Abstract

This report gives a synopsis of the activities of the CORE Operating Center from January 2001 to December 2001. The report forecasts activities planned for the year 2002.

1. CORE Program Description

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 will evolve into the IVS program during 2002.

The Earth orientation parameter goal of the CORE Mark IV experiments during 2001 was to attain precision of at least $3.5 \mu\text{s}$ for UT1 and $100 \mu\text{s}$ in pole position.

CORE sessions were run with five basic network configurations: CORE-A, CORE-B1, CORE-B2, and CORE-B3 during 1997 and 1998. During 1999, the networks of the CORE-B sessions changed and the sessions were named CORE-B4, CORE-B5, and CORE-B6. The CORE-A sessions were simultaneous with NEOS sessions and CORE-B and NEOS sessions were on sequential days during both 1998 and 1999. During 2000, the CORE-3 sessions started in July and were performed in Mark IV mode. It was decided that the CORE-A/NEOS series of 76 sessions was sufficient for the analysis of EOP estimated from different networks and it was therefore ended. The CORE-A network was moved from Tuesdays to Mondays and renamed CORE-1. During 2001, the CORE-1, CORE-3, and CORE-B sessions continued. The CORE-C sessions were added during 2001.

2. CORE Sessions January 2001 to December 2001

This section displays the purpose of the CORE-C, CORE-B, CORE-1 and CORE-3 sessions. It also lists other programs used by CORE.

- CORE-1: In 2000, the CORE-As were scheduled once per month until July. In July, the CORE-As were moved to Mondays and renamed CORE-1 because Algonquin was added to the NEOS weekly sessions. The network for the CORE-A and CORE-1 was Algonquin, Fairbanks, HartRAO, Matera, Tsukuba, and Hobart. During 2001 the network for CORE-1 changed slightly to Fairbanks, HartRAO, Matera, Seshan, Tsukuba, and Westford.

The purpose of the CORE-1 sessions is to provide a monthly 72 hour continuous date set (CORE-1 + NEOS + CORE-3).

- CORE-B: The purpose of these sessions is to provide additional data for comparison of EOP measurements, to obtain long 48-hour data sets for geophysical studies and to provide observing sessions during which the stations can demonstrate their performance and their ability to participate in future regular CORE sessions.
- CORE-3: These sessions started in July of 2000 and were observed monthly. The CORE-3 series was named for the third day of the work week since it is scheduled for Wednesdays

following the NEOS sessions. The CORE-3 sessions were the first of the regular, operational CORE sessions, recorded in a Mark IV mode. The CORE-3 were scheduled more often during 2001: from January to June the sessions were observed bi-weekly and then became weekly sessions during the second half of 2001. There were two different networks observing on a bi-weekly basis.

- CORE-C: The purpose of the CORE-C sessions was to provide additional observing sessions for stations that have demonstrated by their performance and their ability that they can participate in regular CORE sessions but do not have Mark IV capabilities.

There is data from other programs established by Bonn (IRIS-S, CORE-OHIGGINS, and EUROPE), USNO (NEOS and CRF), and GSI (APSG) that are used by the CORE program. Some of the data is used to help determine the direction of the CORE program during its evolution.

The CORE Operations Center provided fringe test schedules to test equipment at the stations and special sessions. During January through May of 2001 the CORE Operations Center also provided schedule files for the NEOS-A and Intensive sessions while the NEOS Operations Center's scheduler was on maternity leave.

3. Current Analysis of CORE

The first Mark 4 sessions, CORE-1 and CORE-3 were correlated this year. These sessions had generally better EOP precision than the NEOS-A, CORE-A, or CORE-B sessions. Table 1 gives the median X-pole, Y-pole, and UT1 formal errors for these sessions.

Table 1. Median EOP Formal Uncertainties

Session Type	X-pole (μ as)	Y-pole (μ as)	UT1 (μ s)
Mark 4	80	66	2.6
CORE A+B	91	79	3.2
NEOS-A (1997-2000)	107	86	4.4
Best CORE-1	47	43	1.8

The CORE-1 network has significantly better formal EOP uncertainties than the CORE-3 network because the global geometry than the CORE-3 network is better. Based on the observed differences between simultaneous CORE-A and NEOS sessions, the formal EOP precisions should be multiplied by about a factor of 1.5.

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/STX
David Gordon	Analysis	Raytheon/STX
Ed Himwich	Network Coordinator for CORE stations	NVI, Inc./GSFC
Chuck Kodak	Receiver maintenance	Honeywell
Cindy Lonigro	Analysis	Raytheon/STX
Dan MacMillan	Analysis	NVI, Inc./GSFC
Leonid Petrov	Analysis	NVI, Inc./GSFC
David Shaffer	Sources and antenna parameter maintenance	Radiometrics/NVI, Inc.
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 and sked manager	NVI, Inc./GSFC
William Wildes	Procurement of materials necessary for CORE operations	GSFC/NASA

5. Planned Activities during 2002

As of the end of 2001, the CORE observing program evolved into the IVS program. We will be responsible for the following IVS products during 2002.

- The IVS-R1 sessions will be observed weekly and recorded in a Mark IV mode. The goal of the IVS-R1 sessions is to be processed rapidly, within 15 days.
- The IVS-R&D sessions will be observed 10 times during the year. The sessions will be aimed at studies of instrumental effects.
- The CONT02 campaign will be proposed for a two week period during September or October.

6. CORE Evolving to IVS

The IVS Working Group 2's Plan is to improve the accuracy of results, improve time delay from observation to final product, and improve frequency of sessions in order to achieve a more continuous time series. The CORE Operations center is aiding IVS in achieving these goals with the IVS-R1, the IVS-R&D, and CONT02 sessions that will start in 2002.

References

- [1] Schuh, H. et al.,2001: IVS Working Group 2 for Product Specification and Observing Programs, November 1, 2001