CORE Operation Center Report

Cynthia C. Thomas, Daniel MacMillan

Abstract

This report gives a synopsis of the activities of the CORE Operation Center from January 2003 to December 2003. The report forecasts activities planned for the year 2004.

1. Changes to the CORE Operation Center's Program

The Earth orientation parameter goal of the IVS program is to attain precision at least as good as 3.5 μs for UT1 and 100 μas in pole position.

The IVS program was started in 2002 and used the Mark IV recording mode for each session. The IVS program began using the Mark 5 recording mode in mid 2003. The following are the network configurations for the sessions for which the CORE Operation Center was responsible:

IVS-R1: 52 sessions, scheduled weekly on Mondays, seven 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

2. IVS Sessions January 2003 to December 2003

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

- IVS-R1: In 2003, the IVS-R1s were scheduled weekly with a seven station network. There was a core network for each day plus two or three other stations. Hobart started observing in May 2003 when the station was upgraded to Mark 5. Hobart was the only "Mark 5 only" station during 2003. Wettzell, Westford, Kokee, and HartRAO were the only other stations that recorded on Mark 5 during this period.

  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 Oeration Center) prepares the schedules for the RDV sessions.

- R&D: The purpose of the 10 R&D sessions in 2003, as decided by the IVS Program Committee, was to provide additional information to understand possible differences between the IVS-R1 and the IVS-R4 sessions. In 2002, the IVS-R4 sessions appeared to be achieving better earth orientation results with a lower data rate (56 Mbps vs. 256 Mbps). The R&D sessions were scheduled with a network similar to the IVS-R4 network but using the IVS-R1 observing mode. The R&D experiments used a 7-station Northern-hemisphere geodetic network and were scheduled monthly, adjacent to IVS-R4 sessions with the same stations except one. Westford participated in the R&D replacing Fortaleza since Fortaleza has not been upgraded to Mark IV.

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

Table 1 lists the average formal errors for X-pole, Y-pole, UT1, and nutation parameters estimated from the R1, R4, R&D, T2, and RDV sessions that took place during 2003. The R1 EOP parameters agree better with C04 than those from R4, T2, and R&D sessions although this may be due in part to the better formal uncertainties of the R1s and the weighting scheme employed in generating C04. Clearly X-pole and DPSI are not determined as precisely with R4 compared to R1. Formally, the R&D EOP precision is not significantly different from R4 precision (except somewhat in X-pole) but there are some significant differences in the comparison with C04. But with only 10 sessions, we may not be able to make statistically significant conclusions. For example, removing one session reduces the wrms difference relative to C04 for UT1 to 2.7 us.

Table 1. Table 1. Average EOP Formal Uncertainties

Session Type	X-pole (μas)	Y-pole (μas)	UT1 (μs)	DPSI (mus)	DEPS (mus)
R1	52	50	1.9	114	47
R4	81	69	2.9	163	65
T2	157	157	6.0	335	145
R&D	65	70	2.4	143	60
RDV	33	37	1.8	72	28

Table 2. Table 2. WRMS Differences Relative to C04

Session Type	X-pole (μas)	Y-pole (μas)	UT1 (μs)	DPSI (mus)	DEPS (mus)
R1	61	71	2.9	113	56
R4	97	66	3.3	165	77
T2	158	99	6.2	164	81
R&D	94	103	9.2	122	36
RDV	44	32	2.5	79	28

4. The CORE Family

Table 3 lists the key technical personnel and their responsibilities so that everyone reading this report will know whom to contact about their particular question.

Table 3. 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
John Gipson	SKED program support and development	NVI, Inc./GSFC
Frank Gomez	Software engineer for the Web site	Raytheon/GSFC
David Gordon	Analysis	Raytheon/GSFC
Ed Himwich	Network Coordinator	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 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 2004

The CORE Operation Center will continue to be responsible for the following IVS sessions during 2004.

- The IVS-R1 sessions will be observed weekly and recorded in a Mark IV mode. We will increase the number of stations using 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 2004 as determined by the IVS Observing Program Committee is to study how to use Gb/s data rate for geodesy. Phase delay will be attempted and the SNRs will be set high.
- The RDV sessions will be observed 6 times during the year.