CORE Operation Center Report

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Abstract

This report gives a synopsis of the activities of the CORE Operation Center from January 2006 to December 2006. The report forecasts activities planned for the year 2007.

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 which started in 2002, used the Mark IV recording mode for each session. The IVS program began using the Mark 5 recording mode in mid 2003. By the end of 2006, all stations with the exception of two have been upgraded to Mark 5. Due to the efficient Mark 5 correlator, the program continues to be station time and media dependent—as it has been for the past two years. The following are the network configurations for the sessions for which the CORE Operation Center was responsible:

IVS-R1: 52 sessions, scheduled weekly and mainly on Mondays, six to eight station networks

RDV: 6 sessions, scheduled evenly throughout the year, 16 to 20 station networks

IVS-R&D: 10 sessions, scheduled monthly, five to seven station networks

2. IVS Sessions January 2006 to December 2006

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

- IVS-R1: In 2006, the IVS-R1s were scheduled weekly with six to eight station networks. Ny-Ålesund, Westford, and Wettzell participated in most of the IVS-R1 sessions. Fortaleza participated in several IVS-R1 sessions using 4 MHz bandwidth while the other stations used 8 MHz. Seshan participated in the IVS-R1 sessions with only 8 BBC during 2006. Both Ny-Ålesund and Zelenchuckskaya were tagged along to all IVS-R1 sessions in which the two stations participated.

  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 discs to the correlator as rapidly as possible. The "1" indicates that the sessions are mainly 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 a small number of sources. NASA (the CORE Operation Center) prepares the schedules for the RDV sessions.

- R&D: The purpose of the 10 R&D sessions in 2006, as decided by the IVS Observing Program Committee, was to record at 1 Gbit/s data rate to evaluate the geodetic results. Those experiments also tested the entire data flow from scheduling through analysis for the higher data rate. There were six regular stations that participated in the R&D sessions during 2006 until July when Algonquin stopped observing permanently.

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

Table 1 gives the average formal errors for the R1, R4, RDV, R&D, and T2 sessions from 2006. The R1 sessions have somewhat better formal uncertainties in 2006 compared with 2005, where poorer uncertainties in 2005 were mostly due to problems with Gilcreek. RDV uncertainties are somewhat better in 2006 than 2005 apparently reversing the trend of the previous 2-3 years, which was caused by a decrease in the number of sites in the RDV network and in the number of observations. The differences between R&D mean formal uncertainties from 2005 and 2006 is due to a generally smaller observing network for the 2006 sessions.

Table 2 provides the EOP differences with respect to IGS for the different VLBI series. The level of WRMS agreement for the R1 sessions is better in 2006 than in 2005, which is consistent with better formal uncertainties in 2006. On the other hand, the agreement of R4 sessions with IGS was worse in 2006, consistent with poorer formal uncertainties. To understand the cause of this requires further investigation of the R4 networks used in 2005 and 2006. No statistically significant conclusions can be drawn from the WRMS differences for the RDV and T2 sessions since there are too few sessions available.

Table 1. Average EOP Formal Uncertainties for 2006

Session Type	Num	X-pole (μas)	Y-pole (μas)	UT1 (μs)	DPSI (μas)	DEPS (μas)
R1	49	54(62)	52(59)	2.5(2.3)	111(132)	45(53)
R4	49	73(62)	72(59)	3.2(2.3)	166(132)	67(53)
RD	8	73(59)	57(51)	2.0(1.8)	146(120)	58(49)
T2	3	54(62)	55(61)	2.5(2.5)	126(148)	48(60)
RDV	5	40(43)	41(48)	1.9(2.6)	74(84)	31(34)

Values for 2005 are shown in parenthesis

4. The CORE Operations Staff

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 2. Offset and WRMS Differences (2006) Relative to the IGS Combined Series

Session Type	Num	X-pole		Y-pole		LOD	
		Offset (μas)	WRMS (μas)	Offset (μas)	WRMS (μas)	Offset (μs/d)	WRMS (μs/d)
R1	49	-78(-56)	79(90)	-185(-162)	79(88)	-5(-2)	18(17)
R4	49	-122(-138)	97(92)	-181(-212)	136(105)	-2(1)	21(19)
RD	8	-30(-146)	164(134)	-199(-178)	180(111)	1(-1)	17(17)
T2	3	-180(-35)	106(l53)	-197(-254)	86(83)	-4(2)	9(19)
RDV	5	-47(-70)	10(29)	-150(-138)	81(43)	-2(3)	11(20)

Values for 2005 are shown in parenthesis

Table 3. Key Technical Staff of the CORE Operations Center

Name	Responsibility	Agency
Dirk Behrend	Organizer of CORE program	NVI, Inc./GSFC
Brian Corey	Analysis	Haystack
Irv Diegel	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
Dan MacMillan	Analysis	NVI, Inc./GSFC
Leonid Petrov	Analysis	NVI, Inc./GSFC
David Rubincam	Procurement of materials necessary for CORE operations	GSFC/NASA
Dan Smythe	Tape recorder maintenance	Haystack
Cynthia Thomas	Coordinate master observing schedule and prepare observing schedules	NVI, Inc./GSFC

5. Planned Activities during 2007

The CORE Operation Center will continue to be responsible for the following IVS sessions during 2007.

- The IVS-R1 sessions will be observed weekly and recorded in a Mark 5 mode.
- The IVS-R&D sessions will be observed 10 times during the year. The purpose of the R&D sessions in 2007 as determined by the IVS Observing Program Committee is to continue the series of Gb/s tests and to check new stations in Gigabit mode.
- The RDV sessions will be observed 6 times during the year.