

CORE Operation Center Report

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Abstract

This report gives a synopsis of the activities of the CORE Operation Center from January 2007 to December 2007. The report forecasts activities planned for the year 2008.

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 $3.5 \mu\text{s}$ for UT1 and $100 \mu\text{as}$ 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 2007, all stations were 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 three 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, 14 to 18 station networks

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

2. IVS Sessions January 2007 to December 2007

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

- IVS-R1: In 2007, 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 until the end of October. Fortaleza started using 8 MHz bandwidth during R1300 on October 29. Seshan participated in the IVS-R1 sessions with only 8 BBCs during 2007. Both Ny-Ålesund and Zelenchukskaya 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 8 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 2007, as decided by the IVS Observing Program Committee, was to record at 1 Gbit/s data rate to evaluate the geodetic results for sessions one through four. Those experiments also tested the entire data flow from scheduling through analysis for the higher data rate. The purpose of the fifth session was to determine polarization leakage in the receiver on the geodetic VLBI measurables. The purpose of the sixth through tenth sessions was to test 512 Mbps recording mode for possible usage in the CONT08 campaign.

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

Table 1 gives the average formal errors for the R1, R4, T2, and RDV sessions from 2007. The R1 sessions have significantly better formal uncertainties in 2007 compared with 2006. RDV uncertainties are worse in 2007 than 2006. This is probably due to the decrease in the number of sites in the RDV sessions from 2006 (18-19 sites) to 2007 (15-16 sites).

Table 2 shows the EOP differences with respect to IGS for the R1, R4, and RDV series. The level of WRMS agreement for the R1 and R4 sessions in 2007 is within 10-15% of the WRMS IGS difference in 2006. The RDV WRMS IGS differences are larger than in 2006; however, it is difficult to draw any statistically significant conclusions from these differences since there were only 5 RDV sessions that were analyzed at the time of writing.

Table 1. Average EOP Formal Uncertainties for 2007

Session Type	Num	X-pole (μ as)	Y-pole (μ as)	UT1 (μ s)	DPSI (μ as)	DEPS (μ as)
R1	49	45(54)	43(52)	1.9(2.5)	82(111)	33(45)
R4	49	69(73)	73(72)	2.9(3.2)	162(166)	68(67)
T2	1	44(54)	49(55)	2.2(2.5)	107(126)	36(48)
RDV	5	50(40)	53(41)	2.8(1.9)	92(74)	41(31)

Values for 2006 are shown in parentheses

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 (2007) Relative to the IGS Combined Series

Session Type	Num	X-pole		Y-pole		LOD	
		Offset (μ as)	WRMS (μ as)	Offset (μ as)	WRMS (μ as)	Offset (μ s/d)	WRMS (μ s/d)
R1	52	-20(7)	60(76)	4(15)	77(77)	-1(-4)	19(17)
R4	52	-38(-35)	112(98)	10(36)	125(131)	2(-2)	22(21)
RDV	5	-10(31)	104(16)	-140(22)	86(95)	7(-7)	22(12)

Values for 2006 are shown in parentheses

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
Mark Evangelista	Receiver 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	NVI, Inc./GSFC
Ed Himwich	Network Coordinator	NVI, Inc./GSFC
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 2008

The CORE Operation Center will continue to be responsible for the following IVS sessions during 2008.

- 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 2008 as determined by the IVS Observing Program Committee is to continue the series of 512 Mbps tests.
- The RDV sessions will be observed 6 times during the year.