

CORE Operation Center Report

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Abstract

This report gives a synopsis of the activities of the CORE Operation Center from January 2008 to December 2008. The report forecasts activities planned for 2009.

1. Changes to the CORE Operation Center's Program

The Earth orientation parameterization 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, initially 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 dependent on station time and media—as it has been for the past four 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 from January 2008 to December 2008

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

- IVS-R1: In 2008, the IVS-R1s were scheduled weekly with six to eight station networks. There were four stations that participated in at least half of the scheduled sessions, Ny-Ålesund, Westford, Fortaleza, and Wettzell. 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 the 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 purposes of the nine R&D sessions in 2008, as decided by the IVS Observing Program Committee, were the following. The purpose of sessions one, five, and six was to observe high-redshift radio sources. The purpose of sessions two through four was to test the 512 Mbps recording mode for possible usage in the CONT08 campaign. Sessions seven and eight were used to vet candidate geodetic sources. Session nine was used to select sources for the next generation of the ICRF, which will be unveiled in 2009.
- CONT08: The purpose of CONT08 was to provide a two-week campaign of continuous VLBI sessions, scheduled for observing during the month of August (August 12 through August 27). The CONT08 campaign continues the series of the very successful continuous VLBI campaigns that were observed at irregular intervals: January 1994, August 1995, September 1996, October 2002, and September 2005.

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

Table 1 gives the average formal errors for the R1, R4, RDV, and T2 sessions from 2008. The R1 sessions have formal uncertainties about the same as for 2006, but worse than in 2007. It is not clear what is different for the 2008 R1 sessions, but it is possible that network differences account for the change in formal uncertainties. R4 uncertainties for 2008 are at about the same level as for 2006—2007. RDV uncertainties are better in 2008 than 2007. This may be due in part to an increase in the number of sites in the RDV sessions from 15-16 sites in 2007 to 17-18 sites in 2008.

Table 2 shows the EOP differences with respect to IGS for the R1, R4, T2, and RDV series. For most session types, the level of WRMS agreement in 2008 is better than the WRMS agreement for all sessions of that type. The WRMS differences were computed after removing a bias, but estimating rates does not affect the residual WRMS significantly.

Table 1. Average EOP formal uncertainties for 2008.

Session Type	Num	X-pole (μas)	Y-pole (μas)	UT1 (μs)	DPSI (μas)	DEPS (μas)
R1	50	56(45,54)	51(43,52)	2.4(1.9,2.5)	109(82,111)	42(33,45)
R4	50	72(69,73)	79(73,72)	2.8(2.9,3.2)	176(162,166)	73(68,67)
T2	5	53(44,54)	66(49,55)	2.7(2.2,2.5)	127(107,126)	55(36,48)
RDV	5	43(50,40)	45(53,41)	2.2(2.8,1.9)	77(92,74)	30(41,31)

Values in parentheses are for 2007 and then 2006

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 (2008) 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(356)	-29(8)	92(90)	64(49)	71(89)	-3(-2)	17(17)
R4	52(355)	-44(-35)	101(108)	56(45)	108(109)	-5(0)	15(19)
RDV	5(53)	-13(65)	71(85)	47(73)	87(89)	-3(0)	14(15)
T2	5(57)	-33(3)	63(139)	3(11)	93(125)	15(-2)	11(19)

Values in parentheses are for the entire series for each session type

Table 3. Key technical staff of the CORE Operations Center.

Name	Responsibility	Agency
Dirk Behrend	Organization 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 engineering 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
David Rubincam	Procurement of materials necessary for CORE operations	GSFC/NASA
Braulio Sanchez	Procurement of materials necessary for CORE operations	GSFC/NASA
Dan Smythe	Tape recorder maintenance	Haystack
Cynthia Thomas	Coordination of master observing schedule and preparation of observing schedules	NVI, Inc./GSFC

5. Planned Activities during 2009

The CORE Operation Center will continue to be responsible for the following IVS sessions during 2009.

- The IVS-R1 sessions will be observed weekly and recorded in a Mark 5 mode.
- The IVS-R&D sessions will be observed ten times during the year.
- The RDV sessions will be observed six times during the year.