

# **MONTHLY PROGRESS REPORT**

February, 2004

Prepared for

**NASA/Goddard Space Flight Center  
Greenbelt, MD 20771**

**Contract NAS5-01127**

Prepared by

**NVI, Inc.  
William E. Himwich  
Project Manager**

## Monthly Report

### Subtask 1: Observation Coordination

#### 1. Work Plan

COTR: C. Ma  
 Subtask Leader: N. Vandenberg  
 Subtask description: This subtask supports coordination of the International VLBI Service activities including support of the Coordinating Center and the Network Coordinator.  
 Contributors to this Report: N. Vandenberg, C. Thomas, D. Gonzalez, K. Baver, J. Gipson

#### 2. Conformance to Metrics and Performance Standards and Deliverables

The table below gives a summary of the subtask's work or metrics in the surveillance implementation plan that were met this month. Items marked "n/a" are not applicable this month. Copies of the reports listed in the table are available in the Monthly Report notebooks maintained in the NVI office onsite (Bldg 33, Rm G206).

Work or Metric	Assessment of Performance During the Month	Deliverables
Master schedule posted in November	n/a	
Monthly master schedule updates	Scheduled posted during the month.	Master schedule
Observing schedules 5 days prior to session	Schedules were posted an average of 7.0 days prior to each session.	Schedules and notes
Inventory of data tapes	Tape inventory monitored.	
Maintain session web pages	Web pages monitored.	
Maintain sked/drudg	Bugs fixed this month.	
Maintain catalogs, respond in 5 days	Response <5 days.	
Response in 5 days for sked/drudg	Response was <1 day this month.	

#### 3. Work Performed During the Past Month

a. **2003 Master Schedule.** C. Thomas updated the 2003 Master Observing Schedule during February and posted the file to cddisa. The status column and correlator column updates were the modifications made to the observing schedule this month.

**2004 Observing Schedule.** C. Thomas updated the 2004 Master Observing Schedule during February and posted the file to cddisa. The status column and correlator column updates were some of the modifications made to the observing schedule this month. The following are notes posted to cddisa about the 2004 Observing Schedule about the other changes.

- February 6 HartRAO is able to participate in the IVS-OHIG29 and IVS-T2026 sessions because their EVN schedule had some breaks. New schedules were posted to cddisa by Arno Mueskens because of this change.
- February 9 The JADE sessions were added to the master schedule.
- February 26 Matera will be down for at least a month due to rail problems. Medicina has agreed to replace Matera in the R1113, R1115, R1117, and R1119 sessions.
- February 26 Noto's new receiver will not be operational until mid to late May. As a result, Noto will not participate in RDV44 on May 5.
- February 26 The correlator assignments for the IVS-T2s and R&Ds have been modified, please review the master schedule.

**Schedules.** The following schedule files were made and posted to cddisa on the dates listed below by C. Thomas.

Feb 10 16:17	r1110.skd
Feb 13 12:08	r1111.skd
Feb 25 17:53	r1112.skd

The schedules were posted on an average of 7.0 days prior to the observing date.

**IVS-R1 & IVS-R4.** C. Thomas kept track of the IVS-R1 and IVS-R4 sessions during the month of February. All of the R4s and R1s were up to date at the end of the month and completed within 15 days with the exception of R4106 (completed in 20 days) and R1106 (completed in 16 days).

**Mark 5.** C. Thomas has been working on the Mark 5 module distribution. USNO has approximately 140 Mark 5 modules that need to be distributed to the stations. C. Thomas has worked on a report that shows all of the stations with Mark 5 can record with Mark 5-only for all geodetic sessions except the RDVs (processed at the VLBA which is not a Mark 5 correlator). C. Thomas will update the master schedule with the Mark 5 information so that the Washington correlator can use the information to distribute the Mark 5 modules. The modules will be distributed in early March.

**Correlator Loading.** At the request of the Bonn Correlator, C. Thomas modified the correlator loading and allocated most of the T2 sessions to Bonn instead of the Washington Correlator. This reallocation increased Bonn's loading so that their funding would not be in jeopardy. The request for additional sessions is largely due to the increased efficiency in the processing factors at the correlators which is attributed to Mark 5. Unfortunately, Washington's loading is now low. The program committee is reviewing ways to increase the processing load at the correlators.

**RDV43.** J. Gipson generated the schedule for RDV43. This schedule included 12 sources at the request of L. Petrov. These are all sources which had not been observed by the VLBA.

**INT and INT2.** N. Vandenberg sent a message to R. Kilger (Wetzell) outlining a plan for additional INT and INT2 observing. Copies were sent to W. Schlueter (BKG) and M. Rothacher (TU Munich) for concurrence. The outline of the plan is to add an INT day on Thursday during, or just before, the R4 session, and to add a Sunday INT2 to be processed at GSI. No response was received from Wetzell as of the end of the month. The plan was developed based on discussions held at the OPC and several splinter discussions at the General Meeting.

**b. Session web pages.** D. Gonzalez continued the process of cleaning up nocode file for 2004. A few of the messages had neglected to include the experiment name in the subject line, so D. Gonzalez added the names to the subject and resubmitted.

D. Gonzalez monitored the 2004 sessions index to assure that all schedule files were submitted in a timely fashion to allow stations to access them for experiments. Eleven schedule reminders were sent out.

D. Gonzalez continued the process of locating missing log files, correlator reports, schedule files, etc for the session web pages. Two missing station logs were located and submitted to cddisa. One correlator report was requested and posted.

**c. Tape shipping monitoring.** D. Gonzalez continued to monitor TRACK to assure stations had enough tapes to participate in scheduled experiments.

**d. Special Experiments.** Upon request from A. Whitney (Haystack) N. Vandenberg generated a test schedule for the first real-time VLBI test between GGAO and Westford. The goal was to acquire data and send it in real time to the correlator without recording on disks.

N. Vandenberg provided setup advice and reviewed a schedule (NORD01) generated by R. Haas for testing the new geodetic capability at Metsahovi and for helping Urumqi test their Mark 5 system.

**e. Source Monitoring.** In January J. Gipson developed the program *updatevdbout*, which updates the VLBI Summary Database (VSDB) given a sked file. This routine was incorporated in the script which processes schedules when they are put on cddisa. In checking the performance of this script, J. Gipson discovered that there several sessions did not make it into

VSDB. This was traced to an error in *updatevdbout* in parsing the output of sked files.

We began the routine source monitoring program with session R1108. This and the subsequent R1s all used the scheme to select the sources:

1. 10 sources were chosen from the source monitoring list.
2. An additional 50 sources were chosen from the geodetic catalog.

We also need to write a routine to update VSDB when an experiment is received from the correlators. This routine would read the database, extract the number of observations which were correlated and the number usable, and then update the database accordingly.

J. Gipson began work on a memo summarizing the source monitoring program.

**f. Distribution of new sked version.** The research version of sked was put on cygx3 at USNO in January. At that time we found that we could not communicate with the *mysql* database on lyra. Ultimately this was tracked to a firewall issue at USNO. The firewall was modified by USNO personnel to enable communication. This communication is necessary if USNO is to communicate in the source monitoring program.

A. Mueskens (U. Bonn) was having problems generating good schedules for the O'Higgins bursts. J. Gipson generated a schedule for the first of these using the research version. A. Mueskens asked for and was given a copy of the binary executable which he used to generate schedules for other T2 sessions. He found several bugs in sked which were subsequently fixed. There are some problems in connecting from Bonn to the *mysql* database. The connection starts OK, but does not work correctly. J. Gipson is trying to track down the reason for this.

N. Vandenberg also found several errors in the research version which were subsequently fixed.

J. Gipson worked on writing up distribution notes for this release of sked.

J. Gipson attended the 3<sup>rd</sup> IVS meeting in Ottawa where he presented a paper on "Past, Present and Future of Sked" which was well received by the participants.

**g. Drudg.** J. Gipson corrected a bug in drudg having to do with incorrectly handling Kokee's formatter.

**h. Catalogs.** N. Vandenberg updated the catalogs at the request of R. Haas to include parameters for the new geodetic receiver at Metsahovi.

#### 4. Problem Areas

There are no problems to report.

## **5. Travel**

J. Gipson traveled to Ottawa to attend the General Meeting.

## **6. Work Planned for Next Month**

- Generate and submit schedules for March/April observing sessions.
- Update master schedule for 2004 as needed.
- Monitor tape and disk module usage.
- sked/drudg/catalog and software updates as needed

## Monthly Report

### Subtask 2: Data Acquisition System Control Software

#### 1. Work Plan

COTR: Chopo Ma  
 Subtask Leader: Ed Himwich  
 Subtask description: This subtask supports development, documentation and user support for the Field System.  
 Contributors to this Report: Ed Himwich, Ray Gonzalez

#### 2. Conformance to Metrics and Performance Standards and Deliverables

The table below gives a summary of the subtask's work or metrics in the surveillance implementation plan were met this month. Items marked "n/a" are not applicable this month. Copies of the reports listed in the table are available in the Monthly Report notebooks maintained in the NVI office onsite (Bldg 33, Rm G206).

Work or Metric	Assessment of Performance During the Month	Deliverables
Maintain FS software, release revision and patches	n/a	n/a
Linux Kernel Support	n/a	n/a
Test and prepare new FS PCs for VLBI network stations	n/a	n/a
FS Documentation	n/a	n/a
Respond to reports of FS problems within 2 working days	There were 29 requests received during the month. Two low priority requests were responded to more than two days. One high priority request was responded to in more than 2 days due to travel, but it would not have been possible to provide any assistance anyway. All others were responded to within a few hours.	n/a

EVN TOG meeting report within two weeks	n/a	n/a
--	-----	-----

### 3. Work Performed During the Past Month

**a. PC Computers.** R. Gonzalez has received and installed two (2) PC FS with the new FS Linux 5 distribution. One for Shanghai, China and one as a replacement for the GSFC/NASA atri FS server.

**b. Security Scan.** R. Gonzalez has processed the two (2) PC FS system according to NASA IT Security requirements. M. Bur (CSC) performed the security scans. It has also been arranged for R. Gonzalez to do future Linux PC FS computer security scans using the same security scan software.

**c. atri.gsfc.nasa.gov.** R. Gonzalez has setup the new atri server in the Lab (Room F221) next to the old atri server. The new atri server will come online as soon as another IDE disk arrives.

**d. fsadapt script.** R. Gonzalez has added the IRQ to the /etc/serial.conf file from the file produced from the vscardcfg software for the VScom multiport serial card. This is due to different PC's having different BIOS settings.

**e. FS Linux 5 Distribution.** R. Gonzalez has been helping users with problems H. Osaki (CRL), W. Schwarz (Wetzell), C. Kodak (Honeywell), J. Redmond (Honeywell) and others.

E. Himwich explored issues related to applying upgrades to the distribution. It appears that some times it is necessary to answer interactive questions during the upgrade process. These are either new questions associated with the upgrade or old questions that "debconf" lost the answers to. An e-mail was sent to the users advising to take the default answers if they should get one of these questions and to inform us of what questions they were asked and how they responded.

E. Himwich obtained information from A. Whitney (Haystack) about a recommended bar code reader in the field at the request of S. Farley (NRCAN). Himwich made some suggestions about improvements that should be made in the documentation that describes the readers, primarily to add some missing set-up information.

**f. IVS meeting.** R. Gonzalez prepared a Field System Development poster.

**g. Mark 5.** E. Himwich responded to a problem reported at Onsala with the back\_check command. It turned out that the cause of the problem was that the Mark5A control program was returning incorrect data if both banks were empty. J. Ball (Haystack) created a new version of the program that corrected this problem.

**h. Support requests.** There were 29 requests received during the month. Most were responded to within a few hours despite personnel being on travel. Some requests arrived and responded to during weekends. Two low priority requests were responded to in more than two days. One high

priority request was responded to in more than 2 days due to travel, but it would not have been possible to provide any assistance anyway. All others were responded to within a few hours.

i. **FS-9.6.11.** E. Himwich starting collecting input for users for changes for the next release of the FS, expected in early April. The major changes will include improvements in the mark 5 support, new eVLBI support, and new ftpVLBI support.

E. Himwich consolidated changes made to the FS in version 9.6.10 (now installed in Japan at several telescopes with changes that been under development here.

#### **4. Problem Areas**

There are no problem areas to report this month.

#### **5. Travel**

There was no travel this month.

#### **6. Work Planned for Next Month**

- Finish logpl range commands for Channel verses Channel.
- Continue development of ddout and fsvue Client/Server
- Continue integration of Mark 5A recorders into the FS
- Continue development of FS release FS 9.6.11
- Modify phase-cal FS software to work with new firmware
- Assist users installing FS Linux Distribution 5
- Check-out FS PCs that arrive

## Monthly Report Subtask 3: Station Support

**1. Work Plan**

COTR: Chopo Ma  
 Subtask Leader: Ed Himwich  
 Subtask description: This subtask provides for support to cooperating stations.  
 Contributors to this Report: Ed Himwich

**2. Conformance to Metrics and Performance Standards and Deliverables**

The table below gives a summary of the subtask's work or metrics in the surveillance implementation plan were met this month. Items marked "n/a" are not applicable this month. Copies of the reports listed in the table are available in the Monthly Report notebooks maintained in the NVI office onsite (Bldg 33, Rm G206).

Work or Metric	Assessment of Performance During the Month	Deliverables
Site visit reports within 3 weeks of trip	n/a	n/a

**3. Work Performed During the Past Month**

None

**4. Problem Areas**

There are no problem areas to report this month.

**5. Travel**

No travel this period.

**6. Work Planned for Next Month**

– None

## Monthly Report

### Subtask 4: Correlation, Data Processing, and Analysis

#### 1. Work Plan

COTR: Chopo Ma  
 Subtask Leader: David Gordon  
 Subtask description: This subtask provides for analysis of VLBI data, station performance monitoring, generation of solutions, and maintenance of operational software.  
 Contributors to this Report: David Gordon and Karen Baver.

#### 2. Conformance to Metrics and Performance Standards and Deliverables

The table below gives a summary of the subtask work or metrics in the surveillance implementation plan that were met this month. Items marked N/A are not applicable this month. Copies of the reports listed in the table are available in the Monthly Report notebooks maintained in the NVI office onsite (Bldg 33, Room G206).

Work or Metric	Assessment of Performance During the Month	Deliverables
Import/process/analyze ~150 24-hr sessions, ~200 1-hr sessions annually	9 24-hr and 14 1-hr NEOS Intensive sessions were imported, processed, and analyzed.	9 24-hr MK4 and 14 1-hr NOES Intensive session analyzed database files and superfiles.
Submit updated EOP to IVS Data Center: 24-hr MK4 sessions within 2 working days, 1-hr NEOS UT1 sessions within 3 working hours.	All EOP updates made within the required time. Average response times: 24 hr Mk4 sessions – 4.5 working hrs, 7.3 elapsed hrs. 1-hr NEOS sessions – 1.6 working hrs, 5.2 elapsed hrs.	9 24-hr MK4 and 1 RDV session EOP file updates, and 14 NEOS and 3 INT2 UT1 file updates, submitted to IVS.
Process 6 RDV's annually	One RDV processed and analyzed.	RDV42 analyzed database file and superfile.
Monitor station performance	Station performance monitored in all new sessions, documented	Analysis history entries.

	in database history entries.	
Quarterly TRF to IVS	N/A	N/A
Quarterly TRF solutions and plots to GSFC web page within 2 weeks.	N/A	N/A
CRF updates as necessary	N/A	N/A
Maintain and document operational software.	N/A	N/A

### 3. Work Performed During the Past Month

**a. 24-hr Sessions Processed.** D. Gordon and K. Baver processed 9 24-hr Mark4 VLBI sessions. Processing included importing version 1 database files into the database catalog, inserting theoretical quantities with program *Calc*, inserting cable and weather files with program *Dbc*, and analysis and updating with program *Solve*. Updated EOP files were generated for all sessions and submitted to the IVS Data Center immediately following analysis. The experiments processed were:

\$04JAN20XA/SA	R1106
\$04JAN22XE/SE	R4105
\$04JAN26XA/SA	R1107
\$04JAN26XN/SN	CRF25
\$04JAN29XE/SE	R4106
\$04FEB02XA/SA	R1108
\$04FEB05XE/SE	R4107
\$04FEB09XA/SA	R1109
\$04FEB12XE/SE	R4108

**b. Intensive Sessions Processed.** K. Baver and D. Gordon processed 14 NEOS-Intensive UT1 sessions (\$04JAN28XU through \$04FEB24XU). Processing included importing version 1 database files into the database catalog, inserting theoretical quantities with program *Calc*, inserting cable and weather files with program *Dbc*, and analysis and updating with program *Solve*. Updated UT1 files were generated for each session and submitted to the IVS Data Center immediately following analysis.

K. Bayer also captured, processed, and analyzed three sessions from the IVS-INT2 UT1 Intensive series (\$04JAN31XK through \$04FEB14XK).

**c. RDV Sessions Processed.** D. Gordon processed and analyzed VLBA session RDV42 (\$03DEC17XA/SA). This involved fringing with program *AIPS* and analysis with *Calc/Solve*. After analysis and updating, the analyzed databases and an updated EOP file was submitted to the IVS Data Center.

**d. Station Performance Monitoring.** Each station's performance was monitored in each experiment processed. History entries were written for each experiment processed, with descriptions of any significant station problems.

**e. TRF Updates.** No TRF (Terrestrial Reference Frame) updates were made during the month.

**f. CRF Updates.** No CRF (Celestial Reference Frame) updates were made during the month.

**g. Operational Software.** N/A.

#### 4. Problem Areas

None.

#### 5. Travel

None.

#### 6. Work Planned for Next Month

- Process all incoming 24-hr and 1-hr Intensive VLBI sessions and submit EOP results to IVS.
- Prepare and submit quarterly TRF solutions, plots, and data files to the IVS Data Center and to the GSFC VLBI web page.
- Update operational software as necessary for smooth data handling operations.
- Continue the Unix to Linux conversion of the database catalog system.

## Monthly Report Subtask 5: Data Distribution and Archiving

### 1. Work Plan

COTR: Chopo Ma  
 Subtask Leader: David Gordon  
 Subtask description: This subtask provides for distribution of databases and data related files and archiving databases.  
 Contributors to this Report: David Gordon, Karen Bayer, and Cindy Villiard.

### 2. Conformance to Metrics and Performance Standards and Deliverables

The table below gives a summary of the subtask work or metrics in the surveillance implementation plan that were met this month. Items marked N/A are not applicable this month. Copies of the reports listed in the table are available in the Monthly Report notebooks maintained in the NVI office onsite (Bldg 33, Room G206).

Work or Metric	Assessment of Performance During the Month	Deliverables
Submit Mk4 databases, SINEX, NGS, cable/wx files to IVS within 2 working days.	All products submitted within the required time. Average response time: 24-hr Mk4 sessions – 4.0 working hours, 12.0 elapsed hours. 1-hr Intensive sessions – 1.6 working hours, 5.2 elapsed hours.	Database files, NGS files, cable and weather files for 4 Mk4 24-hr sessions, 1 VLBA session, and 14 1-hr NEOS Intensive sessions.
Archive ~800 database files annually.	All necessary archiving and purging performed, database and solution catalogs updated accordingly.	Databases: 141 archived, 3 purged.

### 3. Work Performed During the Past Month

**a. IVS Data Products.** D. Gordon and K. Bayer submitted data products for all NASA and NEOS-Intensive sessions to IVS immediately after their analysis, using programs *opa* and *ftp*. Data products included the analyzed database files, NGS files, SINEX files, cable calibration files, and weather files for 4 R1, 1 RDV, and 14 NEOS-Intensive sessions.

**b. Archiving.** C. Villiard archived 141 database files and D. Gordon purged 3 database files.

**4. Problem Areas**

None.

**5. Travel**

None.

**6. Work Planned for Next Month**

- Submit data products for all new NASA/GSFC and NEOS-Intensive sessions.
- Archive, purge, move, and/or restore database and solution files, as needed.

## Monthly Report

### Subtask 6: Technique Improvement and Research

#### 1. Work Plan

COTR: Chopo Ma  
 Subtask Leader: Dan MacMillan  
 Subtask description: This subtask provides for support of the research activities of the Goddard VLBI group.  
 Contributors to this Report: Dan MacMillan, L. Petrov, David Gordon, and Karen Baver

#### 2. Conformance to Metrics and Performance Standards and Deliverables

The table below gives a summary of the subtask's work or metrics in the surveillance implementation plan were met this month. Items marked "n/a" are not applicable this month. Copies of the reports listed in the table are available in the Monthly Report notebooks maintained in the NVI office onsite (Bldg 33, Rm G206).

Work or Metric	Assessment of Performance During the Month	Deliverables
Research activities	(1) Completed preparations of IVS general meeting presentations (2) Continued with CALC upgrade (3) Analysis of gravity session and preparation of paper for IVS proceedings (4) NMF2 mapping function (5) Analysis of R1 and R4 performance	N/A N/A N/A N/A N/A
AIPS install & test	N/A	N/A
Calc/solve maintainance	0 solve bugs (frozen version) were fixed.	N/A
Calc/solve problems (2 day response)	22 problem reports and questions answered within 2 working days with an average response time of 0.4 days	N/A
ICRF-Ext.2	N/A	N/A
Maintain GPS analysis software	N/A	N/A

### 3. Work Performed During the Past Month

**a. Quarterly solution.** L. Petrov ran a solution 2004b with the new a posteriori model of nonlinear motion of Gilcreek from D. MacMillan based on data through 2004.0 and investigated possible errors in Solve. It is planned that the next quarterly solution will be generated using the latest version of SOLVE, which is the Fortran-90 version. In order to compare with the previous Fortran-77 version, D. MacMillan ran the 2003c control file with this latest Fortran-90 version of SOLVE. Comparisons of EOP estimates show wrms differences of less than 1  $\mu$ s. Further tests of the Fortran-90 version are planned.

**b. Mapping function.** L. Petrov has developed mapping function NMF2. NMF2 is obtained by fitting 14-parameter model to the time series of the coefficients for the mapping function IMF for each site separately. The parametric model consists of 6 harmonic constituents for the annual, semi-annual, ter-annual, 4-annual, bi-annual, and diurnal frequencies, mean and drift. IMFh parameters "a", two parameters of the IMFh tilt, parameters "a", "b" and "c" for IMFw are modeled by these site-dependent coefficients. L. Petrov has run 3 baseline-type VLBI solutions. He has upgraded his program olc for computing harmonic site position variations for dealing with the NMF2 mapping function and run several global solutions for estimation of harmonic site position variations using NMF, IMF and NMF2 mapping functions. The results will be reported next month.

**c. Mass loading effects.** D. MacMillan prepared a presentation on mass loading effects on VLBI site position variation and made the presentation at the IVS General Meeting. He began preparing a manuscript for the IVS meeting proceedings.

**d. Gilcreek post-earthquake site variation.** D. MacMillan completed a poster for the IVS General Meeting entitled "Postseismic Transient after the 2002 Denali Fault Earthquake from VLBI Measurements at Fairbanks." He began preparation of a manuscript on this topic for the IVS meeting proceedings.

**e. Higher frequency observing.** In the previous month, D. Gordon reprocessed the last two K/Q sessions using extrapolation in the *AIPS* processing to match the time tags of the consecutive K and Q observation pairs. Both were then processed to get ionosphere-free solutions. These two sessions were combined with the first two K/Q sessions and three global solutions were run by K. Bayer (K band, Q band, and K/Q ionosphere-free) to study the effect of the ionosphere on the derived celestial reference frame. The ionosphere-free version appears to be too noisy to improve the source solutions or to eliminate systematic errors. Listings of the K and Q source position solutions were also Emailed to Dr. M. Rioja (Centro Astronomico de Yebes, Spain) at her request, for use in the VERA project.

**f. VCS Observing.** L. Petrov has completed preparation of a list of sources for the VCS3a observing campaign and handed this list over to E. Fomalont for scheduling.

**g. R1 and R4 performance.** D. MacMillan reported his results at the observing committee meeting at the IVS General Meeting on analysis of the performance of the R4 series and specifically

the effect of TIGOCONC. He also prepared a memo summarizing these results. The conclusion is that TIGOCONC has very little effect on the performance of the R4s and the cause of the systematic apparent R4-C04 differences between alternate R4 networks is that Tom Johnson mistakenly linearly interpolated C04 to the R4 observation times. The presence of zonal tide terms (5-35 day periods) particularly the fortnightly term makes it necessary to do a higher order interpolation like a cubic spline. The linear interpolation error of the zonal tide series is clearly seen in Tom's R4-C04 differences.

**h. IVS General Meeting.** D. Gordon traveled to Ottawa and attended the IVS General Meeting and the IVS Analysis workshop, Feb. 9-12, 2004. He presented two papers, a poster titled 'Calc: The Next Upgrade', and an oral paper titled 'VLBA Impact on Geodesy and Astronomy'. Written versions for the IVS Meeting Proceedings were being prepared at month's end and will be completed next month.

Baver supported D. Gordon's IVS 2004 General Meeting presentation. Baver ran three small solutions using variations of K-band and Q-band data with and without ionosphere information. Baver then produced a source adjustment plot from each solution. Baver later reran the K-band only solution with an additional database for Gordon's IVS 2004 General Meeting Proceedings submission.

**i. Intensive sessions.** To support the production of data and plots for her IVS 2004 General Meeting presentation, K. Baver made special versions of two Fortran programs, corrected a third Fortran program, and updated a fourth Fortran program. To tailor two programs' output for specific plots, Baver made a special version of Plot\_distrib\_series, which plots AZ/EL and RA/DEC observation coordinate plots for a series of databases, and she made two special versions of Difint, which plots (by calendar date) differences between UT1 values observed in the Intensives and UT1 values extrapolated from the closest session in a specified solution of 24 hour sessions. Baver corrected a third program, Dif\_tint, a derivation of Difint that plots UT1 differences against the elapsed time between the observation and extrapolation epochs. The correction incorporates last month's Difint UT1 tidal term correction. Finally, Baver updated Arb\_cluster\_wrms, which calculates the wrms of UT1 differences for groups of Intensive sessions that have nearly the same time difference relative to a 24-hour session. The update reports the number of data points in each group. Baver completed the poster on the Intensives for the IVS 2004 General Meeting.

Baver subsequently converted the Intensives poster to Latex for the IVS 2004 General Meeting proceedings.

L. Petrov prepared proposal for the 16IN VLBI experiments aimed at evaluation of the accuracy of UT1 angles derived from analysis of INT1 and INT2 campaign.

**j. Astrometry data base.** An astrometry database (\$03JAN26XL) was put together for Dr. D. Lebach (Center for Astrophysics). The data was from a VLBA X-band session observing the guide star and two nearby calibrators for the gravity Probe-B mission. The data was processed through AIPS by Dr. Lebach and was picked up by FTP.

**k. Gravity sessions.** L. Petrov participated in the IVS General Assembly in Ottawa. He made an oral presentation "Preliminary results of the IVS gravity experiment grav01".

L. Petrov analyzed three gravity experiments. He has estimated relativistic parameter gamma for the Jupiter and parameters of admittance of the  $v^3/c^3$  terms in gravitational delay. He is preparing a paper for the proceedings with results of this study.

**l. Calc/Solve software.** L. Petrov provided consulting to colleagues from Haystack, USNO, NRAO, Ukraine, Canada and Russia.

#### **4. Problem Areas**

None.

#### **5. Travel**

D. MacMillan, L. Petrov, and D. Gordon traveled to Ottawa for the IVS General Meeting

#### **6. Work Planned for Next Month**

Continue work on Calc 10 upgrades.

Resume work on SOLVE port to Linux

Complete manuscripts for the IVS General Meeting Proceedings

Start work on terdiurnal EOP signal for EGU meeting

Continue work on explaining seasonal site position variations for the EGU meeting

## Monthly Report Subtask 7. IVS

### 1. Work Plan

COTR: C. Ma  
 Subtask Leader: N. Vandenberg  
 Subtask description: This subtask supports International VLBI Service activities, including the Coordinating Center and the Network Coordinator.  
 Contributors to this Report: N. Vandenberg, E. Himwich, K. Bayer

### 2. Conformance to Metrics and Performance Standards and Deliverables

The table below gives a summary of the subtask's work or metrics in the surveillance implementation plan were met this month. Items marked "n/a" are not applicable this month. Copies of the reports listed in the table are available in the Monthly Report notebooks maintained in the NVI office onsite (Bldg 33, Rm G206).

Work or Metric	Assessment of Performance During the Month	Deliverables
Annual Report	Finalized editing, submitted to print shop.	
Support DB meetings: prepare, attend, minutes in a month.	Prepare for and attend 11 <sup>th</sup> meeting in Ottawa. Take notes, submit to board.	Minutes.
Maintain web site	Added links as needed. Reviewed new design.	
Newsletter	Preparation for April issue.	
General Meeting support	Coordination with Local Committee.	
Proceedings	Announced at General Meeting.	
Monitor station performance	Performance data base updated.	
CORE Operation Center	Schedules and notes generated.	

### 3. Work Performed During the Past Month

#### a. Coordinating Center.

*Observing Program Committee.* N. Vandenberg coordinated and chaired an OPC face-to-face meeting to occur during the Ottawa meeting. D. MacMillan and R. Haas (Onsala) also attended for specific agenda items. Notes from the meeting were prepared and sent to the attendees.

*TOW.* N. Vandenberg finalized the TOW notebook files with H. Johnson (Haystack) and sent

a notice to the attendees about availability of the files.

*Newsletter.* N. Vandenberg requested R. Strand (Fairbanks, retired) to write an interview about Gilmore Creek. She reviewed his article and received comments on it from H. Hase (BKG), feature editor.

*Mark 5 Usage.* N. Vandenberg and C. Thomas updated the Mark 5 deployment and usage plan in preparation for the release of large numbers of disk modules by USNO next month. The plan now calls for stations to become Mk5-only as soon as possible. The schedule was shown at the General Meeting as part of the Coordinating Center presentation.

*Web site update.* N. Vandenberg reviewed the partially-built new site, and showed images of the home page and level 1 page at the General Meeting as part of the Coordinating Center presentation.

*General Meeting.* N. Vandenberg completed coordination with the LOC about arrangements for the General Meeting and all the attendant meetings to be held during the week. She attended many meetings during the week representing the Coordinating Center. She prepared a talk with the Coordinating Center report, covering master schedule coordination, Mark 5 status, the new web site, and publications status.

N. Vandenberg placed her photos taken at the General Meeting, along with those received from others, on the IVS ftp site. She made thumbnail pages for viewing on the web, where the user clicks on the small image to load the full size image. She sent a message to participants informing them about the pictures.

N. Vandenberg set up a page with links to the electronic presentations made at the meeting. She made an HTML version of the program and added links to the files. A general message to presenters was sent, requesting them to send presentations. The presentations files are on the IVS ftp site.

K. Baver resumed preparations for the IVS 2004 General Meeting Proceedings. She set up two files for tracking papers, removed some old files to release disk space, and put style and example files on separate ftp areas for the users' convenience. She updated the submission instruction and testing web pages to:

- tell users how to test their submissions on their own machines
- warn users about browser caching problems
- identify or more strongly emphasize user procedures that should improve the processing of the Proceedings:
  - the use of the right file names
  - moving files from the test area to the submission area instead of resubmitting them (which would create duplicate copies and waste space)
  - not moving the postscript output files generated by testing to the submission area (where they are harder to identify and remove)

K. Baver helped six authors solve a variety of problems (five latex problems, a figure problem and four problems in testing their files). She also posted a set of files for an author.

*Annual Report.* K. Baver and N. Vandenberg sent final messages to those who had not submitted reports as of mid-month. A final review of the entire book was done, including the graphics and front pages, and the files were submitted to the print shop.

K. Baver continued processing the IVS 2003 Annual Report. She assisted N. Vandenberg in tracking down all but five of the outstanding reports. (Of these, two components declined to submit reports, two promised to submit but missed the final deadline, and one never responded.) K. Baver then preprocessed the reports submitted in February, correcting fifteen IVS keyword setup problems, eleven figure problems, one table problem and three excessively long reports. Baver printed all reports, made editing changes identified by N. Vandenberg, and printed a second copy of the reports for final review.

K. Baver generated the seven IVS Coordinating Center information reports placed at the back of the Report (e.g., the list of Report acronyms), and she began making corrections identified by N. Vandenberg. K. Baver also generated the text for the necessary GSFC Report Documentation page.

In an effort to make generation of the acronym list more efficient, K. Baver began developing a new process, based on comparisons of identified acronyms to master lists of acronyms to be included and excluded. More work is needed to improve the process, but this month she began developing the master lists, and she wrote two C shell scripts for the new process: `Ann_rep_06b_acro_acc_rej`, to compare each acronym to the master files, and `Ann_rep_06c_acro_context` to print the Report lines in which new acronyms appear in order to help identify the acronyms' meanings.

K. Baver also updated five other scripts. She corrected `Ann_rep_06_info_section`, the C shell script that controls the generation of the seven IVS Coordinating Center information reports (e.g., the acronym list), so that the script calls accent correction scripts at three overlooked places. She also made minor updates to four C shell scripts (`Ann_rep_00a_skeleton`, `Ann_rep_00b_get_new`, `Ann_rep_00e_pass`, and `Ann_rep_01_init`) to recognize a moved processing directory.

K. Baver investigated reports from two users that the web-based test script was not putting the output postscript files in the test area. She tentatively tracked this to a browser caching problem, in which the files were actually produced but the users' browsers didn't see the directory updates. But neither user had time to help test this theory.

K. Baver removed duplicate lists from two IVS web pages (the lists of IVS Associates sorted by last name and by country).

*Other Reports.* N. Vandenberg prepared the annual report for the IERS, using input from A. Nothnagel (U Bonn) for the analysis part of the report. She updated last year's report and submitted it to W. Dick (IERS CB) for publication.

**b. Network Coordinator.** E. Himwich prepared a station performance report for 2003. This included information about what stations had problems and how much data was lost. Results were prepared on what percentage of observing time was lost for each station. Problems were also divided into categories based on what sub-system experienced the problem. This information was presented at the IVS Directing Board meeting and the General Meeting. The presentation at the General Meeting presented stations performance in summary form so that it was impossible to determine the "ranking" of stations.

E. Himwich attended several meetings in Ottawa: IVS Directing Board, IVS General meeting, IVS Analysis Workshop, IVS Working Group 3 meeting, IVS Observing Program Committee meeting, eVLBI protocol meeting, and Mark 5 logistics meeting. These meetings were part of or were organized around the IV General Meeting in Ottawa.

E. Himwich prepared the Network Coordinator's report for the IVS 2003 Annual Report. This included the station performance report and an update on the clock offset situation.

E. Himwich prepared the GSFC Technology Development Center report for the IVS 2003 Annual Report.

Currently two stations are declared "down". One of these is Crimea, which appears unable to record any data. There is no clear way to solve this problem until the station upgrades to Mark 5. The other station that is down is Matera. It has a rail problem. There will be no information on how soon this will be fixed for at least a month. Therefore it was decided more than just being "down", Matera should be removed from all schedules and stations found to substitute for it when possible.

#### **4. Problem Areas**

No problems to report.

#### **5. Travel**

N. Vandenberg and E. Himwich attended the General Meeting in Ottawa.

#### **6. Work Planned for Next Month**

- Continue maintenance of the station performance data base.
- Continue maintenance of the clock offset data base.
- Continue to monitor and update Mark 5 usage plan.
- Send final Annual Report files to publications office.
- Try to complete work on IVS web site design.
- Continue work on processing of papers for Proceedings.
- Begin production of web version of Annual Report.

## Monthly Report

### Subtask 8. Computer Support

#### 1. Work Plan

COTR: Chopo Ma  
 Subtask Leader: Frank Gomez  
 Subtask description: This subtask provides system administration support and user support for the Code 926 computers and users.  
 Contributors to this Report: Frank Gomez and Scott Bringen.

#### 2. Conformance to Metrics and Performance Standards and Deliverables

The table below gives a summary of the subtask work or metrics in the surveillance implementation plan that were met this month. Items marked N/A are not applicable this month. Copies of the reports listed in the table are available in the Monthly Report notebooks maintained in the NVI office onsite (Bldg 33, Room G206).

Work or Metric	Assessment of Performance During the Month	Deliverables
System administration support	All systems administration work documented in the systems administrator's log file.	N/A
Update operating systems within 6 weeks	All HP10.20 systems updated with the latest HP system patches.	Updated operating systems.
Weekly and monthly disk backups	Backups made and documented in backup log file.	Weekly, monthly backup tapes

#### 3. Work Performed During the Past Month

All work on this subtask was performed by the systems administrator, F. Gomez, and the assistant systems administrator, S. Bringen. Seventeen HP workstations, 7 Sun workstations, one Linux PC, and 3 X-terminals are being maintained under this subtask. The workstations and their operating systems referred to in the following report are:

Name	Model	Operating System
------	-------	------------------

VLBI Group:		
aleph	HP9000/745	HPUX 10.20

algol	HP9000/735	HPUX 10.20
aquila	HP9000/735	HPUX 10.20
bootes	HP9000/785	HPUX 11.00
dorado	HP9000/735	HPUX 10.20
gemini	HP9000/735	HPUX 10.20
ivscc	HP9000/735	HPUX 10.20
jukie	HP9000/705	HPUX 10.20
leo	HP9000/780	HPUX 10.20
lupus	HP9000/715	HPUX 10.20
lyra	HP9000/785	HPUX 11.00
schwartz	I686	Red Hat Linux
virgo	HP9000/735	HPUX 10.20
wildbill	HP9000/705	HPUX 10.20

#### Space Geodesy Group:

bowie	Sun Ultra Sparc	Solaris 7
elysium	Sun Blade 2000	Solaris 9
geodesy	HP9000/735	HPUX 10.20
geodesy2	Sun Blade 2000	Solaris 9
inversion	IA64	HPUX 11.22
ishtar	Sun Ultra Sparc	Solaris 9
neriid	Sun Blade 1000	Solaris 9
santafe	Sun Blade 2000	Solaris 9
shavano	HP9000/780	HPUX 11.00
stokes	HP9000/780	HPUX 11.00
xyz	Sun Blade 1000	Solaris 9

**a. Systems Administration:** Systems administration was performed, as needed, to support the two user groups (VLBI and Space Geodesy).

#### Both Groups:

S. Bringen checked for HP security advisories. He found a common NFS mount file system to store HP10.20 patches, and installed the latest patches on the HP10.20 systems. He also began determining what HP11.00 patches were needed for the HP11.00 systems. He investigated a dynamo hosts problem (was blocked at the router). He created a script to check for missing DMSG\_TEST notices. He set up more sbringen accounts. And he wrote scripts *distrib\_sun* and *distrib\_hp* to distribute files to the Sun and HP machines.

#### VLBI Group:

A few code 297 security alerts were acted upon by the systems administrator. Cindy Villiard's PC (draco) was updated with the latest patches from <http://windowsupdate.com> and a waiver for Dan Macmillan's PC (anasazi) was sent to Ed Masuoka because the vulnerability reported by code 297 was a false positive.

Bootes was unable to communicate with the network router. A call was placed to the ODIN Intellicenter concerning this. The problem was resolved by the ODIN Intellicenter when they discovered that Bootes had been "blocked" by the router last year. They unblocked it after running a security scan to confirm that it was fully patched. Leo's /box1 disk became inoperative and had to be replaced with a spare. Twenty-three GBytes of data was restored from tape. Ivscc's power supply burned out and had to be replaced with a spare. The opportunity was also taken to increase its memory by 50 percent. Staff ran *cfg2html* (a system configuration lister) on ivscc after the memory upgrade.

UPS (uninterruptible power supplies) capacity estimations were made for machines algol, virgo, aleph, and leo. Purchase orders for those UPS's are pending. Disk protection against electrical spikes (seemingly common in second floor G-wing) is the motivation for this.

S. Bringen checked for updates to Redhat (Linux) and installed them on schwartz. He also fixed the system monitoring script output on schwartz. The virgo:/data12 file system and disk ivscc:/MOUNTS/virgo/box4 were found to be full. Messages were sent out identifying the largest users.

Space Geodesy Group:

Disk bowie:/space was found to be full. The largest users were identified and informed.

**b. User Assistance:** Many user problems and requests, including the usual printer problems, terminal problems, space problems, mail problems and restoration of files, were addressed and resolved.

VLBI Group:

For user kdb, staff restored files nskas01.eps, nskas02.eps, and nskas03.eps to virgo directory /box4/IVSCC\_USERS/ftp/arincoming. Aquila:/aqbox/10.20.DEPOT was also restored. The VLBA RDV42 correlator output tape was copied for user dgg.

Space Geodesy Group:

New accounts were created for user epavlis on geodesy2; for users kmatsumo, mtorrenc, and rwilliam on nereid; and for user rwilliam on stokes.

**c. Operating system updates and patches:** S. Bringen updated all HP10.20 systems with the latest patches.

**d. Backups:** Weekly and monthly backups were made to Exabyte, DAT, and SDLT tapes, as scheduled.

**e. Software Support:** Software support was provided to the two groups as needed.

**Both Groups:**

Script *nc\_uxbootlf* was written. It prepends an LIF boot area on a recovery DAT before a disk dump to the same DAT. This enables the tape to be bootable, removing the necessity of attaching a CDROM drive to a machine during disk crash recovery. *Sshd* 3.7.1 was installed on all machines except santafe, bowie, and schwartz. *Sshd* 3.8.1 was installed on santafe.

**VLBI Group:**

The master file formatting and distribution script *mcdp* was updated to revision 2.10. Code to handle new mail messages was put into subroutine *mail\_notify*. The Intensives file formatting and distribution script *mint* was updated to revision 2.7. This change also uses the new mail message handling code in subroutine *mail\_notify*. The incoming2ivs script on the IVS data center, *i* was updated to revision 2.13. This update changes the destination directory of baseline pilot project files. *Perl* 5.8.0 was installed on lyra. And *HOPS* was updated to version *mk4\_2003Sep22* on aquila.

**Space Geodesy Group:**

*Fortran 77* was installed on stokes. *Acroread* 5.08 was installed on nereid. *ImageMagick* 5.5.7 was installed on nereid. *Lsof* 4.68 was installed on santafe. And *IDL* 6.0 was installed on elysium.

**4. Problem Areas**

None.

**5. Travel**

None.

**6. Work Planned for Next Month**

- Weekly and monthly tape backups.
- User assistance.
- Periodic system checkups.
- Shell script programming.
- C system programming.

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE March 9, 2004	3. REPORT TYPE AND DATES COVERED Monthly - February 01, 2004 - February 29, 2004
----------------------------------	---------------------------------	---

TITLE AND SUBTITLE Monthly Progress Report for Research and Development in Very Long Baseline Interferometry (VLBI)	FUNDING NUMBERS C - NAS5-01127
--	-----------------------------------

AUTHORS NVI, Inc.	
----------------------	--

PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) NVI, Inc. 6301 Ivy Lane Suite 700 Greenbelt, MD 20770	PERFORMING ORGANIZATION REPORT NUMBER 0801
---	---

SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) NASA Goddard Space Flight Center Greenbelt, MD 20770	SPONSORING/MONITORING AGENCY REPORT NUMBER
--	--

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT Unclassified - Unlimited	12b. DISTRIBUTION CODE
--	------------------------

13. ABSTRACT (Maximum 200 words)  
Monthly Progress Report for VLBI contract

14. SUBJECT TERMS Geodesy, Astrometry, VLBI, Earth Orientation	15. NUMBER OF PAGES 30
	16. PRICE CODE N/A

17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL
---	--	---	----------------------------------