

U.S. Naval Observatory VLBI Analysis Center

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Abstract

This report summarizes the activities of the VLBI Analysis Center at the United States Naval Observatory for calendar year 2002. Over the course of the year the center analyzed semiweekly diurnal experiments with designations IVS-R1 and IVS-R4. The center also took over responsibility for the timely submission of the IVS-R4 databases for distribution to the IVS. In addition, the analysis center analyzed and submitted databases for three experiments designated CRF-13, CRF-14, and CRF-15. During the 2002 calendar year, the USNO analysis center produced three global TRF solutions with designations usn2002a, usn2002b, and usn2002c. Earth orientation parameters based on these solutions and updated by the diurnal (IVS-R1 and IVS-R4) experiments were submitted to the IVS. The VLBI Analysis Center at USNO continued work on global CRF solutions (crf2002a) which will directly result in Extension 2 to the International Celestial reference Frame (ICRF). This report also describes activities planned for the 2003 calendar year.

1. Introduction

The USNO VLBI Analysis Center is supported and operated by the United States Naval Observatory (USNO) in Washington, DC. The primary services provided by the Analysis Center are the analysis of diurnal experiments, the production of periodic global Terrestrial Reference Frame (TRF) and Celestial Reference Frame (CRF) solutions, and the submission to the IVS of session-based Earth orientation parameters (EOP-S) based on USNO global TRF solutions. Analysis Center personnel maintain the necessary software required to continue these services to the IVS including periodic updates of the GSFC CALC/SOLVE software package. In addition to operational VLBI analysis, USNO personnel engage in research aimed at developing the next generation ICRF. Information on USNO VLBI analysis activities may be obtained at:

<http://rorf.usno.navy.mil/vlbi/>.

2. Current Analysis Center Activities

2.1. Experiment Analysis and Database Submission

During the 2002 calendar year, personnel at the USNO VLBI Analysis Center continued processing of diurnal (IVS-R1/R4) experiments for use in internal USNO global TRF and CRF solutions. Beginning in the middle of March 2002, the Analysis Center took over the responsibility for database submission for the IVS-R4 experiments, a task previously performed by the GSFC group. IVS-R4 experiments are analyzed at USNO and the resulting databases are submitted within 24 hours of correlation for dissemination by the IVS. In addition, Analysis Center personnel continue to be responsible for the analysis and database submission for the periodic IVS-CRF experiments. The primary goal of these experiments is the densification of ICRF sources in the Southern Hemisphere. In 2002, USNO processed three CRF experiments (CRF-13, 14, and 15) and submitted databases to the IVS.

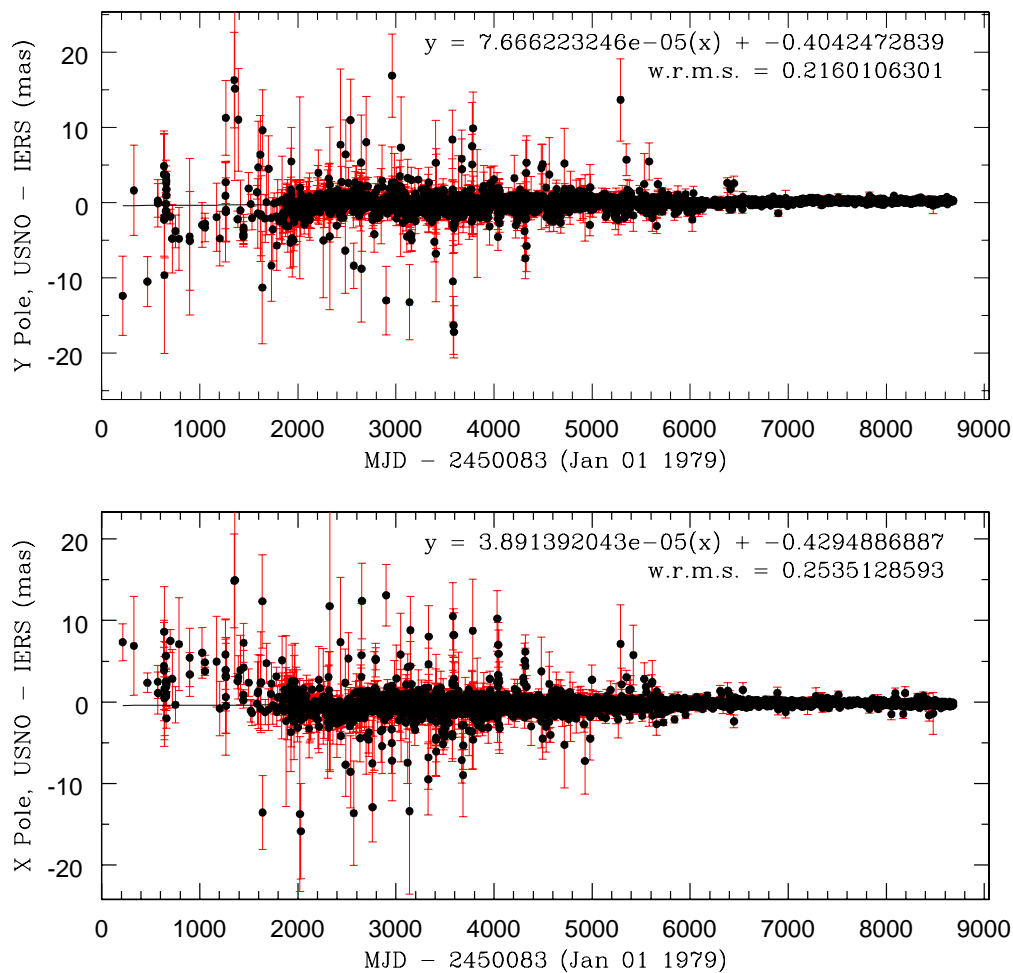


Figure 1. Differences between pole positions estimated from the usn2002c TRF solution and the IERS-C04 time series. A weighted least squares linear fit to the data and the weighted RMS are shown in the upper right corner of each plot.

2.2. Global TRF Solutions and EOP Submission

USNO VLBI Analysis Center personnel continued to produce periodic global TRF solutions (usn2002a, usn2002b, and usn2002c) over the course of the 2002 calendar year. All USNO global TRF solutions including the most recent solution may be found at:

<http://rorf.usno.navy.mil/solutions/>.

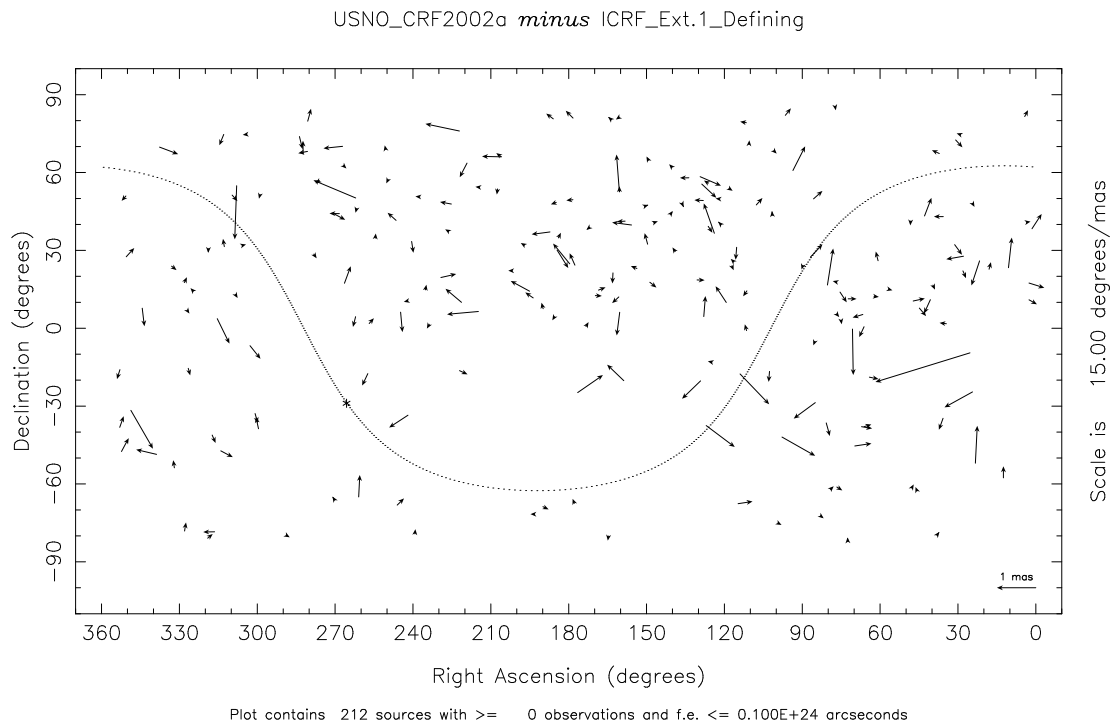
Session-based Earth orientation parameters derived from these TRF solutions were compared to those derived from GSFC periodic TRF solutions and with the IERS-C04 time series prior to submission to the IVS. Figure 1 shows an example of the comparison information available at the

web site mentioned above. In this figure, differences in pole position estimates derived from the usn2002c solution and the IERS-C04 time series are plotted.

EOP-S based on the global TRF solutions were continuously updated with new data from the IVS-R1/R4 experiments prior to the introduction of the next global solution. These updated EOP-S files were submitted to the IVS twice weekly within 24 hours of the experiment correlation.

2.3. Global CRF Solutions and ICRF-Ext. 2

During the calendar year 2002, personnel at the USNO VLBI Analysis Center continued to produce global CRF solutions and to compare these solutions with the current ICRF. Figure 2 shows the differences between USNO CRF2002a source positions and the ICRF-Ext.1 positions as an example. The culmination of the USNO CRF work in 2002 will be Extension 2 to the ICRF, which will be published in 2003. The primary objective of ICRF-Ext.2, is to provide positions for extragalactic radio sources observed since the definition of the ICRF (July 1995) and its first extension (April 1999) and to refine the positions of candidate and other sources using additional observations. The data added to the ICRF in this extension spanned May 1999 through May 2002 and was obtained from both geodetic and astrometric observing programs coordinated through the IVS. Approximately 1.2 million new observations from approximately 400 sessions were added along with 50 new sources.



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Figure 2. Differences in the source positions as derived from the USNO CRF2002a solution and the ICRF-Ext.1 solution. Plotted are all 212 defining sources of the ICRF. The dotted line represents the galactic equator.

3. Staff

The staff of the VLBI Analysis Center is drawn from individuals who work at the USNO. The staff and their responsibilities are:

Name	Responsibilities
David A. Boboltz	Quarterly global TRF solutions, solution comparisons, web page design and administration, VLBI data analysis.
Alan L. Fey	Quarterly global CRF solutions, solution comparisons, web page design and administration, VLBI data analysis.
David M. Hall	VLBI data analysis and database submission, IVS EOP submission.
Kerry A. Kingham	Correlator interface, VLBI data analysis

4. Future Activities

For the upcoming year January 2003–December 2003, USNO VLBI Analysis Center personnel plan to accomplish the following activities:

- Continue the processing of biweekly IVS-R1/R4 experiments for use in internal TRF and CRF global solutions.
- Continue the submission of databases for IVS-R4 experiments for dissemination by the IVS.
- Continue the analysis and database submission for all IVS-CRF experiments.
- Continue the production of periodic global TRF solutions and the submission of EOP-S estimates to the IVS updated by the IVS-R1/R4 experiments.
- Begin the submission of EOP-I estimates based on the intensive experiments to the IVS.
- Begin the analysis of intensive experiments for use in USNO internal EOP-I time series estimates.
- Continue the production of periodic global CRF solutions.
- Make additional astrometric observations in the Southern Hemisphere in collaboration with ATNF partners.