

IVS Analysis Center at Main Astronomical Observatory of National Academy of Sciences of Ukraine

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Abstract

This report summarizes the activities of VLBI Analysis Center at Main Astronomical Observatory of National Academy of Sciences of Ukraine in 2003.

1. Introduction

The VLBI Analysis Center was established in 1994 by Main Astronomical Observatory (MAO) of the National Academy of Sciences of Ukraine as a working group of the Department of Space Geodynamics of MAO. In 1998 it started its IVS membership as an IVS Analysis Center. The AC MAO is located in Central building of the observatory in Kiev.

The primary goal of the activity of the Center is the development of the VLBI data processing software STEELBREEZE. From 2003 we started submissions of VLBI data analysis results to IVS.

2. Technical Description

The computer of the Analysis Center is a Pentium-4 1.9 GHz CPU box with 256M RAM and a 160 Gb HDD. It is running under Linux/GNU Operating System and is used for software development and VLBI data processing.

Main Astronomical Observatory has a 56 kbps link for Internet connection.

The STEELBREEZE software is written in the C++ programming language and uses Qt widget library. STEELBREEZE makes Least Square estimation of different geodynamical parameters with the Square Root Information Filter (SRIF) algorithm (see [1]).

The software analyzes VLBI data (time delay) of single and multiple sets of sessions. The time delay is modeled according to the IERS Conventions (2003) [2], plus additional models (tectonic plate motion, nutation models, wet and hydrostatic zenith delays, mapping functions, etc). The software makes estimations of the following parameters: Earth orientation parameters, coordinates and velocities of a selected set of stations, coordinates of a selected set of radio sources, clock function and wet zenith delay.

3. Staff

The VLBI Analysis Center at Main Astronomical Observatory now consists of two members:

Prof. Yaroslav Yatskiv: Head of the Department of Space Geodynamics, performs general coordination and support of activity of the Center.

Ph.D. Sergei Bolotin: Senior research scientist of the Department of Space Geodynamics, responsible for the software development and data processing.

4. Current Status and Activities in 2003

This year production of two types of solutions has been started. The first type of solution, “global”, is based on the all available VLBI data which are suitable for determination of TRF, CRF and EOP and consists of estimated coordinates and velocities of stations, coordinates of radio sources and a series of Earth rotation parameters. In the second one, “operational”, only sessions from latest several years are used and Earth rotation parameters estimated in VLBI data analysis.

The “global” solution was obtained in the end of 2003 and submitted to IVS. Almost all suitable VLBI observations conducted since 1979 till September 2003 were analyzed. The IERS Conventions (2003) [2] models have been applied in the analysis. In addition, atmospheric pressure loading ephemerides [3] have been used to model site displacements. Obtained TRF consists of coordinates of 106 and velocities of 67 stations of observations. The CRF consists of coordinates of 1571 radio sources. In the analysis 2654 estimates of EOP have been obtained.

The “operational” solution is produced and submitted to IVS on a weekly basis since November. It is based on VLBI observations conducted since 2000 and analysis procedure is similar to the “global” one (except applying atmospheric pressure loading). In this solution only coordinates of stations and Earth rotating parameters are estimated.

5. Plans for 2004

MAO Analysis Center will continue to take part in operational EOP determination as well as updating the solutions of TRF and CRF from VLBI analysis of full dataset of observations.

The development of the software STEELBREEZE will be continued next year also.

Acknowledgments

The work of our Analysis Center would be impossible without activities of other components of IVS. We are grateful to all contributors of the Service.

References

- [1] Biermann, G.J., 1977, Factorization Methods for Discrete Sequential Estimation, V128, Mathematics in Science and Engineering Series, Academic Press.
- [2] McCarthy, D.D. (ed.), IERS Conventions (2003), IERS Technical Note 32, Observatoire de Paris, Paris.
- [3] L. Petrov, J.-P. Boy, 2003: Study of the atmospheric pressure loading signal in VLBI observations, *J. Geophys. Res.*, 10.1029/2003JB002500, Vol. 109, No. B?, 2004