

# 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 the Main Astronomical Observatory of the National Academy of Sciences of Ukraine in 2006.

## 1. Introduction

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

## 2. Technical Description

VLBI data analysis at the center is performed on two computers: a Pentium-4 1.9GHz box with 256 MB RAM and a 160 GB HDD, and a recently purchased Pentium-4 3.4GHz box with 1 GB RAM and two 200 GB HDD. Both computers are running under the Linux/GNU Operating System.

The Main Astronomical Observatory has a 256 kbps main Internet channel and a 256 kbps backup.

For data analysis we are using the software STEELBREEZE which is being developed at the MAO NASU. The STEELBREEZE software is written in the C++ programming language and uses Qt widget library. STEELBREEZE makes Least Squares 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 consists of three members:

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

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

**Svitlana Lytvyn:** A Ph.D. student who is involved in the activities of the AC. Her Ph.D. thesis concerns the stability of VLBI-derived celestial and terrestrial systems.

#### 4. Current Status and Activities in 2006

In 2006 we performed regular VLBI data analysis to determine Earth orientation parameters. “Operational” solutions were produced and submitted to the IVS on a weekly basis. The IERS Conventions (2003) [2] models have been applied in the analysis. In the solution, coordinates of stations and Earth orientation parameters are estimated.

Also, this year our participation in the IVS Tropospheric Parameters project was continued. Estimated wet and total zenith delays for each station were submitted to IVS. The analysis procedure was similar to the one used for the operational solutions.

#### 5. Plans for 2007

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 also be continued next year.

#### 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] IERS Conventions (2003), IERS Technical Note 32, eds. D.D. McCarthy and G. Petit, Bundesamt für Kartographie und Geodäsie, Frankfurt am Main.