Analysis Center of Saint Petersburg University

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Abstract

This report briefly summarizes the activities of the Analysis Center of Saint Petersburg University during 2011. Changes which happened, as well as our future plans, are described.

1. Introduction

The Analysis Center of Saint Petersburg University (SPU AC) was established in the Sobolev Astronomical Institute of the SPb University in 1998. The main activity of the SPU AC for the International VLBI Service before 2007 consisted of routine processing of 24-hour and 1-hour observational sessions for obtaining Earth Orientation Parameters (EOP) and rapid UT1-UTC values, respectively. Due to staff changes in 2007 we had a gap in our submissions to IVS. In 2008 we resumed submitting results of 24-hour session processing. During 2011 the activities of the SPU AC continued unchanged.

2. Staff

The lecturer in astronomy of Saint Petersburg University, Dmitriy Trofimov, was in charge of the routine processing of the VLBI observations. General coordination and support for the activities of the SPU AC at the Astronomical Institute was performed by Prof. Veniamin Vityazev.

3. Activities in 2011

- In 2011 we continued the work resumed in 2008. There were breaks in the work due to technical reasons. The routine estimation of the five Earth Orientation Parameters was performed. The OCCAM software package (version 6_2) was used for current processing of VLBI data [1]. The time series is named spu00004.eops. It includes data obtained by the IRIS-A, NEOS-A, R1, and R4 observing programs, and it covers 24 years of observations (from January 2, 1989 until the end of 2011). The total number of processed experiments is about 1730, of which 90 VLBI sessions were processed in 2011. Our experience and the equipment of the Analysis Center was used for giving lectures and practical work on the basics of radio interferometry for the university students. In 2011, with the purpose of giving students education in practical applications, we published a training manual on modern astrometry, in which the VLBI technique is considered [2].

  In 2011, the work of the SPU AC was supported by the project "Kinematic and Dynamic Astronomy" (a grant of the President of the Russian Federation for leading scientific schools) as well as by the project "Acquisition and analysis of time-series in astronomy and the study of astronomical catalogs" (an SPU grant for fundamental research) and "GLONASS, GPS and VLBI observations as the basis of astronomical, gravimetric and geodynamic studies" (an SPU grant for fundamental research).

- All parameters were adjusted using the Kalman filter technique. For all stations (except the reference station), the wet delay, clock offsets, clock rates, and troposphere gradients were

estimated. Troposphere wet delay and clock offsets were modeled as a stochastic process such as a random walk. The clock rates and the troposphere gradients were considered to be the constant parameters.

- The main details of the preparation of the EOP time series spu00004.eops are summarized below:
  - Data span: 1989.01–2011.12
  - CRF: fixed to ICRF-Ext.2
  - TRF: VTRF2005 was used as an a priori TRF
  - Estimated parameters:
    1. EOP: $x, y, UT1 - UTC, d\psi, d\varepsilon$;
    2. troposphere: troposphere gradients were estimated as constant parameters, and wet troposphere delays were modeled as a random walk process;
    3. station clocks were treated as follows: offset as a random walk process, rate as a constant.
  - nutation model: IAU 1980
  - mapping function: VMF1
  - technique: Kalman filter
  - software: OCCAM v.6_2

4. Future Plans

In 2012 we are going to continue our regular processing of the results of the VLBI sessions as well as giving lectures and the practical work for the students within a special course on radio astrometry which is included in the systematic curriculum of astronomical education at SPb University.

References

[1] O. Titov, V. Tesmer, J. Boehm, OCCAM v. 6. 0 Software for VLBI Data Analysis, In International VLBI Service for Geodesy and Astrometry 2004 General Meeting Proceedings, N. R. Vandenberg and K. D. Baver (eds.), NASA/CP-2004-212255, pp.267-271, 2004.

[2] V.Vityazev, I.Guseva, V.Kiyaev, M.Mishchenko, O. Titov, A.Tsvetkov. Celestial and Terrestrial Coordinates (In Russian), Manual on Astrometry, 301 p., SPb University, 2011.