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 2017 and 2018. The current status, as well as our future plans, are described.

1 General Information

The Analysis Center of Saint Petersburg University (SPU AC) was established at 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 one-hour observational sessions for obtaining Earth Orientation Parameters (EOP) and rapid UT1-UTC values, respectively. In 2008 we began submitting the results of 24-hour session processing.

2 Component Description

Currently we support two series of the Earth Orientation Parameters, spu00004.eops and spu2015a.eops.

- 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 and spu2015a.eops are summarized below:
  - Data span: 1989.01–2018.08
  - 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 (spu00004.eops), IAU 2000 (spu2015a.eops)
  - mapping function: VMF1
  - technique: Kalman filter
  - software: OCCAM v.6_2

3 Staff

The assistant professor 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 were performed by Professor Veniamin Vityazev. After his death in the summer of 2018, the general management and support is performed by the head of the chair of astronomy Sergey Petrov.

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4 Current Status and Activities

- In 2017, 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, R4, RDV, and R&D observing programs, and it covers 28 years of observations (from January 2, 1989 until August 2018). The total number of experiments processed at the SPU AC is about 2,350, of which about 120 VLBI sessions were processed in 2017–2018.
- The new series of the Earth Orientation Parameters launched in 2015 was also continued. The total number of points in spu2015a.eops is about 2,350, of which about 120 VLBI sessions were processed in 2017–2018.
- Our experience and the equipment of the Analysis Center was used for giving lectures and practical work on the basics of radio interferometry to university students. We use our original manual on the training in modern astrometry and in particular VLBI [2]. In 2018 a student term paper has been performed on the center equipment. During the period 2017–2018, we processed only observations in NGS format.

5 Future Plans

In 2019, we plan to begin processing data in vgosDB format. Also we are planning to start processing a series based on new reference catalogs of antenna positions and radio sources. Lectures and practical exercises for students in a special course on radio astrometry will continue. This course is part of the curriculum of astronomical education at St. Petersburg State University.

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References

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