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ORIGINAL ARTICLE

International VLBI Service for Geodesy and Astrometry

Delivering high-quality products and embarking on observations of the next generation

A. Nothnagel[1] · **T. Artz**[1] · **D. Behrend**[2] · **Z. Malkin**[3,4,5]

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Abstract The International VLBI Service for Geodesy and Astrometry (IVS) regularly produces high-quality Earth orientation parameters from observing sessions employing extensive networks or individual baselines. The master schedule is designed according to the telescope days committed by the stations and by the need for dense sampling of the Earth orientation parameters (EOP). In the pre-2011 era, the network constellations with their number of telescopes participating were limited by the playback and baseline capabilities of the hardware (Mark4) correlators. This limitation was overcome by the advent of software correlators, which can now accommodate many more playback units in a flexible configuration. In this paper, we describe the current operations of the IVS with special emphasis on the quality of the polar motion results since these are the only EOP components which can be validated against independent benchmarks. The polar motion results provided by the IVS have improved continuously over the years, now providing an agreement with IGS results at the level of 20–25 μas in a WRMS sense. At the end of the paper, an outlook is given for the realization of the VLBI Global Observing System.

Keywords VLBI · Polar motion · Product quality · VLBI Global Observing System

✉ A. Nothnagel
nothnagel@uni-bonn.de

T. Artz
t.artz@gmx.de

D. Behrend
dirk.behrend@nasa.gov

Z. Malkin
malkin@gao.spb.ru

[1] Institute of Geodesy and Geoinformation, University of Bonn, Nussallee 17, 53115 Bonn, Germany

[2] NVI, Inc., 7257D Hanover Parkway, Greenbelt, MD 20770, USA

[3] Pulkovo Observatory, St. Petersburg 196140, Russia

[4] St. Petersburg State University, St. Petersburg 199034, Russia

[5] Kazan Federal University, Kazan 420000, Russia

1 Introduction

Since March 1999, the International VLBI Service for Geodesy and Astrometry (IVS, Schuh and Behrend 2012) has been operating a truly global infrastructure for the determination of highly precise Earth orientation parameters (EOP) and celestial and terrestrial reference frames (CRF/TRF). As it is stated in its *Terms of Reference*, the IVS is an international collaboration of organizations which operate or support very long baseline interferometry (VLBI) components. As such, the IVS in itself does not possess any financial assets but relies purely on the goodwill of its member organizations for developing and maintaining reliable state-of-the-art components. In this paper, we will assess the current status of the IVS using the example of its polar motion results and its path for future development. We will provide a quantitative evaluation of steps in the quality of the IVS's products brought about by significant changes in hardware and procedures and the evolution of the number of radio telescopes and observations. At the same time, we will also point at biases between the polar motion results of the IVS and those of the International GNSS Service (IGS).

The technique of astronomical VLBI has encountered its first development steps in the mid-1960s (e.g., Matveenko et al. 1965; Broten et al. 1967; Moran et al. 1967; Bare et al. 1967) with applications to geodesy and astrometry a few years later (e.g., Cohen and Shaffer 1971; Hinteregger et al.