

# A Comparison of the VLBI Nutation Series With Model

Zinovy Malkin

*Institute of Applied Astronomy, St.Petersburg, Russia*

**Abstract:** The paper presents preliminary results of determination of corrections to precession and obliquity rate from analysis of differences between four VLBI nutation series and MHB2000 model.

## 1 Introduction

This paper continues an investigation of the VLBI results of determination of nutation of the Earth's rotation axis in comparison with the latest nutation models (Malkin 2001). Some results of mutual comparison of the VLBI nutation series and possible sources of systematic differences are considered in Malkin 2001, Malkin 2002. The latter includes inconsistency in CRF realizations and different models of daily and subdaily EOP variations used by various Analysis Centers. Influence of non-stability of ICRF on observed precession parameters is discussed in Feissel 2002.

We used for comparison four long-time VLBI EOP series available in the IVS data base (BKG00001, GSF2001C, USN2001D, IAAO0106) at common interval 1984.0–2001.9 and the latest available version of MHB2000 nutation series of the end of 2001 (<http://www-gpsg.mit.edu/~tah/>) which provides FCN amplitudes for period ended at epoch Jun 1, 2001. After that date only predicted FCN amplitude is available and one should keep this in mind during comparison the model with observations.

## 2 Corrections to precession parameters

Precession parameters (precession in longitude and obliquity rate) were estimated as linear trend along with largest long-period terms  $6798.38^d$ ,  $3399.19^d$ ,  $365.26^d$ ,  $182.62^d$ ,  $121.75^d$  from differences between VLBI nutation series and MHB2000. Since VLBI results show significant improvement beginning from epoch  $\approx 1990.0$ , we have computed the precession parameters both for whole interval 1984.0–2001.9 and for 1990.0–2001.4 (in the latter case the term with period  $6798.38^d$  was not included in adjustment procedure).

The results of computation are presented in Table 1. For more detailed comparison we compute those both for individual series and for all their combinations. Table 1 contains results for individual series, averaged CALC/SOLVE series and averaged over all four compared series. One can see that there is no evident systematic differences between OCCAM and CALC/SOLVE results for  $\Delta\psi$ , however such a difference obviously exists for  $\Delta\epsilon$ .

Obtained corrections to  $\Delta\psi$  and  $\Delta\epsilon$  rates averaged over all the series are in reasonable good agreement with those found in Feissel 2001, Feissel 2002.

## 3 Acknowledgement

Author is very grateful to the organizers of the IERS Workshop for financial support of his trip to the meeting. This research is partially supported by the Russian Science Support Foundation and St.Petersburg Scientific Center of the Russian Academy of Sciences.

Table 1: Corrections to precession parameters, bias in  $\mu\text{as}$  and rate in  $\mu\text{as}/\text{y}$ .

Series	1984.0–2001.9				1990.0–2001.4			
	$\Delta\psi$		$\Delta\epsilon$		$\Delta\psi$		$\Delta\epsilon$	
	bias	rate	bias	rate	bias	rate	bias	rate
BKG	$-14\pm 9$	$+42\pm 4$	$-25\pm 4$	$+11\pm 2$	$-42\pm 5$	$+24\pm 2$	$-10\pm 2$	$-6\pm 1$
GSF	$+18\pm 9$	$+20\pm 4$	$-27\pm 3$	$+6\pm 2$	$-36\pm 5$	$+13\pm 2$	$-20\pm 2$	$-9\pm 1$
IAA	$+12\pm 9$	$+34\pm 4$	$+37\pm 3$	$-5\pm 2$	$-72\pm 5$	$+25\pm 2$	$+29\pm 2$	$-2\pm 1$
USN	$-23\pm 9$	$+27\pm 4$	$-34\pm 4$	$+8\pm 2$	$-71\pm 6$	$+14\pm 2$	$-14\pm 2$	$-8\pm 1$
BKG GSF USN	$-7\pm 8$	$+31\pm 4$	$-28\pm 3$	$+8\pm 2$	$-50\pm 5$	$+17\pm 2$	$-14\pm 2$	$-8\pm 1$
BKG GSF IAA USN	$-2\pm 8$	$+32\pm 4$	$-11\pm 3$	$+4\pm 1$	$-57\pm 5$	$+19\pm 2$	$-5\pm 2$	$-6\pm 1$

## References

- Feissel, M., M. Yseboodt, V. Dehant, O. de Viron, C. Bizouard. How much can we cheat the non-rigid Earth nutation theory to make it match VLBI results? Journees 2001, Brussels, Belgium, Sep 24–26, 2001.
- Feissel, M., Ma, C. Radio Source Stability and the Observation of Precession-nutation. Second IVS General Meeting, Tsukuba, Japan, Feb 3–7, 2002.
- Malkin, Z. A comparative analysis of the VLBI nutation series. Presented at the Journees 2001 Influence of geophysics, time and space reference frames on Earth rotation studies, Brussels, Belgium, 24–26 September 2001.
- Malkin Z. A Comparison of the VLBI nutation series with IAU2000 model. Presented at the 2nd IVS General Meeting, Tsukuba, Japan, Feb 4–7, 2002.