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A search for geophysical signals in diurnal and semidiurnal polar motion from analysis of the routine VLBI observations from analysis of the routine VLBI observations

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Polar motion contains physical signals within the diurnal and semidiurnal frequency bands. The dominant part ($<$1 mas) is due to the gravitationally forced ocean tides. There is also a small variation (ca. 0.03 mas) due to the direct influence of the tidal gravitation on the triaxial structure of the Earth. The remaining part (ca. 0.1 mas) comprises the atmospheric and nontidal oceanic influences driven mostly by the daily cycle in the solar heating. The observational evidence of diurnal and semidiurnal signals in polar motion concerns mostly the purely harmonic ocean tide signals (Sovers et al., 1993; Herring and Dong, 1994; Gipson, 1996). The special VLBI observing campaigns, like CONT94, CONT02, CONT05, have been also organized to estimate a less regular high frequency geophysical signals in Earth rotation and compare them with models.

But even from the routine VLBI observations with one session in 3 to 5 days, it is possible to determine a quasi periodical geophysical signal with high frequency. The method, proposed originally by (Herring and Dong, 1994) and further developed by (Mathews and Herring, 2000; Brzezinski et al., 2002), relies upon the so-called complex demodulation technique. Here we discuss this possibility from the point of view of both theory and practical applications. We process all the available VLBI observations which are suitable for simultaneous determinations of the celestial and terrestrial reference frames and the Earth orientation parameters, in order to extract the semidiurnal and prograde diurnal signals in polar motion. From the spectral analysis of the

demodulated series we estimate amplitudes of the important harmonic components and compare them to the apriori model. In case of diurnal polar motion we perform also time domain comparisons with the available estimates of the atmospheric and oceanic excitations.