STUDIES OF REGIONAL ATMOSPHERIC PRESSURE EXCITATION FUNCTION OF POLAR MOTION

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EXTENDED ABSTRACT. It is known from earlier studies such as Salstein and Rosen (1989), Nastula and Salstein (1999) and Nastula et al. 2003, that isolated regions such as North Eurasia are very important in driving polar motion on seasonal and subseasonal time scales. The paper presents correlations and covariances between the regional atmospheric pressure excitation functions of polar motion and global geodetic excitation function of polar motion computed in two spectral bands, annual and semi-annual ones in two sets of geographic regions of different sizes. In the paper the following two sets of regional atmospheric data are used:

- The regional atmospheric excitation functions chi1 and chi2 computed by Nastula and Salstein (Nastula et al. 2003) in 828 equal-area sectors for the period January 1983 to December 2000 from meteorological fields on $2.5^o \times 2.5^o$ latitude-longitude grid. This network sector has an area of $6.16 \times 10^5 km^2$.

- The regional atmospheric excitation chi1 and chi2 computed by Nastula during visit at the Atmospheric and Environmental Research Inc. USA Lexington in 3312 equal-area sectors for the period January 1983 to December 2000 from meteorological fields on $2.5^o \times 2.5^o$ latitude-longitude grid. This network sector has an area of 1/4 of the previous one.

The excitation function of polar motion referred to as geodetic (GEOD) excitation was computed from the COMB02 series of polar motion (Gross, 2003), filtering by the Kalman filter developed by Brzeziński (Brzeziński, 1992; Brzeziński et al., 2004). The input polar motion series covers the period from 1962 to 2003 with 12-hour sampling. The computations were performed for seasonal, annual and semi-annual, bands obtained by filtering with Butterworth filter for periods 230-500 days and 150-230 days respectively. Covariations between regional atmospheric pressure and global geodetic excitation functions of polar motion computed in two mentioned above regions of different sizes show that the covariances diminishes with the size of region but the geographic patterns are not very sensitive on the size of regions. In the smaller regions more fine details are seen. The covariances for the semi-annual are ten time smaller than in the case of annual band. Comparison of covariances between regional atmospheric pressure and global geodetic excitation functions computed for annual and semiannual bands for considered two regions of chosen sizes are shown in Fig. 1. Correlation coefficients between regional atmospheric pressure and global geodetic excitation functions of polar motion were computed for larger and finer (only for the Northern Hemisphere) sectors. They are comparable although they are not shown here. Even

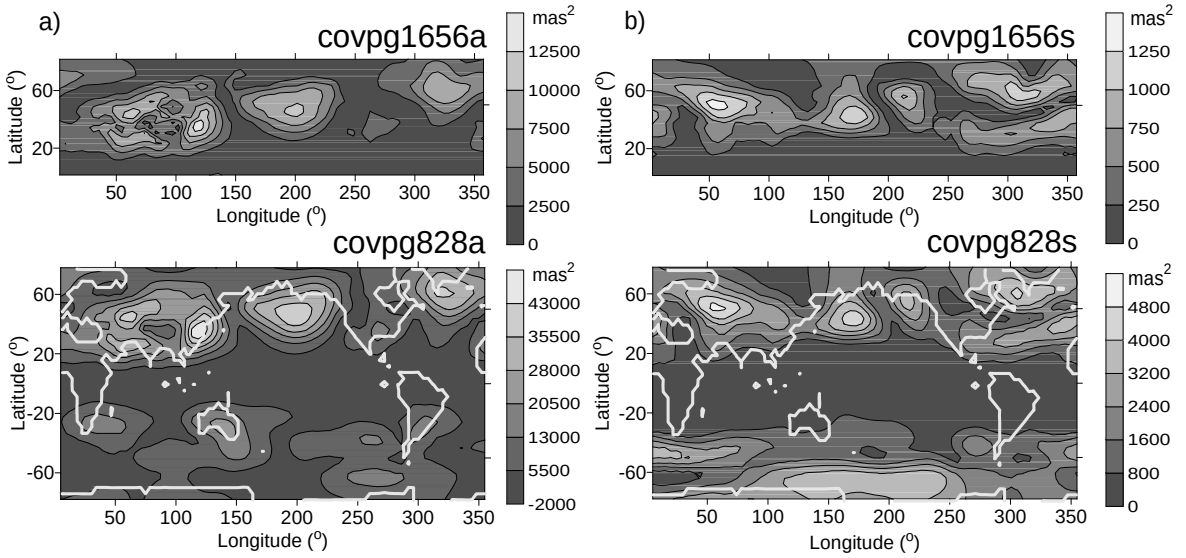

Figure 1: Maps of the covariance between values of excitation functions of polar motion of global geodetic and regional atmospheric pressure computed for a) annual band (230–500 days) for 1656 and 828 regions, and for b) semiannual band (150–230 days) for 1656 and 828 regions.

for such small regions, are quite high and reaching in maximum 0.7–0.8 for the annual band and about 0.6 for the semiannual band.

Acknowledgments. The work has been supported partly by The Polish State Commit tee for Scientific Research through the project 0001/T12/2004/26.

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