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To explanation of the height variations at Medicina and Syowa stations

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The perturbed and free translational oscillations of the outer core relatively to the centre of mass of the mantle determine variations of many planetary processes. The gravitational attraction of displaced superfluous mass of the core causes slow secular and periodic deformations of all layers of the mantle, causes inversion oceanic and atmospheric tides for which grandiose masses of the Earth are transported from one hemisphere in opposite. All mentioned processes give in to dynamic research and the analytical description. Variations of heights are influenced first of all with drift of the centre of mass of the Earth and deformation of its surface. Local tectonic processes can bring the significant contribution to heights variations. In the given work on the basis of geodynamic model about polar displacement of the core (Barkin, 2005) and results about an annual mode of inversion deformations of the Earth (Blewitt et al., 2001) the analytical formula for variations of height has been obtained: **dH=[(-8.50t-14.10cosV-3.17cosW]sinQ** mm. Here **t** it is measured in years (from the beginning of year), and arguments are measured in degrees and calculated under formulas **V=360 t-56** and **W = 720 t-207**; velocity of drift is given in mm/yr. **Q** is the latitude of a place of observation. Inversion trend component of the mantle deformation has been predicted by the author on the basis of the mechanism of perturbed swing of the core and the mantle of the Earth (Barkin, 1995, 2005). The analytical description of this deformation is given by Barkin and Shatina (2004). According to developed model the polar core trend organizes slow systematic transport of atmospheric and oceanic masses in northern hemisphere from southern hemisphere which loading results to slow secular deformation of the Earth surface. By our evaluations the definite secular lowering of surface of the northern hemisphere takes place (the maximal velocity in polar region is about 1.8 mm / yr). The opposite tendency is observed in a southern hemisphere.

The first attempt of definition of this size on the basis of GPS data of observations has undertaken Jin Shaunggen (private e-mail communication of 19 October 2005). He has shown that average velocity of slow deformation (rising of the surface of southern hemisphere) makes 1.33 mm /yr. The Medicina station is located at latitude 44.1 ñ.ø. On our model constructions its height varies under the law **-5.92 t-9.8cos (V)-2.2cos (W)** mm. According to precision data of satellite observations in period July 1996 - June 2000 at the Italian station in Medicina has been observed temporal trend of the heights, making -7.0±0.2 mm / year (Zerbini et al., 2000). Theoretical value of change of height under the formula **dH** makes -5.9 mm / yr and basically explains observably geodetic effect. At the Antarctic station Syowa located at latitude 69 S, the height should vary under the law (Barkin, 2005): **7.94 t+13.2cos (V) +3.0cos (W)** mm. According to satellite observation data of DORIS system for 1993-2004 (Daillet, 2006; abstract # EGU06-A-07951) the trend in increasing of height has made 6.5±0.2 mm / yr that will be coordinated to the predicted value of 7.94 mm / yr. Experimental values of amplitudes of annual and semi-annual variations of height were appreciated in 9 mm and in 3.5 mm. Our dynamic evaluations give the appropriate values of amplitudes of 13.2 mm and 3.0 mm.

References

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