Geophysical Research Abstracts,
Vol. 10, EGU2008-A-10506, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-10506
EGU General Assembly 2008

Phenomenon of secular increasing of mean gravity in Northern hemisphere and secular decreasing of mean gravity in Southern hemisphere; predictions and new confirmations

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The mechanism of polar drift and periodic oscillations of superfluous mass of the Earth outer core relatively to the centre of mass of the mantle is one of the basic mechanism of not tidal variations of a gravity. Its nature is connected to external differential gravitational influences on not spherical shells of a planet (Barkin, 2002). Moreover, this mechanism plays the important dynamic role in redistribution of air and oceanic masses of the Earth. It determines and directs the redistribution of planet masses from one hemisphere in opposite. In the given work on the basis of geodynamic model about polar displacements of the core (Barkin, 2005) and known results about an annual mode of inversion deformations of the Earth (Blewitt et al., 2001) the analytical formula for variations of a gravity has been obtained: **dg = [(2.72t+4.52cos (V) +1.02cos (W)] sinQ**. Here the time t 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**; amplitudes are given in microgals (**mGal**), and velocity of drift in **mGal/yr**. Q is the latitude of station of the observations. The formula takes into account direct effect of gravitational influence of displaced superfluous mass of the core, an additional attraction of the mantle deformed by displaced core. The annual deformation of a surface is described by the solution of Blewitt et al. (2001) on which it is estimated also secular inversion component of deformation of the Earth. The core actively participates in a redistribution of masses between northern and southern hemispheres

with various cyclicities. Therefore the discussed mechanism is predominating in researched problem. Circulating between hemispheres atmospheric and oceanic masses bring the certain contribution to not tidal variations of a gravity, but they are small for considered stations. They were evaluated on the basis of the elementary model of polar points with variable masses. We plan to investigate these effects, and also spatial character of relative displacements of the centre of mass of the core and mantle in other works. The given theoretical formula for **dg** rather precisely explains main effects in the variations of a gravity at set of gravimetric stations. In particular this formula describes the phenomenon of inversion of secular changes of gravity in northern and southern hemispheres: the mean value of gravity in northern hemisphere increases with velocity 1.36 mGal/yr, and in southern hemisphere decreases with the same mean velosity. Secular variations of gravity depend on latitude: **dg = 2.72xTx sinQ** mGal/yr, where **Q** is a latitude of a place of observations, **T** - time in years (Barkin, 2005). The modern data of gravimetric measurements at the European stations (Crossley, Hinderer, 2006): Metsahovi, Potsdam, Moxa, Vienna, Wettzell, Strastburg, Medicina etc., in Asia and Australia: Eshashi, Canberra etc., in Northern and South America: Boãlder (Colorado), Patagonia (Argentina) etc., and also in Antarctic Region (Syowa station), will well be coordinated to the theoretical values of secular variations of a gravity predicted earlier in the specified points. Gravity residuals are considered after removal of tides, local pressure and polar motion.

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