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Core polar motion and inversion gravity variations of the Earth

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Core polar motion. Secular, annual and semi-annual variations of a gravity on a surface of the Eart
by influence of the superfluous mass of the moving core are studied. The kinematics of the core n
described on the base of assumption that observed wide spectrum of geocenter oscillations (includi
mainly is caused by the corresponding displacements of the superfluous mass of the core moving rel
the center of the mass of the deformable mantle (Barkin, 1995; Barkin, Vilke, 2004). The reduced
the core motion along polar axis is used here. We take into account secular trend and annual and sem
oscillations of the core relatively to the mantle. The basis of research is made with the solution of a
of the theory of elasticity on deformations of an elastic mantle under gravitational influence of the li
displaced along polar axis on the law (Barkin, 2005):

r=(42.7+/-9.8)t+(100.0+/-4.2)cos(360t-38)-(100.0+/-4.2)cos(720t) mm.

Here and below t is given in years and arguments of trigonometric functions - in degrees. The main
periodic translational oscillations of the core-mantle system is a mechanism of differential gravitation
of the Moon, the Sun and planets on non-spherical, non-homogeneous shells of the Earth (core and man
reason of the core drift (and geocenter drift) is unknown. But we can assume that this motion is reflecti
long-periodic perturbations caused by corresponding perturbations of the theory of the secular orbita
of the planet. Expected periods in the core long-periodic motions along polar axis of inertia can be a
000 years.

Gravity variations. 1. Love number of order (-2). For considered model of the mantle and the co
lated values of these Love numbers consist: k(-2)=-0.1423 and h(-2)=0.1419. **2. Secular variations of**
Secular variation of gravity at station with latitude Ô is determined by formula: **dg/dt=2gM[1-h(-**
2)]sinÔ(dr/dt), where M=0.1932/R, R is the Earth radius, g is the gravity. Taking into account the n
values of parameters of the Earth we obtain: **dg/dt=2.618sinÔ** mg/yr (mg=microgall). **3. Annual a**
annual variations of gravity. At the station with latitude **Ô** the sum of the trend, annual and se
variations of gravity is determined by formula:

dg =[(2.62t+(6.12+/-0.26)cos(360t-38)-(1.84+/-0.23)cos(720t)]sinÔ mg.

Here we represent formulas for gravity variations at some concrete gravimetric stations:

Novosibirsk (Ô=65.5 N): dg =(2.38+/-0.55)t+(5.57+/-0.23)cos(360t-38)-(1.68+/-0.20) cos(720t)
Potsdam (Ô=50.0 N): dg =(2.00+/-0.46)t+(4.69+/-0.20)cos(360t-38)-(1.41+/-0.18) cos(720t)
Medicina (Ô=44.05 N): dg =(1.82+/-0.42)t+(4.25+/-0.18)cos(360t-38)-(1.28+/-0.14) cos(720t)
Esashi (Ô=39.2N): dg =(1.65+/-0.38)t+(3.87+/-0.16)cos(360t-38)-(1.16+/-0.14) cos(720t)
Singapure (Ô=1.3 N): dg =(0.06+/-0.01)t+(0.14+/-0.01)cos(360t-38)-(0.04+/-0.01) cos(720t)
Syuwa (Ô=69.0 S): dg =-(2.45+/-0.57)t-(5.71+/-0.24)cos(360t-38)+(1.72+/-0.22) cos(720t)

Here values of gravity variations are give in microgalls (mg) and t – in years (yr). **4. Comparison of th**
and observations. Predicted secular variation of gravity at the Medicina station consists 1.82+/-0.4
This value is in a good agreement with the trend of gravity observed in this region (1.7 +/-0.1). Th
value of secular variation of gravity at Antarctic station Syuwa -2.45+/-0.57 mg/yr exactly corres
observable here trend of gravity in -2/-3 mg/yr (in 1997-2000). At Potsdam station in period 1997-200
variation of gravity was about 2-2.5 mg/yr that also it will be coordinated with its theoretical value
mg/yr. Observations also demonstrate conformity of theoretical and observable values of amplitudes an
of periodic variations of gravity described above.