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Core polar motions and variations of the Earth figure

Yu. Barkin

Sternberg Astronomical Institute, Universitetskii pr-t, 13, Moscow, Russia
(yuri.barkin@ua.es/phone: 07-095-9395024)

Geodetic consequences of the forced relative displacements of the core and the mantle of the Earth und
of differential gravitational attraction of the Moon, the Sun and planets (Barkin, 2002) are studied. W
that observed wide spectrum of geocenter oscillations (including trend) in firstly is dictated by the
displacements of the superfluous mass of the core relatively to the center of the mass of the deformabl
(Barkin, 1995; Barkin, Vilke, 2004). On the base of this assumption we have restored the style of cor
motion along polar axis of the Earth taking into account secular motion and annual and semiannual osc
It was shown, that clear displays should have the inversion changes of dynamic structure and figure of t
At relative displacements of the core and the mantle there should be contrast changes in opposite hem
of the Earth, first of all contrast variations of the tension state of hemispheres of the mantle. The
phenomena caused by relative displacement and deformations of the mantle and the core of the Earth
polar axis are discussed in details. The predicted and described phenomena have obtained highly confi
on the basis of the modern observations. The basis of research is made with the solution of a pro
the theory of elasticity on deformations of an elastic mantle under gravitational influence of the liq
displaced along polar axis and observational data about geocenter drift and annual and semi-annual osc
along polar axis of the Earth on the law: **r=4.646t+(11.03+/-0.47)cosU-(3.31+/-0.41)cosV** mm. Here ar
reduced arguments of trigonometric functions: **U=360t-38, V=720t** (Tatevian, Kaftan, Kuzin, 2004) a
in degrees, **t** is given in years (**t=0** at 1 January).

1. Core drift and its annual and semiannual oscillations along polar axis of the Earth. In the last
the core drifts and oscillates with respect to deformable mantle by the law: **r=(42.7+/-9.8)t+(100.0+/-4
(100.0+/-4.2)cosV** mm. The main reason of periodic translational oscillations of the core-mantle s
a mechanism of differential gravitational action of the Moon, the Sun and planets on non-spheric
homogeneous shells of the Earth (core and mantle). The reason of the core drift (and geocenter drif
known. But we can assume that this motion is a reflection of the long-periodic perturbations caused by p
secular orbital perturbations (period of the core long-periodic motion along polar axis of inertia can
100 000 years).

2. Height changes. Secular, annual and semi-annual variations of heights **H** at latitude Ô, caused by th
of displaced core are described by formula (t in years):

dH=[(-7.7014t-(18.29+/-0.78)cosU-(5.49+/-0.68)cosV]sinÔ mm.

Observations. The predicted variations of heights obtain confirmation in results of GPS of daily obse
of the heights fulfilled in the period July 1996 - June 2000 in Medicine station (Zerbini et al., 2001). F
marked negative linear òðåíä -7.0+/-0.2 mm / yr that will be coordinated with predicted trend for thi
-5.4+/-1.2 mm / yr.

3. Lengthening and shortening of parallel circles. The length of parallel circle **L(Ô)** for latitude **Ô** is
by the law:

dL(Ô)=[(-15.8t-(37+/-2)cosU+(11+/-1)cosV]sin(2Ô) mm.

The maximal lengthening (shortening) has place in southern (northern) hemisphere for parallel circle 45
and is characterized by velocity of 15.8 ìì/ãîä. ***Observations.*** Lengthening of parallel circles of mean
of the southern hemisphere, obtained on base of VLBI measurements makes 16-18 mm /yr (Jin Shu
Zhu Wenyao, 2003).

4. Variations of meridian arcs. The length **S(i,j)** of arc between any two stations situated on one me
the Earth is changed by the law:

d S(i,j) =[(6.3t+(14.9+/-0.6)cosU-(4.5+/-0.6)cosV][cosÔ(j)-cosÔ(i)] mm.

Here **Ô(j)** and **Ô(i)** are latitudes of stations.