Geophysical Research Abstracts
Vol. 12, EGU2010-14691, 2010
EGU General Assembly 2010

Structural features of geosphere and dynamics of relative movements in the Sun-Earth-Moon system.

Natalia Bulatova

Russian Academy of Sciences, Institute of Physics of Earth, Moscow, Russian Federation (n.p.bulatova@mail.ru)

Applying of Spatio-Temporal Technology (STT) developed by the author in 1996-2000, to astrometry database, made possible a study of the dynamics of Sun and Moon movements in relation to the Earth for the period from 1982 to 2008. Spatio-Temporal Technology consists of the Earth's 3D model with classic – spherical and geographical – network of coordinates and the Moving-Source Method (MSM), which represents the shifting of Earth – celestial body vectors in time.

The dynamics of the celestial bodies – the Sun and the Moon - movements was analyzed as 1) a change of the celestial bodies' angular distance in relation to the equatorial plane of the Earth, and 2) a change of the Sun-Earth distance. The study revealed new data regarding the orbital motion of the Earth-Moon system's barycenter around the Sun.

1. The analysis of the graphic presentation of value δ(T) for the Sun and the Moon in relation to time T for 26 years revealed the following data regarding the rate of change of the celestial bodies' T-dependent angular distance $\Delta\delta/\Delta$T in relation to the equatorial plane of the Earth, where δ(T)=0:

For the Sun: during the study period, the quasi-sinusoid curve had a symmetrical trend in relation to δ(T)=0.

For the Moon: from 1953 until 2009, the type of the dependence of $\Delta\delta/\Delta$T on time T was revealed, which repeats every 18.6 years in accordance with the moon cycle. It was found out that in each such cycle:

a) the dynamics of the Moon's periodic deviation from the equatorial plane are very much different for two phases of the cyclic change of T-dependent $\Delta\delta/\Delta$T with deviation amplitudes 1) from 28 [U+F0B0] to –28 [U+F0B0], and 2) from 18 [U+F0B0] to –18 [U+F0B0].

b) The graphically presented collected data regarding cyclic deviation for $\Delta\delta/\Delta$T and $\Delta 2\delta/\Delta 2$T for <0 and >0 zero line are very different, although the cyclic deviations of T dependent angular distance δ(T) in relation to the equatorial plane are symmetrical. This result may mean that different dynamics of the Moon's movement over the North and the South hemispheres are connected to the structure of the geosphere of the Earth.