Geophysical Research Abstracts,
Vol. 11, EGU2009-1748, 2009
EGU General Assembly 2009
© Author(s) 2009

Role of the Earth's rotation in global geodynamics

N. Pavlenkova
Institute of Physics of the Earth, Moscow< Russia (ninapav@ifz.ru / 07-495-255-60-40)

Role of the Earth's rotation in the global geodynamics.

Pavlenkova N.I., Institute of Physics of the Earth of Russian Academy of Science, B.Grusinskaja 10, 123995, Moscow, ninapav@ifz.ru

Geophysical studies show several regularities in Earth's structures which are not explained by the traditional global tectonics conceptions.
(1) The surface of the Earth, as well as a surface of other planets, precisely shares on two hemispheres with a different relief and structure of an earth's crust: on the Pacific (oceanic) hemisphere with the lowered relief and a thin oceanic crust, and a continental hemisphere with prevalence of the raised relief and a thick continental crust.
(2) There is a regular system of global lineaments and ring structures which are stretched on thousand kilometers, covering continents and oceans. As one of examples it is possible to result system of rift zones (mid-oceanic ridges), forming a ring around of the Antarctica with rift branches from it through everyone of 90 degrees.
(3) Asymmetry with a relief of a day time surface when to each raised structure there corresponds the lowered surface on the opposite side of globe is observed.
(4) The continental and oceanic mantles have different compositions and deep roots (>300 km) beneath the continents are prominent as regions with relatively high seismic velocities. There are regular connections between geological structures and deep mantle roots.
(5) The classical lithosphere-asthenosphere model is not confirmed by seismic data. The asthenosphere can not be traced as a continuous layer, there are disconnected lenses (asthenolenses) even beneath mid-oceanic ridges.
Significant horizontal movements of the lithosphere, as proposed by the global plate tectonics, would destroy all these regularities and crust-mantle interaction. To make an agreement between all observed data, the fluids-rotation hypothesis is proposed. The hypothesis supposes two main energy sources of the global tectonics: the degasification of the Earth (the fluids advection) and changes in the Earth rotation. At formation of the core there was the Earth's expansion and was formed system of global lineaments and the Pacific ring. Bipolar convection in the core has created a magnetic field and the increased advection of deep fluids in the southern hemisphere. The last promoted formation of thick continental lithosphere in this hemisphere in Archean-Proterozoi. This thick lithosphere has led to asymmetry of the planet and to relative displacement of the mass centers of the Earth's spheres. It produced high pressure between the spheres (Barkin, 2002) and could have initiated their relative displacements. As a uniform asthenosphere does not exist and the continents have deep roots such displacements were most probable on a surface of a liquid outer core. The marked mass centre dislocation has caused the turning of the mantle around the core with movement of the continental hemisphere from South Pole to the equator. It corresponds to the data on movement of paleomagnetic and paleoclimate poles that took place in Paleozoic era.
The rotation of the mantle around the core passed non-uniformly: the tidal forces connected to periodic change of Earth's rotation axis position in system the Earth-Lund-Sun (Avsyuk, 1996) were imposed on the basic moving forces restoring the mass center balance. The periodic displacements of the mantle created conditions for alternation of tectonic activity epochs.
Rotation of the mantle around the core created a new nonequilibrium system. Therefore in Mesozoic era a new stage begins: an expansion of the southern hemisphere which radius is now bigger, than the northern one. Such expansion created the regular system of the mid-oceanic ridges forming a ring around Antarctica with the symmetric Mid-Atlantic, Indian and Pacific ridges.
Supposedly at the last stage the formation of the continent on South Pole (Antarctica) and destruction of a

continental crust on the northern hemisphere (formation of the Arctic ocean) took place to mount on the mass center balance.