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The mechanism of translational displacements of the core of the Earth at inversion molten and solidification of substance at core-mantle boundary in opposite hemispheres

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Shell dynamics. “The Earth represents system of non-spherical eccentric shells (the core, the mantle, a rigid core etc.) which have various structure and distribution of density. Their moments of inertia and dynamic oblatenesses are various. From the point of view of the mechanics it means, that external celestial bodies (the Moon and the Sun) on miscellaneous (differentially) gravitationally act on the separate shells. They try to cause various accelerations to the centers of masses of shells and various angular accelerations to their rotary motions. It the most external celestial bodies put shells of forced body in difficult state, forcing them to push each other to prevent each other and to struggle with each other. That is between shells there are powerful force interactions: additional forces, and more significant on value, than tidal forces, and the huge moments of forces which all time aspire to turn one of shells relatively to another. The external influence is stronger, the shells are pressed more strongly or taken away. If external action weakens, also shells mutually exist more quietly. External influence depends on position of perturbing celestial bodies. But the last vary cyclically in various time scales. It means, that interactions of shells with each other also are cyclic with the set of frequencies being a derivative from basic frequencies of orbital motions of celestial bodies (coincide with basic frequencies or are their various combinations). Clearly, that the specified mechanical interactions are as though primary which generate then a sequence of every possible interactions of all layers of shells, geodynamic and geophysical processes (which are naturally also cyclic). Elastic layers will test deformations, thus absorbing, and then returning a mechanical energy of translatory - rotary motion of shells and their relative swing. Plastic properties of layers of shells will result in absorption of mechanical energy and to its transformation to thermal energy. The directed mechanical influences of the bottom shell on top (of the core on the mantle) on geological intervals of time will result in enormous additional variations of the tension state of the top shell, also ordered in space and time (besides in various time scales). This influence will be transferred to all natural processes which will have similar properties of cyclicity and orderliness. Thermodynamic stimulation of layer D " by the relative displacements of the core and mantle will result in formation of ascending mantle streams - plumes. Relative oscillations of the top shells of the Earth with boundaries on depths of 670 km, 430 km and oth. will generate the fluid formations (lenses and chambers) from a magmatic materials and fusions. Ascending fluid streams in the top mantle on system of breaks and cracks move in the top layers and on a surface of the Earth. So magmatic and volcanic activity of the Earth is realized. Over this activity again "supervise" mutually - displaced and deformed shells of the Earth. The last, in turn, are in strict "submission" at the Moon and the Sun and «are sensitively listen» to the slightest changes of their orbital motions.” (Barkin, 2002, pp. 45, 46).

“The powerful impacts repeating cyclically, on zones of a congestion of fluid masses (astenosphere lenses, magmatic chambers etc.) result in their growth and expansion, and at significant subsequent impacts to a effects of wedging of the top layers of lithosphere and the crust, i.e. to formation of new or to stimulation and expansion of old cracks and lineaments. Subsequent or more powerful impacts (influences) of the bottom shell on a direction of wedging will result in transport of molten mantle substances from the bottom layers in top, including outpourings of magmas and other fluids on a surface of a planet (the Earth). ” (Barkin, 2002, with. 47).

The mechanism of formation of plums and hot spots. “The most significant displacements of the centers of mass of shells of the Earth result in the most significant variations of the intense condition of a transitive layer between the core and the mantle and overlying layers of the mantle. A capacity of layer D", covering makes a liquid nucleus

about 250 km. It, apparently, is determined by extreme displacements of a liquid core relatively to the mantle (original active sphere of its influence). The appropriate relative displacements of the centers of mass of the core and the mantle (certainly, on geological intervals of time) thus can achieve kilometers. Cyclic displacements of a liquid core with various amplitudes and frequencies result to heating of all layer D" (or the certain zones of this layer) and to downturn of its density. Layer D" passes as though in the excited state. Its temperature raises its thickness and surpluses of heated masses under an impact of the bottom shell (the core), apparently, is increased start to rise along the weakened radial zones in the top levels of standing. To formation of the similar weakened zones is promoted also by mechanical influence of the bottom shell of the mantle. Thus the plums are formed, bringing heated substance to the uppermost layers of the mantle. At catastrophic interactions of shells the plums promote carrying out of magmas directly on a surface of the Earth. Actually the theoretical illustration here is given to known representation, that layer D" is "kitchen of inner plate magmatism» (Zonenshain, Kuzmin, 1993). Similar processes occur on boundaries of other shells of the Earth. The intensification of interactions of shells on boundaries of 430 km, 670 km and even in more high levels results in formation of zones of fusions, astenosphere lenses and to that of similar formations which promote volcanic activity of the Earth. At the intensive swing of shells the top layers of the Earth (of lithosphere) are exposed by hydraulic wedging (Khain, Lomise, 1995). As a result of the specified long process there is a formation of system of cracks and breaks, hot spots and their systems on the Earth surface etc. It is natural, that by virtue of the ordered cyclic displacements of shells the specified geological structures also will have properties of orderliness (Barkin, 2000)." (Barkin, 2002, p. 78).

The thermodynamic mechanism. In the report the new thermodynamic mechanism of the contrast phenomena of fusion of a frontier layer of a sole of the mantle (in northern hemisphere) to which the core is forced to be displaced, and solidification of zones of a liquid core from the opposite side (in a southern hemisphere) is discussed. This mechanism is hypothetical, but it rather logically explains observably contrast temperature modes of hemispheres in modern and the last geological epoch, the source of plume material which moves specifies (is redistributed) to the top layers and a surface of the Earth, i.e. the mechanism of plume-tectonic activity of the Earth. Plum-tectonic activity of the core drifting and varying with a wide spectrum of frequencies relatively to the mantle, in a long time scale results in contrast variations of geodynamic conditions in N/S hemispheres. The specified polar oscillations of the core and mantle during geoevolution have left after themselves geological certificates on a surface of the Earth about inversion changes of geodynamic and geological conditions in opposite hemispheres (Bozhko, 1992). Such huge bodies as the core and mantle of the Earth as a result of oscillations, deformations and relative displacements easily transformed a face of the Earth: formed N/S orientated rifting structures, resulted in the directed and organized motions of lithosphere plates, more intensively warmed up that southern northern hemispheres, operated by ocean, deforming its bottom and raising or lowering its mean level due to the tide from a displaced core. The specified processes are long and occur, including, in a geological time scale. It means that the fundamental tectonic process of formation of supercontinents also has a polar orientation, is cyclic. Our modeling researches have shown, that relative oscillations of the core and mantle arise even at absence of strongly pronounced thermodynamic transformations of a material on CMB due to viscous elastic properties of all layers of the mantle (Barkin, Vilke, 2004). The formulated positions require detailed study from positions of the mechanics and thermodynamics. It is possible to assume, that action of this mechanism precisely should be shown and in a short time scale, for example, at annual and monthly oscillations of the core. It means that cyclic variations of thermal flows from the Earth with the specified periods, and with contrast thermal flows in relation to northern and southern hemispheres should be observed. The core trend also should be displayed in contrast secular changes of thermal flows and in variations of temperatures at a surface of the Earth and in various layers of ocean and an atmosphere. Confirmations to these preliminary conclusions in particular is yielded with results of modern researches of temperature changes in an atmosphere and a stratosphere (Fred Singer, 2001 [2]; Douglass, Pearson, Fred Singer, Knappenberger, Michaals, 2008).

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