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The disturbances of the equilibrium state of the rotating Earth and the physical nature of its tectonic activations and modern earthquakes: generality and differences

© ***K. Tyapkin, M. Dovbnich, 2010***

National Mining University, Dnepropetrovsk, Ukraine
dovbnichm@mail.ru

Most scientist in the whole world supposed Earth tectonogenesis and particularly its tectonic activations are controlled by endogenous forces caused by intra earthy spontaneously physical geological and geochemical processes flowed in its interior. The role of external factors leaded to the disturbances of the Earth equilibrium state determined the nature of the geodynamic processes appearance was showed in monograph being published recently [Tyapkin, Dovbnich, 2009]. In this work the new notions are justified and stated. In accordance with it observed geodynamic processes caused by the interaction between our planet and its surrounding space fields. So face of the Earth and its interior structures form under the influence of two opposed groups of forces according to it: the phenomena leaded to the keeping the dynamic equilibrium of the rotating Earth (geoisostasy) happen under the influence of one group; the other forces group aspired to disturb this equilibrium state. The physical nature of the first group forces is studied well enough. This group control peneplanization processes of the Earth surface trying to rich its equilibrium figure-ellipsoid. The source of the second group forces are the stresses occurred in tectonosphere as a result of the Earth rotation regime variations: changes of the angukar velocity and the displacements of the rotating axes relatively to geoid.

For the first time the geoisostasy conditions was stated and insonified on the XXVII session of IGC [Tyapkin, 1984]. Based on this conception M. M. Dovbnich gained the calculation algorithm of the stress fields in tectonosphere, caused by variations of the Earth of rotation regime. They were described in the II part of monograph in detail [Tyapkin, Dovbnich, 2009]. I can be find in free access in internet [www.nmu.org.ua/ru/scientific/publications/].

The analysis of the global stress fields occurred in the Earth tectonosphere as a result of the rotating regime variation made it possible to make following conclusions.

1. A main contribution in the global filed of the rotating stresses in tectonosphere make a component caused by the displacement of the Earth rotation axes relatively to the geoid. The value of these stresses of this component exceeds breaking point of tectonosphere rocks (10^7 Pa), so it can be seen as a reason of the Earth tectonic activations.

2. The contribution of stress field component caused by the variation of the angular velocity of the Earth rotation is much less. Maximum value of this stress component can rich the value 10^5 Pa. So, the Earth tectogenesis in essence determined by the component of the global field in tectonosphere, caused by displacement of the Earth rotation axes relatively to the geoid.

The Earth tectonic activations appeared in the tectonosphere zones, in which the rotation stresses rich the values exceeded breaking point of its constituent rocks. The specified tectonosphere fault system is developed as a result of every tectonic activations. This system is presented as hierarchically subordinated faults of two mutually orthogonal directions. The interaction of the both direction faults created an appropriate blocks system. Relational block displacements on the faults initiate a denudation sedimentary process generating a mainframe terrigenous matter necessary for surface structure formation.

Experience of our scientists argued that in Eurasia six Precambrian fault systems of tectono-

sphere are easily fixed. Its parameters are characterized by the strick azimuth: 0° and 270°; 17° and 287°; 35° and 305°; 45° and 315°; 62° and 332°; 77° and 347°, less fixed fault systems with strick azimuth intermediate relatively with azimuth mentioned above. So, only in Precambrian there took place six large-scale tectonic activations of the Earth, regardless of much smaller — activations phases.

Earthquakes present as a oscillations of the Earth surface, caused by abrupt energy release in rather localized tectonosphere zones called sources. Talking about the forces nature caused the earthquakes famous american geologist Bruce Bolt said: the same forces geological or tectonic creating mountains, rift valley, ridges and deep-water trays, the same forces are the primary reason of the earthquakes. The nature of these global forces is not so clear [Bolt, 1981]. Fully share this opinion we can state, that the source of the forces caused the earthquake origin is the mentioned above global stress field occurred in the Earth tectonosphere as a result of its rotation regime variations.

The distinctive features of modern earthquakes from ancient tectonic activations are: its much less energy intensity; corresponding between origination sources and ancient fault structures; and also — much higher frequency of the earthquakes appearance argued about that the preparation before the earthquakes need much less time. All features mentioned above can be explained by that the modern tectonosphere is less homogeneous relatively with Pracembrian tectonosphere. Earlier tectonic activations of the Earth caused the appearance of the weak areas with lower strength ($<10^7$ Pa). These areas are the zones of Precambrian different scale faults. This feature allows scientists to use it as an additional criterion for the earthquake prognosis.

Based on the possibility to calculate the global stress fields and all study features of earthquakes demonstration our university together with the UkrNIMI NAN Ukraine (Donetsk, Ukraine) are going to make research dedicated to creation of rational forecasting earthquake technique, included relational to it dynamic phenomena in mines, catastrophic consequences of which cause grand losses for mining industry of Donbass. Authors will be glad for collaboration.

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High-quality seismic imaging and interpretation of prospective features in a thrust zone of onshore Ukraine

© *O. Tiapkina, O. Polunin, 2010*

Nadra Group, Kiev, Ukraine
yutyapkin@rambler.ru
aipolunin@yahoo.com

Introduction. For many years, the Dnieper-Donets Basin (DDB) in Ukraine has attracted extensive exploration activities. In this mature petroleum-bearing sedimentary basin, significant efforts are made to searching for and exploration of hydrocarbon traps in a variety of complex-structure land environments. Geophysicists face, to name a few, overburdens of intense lateral structure variations and large velocity contrasts [Tiapkina et al., 2006], settings of complex salt tectonics [Tiapkina et al., 2008], and highly folded and faulted thrust zones. Interpretation of seismic data in these complex environments is quite a challenge. The objective of this study is to demonstrate, with examples from a thrust zone, which comprises several productive fields and prospective areas, how integration of high-quality