The turbulence theory – a new geodynamic concept

Турбулентната теория – една нова геодинамична концепция

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Резюме. Представена е една нова концепция свързана се глобалната геодинамика. На основата на новополучени геодезически (GPS) наблюдения, геофизични данни и модели и други съвременни резултати от специализирани изследвания и измервания е предложен нов поглед към съвременната геодинамика, основаващ се на допускането, че основните движения в Земята са вихрови турбуленции. Показани са множество примери илюстриращи тази нова концепция от геодезическо, геофизично и геоложко естество. Съставена е сравнителна таблица за различни компоненти и елементи на раглежданата теория и на тектониката на плочите. Показано е коя от хипотезите обяснява по-лесно или по-трудно наблюдаваните съвременни геофизични, геодезически и геоложки данни и факти. Предполага се, че допълнителни изследвания и наблюдения могат да потвърдят, отхвърлят или усъвършенстват предложените допускания.

Key words: turbulence theory, global geodynamics.

Introduction

Over the last years many new concepts about the Earth's geodynamics have been suggested. To make even a short review is a very hard task. In this recent paper the main purpose is to suggest the general ideas about a new concept concerning the solid Earth's geodynamics dominated by turbulence movements called "turbulence theory". We believe that every theory can generate many different hypotheses targeted to many different aspects of the theory's applications. The creation of the turbulence theory was provoked by many new, modern and recently published data on the global observations including NASA's GPS data, satellite gravimetry mapping, last models of the Earth's plates, etc. For the first time the rotational movements as a most important recent geodynamics process is suggested on a global level to the new concept. Many recent publications are presented in the monograph study "Rotational processes in geology and physics" (Milanovsky, 2007 (Ed.).

The main concept

The main fundamental concept is based on the assumption that rotational turbulence movements are the main elements of the global geodynamic structures developed on the solid Earth surface and in the Earth's interior during Earth's history. They are called "corkings" and have different sizes, forms and velocities of the movements, consist of different branches with different vertical and horizontal displacements. Some of them are more active, some are calmer, but both have their expressions in the different geodynamic structures observed on the Earth's surface. This is a fully mobilistic concept. The direct analogy with the atmospheric turbulences and ocean flows is obvious and accepted. The reason is – cyclones and anticyclones create spiraling forms observed on the meteorological satellite images. They look very similar to the forms, sizes, branches, space positions, etc., of the corkings. The atmospheric turbulences are developed in the atmosphere, the ocean flows in the hydrosphere, while according our concept the corkings are developed in the lithosphere and in the deep Earth's interior. The main differences are the medium where the turbulences originate and developed, (appearing and disappearing) and the velocities of the movements. The corkings and/or of the different branches of the corkings themselves and the atmospheric turbulences, (respectively the ocean flows) are similar in their shape and forms. They are interacting as well as in similar way.

The substances where these structures are created and developed are different. For the meteorological events this is the atmosphere, for the ocean flows – the hydrosphere, for the corkings – the solid Earth and the deep Earth's interior. The corkings have the same properties as the atmospheric (ocean) turbulences – strongly expressed nonlinearity in their behavior and interactions, especially during the catastrophic phases of the Earth's development. They

appear and disappear spontaneously in time. After being formed they have relatively stable development in the time domain to the moment they are destroyed or disappear. Corkings could penetrate deeper in the Earth's interior, or have shallower influence. Thus, in general the similarities between atmospheric (ocean) turbulences and the corkings are the shape, branching structure, different forms and sizes and the interactions between them.

The main differences are the substances they exist in, the velocity of the movements of the masses and the possibilities of axial position (usually the atmospheric turbulences have vertical or sub-vertical space position, but the ocean flows are more complicated having as well as relatively great horizontal components). Corkings due to the very high viscosity of the substance where they exist in may have not only the vertical, but even horizontal and/or sub-horizontal position.

The probable main energy source (driving mechanism) of the movements and the generation of the corkings is the Earth's core, its perturbations and/or movements, balancing the stability and the space position of the Earth and acting as source of the different turbulences in the "solid" Earth. Many of the structures observed now on the Erath's surface could be the recent corkings, their branches and/or relicts of the existing earlier corkings. Many examples from the different fields of the knowledge on the Earth are discussed. Summary data and information are compiled from the different fields of the geodynamics – recent GPS measurements, gravity field observations, seismic tomography and geology evidences are incorporated as illustrations to the new developed concept (Рангелов, 2007).

We believe that up to now nobody is considering the turbulence theory to the global level of the Earth's dynamics using it as a more common explanation tool of the recent geodynamics (Gurov R., B. Ranguelov., 2007). A lot of data, information and observations confirmed the turbulence theory. If this is correct or not – the time and experience will assess that. This is just an attempt to focus the attention of the geodynamic community to look more careful to this concept. If this concept is accepted, many existing and newly observed facts can get easy and reasonable explanations.

Conclusions

There are a lot of different geological, geophysical and geotectonic evidences supporting the turbulence theory and related hypothesis.

The plate tectonics theory is a simple (it consists of 4–5 main elements and assumptions – plates, horizontal movements, subduction, rifts and transform faults, ridges, etc.) and explains many cases about the earth's geodynamics.

The turbulence theory is even simpler and needs only recognition of the corkings themselves and acceptance of the rotational movements. In this way much of the observed and recently collected data and information (GPS global data, gravity field, hot spots, triple junctions, etc.) became easier explainable. Many controversial and not easy explainable by the plate tectonics observational facts became well recognized. If this new view is accepted then the recognition of the corkings, the study of their dynamics and time development may help to solve many important practical issues related to all branches of the recent geodynamics.

References

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