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Wave influence on the stress-deformed state of the lithosphere

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During core study of the Kola Superdeep borehole an original layering- rhythmic alternation of prevailing vertical or horizontal components of the modern stress field was registered. Similar picture is in the German deep borehole. It is impossible to explain a presence of this layering on the base of traditional methods for calculation of stress distribution in rocks. Many large intrusions, crystal shields and lithosphere itself are also layered. According to this data we can assume, that the reason for this stratification could be the influence of long live oscillations in lithosphere blocks which are in constant interaction. These oscillations determine the structure of vertical variations of the main stress field components during geological time. So a presence of standing wave is necessary for the appearance of stable stratification. The standing wave ray must be normal to the direction of the main component of the stress field of a massif, and along the wave spreading direction zones of nodes and antinodes with different dynamics concentration or rarefying) of particles are formed. Earlier we have experimentally proved the origination of stratification in the solidifying artificial medium under the influence of standing waves. Now we study plastic and elastic properties of sedimentary rocks under uniaxial loading. When a spreading direction of ultrasonic standing wave was normal to the direction of loading, sandstone and shungite samples showed structural alterations, resulted in appearance of microcracks. Samples look like a rouleau of cone-shaped crocks one into another, where cone altitude coincides with the loading direction and a crock thickness is a half-length of the used wave. Destruction of the same samples without ultrasonic influence resulted in an ordinary picture, which can be get for samples under uniaxial loading – system of cracks under an angle of 40-45^{o} to the direction of loading. Thus, it was established that standing wave-

stress field interaction can play a controlling role during changing of stress-deformed state of rocks, at least sedimentary. There are few hypothetical reasons for appearance of a standing wave, which could lead to the stratification of the lithosphere. The most attractive, to our opinion, is deformation waves, caused by gravitational planet interaction (the Sun-Moon tidal waves, for example) or autooscillations of the Earth itself, due to the movements of its internal core.

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