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Weak Vibrations Generated in the Earth Crust by Geomagnetic Filed Variations

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At present the problem of short-term earthquake prediction based on behavior of precursors (featured variations of various geophysical fields) is far from solving. At the same time an evidence of earthquake triggering by natural and man-made factors is world-wide verified. Based on well-monitored triggering impacts the new concept of earthquake prediction may be developed. From this point of view an analysis of various triggering factors and mechanisms of interactions of rocks under stressed conditions with physical impacts is very important. One of the possible triggering mechanisms was proposed by G. Duma and Yu. Ruzhin [2003], which is a generation of mechanical forces in the Earth crust due to interaction of magnetotelluric currents with geomagnetic field. It was shown that the energy produced by this interaction is equivalent to the energy of M4 earthquake for an area of 200x200 km. Based on results of analysis of dynamic triggering of earthquake it should be noted that this energy is not sufficient for significant influence on seismic activity. Nevertheless, it is known that weak vibrations may result in changing the seismic cycle of seismogenic fault. These vibrations may be produced by variations of geomagnetic field. For verification of the hypothesis a territory of Bishkek geodynamical proving ground (Northern Tien Shan region: 40.5°-44.5°N, 71.5°-78.5°E) was selected where seismic and geomagnetic observatories are concentrated, and extensive geophysical data bases are available. A correlation of seismic activity and frequency/magnitude of variations of geomagnetic field is analyzed. Various statistical methods (cross-correlation, spectral analysis) are employed. Based on results of performed analysis it is concluded that the geomagnetic field variations may produce weak vibrations in the Earth crust resulted in increase/decrease of seismic activity.
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