

CALCULATION OF STATIC STRESS CHANGES IN THE VICINITY OF A MAJOR EARTHQUAKE INITIATED BY MINING OPERATIONS

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The study of induced seismicity caused by mining remains one of the most relevant scientific directions. Such a large earthquake as the Bachat earthquake and the results of recording the sequence of its aftershocks seem to be a good basis for analyzing various aspects of a major earthquake initiated by mining operations. Based on these data, the nature and magnitude of changes in the parameters of the tectonic stress field in the mining area as a result of movement in the focus of a large man-made earthquake were investigated.

Previously, numerical and analytical calculations of the unloading of the array due to the formation of a pit and additional loading due to the formation of rock dumps were performed as two main factors of anthropogenic impact on the static stress field.

The estimation of changes in the field of static stresses caused by an earthquake was performed by calculating changes in shear and normal stresses in the vicinity of the initiating focus. Calculations have shown that the residual stress variations of even a large earthquake decrease rapidly as they move away from its source. For the Bachat earthquake (ML=6) at a distance of less than 20 km along the fault axis and at a distance of less than 10 km perpendicular to it, the variations of the Coulomb function rapidly decrease to values less than 0,1 MPa. At the same time, it is shown that the regions of positive increment (up to 1,5 bar) of the Coulomb voltage are in good agreement with the region of registration of most aftershocks at the marked depths.

Thus, the possibility of quarry explosions to influence the seismic situation is probably limited to an area with a radius of no more than a few kilometers (for the largest quarries by area). At the same time, it should be borne in mind that the time of an earthquake prepared by the natural course of events may be somewhat approximated if the focus of a potential event turns out to be directly under the quarry.