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NUMERICAL MODELLING OF SEISMIC PROCESS ACCOMPANYING THE FORMATION OF CHUYA-KURAY FAULT ZONE

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Seismic activity around the world is clearly a threat to people's lives, as well as infrastructure and construction. It is the instability of the latter to powerful earthquakes that most often causes human casualties. Therefore, during construction it is necessary to consider the risks of large-scale natural disasters. The task of assessing the risks of natural disasters is one of the most urgent at the present time. The final goal of any study of earthquakes is forecasting. This is especially important for seismically active regions of the planet where earthquakes occur frequently. Gorni Altai is one of such regions. In work, we developed the physical-mathematical model of stress-strain evolution of loaded subsurface with the purpose of numerical simulation of seismic process accompanying the formation of Chuya-Kuray fault zone, Gorni Altay, Russia. We build a structural model on the basis of seismotectonic and paleoseismogeological investigations, as well as Space Radar Topography Mission data. The mathematical model is based on the system of solid mechanics partial differential equations which includes the fundamental conservation laws and constitutive equations for elastic (equations of hypo-elastic media) and inelastic response (modified model of Drucker-Prager-Nikolaevskii). An initial stress state of the model is the result of gravity forces. The simulation of a buried dextral strike-slip paleo-fault activation located in the basement of the model is carried out. The stages of formation and the structure of Chuya-Kuray fault zone are obtained. It is shown that results of numerical simulation are in good agreement with field observations in statistical sense. Simulated seismic process is strongly bound to the faults - lineaments with high degree of inelastic strain localization. Fault zone represents en-echelon system of dextral strike-slips according to the Riedel model. The system of surface lineaments is represented by R-, R'-shear bands, X- and Y-shears, T-fractures. Simulated seismic process obeys the laws of Gutenberg-Richter and Omori.

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