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MODELING STRESS-STRAIN STATE IN THE EPICENTRAL ZONE OF THE EARTHQUAKE 26.01.2001, M=6.9 (INDIA)

V.N. Morozov, A.I. Manevich

Geophysical Center, RAS, Moscow, Russia

Abstract. The genetic linkage of strong earthquakes with fault tectonics in continental regions gives grounds to assume that the high intensity gradient fields of tectonic stresses in local areas lead to tectonic ruptures (earthquakes) and following aftershock activity including co-seismic effects. We present the results of modeling of stress-strain state (SSS) in the epicentral zone before and after the strong tectonic earthquake 26.01.2001, M=6.9 in the northwestern India. For this purpose, we used the author's software package of SSS calculation for heterogeneous blocks disturbed by a system of tectonic faults (elastic formulation of the problem). The calculations were based on the experimental geological, geophysical, and seismological data available for this region.

It is shown that areas of high stresses that were formed before the earthquake determine the epicenter position and location of strong aftershocks with M≥5, whereas the stress drop areas correspond to location of weaker aftershocks. The majority of aftershocks are concentrated in the region of static stress drops exceeding 5 MPa. Assuming the thickness of seismogenic layer equal to 25 km, the energy released is $\sim 2 \cdot 20^{17}$ J, which exceeds the energy of seismic waves radiated in the rupture process of the 2001 earthquake by two orders.

The results of modeling indicate that the epicentral zone of the possible future strong earthquake corresponding to high stress area moves to the south. The results obtained can contribute to the possibility of forecasting the locations of strong earthquakes in seismically active regions based on SSS modeling of heterogeneous blocks disturbed by tectonic faults.

Keywords: modeling, stress-strain state, strong tectonic earthquakes, earthquake, aftershocks, forecast of earthquakes.

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