

Phenomenological model of earthquake swarms in relevance to triggered seismicity

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The seismic swarms which have been observed in the south of Sakhalin island during last decade may be relevant to aftershock process, when the stress unloading after the main event is not so much. The alternative treatment is that the swarms of earthquakes display a peculiar regime of the fault zone during some period of time. The swarms are of interest, because they are capable to prevent analysis of problem of the possible effect of remote strong earthquakes on the seismicity of Sakhalin. Mathematical models describing the flow of local seismicity events may contribute to this problem. Such models have been currently developed for forshock and aftershock consequences [Malyshev, Tikhonov, 1991]. The models are adequate to describe separately the growth of seismic activity before the main shock, so called "blow up regime"

(explosive mode, more quickly than the exponent,

Malyshev – Tikhonov self developing processes etc.) as well as the decay of aftershock activity by Ohmori – Utsu law. But they are not able to describe seismic swarms involving peaked temporal dependence due to the same kind of kinetic equations. It has been demonstrated in the presentation that some modification of self developing process model (namely the introduction of negative feedback by accumulation of events amount) allows the pattern of activity outburst during the swarm. Analytical solution of the kinetic equation has been found for a swarm. The presented model of seismic swarms are phenomenological like that of self developing processes [Malyshev, Tikhonov, 1991; Tikhonov, Rodkin, 2012]. However this model filled by proper physical content may be relevant to the problem of controlled man-made action on earthquake source site. Indeed, the seismic swarm manifests itself as a prototype of plausible mode of the earth reaction to the action of physical fields.

Literature

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