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Seismic hazard estimation: analyzing of spatial distribution of events

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To estimate seismic hazard a new characteristic D is considered. It is minimal distance between considered seismic event and old ones (which occur n days before or less). The most interesting case – when D is distance between strong event and old weak events. If we know location of old events and distribution of D, then we can calculate probability of occurrence of next earthquake in any point. To do it we should find distance from considered point to nearest event, occurred not more then n days before and the probability to find this distance corresponds to probability of earthquake occurrence. Thus distribution of Dcan be used as a kernel spatial smoothing function.

Seismicity of southern California and Toktogul region (Kirgizia) is analyzed. The distribution of D has stable shape for considered regions (some enough strong deviations are only for little n – we suggest that it corresponds to foreshock sequences). For different n and analyzed magnitude intervals the distribution of Dcan be obtained as a scale version of base distribution, where average value $< D >$ can be used as the scale parameter. The distribution of D can be fitted by the gamma distribution. It has increase and one peak. This peak corresponds to most probable distance between current event and old ones. It is about half $< D >$. About 90% of values of D are less the $3< D >$. Relationships of $< D >$ with n and magnitude intervals as well as some examples of seismic hazard estimation are discussed.