PREDICTION OF SEISMICALLY HAZARDOUS PERIODS IN THE REGIONS OF KAMCHATKA AND SOUTH KURILE ISLANDS ON THE BASIS OF PERIODICITIES OF LARGE SHALLOW-FOCUS EARTHQUAKE OCCURRENCES

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In the previous paper (see the present paper collection) we have suggested a technique of revealing statistically significant, informative and stable in time periodicities of large shallow-focus earthquakes in separate seismically active regions. These periodicities are used for evaluation of time intervals with the higher probability of occurrence of large seismic events called then alarms.

This report deals with the approbation results of the suggested technique on the earthquake catalog data with $M \geq 7.3$ and $h \leq 105$ km of Kamchatka and South Kurile Islands for 1900-2003 and 1918-2003, respectively. Sets of the best periodicities were revealed in each region. The obtained sets were used by the long-term prediction of alarms and also by evaluation of the technique effectiveness. The investigation results are given below for each region separately.

**Kamchatka.** Of a great number of statistically significant and informative periodicities within the range $15 \text{ days} \leq T \leq 52 \text{ years}$ 16 periods from $T = 22.8 \text{ days}$ to $T = 22.637 \text{ years}$ appeared to be stable in time. Their stability depends on the period value. Thus maximum variations of periods evaluated for 1971-1997 do not exceed 0.0026 days for $15 \leq T < 30 \text{ days}$ and 5.5 days for $4 \leq T < 12 \text{ years}$. Stability of the boundaries of calm window on the ring determined for 1971-1997 appeared also to be good. In 13 cases there were no displacements of boundaries at all. In 2 cases they were small and only in one case they were relatively great (0.07 relative units). Tolerances to the boundaries of calm windows of separate periodicities were chosen taking into account their stability and were 0.06 - 0.20 relative units.

Using 16 periodicities 10 hazardous intervals (alarms) of duration from 1 day to 16 days were revealed by the long-term prediction of hazardous periods for earthquakes with $M \geq 7.3$ for 2004-2007. The first 5 alarms are expected in the second half of 2005 beginning in July 1.

The retrospective prediction made for this technique adjustment for 1900-1997 yielded the following results. It is expected that average number of alarms during a year must be $N_a = 1.87$ with average duration of one alarm $T_a = 5.62 \text{ days}$. The relationship between a number of true alarms and false alarms will be probably $R_a = 1: 8.71$ and a part of alarm intervals in the total period of observations must be $P_a = 0.029$.

**South Kurile Islands.** The best 12 periodicities from $T = 17.88 \text{ days}$ to $T = 3.458 \text{ years}$ were revealed for this region. As a whole, their informativity according to the $S$ parameter appeared to be lower than that one of Kamchatkan periodicities. At the same time South Kurile periodicities are characterized by higher stability of periods and boundaries of calm windows.

By prediction of alarm periods to earthquakes with $M \geq 7.3$ for 2004-2006 using total 12 periodicities 10 alarms of duration from 1 day to 24 days were revealed. The retrospective prediction of alarm periods for 1918-1995 resulted in the following evaluations: $N_a = 4.72$; $T_a = 11.12 \text{ days}$; $R_a = 1: 12.69$; $P_a = 0.1167$.

There are two reasons of a great number of the expected false alarms for both regions: desire of reducing to zero the probability of omission of a large earthquake and low informativity of periodicities of events with $M \geq 7.3$. A number of false alarms by prediction can be reduced if samples of more large earthquakes are processed. The wider of calm windows providing the technique greater resolution are observed for them.

By occurrence of just another large seismic event in the region predictions should be replenished using only those periodicities, which maintain stability of their parameters. These predictions are of the experimental character. The stage of its testing for reliability in real time must precede practical use of the technique.