



## **Experiment in prospective earthquake prediction using Reverse Tracing of Precursors (RTP): evaluation of first results**

**P. Shebalin** (1,2), V. Keilis-Borok (3)

(1) International Institute of Earthquake Prediction Theory and Mathematical Geophysics, Russian Academy of Sciences, Moscow, RUSSIAN FEDERATION; (2) Institut de Physique du Globe de Paris, 4 Place Jussieu, 75252 Paris, FRANCE; (3) Institute of Geophysics and Planetary Physics, 3845 Slichter Hall, University of California, Los Angeles, U.S.A. (E-mail: shebalin@mitp.ru / Fax Nr. +7-495 310 7032)

The experiment in prospective documented earthquake prediction using the algorithm Reverse Tracing of Precursors (RTP) has been started in June 2003. The algorithm is based on the analysis of a set of intermediate-term precursors in an area of a shorter-term long-range activation of seismicity, detected by earthquake chains. Earthquake chains are clusters of moderate-size earthquakes which extend over large distances and are formed by statistically rare pairs of events that are close in space and time. We put predictions on record at <http://www.igpp.ucla.edu/prediction/rtp> (with a restricted access to current predictions). Predictions are not deterministic: they are expected to be true with some probability exceeding 50%.

During the period June 2003 to January 2007 ten predictions were put on record (we do not count current alarms. Formally, four of ten predictions happened to be correct. Four of five target earthquakes with magnitudes from 6.5 to 8.3 (five of seven if we would score aftershocks with magnitude above the threshold for target earthquakes) have been successfully predicted. Estimated from the statistics of target earthquakes occurred in the past, the average rate of expected targets per duration of alarms integrally for all predictions is equal to 1.20; the actual number of earthquakes confirming predictions is 4, almost four times higher. The similar number for the whole time and space of the experiment is equal to 5.12; this corresponds well to the actual number, five.

The estimations above are not yet sufficient for final conclusions. However, they are very promising, particularly if to take into account informal details of the experiment. Three predictions, formally scored as false alarms, may be treated as near misses. For one of them target magnitude was documented as  $M_w=5.5$  or larger, and the earthquake that happened within the time and space of alarm had magnitude  $M_w=5.2$  and  $ML=5.7$ . In two other cases the target earthquakes occurred within the time of prediction, but outside its area, at a distance much smaller than its size.