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Operative Forecasting of the hazard from aftershocks of Large Earthquakes

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Large aftershock forecasting Is an important task of Operational Earthquake Forecasting. In practice, after large earthquakes the following questions arise. Should we expect large aftershocks? How long? Where? How strong can be the largest aftershock? Correct answers to these questions are important for decision making.

In first several hours after a large earthquake destructive aftershocks are naturally expected in any case. Thus, the information about the current aftershock process during first hours after the main shock can and should be used to answer the questions. Here we consider two types of estimates, based on the information of the main shock and its aftershock during first 12 hours. The first type is rough express estimates. They may give important information on the danger level. We compare theoretical (combination of Gutenberg-Richer and Omori laws), empirical estimates, and study some regional peculiarities as well.

The second type is probabilistic estimates. The forecasts are never absolute because errors of the two kinds are inevitable. Studying retrospectively case histories, we may analyze the error diagrams and detect two points corresponding to two marginal forecasting strategies: "soft" and "hard". Hard strategy gives small rate of failures to predict at the cost of large number of false alarms. The point is found with a condition that an extra decrease of the failure to predict rate leads to an unjustifiably strong increase of the rate of false alarms. Soft strategy, vice versa, ensures small number of false alarms at a cost of large number of failures, with unjustifiably strong rise at smaller false alarm rates. A third benchmark strategy, for example equalizing errors, may help to decision makers to choose an appropriate strategy between "soft" and "hard".