Experimental stochastic prediction of major aftershocks by negative binomial model

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Experimental stochastic predictions of the largest aftershock in the forthcoming periods were made for ten aftershock sequences in and near Japanese islands, using a statistical method, proposed by Okada and Ito (2001), based on the negative binomial model and the modified Omori formula. Parameters, the b-value in Gutenberg-Richter law and the c- and p-values in the modified Omori law, in model are usually generic values for aftershock sequences in inland region in Japan. From the number of aftershocks larger than Mm - d in magnitude in the data duration from Ts over Tp, interval estimates of magnitude with confidence coefficient, 50%, 80%, and 90% for the largest shock in the coming period and the probabilities of large earthquake occurrence were calculated and the results are mailed to some clerks in JMA. Here, Mm and Tp are the magnitude of main shock and the prediction time after main shock, respectively. The threshold magnitude, Mm-d, was determined so that the number of aftershocks is about 50 or lower. The prediction was attempted for 97 cases in total for main shock - after shock sequences, except for the Izu earthquake swarm of 2000. Interval predictions of largest aftershocks with the confidence coefficient of 50%, 80%, and 90% were successful for 45, 78 and 87 cases of attempts, respectively. Thus the score is satisfactoy.

Reference: Okada M. and H.Ito, 2001, Probabilistic prediction of major aftershocks by negative binomial model, Zisin, 54, 335-345.