Quantitative Testing on Simulation of Peak Ground Motion

Chen K J (1), Wang J S (1), Chen C S (1), Lin C H (2)

(1) Dept. of Earth Sciences, National Taiwan Normal University, Taipei, Taiwan, 116, kjchen@ntnu.edu.tw /Fax: +886-2-29333315
(2) Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan

In this study, we use the new high-quality data recorded by CWBSN and TSMIP to inverse the detailed Q-structures in Taiwan area. The theoretic maximum amplitudes of the ground acceleration in Taiwan area for 109 events have been calculated by using the attenuation equation and the Q-structures. The deviation between these estimated amplitude and the maximum amplitudes of these events observed at stations of CWBSN are obtained. The results show that most of the deviation is small than 15%. It indicates that we can predict the maximum amplitude of ground acceleration for any events occurred in Taiwan area under the accuracy of 85 % (probability). The average deviations for each station of CWBSN will be used as the station correction for estimation the peak ground motion by using forward calculation from Q-model.

Early Estimate of the Strongest Aftershock Magnitude

Gentili S (1)

(1) OGS, Via Treviso 55, 33100 Cussignacco, Udine, Italy, sgentili@inogs.it

Among statistical properties of seismic sequences, one of the investigated fields is the difference in magnitude Dm between the main shock and the largest aftershock. The reasons of this interest are essentially two. From the theoretical point of view, this information can be useful for a deeper understanding of the statistical properties of the sequences and/or to infer a physical model of the process. From the practical point of view, a large aftershock following a large earthquake can cause even more damages with respect to the main shock, because it happens when the buildings and structures are already damaged. In this poster, two new methods are applied for the early estimate of the largest aftershock magnitude. The methods have been tested on seismic sequences from Italy, California and Japan. The first one is based on the partitioning of the radiated seismic energy between mainshock and aftershocks. The ratio RES(t) between the radiated seismic energy of the mainshock and the summation of the seismic energy radiated by the aftershocks till the time t, appears to play a significant role in the evolution of the sequences also for small values of t. In particular, the value of RES after 24 h is related to the final one, calculated on the whole sequence, and to the value of Dm. The second method is based on the ratio between the radiated energy and the seismic moment of the mainshock. This ratio, related to the apparent stress, appears to be correlated with Dm for most of the analyzed sequences. For all the sequences, both methods allow to find an upper bound for the strongest aftershock magnitude.

Time Depended Seismic Hazard Assessment in the Dead Sea Area

Hakimhashemi A H (1), Grünthal G (2), Schelle H (3)

(1) GeoForschungsZentrum (GFZ) Potsdam, section 5.3, Telegrafenberg, 14473 Potsdam, hakim@gfz-potsdam.de
(2) GeoForschungsZentrum (GFZ) Potsdam, section 5.3, Telegrafenberg, 14473 Potsdam, ggrue@gfz-potsdam.de
(3) GeoForschungsZentrum (GFZ) Potsdam, section 5.3, Telegrafenberg, 14473 Potsdam, schell@gfz-potsdam.de

The seismicity of the Middle East coupled to the Dead Sea Transform Fault (DSTF) is high. The long list of historical earthquakes includes many cases of severe destructions. A short look at the cumulative earthquake energy release in the study area gives us an indication of a possible time-dependence for the large events (with Mw ≥ 5.8). This, besides the new ideas of time-dependent seismic hazard methods, gives us the motivation to develop time-dependent models for the large earthquakes. The dataset used in this study is obtained from the available local historical earthquake catalogs. We consider the earthquakes with the magnitude larger than 5.8 as the large events because:

- rich historical information for the earthquakes with Mw ≥ 5.8
- the completeness of the earthquakes with Mw ≥ 5.8

Our dataset, obtained by a heuristic completeness check method, is including 87 events with Mw ≥ 5.8 and starts in 340 A.D. We calibrate four different parametric distributions including Weibull, Gamma, Lognormal and Inverse Gaussian (Brownian Passage Time-BPT) as time-dependent models against the Exponential distribution as a time-independent model, using the obtained inter-event times for large earthquakes and a Modified Maximum Likelihood Estimation (MMLE) method for the mixed inter-event and censored times. In order to find the best model among the mentioned models, we use both methods of information criteria and Goodness-of-Fit tests. After finding the best model we estimate the confidence intervals of the parameters of the selected model. Finally, we calculate the probability of occurrence of a large earthquake in the next 30 years with its uncertainties using the best time-dependent model as well as the time-independent model (Exponential distribution). Then we compare the results and estimate the best variant of the hazard for the large earthquakes in the study area.

2005-2007 Seismicity Parameters in Kamchatka (Russia)

Kravchenko N M (1), Saltykov V A (1)

(1) Kamchatkan Branch, Geophysical Survey, RAS, Petropavlovsk-Kamchatsky, 683006, Russia, hope_k@emsd.ru, salt@emsd.ru

The unified seismic process can be divided into large earthquakes and background seismicity. It is reasonable that first of them attract the most attention, but it is well to bear in mind that the background seismicity dynamics is a reflection of the tectonic processes, which gave rise to the large earthquakes in particular. So presentation of data about small earthquakes is of interest too. The set of seismic parameters of Kamchatka 2005-2007 is presented. Some of them are canonical; other had appeared in elaboration of prediction techniques. On the base of regional catalogue of Kamchatkan earthquakes the 2D-distribution of seismic parameters was calculated. The set of parameters consists of activity A10, the recurrence graph slope b, parameters of the methods RTL (Sobolev, Tyupkin, 1996; Sobolev, 1999) and Z-test (Wyss, Habermann, 1988). The RTL-technique includes calculation of the quiescence parameter RTL, variation of square of seismogenous fractures dS and search of clusters. Comparison of the values of parameters A10 and b obtained for the last years and average long-time values was carried out. Although used methods of monitoring are different, obtained results are reconcilable and can be considered in the “spatial” groups: Northern Kamchatka: completion of the RTL – anomaly; the anomaly of dS; increased number of clusters in 2006; completion of the Z-anomaly; increased values of A10; decreased b-value. Southern Kamchatka: completion of the RTL – anomaly; completion of the Z-anomaly; increased values of A10; decrease of b-value during last 6 years. This behavior of RTL-, dS-, Z-parameters can be considered as precursor of large earthquake. Used methods of prediction are intermediate, so it is proposed to look these areas as places of preparation of large earthquakes with M>7.0. Observed spatial correlation of A10 and b-value with RTL, dS and Z can be used in elaboration of complex evaluation of seismic situation.