Quantitative evaluation of inland seismic activity in Japan

Satoshi Itaba[1], Kunihiko Watanabe[1], Ryohei Nishida[2]

[1] RCEP, DPRI, Kyoto Univ., [2] Civil Engi, Tottori Univ

http://www.rcep.dpri.kyoto-u.ac.jp/~itaba

It is important for quantitative evaluation to estimate the seismic activity; however, this evaluation has been seldom performed. It has been often determined by subjectivity until now.

On the other hand, the assessment of active faults is the general public requirement today. We proposed a GIS(Geographic Information System)-method of quantitative evaluation of seismic activity (Nishida et al,1999). By this method, the activity of inland active faults in Japan is estimated.

We used in this investigation 2,324 active faults listed in [The quarternary active fault in Japan]. The shallow inland earthquakes of JMA catalogue from Oct.1997 to May 2002 are analyzed.

By applying GIS to these fault traces, a buffered zone can be made, which is the zone within a distance between Ri and Ri+1 from the fault.

The earthquakes included in each buffered zone can be chosen. The seismic activity of the zone is expressed by using three parameters, namely, number of events, accumulated fault surfaces and released energy. Dividing total amount of these quantities by the area of the corresponding zone, the density of seismic activity can be obtained for each buffered zone.

Considering the relation between those activity density and the distance from the fault trace, the effective distance can be estimated, in which the seismic activity is influenced by the existence of the fault. By adopting the effective distance obtained above, we can examine the seismic activity of each fault.

For some faults, the seismic activity decreases in proportion to distance from the fault, but not for others. Generally speaking, the correlation between seismic activity and the distance from the fault is not so high.

Inland seismic activity of southwest Japan is generally higher than that of northeast Japan. There may be two reasons. First, the main pattern of fault movement in Northeast Japan is dip-slip, and that in Southwest Japan is strike slip. Dip slip type fault needs much tectonic energy to move than strike slip ones. Second, it may be caused by the difference of coupling factors.