An attempt to evaluate seismicity change when looked through various space-time filters

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If we can evaluate change in seismicity as a continuous value, the index will be very useful in various viewpoints. For example, we can easily compare seismicity with the data ofcrustal deformation. Further, on the basis of the quantitative evaluation of increase and decrease of seismicity, it might be possible to forcast occurrence of large earthquakes.

In this study, we calculate b-value and a-value on each block of 0.1 x 0.1 degrees in the Japanese islands. Except areas of high seismicity, number of earthquakes is often too small to calcurate b-value and a-value. For this reason, we use a gauss type filter in space to incorprate seismicity in distant regions partly. We should use a smoothing filter in time too. In this study, however, we only attempted to evaluate general features of temporal changes in seismicity. Therefore, we divided the investigated period into three intervals and compared charcteristic parameters such as b-value and a-value of each interval. Using these parameters, we also calculated probability of the occurence of M5 or larger and M6 or larger earthquakes.

We used data set of inland shallow earthquakes with more than M3 in the Japanese islands during the period from 1983 through 1997. Correlation distance in the smoothing filter is 50km. Dividing the period into three intervals of 1983-1987, 1988-1992 and 1993-1997, we compared characteristics of seismicity of each interval. In general, b-value is high on the Pacific coast and low on the Japan sea coast in the whole period. If we look into the results in detail, however, we find that there are some differences in the characteristics of seismicity between each time interval. When we used a declustered data set, we get a smaller b-value. Our preliminary results show that probability of the occurrence of large earthquake is high where seismicity is high.