

Data assimilation aiming at quantitative evaluation of seismic activity

Hiroyuki Takayama[1], Akio Yoshida[2]

[1] M.R.I., [2] Magnetic Observatory

How can we compare results of numerical simulation about the stress accumulation or strain accumulation to seismic activity? In order that the comparison could be performed, it is necessary that we should first extract some quantity that is considered to reflect physical state of seismogenic region from earthquake catalogues. Conventional quantities such as number of earthquakes or energy have shortcomings: The former is controlled by small earthquakes that are likely to be influenced by artificial change in observation condition, and the latter is, on the contrary, dominated by the occurrence of large earthquakes. In this paper we took a-value and b-value in the Gutenberg-Richter relation as the quantities and examined if any significant relationship is seen between change in those values and occurrence of M5 or larger earthquakes. We also calculated recurrence time for M5 earthquakes from the a- and b-values.

For three M5 or larger earthquakes that have been observed after October 1999 in the Japanese islands, we found in the every case that the a-value, the b-value and the recurrence time around the foci of the earthquakes just before their occurrence had been large compared to those in other periods. The feature shows that seismic quiescence appeared before those earthquakes near their foci. We further found that during the 2000-2001 period when all the three M5 or larger earthquakes occurred, increase of the b-value were observed in southwestern Japan where foci of those earthquakes were located. We, however, think it needs much more data to confirm that the relationship is positive.