

Detection of seismically quiescent regions before the repeated interplate large earthquakes

Kenji Ohta[1]; Naoki Hayashimoto[1]; Kazuki Miyaoka[1]; Tamotsu Aketagawa[2]; Sumio Yoshikawa[3]

[1] JMA; [2] SVD/JMA; [3] MRI

Detection of seismic quiescence often depends on subjective judgments. To apply to earthquake prediction, any automatic and objective method is needed with knowledge about the detection capabilities of seismic observation network and information about the long-term seismicity for the interested area. In this study we used the method developed by Aketagawa and Ito (2008). As a way to visualize the degree of earthquake activity, ZMAP (Wiemer and Wyss, 1994) and Matsumura's method (Matsumura, 2007) have been often referred. ZMAP uses the activity of the circular region of specified radius centered on given grid and Matsumura's method uses the spatial distribution of the relative seismicity with respect to a reference period for definite regions. The method of Aketagawa and Ito, making circular or elliptic regions centering on each epicenters of the earthquake over a certain magnitude, determines the seismicity level in each region by using the Poisson distribution. This method makes it possible to create more appropriate regions for indicating real seismicity than those based on a regular spacing grid, since determination of seismicity is based on the Poisson distribution according to seismicity in each region. This method was applied to the repeated interplate earthquakes in the Pacific side of the northern and north-eastern Japan, in which it has been pointed by Yoshikawa(2008) that there is a relatively high proportion of the precursory seismic quiescence. According to the result, seismic quiescence was confirmed for the 2003 off Tokai-, the 2005 off the coast of Miyagi Prefecture-, and the 2008 off the Ibaraki Prefecture- earthquakes. In addition, it was possible to detect activated regions around the area of seismic quiescence before occurrence of the main shocks for the above cases. The result indicates that it is possible not only to detect seismic quiescence automatically and objectively but also to make clear the expected focal region by finding adjacent active regions at the same time.