

Test of the predictability of PI method on the Tohoku M_w 9.0 earthquake

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In this research, the local area (32.0°~46.0°N, 136.0°~148.0°E) including most of Japan was chosen to be the study region for verifying the predictability of the pattern informatics (PI) method under different models with different parameters using the receiver-operating characteristic (ROC) curve test and R score test. Pattern Informatics (PI) method was applied to the retrospective study on the forecasting of large earthquakes especially the Tohoku M_w 9.0 earthquake in this region. Different forecasting maps with different calculating parameters were obtained. The main calculating parameters were respectively the grid size of 0.5°×0.5° or 1.0°×1.0° and forecasting window lengths from 5 to 10 years. The results showed that in most of the models, the hotspots were in its Moore neighborhood grids or its epicentral grid in the forecasting windows containing the M_w 9.0 Tohoku earthquake, which suggests that the PI method could forecast the Tohoku M_w 9.0 earthquake. The results also showed that under the ROC test and R score test the models with larger grid size (1.0°×1.0°) and longer forecasting window length (7~10 years), the forecasting effect were better.

Keywords: PI method, Tohoku M_w 9.0 earthquake, predictability, ROC test, R score test