

A statistical feature of anomalous seismic activity prior to large inland earthquakes in Japan

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To reveal the preparatory processes of large inland earthquakes, we systematically applied the pattern informatics (PI) method to earthquake data of Japan. We focused on 12 large earthquakes with magnitudes greater than M6.4 (based on the magnitude scale of the Japan Meteorological Agency) that occurred at depths shallower than 30 km between 2000 and 2010. We examined the relationship between the spatiotemporal locations of these large shallow earthquakes and the locations of PI hotspots, which correspond to grid cells of anomalous seismic activity during a designated time span. Based on a statistical test conducted using Molchan's error diagram, we investigated whether precursory anomalous seismic activity occurred in association with these large earthquakes and, if so, studied the characteristic time spans of such activity. Our results indicate that Japanese inland earthquakes with $M \geq 6.4$ are typically preceded by anomalous seismic activity in timescales of 8-10 years.

Keywords: pattern informatics, seismic quiescence, seismic activation, Molchan's error diagram, stress accumulation, inland earthquake