

Precursory migration of anomalous seismic activity prior to the 2011 Tohoku, Japan, earthquake

KAWAMURA, Masashi^{1*}, WU Yi-Hsuan², KUDO, Takeshi³, CHEN Chien-Chih¹

¹Dep. of Earth Sciences and Graduate Inst. of Geophysics, National Central University, Taiwan, ²Dep. of Geology, University of California, Davis, ³General Education Division, College of Engineering, Chubu University

For revealing the precursory process of the 2011 Tohoku, Japan, earthquake and its related statistical feature, we applied a modified version of the Pattern Informatics method (PI method) (Wu et al., 2011) to the earthquake data east of the northeastern Japan region including the hypocenter of the 2011 Tohoku earthquake. We especially focused on the spatial distribution of PI hotspots, which show the areas of anomalous seismic activities (seismic quiescence and seismic activation), and its migration pattern. By means of the modified PI method, we found that the area with anomalous seismic activities got closer to the epicenter of the 2011 Tohoku earthquake with time since 1997 prior to the occurrence. A similar tendency was also found since 2001 in the area off the Boso peninsula, where the existence of seismic quiescence is reported. Our result shows that the preparatory process of the 2011 Tohoku earthquake involved anomalous seismic activity that took effect since 1997 and implies that the same process is in progress in the area off the Boso peninsula since 2001.

Keywords: Pattern Informatics method, Seismic quiescence, Seismic activation, Seismic activity, Earthquake migration, The 2011 Tohoku earthquake