

Precursory seismicity change of the 2013 Nantou, Taiwan earthquake sequence revealed by ETAS, PI, and Z-value methods

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M_L 6.2 and M_L 6.3 earthquakes occurred in the Nantou area of central Taiwan on Mar. 27, 2013 and June 2, 2013, respectively. Because their epicenters are close to one another, we regard the March M_L 6.2 and June M_L 6.3 earthquakes as an event sequence. To investigate precursory seismicity change of the Nantou earthquake sequence (or the March M_L 6.2 earthquake), we applied the Epidemic-Type Aftershock-Sequences model (ETAS model) to the earthquake catalog data of the Central Weather Bureau (CWB) covering broader Taiwan region. Application of more than one model to an earthquake catalog would be informative in elucidating the relationships between seismicity precursors and the preparatory processes of large earthquakes. Based on this motivation, we further applied two different approaches: the pattern informatics (PI) method and the ZMAP method, which is a gridding technique based on the standard deviate (Z-value) test to the same earthquake catalog data of CWB. As a result, we found that the epicenter of the 2013 M_L 6.2 Nantou earthquake was surrounded by three main seismic quiescence regions prior to its occurrence. The assumption that this is due to precursory slip (stress drop) on fault plane or its deeper extent of the M_L 6.2 Nantou earthquake is supported by previous researches based on seismicity data, geodetic data, and numerical simulations using rate- and state-dependent friction laws (Kawamura and Chen, 2013).

Keywords: Seismic quiescence, The Nantou earthquake, Stress accumulation, ETAS model, Pattern informatics, ZMAP