

Dynamic triggering of microseismicity around Yunnan following the 2004 Sumatra and 2012 Indian Ocean Earthquakes

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We conduct a systematic detection of microseismicity around Yunnan following the 2004 Mw9.1 Sumatra and 2012 Mw8.6 Indian Ocean earthquakes to better understand the physical mechanism of dynamic triggering. Based on seismicity analysis on China Earthquake Network Center (CENC) catalog and spectral analysis of continuous waveforms, we find clear evidence of triggered seismicity in Yunnan immediately after the 2004 mainshock and a lack of instantaneous triggering following the 2012 mainshock. We further apply a matched filter technique to detect microearthquakes in Tengchong volcanic region 15 days before and 15 days after the 2012 mainshock. The seismicity rate remains stable immediately after the 2012 mainshock, and increases in the next few days, indicating a possible delayed triggering. In addition, we find possible evidence of remote triggering near the city of Yibin in Southern Sichuan Province, near the sites with ongoing shale gas development. We also examine other magnitude > 8 earthquakes from the Sumatra region and do not find any additional evidence of dynamic triggering around Yunnan. We suggest that the absolute value of dynamic stress change is the most important factor to explain why the 2004 Sumatra event triggered a widespread seismicity rate increase around Yunnan, while other great events around Sumatra did not.

Keywords: dynamic triggering, dynamic stress changes, Yunnan region