

# Complex rupture process on the conjugate fault system of the 2014 Mw 6.2 Thailand earthquake

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## ABSTRACT

A moment magnitude 6.2 crustal earthquake occurred in northern Thailand on 5 May 2014, and its aftershocks exhibit several lineaments with conjugate pattern, involving geometric complexity in a multi-segmented fault system of the Phayao fault zone. However, a relationship between those geometric complexities and the rupture evolution of the 2014 Thailand earthquake is still elusive, which is critical to understand complex nature of the earthquake physics and to assess the hazard. Here we elaborated the newly developed potency density tensor inversion method, used it to invert the globally observed teleseismic P waveforms, and estimated the spatiotemporal distribution of both the slip and the fault geometry. We found the complex rupture evolution consisting of two rupture episodes along a conjugated strike-slip fault system that comprises two distinct fault planes. The first episode originated at the hypocenter and the rupture propagated south along the north-northeast to south-southwest fault plane. The second episode was triggered at around 5 km north from the epicenter and the rupture propagated along the east-northeast to west-southwest fault plane and terminated at the west end of the source area at 5 s hypocentral time. Our work demonstrates that our potency density tensor inversion can be applied to the smaller-scale magnitude-6 class earthquakes, and it resolves the complex rupture process controlled by the underlying geometric complexity in the fault system.

**Keywords:** 2014 Thailand earthquake, Complex rupture process, Teleseismic P waveform potency density tensor inversion, Conjugate fault