

Non-double couple micro-earthquakes in the focal area of the 2000 Western Tottori earthquake (M7.3) by "0.1 manten" hyper dense seismic observation

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Earthquakes with non-double couple (NDC) component could provide information such as geometric fault complexity, tensile failure, and fluid flow in faulting.

In this study, we found definite micro-earthquakes with NDC in the aftershock area of the 2000 Western Tottori earthquake (M 7.3) based on polarity analysis for first P-wave motion data from "0.1 manten" hyper dense seismic observation. The observation composed of a thousand seismic stations successfully provided with high resolution focal mechanisms of a lot of micro-earthquakes in the area.

We attempted to model the events with NDC by tensile-shear faulting, shear-tensile faulting, and multiple events with pure double couple focal mechanisms. We analyzed 8 events that distributes the entire after shock area.

Plausible models for the events occurring at shallower and deeper depth are the faulting with tensile crack and the multiple shear faulting models, respectively. The results suggest that fluid contributes to the crack opening at the shallow part. In contrast, fluid pressure does not sufficient to open tensile crack at the deep part. Therefore, the depth of the boundary may relate to the pressure of fluid at the earthquake fault. In addition, the events with large NDC component were located around co-seismic large slip area of the mainshock of the Western Tottori earthquake. This suggests that fluid exits around the co-seismic slip area.

Keywords: non-double couple earthquake, focal mechanism, the 2000 Western Tottori earthquake