

## Structural analysis of seismogenic fault of the 2013 Mw 5.8 Awaji Island earthquake, NW Japan

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The 2013 Mw 5.8 (Mj 6.3) Awaji Island earthquake occurred in the southwest Awaji Island, at 5:33, 13 April, 2013, ca.25 km southwest of the epicenter of the 1995 Mw 6.8 (Mj 7.2) Kobe earthquake, southwest Japan. Pre-existing geologic data and focal mechanism show that this earthquake was triggered by an unknown active fault with a thrusting-dominated mechanism at high-dip angle of >70 degree. Interpretations of aerial photographs and 3D perspective images, field investigations and structural analysis of fault rocks, reveal that: i) a new fault, called Yamada Fault here, striking NNW and dipping WSW at a high-angle of 86 degree was found along a topographic lineament developed along the geological boundary between the Mesozoic granitic rocks and the Late-Tertiary-Quaternary Osaka Group composed of interbedded sandstone and mudstone; ii) a main shear zone of the Yamada Fault consists of a fault core that includes a narrow fault gouge zone of <10 cm in width (generally 1~5 cm), a fault breccia zone of <100 cm in width, and a damage zone of 10~50 m in width that is composed of cataclastic rocks and fractures; iii) the foliations characterized by S-C fabrics developed in the shear zone indicate a dominantly thrusting sense, consistent with that revealed by the focal mechanism; and iv) co-seismic surface ruptures occurred locally along the Yamada Fault, which are composed of numerous short fissures ranging from centimeters to several meters in length and concentrated in a zone <5 m. Our findings show that the newly found Yamada Fault is a active fault that probably triggered the 2013 Mw 5.8 (Mj 6.3) Awaji Island earthquake. Therefore, it is necessary to reconstruct the fault model for studying the tectonic activity and paleoseismicity and to reassess the seismic hazard of the active faults for densely populated Awaji Island, northwest Japan.

Keywords: 2013 M 6.3 Awaji Island earthquake, seismogenic fault, active fault, Yamada Fault, S-C fabrics of fault rocks, fault damage zone