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Detecting the stress condition at a fault from focal mechanism: application to the 2013 Awaji Island earthquake (M6.3)

MATSUMOTO, Satoshi[1]* ; KATAO, Hiroshi[2] ; IIO, Yoshihisa[2]

[1]Institute of Seismology and Volcanology, Kyushu Univ., [2]Disaster Prevention Research Institute, Kyoto Univ.

One of the approaches used to evaluate potential of an earthquake occurrence is the detection of stress concentration at an earthquake fault. Stress fields in stages for pre- and post-seismic event will be different from one another. However, this change cannot provide information regarding the potential for an earthquake to occur. Here, we propose a detection method for stress conditions that uses focal mechanism data. The condition can be defined both by background stress and by a moment tensor equivalent to the stress concentration. We apply this method to actual focal mechanism data from the Awaji Island earthquake (M6.3), Japan, and show the presence of stress concentration around the earthquake fault before the mainshock. In addition, the regional shear stress is shown to be ∼25 MPa in the area, implying that the stress level is still high, thus the potential for further seismicity in the area could be high.

Keywords: stress field, earthquake fault, focal mechanism