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Stress field analysis around faults for the safety assessment of reactivation of pre-existing faults

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The safety assessment of reactivation of pre-existing faults is necessary for preliminary field investigations of HLW geological disposals (Research Center for Deep Geological Environments, editor, 2007). Slip tendency analysis (Morris et al., 1996) is considered of value for evaluating the likelihood of reactivation of multiple pre-existing planes under a uniform stress state. However, the principal stresses may rotate due to damage zone (Caine et al., 1996) surrounding faults (e.g., Rice, 1992). Thus, understanding stress field around faults are important for slip tendency analysis.

We applied a stress inversion method to the fault-slip data from the Atera fault system in Kawakami area. In this area, about 40 m width damage zone develop around the fault system (Niwa et al., 2009). For calculation, we mainly used fault-slip data reported by Tonai et al. (2011).

The calculation of multiple inverse method (Yamaji, 2000) resulted in a strike-slip faulting stress regime with a E-W (N-S) trending sigma_1 (sigma_3) axis for fault-slip data obtained from near the main fault plane, a strike-slip faulting stress regime with ENE-WSW (NNW-SSE) trending sigma_1 (simga_3) axis for fault-slip data obtained apart from the main fault plane, and a stress regime with NW-SE trending sigma_1 axis for fault-slip data from host rock around the main fault.

The result probably shows that the stress field around the main fault of the Atera fault system is heterogenous. It is possible that the damage zone surrounding faults is affected such stress field. In addition to stress field analysis with high space resolution, comparative consideration between several fault systems is important for the understanding of the role of damage zone for stress field around faults.

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References

Caine, J. S. et al., 1996, Geology, 24, 1025-1028.
Morris, A. et al., 1996, Geology, 24, 275-278.
Niwa, M. et al., 2009, Island Arc, 18, 577-598,
Rice, J. R., 1992, Fault Mechanics and Transport Properties of Rocks, edited by B. Evans and T. Wong, 475-503.
Research Center for Deep Geological Environments, editor, 2007, Geological Survey of Japan Open File Report, no. 459. (in Japanese)
Tonai, S. et al., 2011,Annual Report on Active Fault and Paleoearthquake Researches, 11,139-150. (in Japanese with English abstract)
Yamaji, A., 2000, Jour. Struct. Geol., 22, 441-452.

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