

In-situ permeability of fault zones estimated by hydraulic tests and groundwater-pressure observations

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In-situ permeability of the Median Tectonic Line (MTL) fault zone in Mie Prefecture, southwest Japan, was estimated using hydraulic tests and groundwater pressure observations in two boreholes. The screen depths in Holes 1 and 2 are located, respectively, in a major strand of the MTL fault zone within the Sambagawa metamorphic rocks and a branching fault developed in the hanging wall of the MTL within the Ryoke mylonite. The estimated permeability at Hole 1 ranges from 5.3×10^{-17} to $5.0 \times 10^{-16} \text{ m}^2$, and that at Hole 2 ranges from 4.4×10^{-16} to $1.5 \times 10^{-15} \text{ m}^2$. We also measured the permeability of the protolith close to the screened depth of Hole 1 (3.4×10^{-19} and $3.7 \times 10^{-19} \text{ m}^2$) and Hole 2 (3.1×10^{-19} and $6.2 \times 10^{-19} \text{ m}^2$). The permeability of the fault zone was found to be more than 100 and 700 times higher than the protolith permeability at Holes 1 and 2, respectively. The permeability data for Holes 1 and 2 are consistent with previously reported permeability data for samples from an MTL outcrop. The permeability observed in this study reflects the complex fault zone permeability structure of the MTL fault zone.

Keywords: permeability, fault zone, hydraulic test