Spatial characterization of permeability distribution around faults through in-situ permeameter measurements

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In safety assessment for geological disposal of high-level radioactive waste, radionuclide migration caused by the action of groundwater is examined (e.g., JNC, 1999), so it is necessary to understand groundwater flow properties around disposal site. Faults are known to behave as conduit, barrier, or combined conduit-barrier system (Caine et al., 1996) dependent on their internal structure. Because faults can be dominant pathways of groundwater flow and mass transport, their hydrological properties are significant. However, information on spatial distribution of permeability around faults is limited and influences of the spatial distribution on groundwater flow or mass transport have not been sufficiently understood. This research aims to elucidate the spatial distribution of rock permeability around a fault and to reflect them to hydrogeological model around the fault. Study site was research tunnels of Mizunami Underground Research Laboratory, Japan Atomic Energy Agency (Mizunami, Gifu, Japan). A fault referred to as “Main shaft fault” is distributed adjacent to the main shaft and dip of the fault is nearly perpendicular at 300 meters deep (Tsuruta et al., 2010). Several horizontal tunnels extend from the main shaft at different depths, and this is advantageous to examine relationships between permeability and distance from the fault core. Permeability of Toki granite exposed on the tunnel wall was measured along horizontal tunnels at 200, 300, and 500 meters deep using gas permeameter (Mini-Permeameter MP-401, TEMCO, Inc.). In the presentation, spatial distribution of permeability around the fault is shown and cause for the distribution is discussed.
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