

Temporal change in permeability of a fault just after a large earthquake occurrence by repeated water injection experiments

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In order to research a healing process of the fault just after a large earthquake occurrence, three boreholes with depths of 500, 800, and 1800 m were drilled near the Nojima fault, which is one of the 1995 Hyogoken-Nanbu earthquake faults. This research aims to detect the temporal change in permeability, that is to say, crack density of the fault zone as a indicator of a healing state of the fault. In 1997 and 2000, in situ water injection experiments from the 1800-m borehole were repeatedly conducted to measure a temporal change in permeability of the fault. Then discharge changes at the 800-m borehole were observed during the experiments in both 1997 and 2000. We analyzed the discharge changes by method of the modeling of the structure of the fault, considering the permeable zone of the fault zone as simple two-dimensional layer with an uniform thickness. As a result, we estimated the macroscopic permeability near the fault in each 1997 and 2000 experiment. It is found that the permeability decreased by about 50 % from 1997 to 2000. It is expected to detect a strengthening, or a healing process of the fault. In 2003, the experiment will be conducted, and the temporal change in the permeability will be continuously monitored.