

Repeated Water Injection Experiments at the Nojima Fault: The 4-th experiment in 2004

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We carried out repeated water-injection experiments at the Nojima fault, southwest Japan in 1997, 2000, 2003, and 2004. One of the main purposes is to study a healing process of the Nojima fault ruptured by the 1995 Mw6.9 Kobe earthquake, by detecting a temporal change of fault-zone permeability, and the other is to study the generating mechanism of injection-induced earthquakes. Decrease in permeability, ~50% from 1997 to 2000 and 30-50% from 2000 to 2003, of rocks around the fault was detected by continuous measurements of groundwater discharge and strain in the 800-m-deep borehole (~50 m distant from the injection well), and also the electric potential on the ground. These suggest a healing process of the Nojima fault zone advancing from 1997 to 2003. We observed increase in ultra-microearthquake activity (M -2 to 1) at ~2.5-4.5 km distances from the injection point and ~4-7 days after the beginning of each episodic water-injection. This space-time migration can be explained by a 2-D diffusion process of pore water pressure, and we estimate that these are injection-induced seismicities.

We have carried out the 4-th experiment in 2004, in order to elucidate the generating process of induced earthquakes and improve the modeling of permeability estimate. In the presentation we will show the results of preliminary analyses.

