

The measurement of fault permeability

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It is important for oil exploration to evaluate fault seal capability and fluid(hydrocarbon) migration model near fault. Recently, civil engineer are interested in the seal capability of the fault because of geological disposal of high-level radioactive waste. Anyhow, it is important factor for earth science especially in geology, as example of subduction zone fluid migration.

To clarify fluid migration near the fault which is formed in porous sediments is the purpose of this study. The steps of this study are (1)measuring the tendency of permeability near the fault that formed in less lithified sediments, (2)to clarify the permeability anisotropy near fault, and (3)grasping the control factor of fault permeability. Target lithology for this study is restricted in sandstone or sand-mud layer, because it is easy to separate between mechanical effects as compaction and chemical effects as diagenesis. The result of each steps will be presented and explained.

(a)Measuring the tendency of permeability near the fault

The permeability near the fault were measured at two place. One is Moab fault, Utah, US, where aerial sandstone are distributed. Another is Miri, Sarawak, Malaysia, where deltaic sediments are distributed. The former is almost pure quartz sediments and the latter is the dirty sand contain many muddy sediments. The results of measurements were that the permeability decrease at fault deformation band in both case.

(b)Measuring anisotropy of permeability near the fault

The samples were taken from both place and measured the permeability anisotropy in laboratory. The results of the anisotropy of permeability, the permeability perpendicular to fault is less 2 order magnitude than others.

(c)Microstructure observation

All of the samples were made thin section and observing the microstructures.