Analysis of geological history of Atera fault -A case study using faults and fracture system with fracture filling minerals-

Hidekazu Yoshida[1]; Akio Nagatomo[2]

[1] NUM; [2] Env. Earth Sciences, Nagoya Univ.

Understanding the fault evolution is a technical basis to assess the long-term hydrological, geochemical and rock mechanical behavior of fault and fractured zone formed in and around the fault. In particular, the feature of faults and fracture system is a critical issue to be characterized for the safe construction and operation of underground facilities such as liquefied petroleum gas (LPG) storage and high level radioactive waste (HLW) repositories. Here, as an analogue, the Atera fault that is well known as an active fault distributed in central Japan has been studied. Detailed mapping of faults and fracture system in and around the Atera fault, and microscopic observation, XRD and XRF analysis of fault rocks and fracture fillings have been carried out in order to trace the structural and mineralogical evolution of the fault. Micro-texture and filling minerals of fault and adjacent fractures show that the Atera fault has been undergone following three stages in the fault evolution; Stage 1) formation of cataclasite under relatively high confined pressure environment, Stage 2) circulation of high temperature groundwater providing hydrothermal alteration and forming of fracture fillings such as prehnite and quartz, and Stage 3) penetration of low temperature oxidized rainwater to form iron-oxhydroxides in open fractures after the Atera fault allocated close to the ground surface. Results of this study suggest that the analysis using faults and fracture system with filling minerals would be an effective method to provide a technical basis for long-term assessment of the usage of underground facilities.