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Characteristics of fracture and fracture fillings in sedimentary rocks-Example of Shimanto belt, Eastern part of Kyusyu-

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The long-term behavior of underground environment is important in geological disposal systems for radioactive waste, underground storage of CO_2 and liquefied petroleum gas (LPG). Fracture, fracture fillings and redox front have been studied for this evaluation (ex.Yoshida et al., 2004). However, the most of previous papers have been discussed to igneous rocks such as granite.

In this study, those characteristics are investigated in drilling core of Paleogene sedimentary rocks, Shimanto belt distributed at eastern part of Kyushu district.

The depth of drilling core is 120m, and is coherent sequence of accretionary prism which mainly consists of sandstone and shale. Fractures are defined as the discontinuity planes of the drilling core in this study. Redox front is formed with minerals oxidized by permeation of oxidative groundwater (Berner, 1981; Hoffman, 1999). Drilling core observation shows that brown colored rock is oxidized zone, and except for one is host rock zone. The boundary of both is recognized as the redox front. Fractures have characters such as brown colored alteration or mineral filling. Those are classified into the following two types based on the occurrence of fracture fillings and contact condition.

Type A sealed by filling mineral partially, and is easily separated along the fracture planes.

Type B sealed by filling mineral perfectly, and is contacted tightly together.

Type A fracture generally exists in all depth, and brown colored alteration along the fracture surface is remarkable in the depth of 0-60m. In the depth of 60-120m, that is filled by carbonate mineral which is patchy or euhedral shaped. Type B fracture frequency exists in the depth of 60-120m.

Oxidized zone distributes along the fracture in the depth of 0-35m. In this range, the rocks including of fractures are almost altered in brown color. The flesh host rock is rare. Around the depth of 35-50m, brown colored alteration is restricted to fracture surface only, and whole rock alteration is rare. Only a part of fracture surfaces are altered with depth deeper than 60 meters. This alteration is probably due to iron hydroxide occurred by the oxidative groundwater permeated.

Fracture filling minerals are iron hydroxide, calcite, ankerite and pyrite. Calcite and quartz mainly exist deeper than oxidized zone. Ankerite is frequency produced around shale.

In this presentation, we discuss the movement of elements and microstructure of minerals based on the data of chemical analysis and microscopic observation. Furthermore, the relation among the water permeability of a base rock, fracture and fracture filling mineral is also considered.

Keywords: fracture, fracture fillings, redox front, sedimentary rock