Bulk chemical analyses in roof thrust, underplating thrust and melange: Mugi melange, the Cretaceous Shimanto belt, Japan

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The aim of this study is to understand the qualitative process of mass transfar due to the fault activity or rock-fluid interaction within the fault-fluid system along subduction itnerface. The study area is the Mugi melange, the Cretaceous Shimanto Belt, Shikoku, SW Japan. Classification of defromation by outcrop observations and bulk rock chemical analysis for classified samples by XRF were conducted. Analyzed fault rocks are located the northern boundary of the Mugi melange and coherent unit of Hiwasa formation (Minamiawa fault), and the unit boundary between unit I and unit II within the Mugi melange (Hana 4). lithologies of Minamiawa fault zone are black shale as host rocks and fault breccia and fault gouge. In Hana 4, host rocks are black shale and basalt, and defromed rocks cutting the host rocks are identified. For the rocks classified in defromation texture was analayzed in bulk rock chemistry by XRD.

The changes in chemical elements from host rock to fault breccia and fault gouge are examined in the Minamiawa fault. The result shows that the Sr, Th, SiO2 amd Na2O decreases both in fault breccia and fault gouge. Except for Zr and P2O5, other elemets increses both in fault breccia and fault gouge. Immobile isocon diagram (according to insoluble Ti) shows that the 1.0756 for the change form host rocks to fault breccia and 1.2646 from host rocks to fault gouge. Rock densities are 2,617038g/cm3 for host rocks, 2,647325g/cm3 for fault breccia and 2,73724g/cm3 for fault gouge. On the basis of this value and Isocon method, the volume and mass reductions are -5.95269% and -7.0286% for fault breccia, and -17.2916% and -20.924% for fault gouge.

In Hana 4, element reduction was identified in Cr, Sr, Zr, Ba, Ce, SiO2, Al, Na2O, P2O5 and LOI in balck shale. Other elements increases in deformed rock. Immobile isocon was 1.0235. Rock densities are 2.55874g/cm3 for host rocks and 2.554125g/cm3 for defromed rock. Volume and mass reduction shows -2.36288% and -2.296%, respectively. In basalt, element reduction are observed in V, Cr, Co, Rb, Sr, Ba, Fe2O3, CaO and K2O. Other elements are increased in defromed rock. Densities are 3.121g/cm3 for host rocks and 2.79352g/cm3 for defromed rock in basalt. Vlume and mass reductions are -13.9933% and -3.9108% respectively.

The volume change from host rocks to fault gouge is larger than that to fault breccia in Minamiawa fault. In addition, volume change in Hana 4 is smaller than that in Minamiawa fault in black shale. Those result indicates that the amount of displacement or degree of deformation may be related to the volume change. The changes in elemnts in black shale differ from that in basalt, which may indicate that the host rock chemistry contoroll the elemntal change from host rocks to defromed rocks.