Distribution of fluid conduit and estimation of fluid volume of a deep subduction zone. : An example from the Yokonami Melange.

Taketo Kikuchi[1]; Yoshitaka Hashimoto[2]

[1] Natural Environment Sci.,Kochi Univ; [2] Dep. of Nat. Env. Sci., Kochi Univ.

Introduction

The most rapid deformation and fluid expulsion anywhere in the world are occurring along subduction plate interface. Episodic deformation and fluid production results in evolving hydrologic system of subduction zone. Quantitative study of the hydrogeology in subduction zone is considered to be a crucial part of understanding oceanic chemical budgets and the formation of seismogenic zone. We estimated of distribution of fluid conduit and fluid volume of a deep subduction zone through investigating vein distribution and vein thickness in a geologic body of accretionary complex as on land experimented deep subduction zone. We also investigated for magnetic susceptibility of host rocks to examine influence of fluid migration to rock chemistory.

The Yokonami Melange of the Cretaceous Shimanto belt, Shikoku, which is an accretionary complex, has been investigated in this study. Main lithologies in this area are sandstone and mudstone. There is characteristic to contain of oceanic material such as basalt and chert. Yokonami Merange is considered as tectonic merange which is formed by lager parallel shearing along decollment.

The mean of mineral vein thickness of total outcrop was 13.33mm/m. The ratio of quartz to calcite in a mineral vein was examined by image analysis of thin section of vein. As a result, the content of calcite in a vein was about 10%/area. The pressure and temperature was estimated from fluid inclusion analysis within vein. The number of analyzed sample for fluid inclusion microthermometry is two. The results of P-T conditions of the samples represent 175C/143Mpa, and 225C/176Mpa, respectively.

The magnetic susceptibility data suggests that there is plus interrelation between a variation of magnetic susceptibility and vein frequency in interval of 10m.

Discussion

If a mineral vein is as a board in 1m3 host rock, the volume of vein will be 0.00137m3. Under this assumption, we can estimate of volume of fluid which is needed for dissolving veins on the basis of the ratio of quartz and calcite and P-T conditions obtained from this study. It is estimated that the fluid volume is 150 times as much volume as host rock volume. This result suggested that plenty fluid might come from outside of host rock, and then localize to the decollement zone.

The relationship between a variation of magnetic susceptibility and vein frequency may be ascribed to develop of magnetic minerals by fluid-rock interaction.