

Magnetic & chemical properties of basalts along the earthquake source faults in the Okitsu & Mugi Melanges, accretionary complex

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Southwest Japan is an ideal area for magnetic observations because of the availability of high-quality fine-scale airborne magnetic data [GSJ, 2005; 1996] and the absence of a significant magnetic source other than the serpentine diapirs described by Kido et al., 2004. Generally, the predominant magnetic anomaly observed on the land of Shikoku is approximately flat, within amplitude of 50 nT, in comparison with the ocean magnetic anomaly, and smaller than the corresponding value observed offshore. In the flat magnetic anomaly zone, we observed both fresh and altered basalts in the Okitsu melange in the Cretaceous Shimanto accretionary complex along the coastal line of western Kochi. We also observed basalts with the similar characteristics in the Mugi melange in the same sequence along the coast of the south Tokushima. We discovered completely altered basalts along the fault zone and those with varying degrees of alteration across this zone measuring the magnetic properties and chemical compositions; these combined results suggested a strong relationship between the reduction in magnetization and the configuration of the shear plane.

We summarize the physical and magnetic properties of the sampled fresh and altered basalts, such as density, Curie temperature, magnetic susceptibility, NRM, and the Q-ratio for 20 representative samples from more than 100 samples. The sample densities vary from 2.70 to 2.92 g/cc and NRM vary 1.0×10^{-7} to 10.0 A/m; these range are somewhat lower or extremely lowest than that of general oceanic basalts. The Q-ratio values range from 0.00 to 1.26 resulting in extremely low values - zero or up to 0.7. The representative vector plots exhibits almost the same behavior as a component and is uni-directional. By hysteresis loops were symmetrical, then provided several parameters as Hcr/Hc values plotted on the King diagram (King et al., 1982), and indicates pseudo-single-domain (PSD) grain size. From the thermo-magnetization analysis, the outer part was identified as monophasic magnetite and hematite with a Curie temperature of 590-640C, suggest that both the phases are the main magnetic carriers.

Obviously, two opposite types of samples were observed - group A : low k, Jr, and Q; and group B : high k, Jr, and Q. The Group A samples are distributed along the roof thrust of the Okitsu melange, where the pseudotachylyte was discovered, whereas the group B samples are distributed along the bottom of the thrust sheet. Further, the rock chemistry indicated two types of significant components. In these analyses, an extensive alteration involving carbonate, calcite, and carbon dioxide is observed. If much clear understanding to the characterization of these altered processes increases, it is likely to become a fine index of fluid paths in the top of oceanic crust plane in the seismogenic zone.