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Comparison between thermal demagnetization and alternating field demagnetization of basement basalts on Shatsky Rise

Masahiro Ooga[1*], Claire Carvallo[2], Masako Tominaga[3], William W. Sager[4]

[1]Grad. Sch. Eng., Doshisha Univ., [2]IMPMC, [3]Woods Hole Oceanographic Institution, [4]Texas A&M University

During ocean drilling studies, many basaltic cores have been recovered and their paleomagnetism has been used to estimate age and make plate reconstructions. However, exact estimation has often been hampered by drilling induced overprint on the basaltic cores, which leads to equivocal interpretations. In order to understand how to remove drilling induced overprint, we have investigated the difference between thermal demagnetization and alternating field demagnization for samples recovered by ocean drilling. The samples are igneous rocks from Site U1349 recovered on Shatsky Rise during IODP Expedition 324. The Site U1349 basalts are highly altered massive lavas. Some samples appear to be altered under subaerial conditions. For the analysis, cubic samples (8 cc) were cut into multiple 1 cc cubic specimens, and only the specimens from inner part of the cubic samples were demagnetized to minimize the effect from the drilling overprint. We allocated at least two specimens from the same cubic sample: one for alternating field and the other for thermal demagnetizations for comparison. Analytical results show that some samples indicate 2 remanent components; one is the characteristic remanence which is directed towards the origin on the Zijderveld diagram, and the other is a vertical component which seems to be a drilling induced remanence. Alternating field demagnetization data showed a clear difference between characteristic remanence and drilling induced remanence. Vertically magnetized soft components induced by drilling were removed by alternating field at 10 mT. On the other hand, thermal demagnetization data showed overlapped unblocking spectrum of 2 components, and one sample showed that drilling induced remanence could not be removed completely up to 475 degree C. Traditionally, thermal demagnetization results have been preferred to use for directional analysis on paleomagnetism of oceanic basalts due to the self-reversal behavior. However, our results show that drilling induced remanence was well removed by alternating field demagnetization at 10 mT. These results indicate that alternating field demagnetization at low field before thermal demagnetization is a useful method to extract characteristic remanent magnetization in these rocks.