

Rotation Angle of Shikoku Basin: Discremination of drilling induced magnetization from VRM by great circle analysis

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The IODP Expedition 322 penetrated sediments-basement boundary and recovered successive cores at Site C0012, subduction input in Nankai Subduction Zone. The collected basement samples are composed of alternating beds of pillow basalts and hyaroclastite and were retrieved by rotary core barrel drilling system. Paleomagnetic measurements were conducted to understand the polarity, paleolatitude and tectonic rotation. In total, 29 minicores or blocks were collected from the basaltic basement rocks. Paleomagnetic results suffers from intense secondary magnetization during drilling. AF demagnetization field up to 10 mT was generally enough to remove the overprint to allow interpretation of polarity of magnetization.

Paleomagnetic measurements on basaltic basement rocks from Site C0012 (538-561m CSF) show that the stable magnetization has reversed polarity. Paleolatitude was calculated from 7 samples as 28.0+-7.6 degrees N and the expected latitudinal translation is 522+-844km. Magnetic anomaly map can be produced using the recently compiled dataset by Quesnel et al. (2009). Preliminary interpretation based on the simple magnetization model assuming the constant thickness of the magnetized layer (Okino, personal communication), the magnetic anomaly crossing the Kashinosaki Knoll corresponds to anomaly C6Ar (20.7-21.1Ma; ATNTS2004).

We also attempted to reconstruct tectonic rotation related to the development of Shikoku Basin using secondary magnetization component acquired during Brunhes normal polarity chron. A whole round sample used for anelastic strain recovery (ASR) is the best sample for that purpose allowing us to measure a block collected from the center of the core, which has least drilling overprint. We collected multiple sub-samples from the center of ASR sample and carefully measured with stepwise AF demagnetization and thermal demagnetization experiments. However, the results indicate that the secondary magnetization is not directing the magnetic north during the Brunhes chron. In order to extract the information carried by the viscous remanent magnetization (VRM) acquired during the Brunhes, we conducted great circle analysis described by Kirschvink (1980). This allowed us to recognize four components including the VRM. The results shows that the angles between VRM and primarly component of reversed polarity are around 10~20 degrees suggesting no significant rotation since the formation Shikoku Basin.

Keywords: Shikoku Basin, drilling induced magnetization, viscous remanent magnetization, great circle regression analysis, IODP Hole C0012A, Basaltic Basement