

Paleomagnetic analyses of core samples from the plate-boundary thrust obtained during the IODP JFAST

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IODP Expedition 343, Japan Trench Fast Drilling Project (JFAST), drilled through the plate-boundary décollement of the Japan Trench, where large slip occurred during the 11 March 2011 Tohoku-Oki Earthquake. In order to reconstruct the deformation of the sediments at the cm scale and less, we conducted paleomagnetic measurements of the core sample from the plate-boundary décollement zone.

The plate-boundary core sample has a scaly fabric and is composed of bicolored clay layers with sharp contacts. We prepared slabs for thin sections across the contacts with typical dimensions of 3x3x5 cm³ from the core sample. We measured remanent magnetization of 16 slabs. The slabs were subjected to natural remanent magnetization (NRM) measurements in 0.5-1 cm intervals and progressive alternating field demagnetization (AFD) up to 80 mT with a 2G755 pass-through superconducting rock magnetometer at Kochi University.

Typically, two paleomagnetic components were isolated during the AFD of slab samples up to 80 mT. One component ('soft' component) was demagnetized below 20-30 mT, and another component ('hard' component) was not demagnetized even up to 80 mT. For multiple slab samples cut from the same whole-round sample, the hard component generally has a consistent paleomagnetic direction. Contrastingly, the direction of the soft component is not so consistent between adjacent slabs, and even varies within a single slab.

The direction variation of the soft component possibly reflects the cm-scale rotation of competent phacoids during deformation within the slab samples from the plate-boundary thrust zone. The consistency of the hard component directions implies that the hard component was remagnetization during/after the rotation, and was possibly carried by newly-formed magnetic minerals during the deformation.