

Reorientation of cored samples for stress-state analyses: IODP Expedition 370

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In the Nankai Trough subduction zone, SW Japan, moment magnitude (Mw) 8 class great earthquakes have occurred repeatedly at intervals of 100~200 years. To determine the present-day stress state at the toe of the plate subduction zone penetrated during the IODP (Integrated Ocean Discovery Program) Expedition 370, we conducted stress measurements using core samples recovered from Site C0023 by Anelastic Strain Recovery (ASR) method. In order to determine the in-situ stress directions, we need to reorient the samples to the geographic coordinate using the paleomagnetic method.

Experimental procedure is as follows: we first cut a disc-shaped sample with a thickness of 2 cm from a whole round core sample and then further cut it into 9 specimens. To avoid drying of the specimens, they were subsequently wrapped by a parafilm. Progressive alternating field demagnetization (AFD) was conducted on each specimen by 80 mT to extract a primary component of the natural remanent magnetization (NRM). We were able to determine a paleomagnetic direction of each specimen by applying the principal component analysis (Kirschvink, 1980) or the great circle analysis (McFadden and McElhinny, 1988) to the demagnetization results of NRM. The primary component was acquired when the rock formed and records the direction of the geomagnetic field at that time. Therefore this direction corresponds to magnetic north and can be used to reorient the sample.

In this study, we succeeded in the reorientation of 9 out of 15 whole round core samples to geographic coordinates. Specimens from 6 cores had heavy magnetic overprints associated with the drilling and have not been reoriented.

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