

Rotation of the Philippine Sea plate inferred from paleomagnetism of oriented cores taken with a ROV-based coring apparatus

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Reconstructing the history of Philippine Sea (PHS) plate motion is important for better understanding of the tectonics of the surrounding plates. It is generally considered that the PHS plate migrated northward since Eocene, but its rotation has not been constrained well; some reconstructions incorporated a large clockwise rotation but others did not. This is mainly because the difficulty of collecting oriented rocks from the mostly submerged PHS plate hindered establishing an apparent polar wander path. In this study, we conducted a paleomagnetic study of oriented cores taken using a ROV-based coring apparatus from the Hyuga Seamount on the northern part of the Kyushu-Palau Ridge, a remnant arc in the stable interior of the PHS plate. Stepwise thermal and alternating-field demagnetizations were applied to specimens taken successively from two ~30 cm long limestone cores of middle to late Oligocene age, and characteristic remanent magnetization directions could be isolated. Declination and inclination of $D = 51.5^\circ$ and $I = 39.8^\circ$, respectively, were obtained as the mean of the two cores. The easterly-deflected declination means ~50° clockwise rotation of the PHS plate since middle to late Oligocene. In addition, ~5° northward shift of the site is estimated from the mean inclination. The result implies that the Kyushu-Palau Ridge was located to the west of the present position in middle to late Oligocene, and that PHS plate rotation as well as the Shikoku and Parece Vela Basin spreading contributed to the eastward migration of the Izu-Ogasawara (Bonin) Arc to the current position.

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