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Philippine Sea Plate motion since Eocene estimated from paleomagnetism of seafloor drill cores and gravity cores

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Models of Philippine Sea (PHS) Plate motion so far assume a large northward shift since the Eocene in general. In order to constrain better the age and amount of the northward shift, a paleomagnetic study was conducted on drill cores and gravity cores taken from the seafloor of the northern part of the PHS Plate. The core samples studied are sedimentary rocks or semi-consolidated sediments, and their ages range from the Eocene to late Miocene, which were estimated from microfossils and strontium isotope ratios. After stepwise alternating-field and thermal demagnetization experiments, 19 sections at 17 sites out of 58 sections at 29 sites examined yielded mean paleomagnetic directions with the 95% confidence limit (alpha95) of smaller than 25 degrees, and 14 sections at 13 sites have alpha95 < 15 degrees. An amount of northward shift at each site was obtained from a difference between the paleolatitude and the present latitude. It was revealed that the northern part of the PHS Plate was located near the equator at 50 Ma, and the majority of the northward shift took place between about 50 and 25 Ma. Northward movement after 15 Ma is small. Together with the available paleomagnetic information suggesting clockwise rotation of about 90 degrees since the Eocene and the requirements from geometry with the surrounding plates, we present a model that the PHS Plate rotated 90 degrees clockwise between 50 and 15 Ma on the Euler pole near 23N, 162E, although it is impossible to determine uniquely the Euler pole position.

Keywords: Philippine Sea Plate, rotation, paleomagnetism, paleolatitude, BMS, Eocene