R004-02
Zoom meeting A ：11/4 AM1 (9:00-10:30)
9:15〜9:30

Magnetic and gravity constraints on crustal structure of the Nosappu Fracture Zone, Northwestern Pacific

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Fracture zones are linear oceanic features that extend past the transform faults, away from the mid-ocean ridge axis. They are distinct from transform faults, but they have features associated with transform faults and show evidence of past activity. Understanding the structure and lithology of fracture zones provides insight into the long-term behavior of oceanic crust, such as magnetic field variations, crustal accretion processes, and temporal change of lithology. The bathymetry, magnetic anomaly and gravity anomaly data around the Nosappu Fracture Zone located on the old Pacific lithosphere were acquired during two research cruises; the KR06-03 with R/V Kairei and YK14-09 with R/V Yokosuka. Multiple analyses of these data sets were carried out for an interpretation of features of the NFZ together with the adjacent oceanic crusts, and a suggestion of constraints on the crustal structure and relationship with their tectonic background.

To estimate paleo-inclination and declination of oceanic crust, reduction to the pole (RTP) processing of magnetic anomalies was conducted. The paleo magnetization direction was determined by comparing obtained topographic features with the RTP anomaly. After that, equivalent magnetization was estimated from magnetic anomaly based on the well-established inversion methods (e.g., Macdonald et al., 1980; Parker & Huestis, 1974), assuming a 1.0 km thick magnetized source layer and magnetization without vertical variation. In addition, mantle Bouguer anomaly (MBA) was calculated from the satellite-derived free-air gravity anomaly (Sandwell et al., 2014) and newly collected multibeam bathymetry data using the method of Parker (1973).

The obtained bathymetric data shows steep valley walls of the NFZ, and abyssal hills in the oceanic crust to the west of NFZ and J-shaped ridges in the oceanic crust to the east of NFZ. The low intensity of the crustal magnetization is observed along the NFZ area. In the oceanic crust to the east of NFZ, observed characteristic features of magnetization, with the slightly curved to the north along the western edge, are similar to the features of bathymetric J-shape ridge. Anomalous negative MBA also appears around the NFZ area, suggesting the exposure of high-density material or thin crustal thickness.

The results of these analyses provide the basis of the magnetization structure model. Based on the parameters determined by the RTP operation, we interpret that the oceanic crust around the NFZ was formed and magnetized in the southern hemisphere. This interpretation is generally consistent with the global plate reconstruction model of Seton et al.(2012). By combining the results of analyses, It could be mentioned that the magnetization structure of the eastern oceanic crust adjacent to the NFZ retains the crustal structure from the time of the transform-fracture zone system.