Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SVC007-P04 Room:Convention Hall Time:May 27 10:30-13:00

Tectonic fabrics of the Manihiki Plateau

Masao Nakanishi[1*], Yasuyuki Nakamura[2], shipboard scientists of KH-03-1 Leg 5[2], shipboard scientists of KH-10-4 Leg 2[2]

[1]Graduate School of Science, Chiba Univ., [2]JAMSTEC

The Manihiki Plateau, which lies in the western equatorial Pacific Ocean, is considered to be one of the Cretaceous Large Igneous Provinces. The water depth of the plateau is at approximately 2500-4000 m and is several thousands meters shallower than the surrounding oceanic basins. Three major geomorphic plateaus, High, North, and Western plateaus, are discernible within the plateau itself. The depth of the Western Plateau, about 4000 m, is deeper than those of the other plateaus. The Danger Islands Troughs (DIT) and Suvarov Trough are the major linear deep narrow depressions within the plateau (Mammerickx et al., 1974). DIT separates the Western Plateau from the High Plateau to the east. DIT is thought to be a trace of the plate boundaries (Winterer et al., 1974). The age of the plateau is about 117 Ma (Ingle et al., 2007; Hoernle, et al., 2010). Several previous studies (Lonsdale, 1997; Billen and Stock, 2000; Hoernle et al., 2004) proposed the Manihiki Plateau rifted from the Hikurangi Plateau that is situated east of New Zealand at the present. On the other hand Larson et al. (2002) proposed that the Pacific-Farallon-Phoenix triple junction originated at the northwest corner of the Manihiki Plateau around 119 Ma and a volcanic episode around 123.7 Ma created the Manihiki Plateau with at least twice its present volume. Taylor (2006) and Davy et al. (2008) proposed that Manihiki Plateau, Hikurangi, and Ontong Java plateaus were formed from one mega mantle plume around 120 Ma. To expose the formation of the Manihiki Plateau, we collected bathymetric data by R/V Hakuho-maru in 2003, 2005, and 2010. In 2010, we conducted multichannel reflection seismic survey in the northern part of the plateau (Nakamura et al., this session).

The topographic expression of DIT is a trough bordered by ridges with a height of 2500 m above the floor of the trough. The depth of the northern part of DIT, north of 7 30'S, is 5900 m. That of the southern part is 4800 m. There is a seamount, which high is 2500 m, between the northern and southern parts of DIT. The floors of the troughs south of 7 35'S are almost flat. Seismic profiles indicate that the floors are filled with sediments as much as 1.0 s thick.

The 4700 m contours at the base of the eastern and western trough walls are approximately parallel to each other except for the landslide areas. Our detailed bathymetric map shows the 4700 m contour at the base of the eastern trough wall can fit in with those of the western wall. These observations imply NE-SW extension in DIT. There is the NE-SE trending seafloor fabric in the seafloor north of DIT. The tectonic fabric suggests that the seafloor was formed by an NE-SW extension occurred by an extensional shear zone. We do not have enough information to determine when the shear zone was active. If the shear zone was a part of the plate boundaries at the time of the formation of the Manihiki Plateau, DIT is thought to be a trace of an oblique spreading system or a leaky transform fault. This idea is similar to the Model I proposed by Winterer et al. (1974).

Keywords: Manihiki Plateau, abyssal hills, Pacific Plate