Crustal structure and tectonic setting of the abyssal basin southeast of the Ontong Java Plateau, western Pacific Ocean

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Ontong Java Plateau(OJP) is located north of the Solomon Islands in thewestern Pacific Ocean. The area of OJP is about 1.9×10^6 km^2. Deep-sea drilling samples indicate that most of the OJP was formed rapidly about 120 Ma at mid-southern latitude in the Pacific Basin. Taylor (2006) proposed that the OJP was formed as a single large volcanic province together with the Manihiki and Hikurangi plateaus, called Ontong Java Nui (Chandler et al., 2012). The OJP is surrounded by the East Mariana, Pigafetta, Nauru, Ellice, Stewart, and Lyra basins. The former three basins (East Mariana, Pigafetta, and Nauru) were formed at the Pacific-Izanagi and Pacific-Phoenix ridges, respectively (Nakanishi et al., 1992). The tectonic history of the latter three basins (Ellice, Stewart, and Lyra) is, however, unknown because of lack of magnetic anomaly lineations. It is thus unclear whether OJP was formed at mid-oceanic ridges or away from active plate boundaries. To expose the tectonic history of Ellice, Stewart, and Lyra basins, we conducted the multichannel seismic reflection survey in the basins as well as OJP during the research cruise MR14-06 Leg 1 by R/V Mirai of JAMSTEC. After the regular data processing, we found several tectonic structures in the basins. The relief of the acoustic basements in the basins are not overall smooth. We found several igneous diapirs in Stewart and Ellice basins, implying that the volcanism occurred after the formation of the basins. We identified normal faults in the southern part of Stewart Basin, probably caused by the plate bending owing to the Pacific Plate subduction. We discovered the graben structures in the OJP situated at the northern and southern franks of the Stewart Basin. The graven structures were formed at the beginning of the formation of the Stewart Basin. Taylor (2006) concluded the basin was formed by NW-SE rifting during the separation of OJP and Manihiki Plateau around 120 Ma. Neal (1997) proposed another model, in which the NE-SW rifting and spreading event formed the Stewart and Ellice basins around the basin around 80 Ma. Our study prefers the model by Neal et al. (1997).

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