Preliminary results of R/V KR03-01 cruise: Chaotic morphology in the Parece Vela Basin

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The seafloor formed over the Miocene in the Parece Vela Basin (PVB) is characterized by chaotic topography and the well-developed mullion structures, indicating a weak magma supply and mantle exposure at the intermediate spreading rate (full rate = 8.8 -7.0 cm/yr) system due to an unusual cold underlying mantle. The recent studies by Ohara and others reported a large, 55 vs.125 km giant megamullion and petrological characteristics of peridotite from the Parece Vela Rift (PVR), the extinct spreading center of the basin. During KR03-01 cruise in January 2003 (R/V Kairei), we conducted 18 dredge hauls and geophysical mapping in order to understand the amagmatic tectonics in the region. This poster presents the preliminary results of the geophysical mapping, in which we show the anomalous seafloor fabrics formed under the amagmatic backarc spreading. The mapped area consists of two parts, 1) chaotic terrain in the western PVB and 2) ridge-transform intersections of PVR including giant megamullion. Although the chaotic terrain is surrounded by normal well-organized north-south abyssal hills area, it is characterized by very deep depth, rugged bathymetry with isolated highs, and high Bouguer gravity anomaly, indicating thin crust. We found at least four new mullion structures, each consisting of domed highs with continuous corrugations. The most prominent mullion has two clear, large corrugations, which continue from the 1500 m domed high to the smaller, 600 m high to the west. The corrugated pattern stops at the N-S trending minor ridge at its west and also N-S trending, but gently eastward convex lineament at its east. These features can be interpreted as the breakaway zone and the termination, corresponding to the start and end of the amagmatic phase with mantle exposure. The giant megamullion structure in the central PVR is quite large, so we propose to name it Godzilla Mullion. It has the following unique characteristics compared with other seafloor megamullions, 1) its exceptional magnitude, 2) development over an entire segment (not only the inside corner), 3) high intermediate spreading rate (7.0 cm/yr), and 4) moderate gravity anomalies. Peridotites were recovered over the whole mullion structure in the cruise. The ridge-transform intersections of the Godzilla Mullion area and northern PVR also show the anomalously deep rift, mullions, remnant inside corner highs and peculiar abyssal ridge bends. These features are compatible with the existence of cold mantle and dominant amagmatic extension. In this presentation, we focus on the preliminary results of the geophysical mapping of KR03-01 cruise and then compare the characteristics of chaotic and mullion structures of the Parece Vela Basin with those of other intermediate to fast spreading systems. The petrological results of this cruise is presented in the J029 Ophiolite and oceanic lithosphere session.

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