

Petrological characteristics of gabbroic rocks from the Parece Vela Rift

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The Parece Vela Basin (PVB) located in the southern Philippine Sea is an extinct back arc basin. The seafloor formed over the Miocene in the 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 reported a large mullion structure (the Godzilla Mullion) 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 and the lithospheric composition of the region. Although reports of gabbroic rocks from back arc basins have been limited (e.g., Mariana Trough; Stern et al., 1996; Ohara et al., 2002), we recovered gabbroic rocks in 7 dredge hauls during the cruise. All the gabbroic hauls came with peridotites except one haul (D2). We conducted 5 hauls on the Godzilla Mullion, and two of them yielded gabbroic rocks (D6 and D10). We also recovered plagiogranite together with gabbroic rocks in D10.

The gabbroic rocks from D10 contain subhedral or anhedral plagioclase, and clinopyroxene (up to 1 cm) and anhedral ilmenite. The albite composition in plagioclase ranges from 0.7 to 0.75 (up to 0.9). Amphibole occurs as reaction rim on large clinopyroxene.

These mineralogical characteristics indicate that the gabbroic rocks from D10 were not the direct products immediately crystallized from gabbroic melt, but were the products of interaction between plagiogranite melt and peridotite. Ohara et al. (2003) suggested that the peridotite from the PVR was the residue of small degree of mantle melting (~ 4% near-fractional melting of a MORB-type mantle). Petrological characteristics of gabbroic rocks from the Godzilla Mullion also indicate a weak magma supply condition where a highly fractionated melt intruded into mantle peridotite.