

## Microstructural and petrological analysis of gabbroic rocks from the Godzilla Mullion at the Parece Vela Basin, the Philippine Sea

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The Godzilla Mullion has been discovered in the Palece Vela Basin, the Phillipine Sea, which size is nearly an order of magnitude larger than megamullions found in the Mid-Atlantic Ridge (Ohara et al., 2001, MGR). We argued that the detachment fault occurred actually on the surface of the Godzilla Mullion, which could possibly extend to deeper level of the mantle lithosphere across the brittle-plastic transition (Harigane et al., 2005, AGU Fall Meet.). Here, we report that the structural development of the gabbroic rocks in the Godzilla Mullion based on detailed microstructural analyses.

The Godzilla Mullion was dredged at four localities by R/V Kairei on KR03-01 cruise. We selected 12 gabbroic samples of the D6 dredge site, where is located at the southwestern distal end of the Godzilla Mullion. The gabbroic samples consist of plagioclase-clinopyroxene gabbro. We divided the gabbro into five categories based on the degree of deformation microstructure: undeformed type, weakly-deformed type, protomylonite, mylonite and ultramylonite. Although hornblende grains occur in most samples due to hydrothermal alteration, those in fault rocks were plastically deformed.

Chemical compositions of major constituent minerals have been analyzed with an electron microprobe. An contents in plagioclase vary among gabbroic rocks; those in undeformed and weakly-deformed gabbroic rocks resulted from the zonal structures, whereas An contents in neoblast are distinctly lower than those in porphyroclasts within the fault rocks. It suggests that the variation of An contents in these gabbroic rocks reflect the deformation conditions (mainly temperature). Since the replaced hornblende grains were also plastically deformed in the fault rocks, these fault rocks have been deformed under retrogressive conditions. Moreover, the replaced hornblende can be divided into two types: high-T type (c.a. 700 degree) and low-T type (c.a. 500 degree), indicating that addition of fluids may often occur within the gabbroic rocks.

The primary chemical compositions of the major constituent minerals within the fault rocks are compatible each other. It may suggest that a shear zone related to the detachment fault occurred in a single gabbroic body in the breakaway region. Since the replaced hornblende has been deformed within the fault rocks, the shear zone developed from high-T (c.a. 700 degree) to medium-T (c.a. 500 degree) conditions. The chemical compositions of a mylonite that were intruded by an undeformed gabbro are different between mylonitic gabbro area and undeformed gabbro area, suggesting that there is active magmatism during the development of the shear zone. In addition, undeformed and weakly-deformed gabbroic rocks has distinctly different chemical compositions from the fault rocks. It may implies that the plural magmatism occurred when the Godzilla Mullion have been formed in the Parece Vela Rift.