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Petrology of gabbroic rocks from the Godzilla Megamullion in the Parece Vela Basin, Philippine Sea

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Godzilla Megamullion is the largest Oceanic core complex (OCC) with a dimension of ˜125km x ˜55km, occurs in the Parece Vela backarc Basin, within the Philippine Sea (Ohara et al., 2001). OCCs are domal bathymetric highs interpreted as portions of the lower crust and/or upper mantle exposed via low-angle detachment faulting (e.g., Tucholke et al., 1998).

Recent cruises (KR03-01, KH07-02 and YK09-05) recovered gabbroic rocks and plagiogranites from 16 localities along the surface of Godzilla Megamullion In this contribution, we will report petrographical analysis of the gabbroic rocks.

Gabbroic rocks are classified into leucocratic gabbro, gabbro, olivine gabbro and Troctolite (based on olivine-plagioclase-pyroxene systematics (Streckeisen, 1976)) or leucocratic gabbro, leucocratic hornblende gabbro, pyroxene hornblende gabbro and hornblende pyroxene gabbro (based on pyroxene-plagioclase-hornblende systematics (Streckeisen, 1976)). The volume of olivine gabbro and troctolite are 5% or less.

Leucocratic hornblende gabbro, pyroxene hornblende gabbro and hornblende pyroxene gabbro contain hornblende, clinopyroxene, plagioclase and Fe-Ti oxide. These gabbros are further classified into several lithological types on the basis of modal and mineralogical assemblage as shown below:

1. Fe-Ti oxide rich type: this type contains abundant Fe-Ti oxide (17 vol% as maximum), hornblende and plagioclase (maximum An = 50). Range of #Mg in clinopyroxene is 42-73.
2. Fine grain type: this type has relatively primitive composition (FeO/MgO = 0.94-1.88). Range of #Mg in clinopyroxene is 73 - 78.
3. Coarse grain type: this type mainly consists of plagioclase (mean An = 50, maximum An = 75) and clinopyroxene (range of #Mg = 73-87), and poor in hornblende. FeO/MgO ratio of bulk composition is 0.53-1.07.
4. Sheared type: this type includes mylonite and amphibolite, products of shearing and subsequent retrograde metamorphism within the lower crust (Harigane et al., 2008)

Olivine gabbro contains plagioclase (An = 68-77), clinopyroxene (#Mg = 73-88) and olivine (Fo = 84-86). Troctolite contains plagioclase (An = 72-83), and olivine (Fo = 87-88).

Olivine gabbro, troctolite and coarse grain type gabbro, which have relatively primitive composition, were recovered only from the vicinity of the beakeaway of Godzilla Megamullion. On the other hand, Fe-Ti oxide rich type and plagiogranite, which have relatively evolved composition, were recovered from all over the surface of Godzilla Megamullion. It should be noted that these evolved lithologies were were particularly abundant near the termination of Godzilla Megamullion.

Keywords: gabbro, Godzilla Megamullion, Oceanic core complex, Parece Vela Basin