

Structural and petrological analyses of serpentized peridotites and talc schists in the Godzilla Mullion

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The Godzilla Mullion (125 km x 55 km), recently discovered within the Parece Vela Basin spreading ridge (Parece Vela Rift), Philippine Sea, is approximately 10 times larger than the oceanic core complexes found along the Mid-Atlantic Ridge. Rock samples dredged from a longitudinal section across the Godzilla Mullion consist dominantly of serpentized peridotite and gabbroic rocks, which are pervasively mylonitized, indicating intense shearing within deeper oceanic lithosphere that extends to lithospheric mantle. Microstructural and petrological analyses of the serpentized peridotites and the talc schists obtained from 9 dredged sites of the Godzilla Mullion (KR03-01 cruise of R/V Kairei: D6, D7, D9 and D10; KH07-02 cruise of R/V Hakuho: D6, D7, D17, D21 and D25) revealed deformation microstructures and the spatial distribution of these samples in the Godzilla Mullion. The sites of KR03-01-D6, KR03-01-D10, KH07-02-D6, KH07-02-D7 consist of mainly serpentized peridotites, plagiogranites, gabbroic rocks and minor basaltic rocks, whereas the sites of KR03-01-D7, KR03-01-D9, KH07-02-D17, KH07-02-D21 and KH07-02-D25 consist of serpentized peridotites.

Despite of intense hydrothermal alteration, the original textures of the serpentized peridotites were preserved so that they were able to be classified into four types: weakly deformed, deformed, mylonite and ultramylonite. These serpentized peridotites and the talc schists were distributed from the entire area of the Godzilla Mullion. In the breakaway area (KR03-01-D6, KH07-02-D6 and KH07-02-D17), the serpentized peridotites were weakly deformed peridotites and moderately deformed peridotites and talc schists were also present. In the medial area (KR03-01-D7 and KH07-02-D7), weakly deformed and moderately deformed peridotites were also dominant. In the termination area (KR03-01-D9, KR03-01-D10, KH07-02-D21 and KH07-02-D25), peridotite mylonites and ultramylonites as well as the talc schists are dominant, whereas there were weakly deformed peridotites and the talc schist. These peridotite mylonites and ultramylonites indicate the occurrence of a shear zone in the mantle lithosphere. The talc schists are thought to result from faulting at a temperature condition of 600 degree, suggesting that a fault has been developed at shallower level of the oceanic lithosphere accommodated with the detachment fault. The serpentized peridotites and the talc schists indicate that the Godzilla Mullion represents the movement surface of a detachment fault that possibly extends into the mantle lithosphere as a part of an oceanic core complex.