オマーンオフィオライト・ワジタイン岩体のCM1およびCM2サイトにおける地殻-マントル境界の掘削結果の概要

Overview of drilling of crust-mantle boundary at CM1&2 sites of Wadi Tayin massif of Oman ophiolite: the ICDP Oman Drilling Project

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At the boundary between the crustal section and the mantle section of the Oman ophiolite there are several tens to hundreds of meters thick, mainly composed of dunite called the crust-mantle transition zone (MTZ) [1]. Since it often accompanies thin veins or clots of plagioclase and clinopyroxene and several centimeters to meters thick gabbro sills, it leaves traces of magma activity right under the ridge. The origin of dunite in MTZ is still under debate: the accumulation of olivine crystallized from melt [2], or the reaction of harzburgite with pyroxene-undersatulated melt [3], or both [4]. Recently, the presence of water at the time of formation has also been pointed out [5]. To clarify the origin of MTZ, more detailed research by continuous core through MTZ is necessary.

From November 2017 to January 2018 MTZ of Wadi Zeeb (CM1&2 sites) in Wadi Tayin massif was drilled by the International Continental Scientific Drilling ProgramOman Drilling Project [6]. Geological mapping on ground associated with information from the recovered cores the thickness of the MTZ is estimated as about 150 m. The upper and lower boundaries of the MTZ has a strike in the east-west direction, and it is inclined about 30 degrees south. In the summer of 2018, the drilled cores were carefully described by scientists on the deep-sea drilling vessel "CHIKYU". The stratigraphy has been divided into four igneous sequences based on the abundance of different lithologies: Layered Gabbro Sequence, Dunite Sequence, Dunite with Gabbro Sequence, and Mantle Sequence. Dunite Sequence and Dunite with Gabbro Sequence are summarized as Crust - Mantle Transition.

Hole CM1A is inclined 60˚ northward. The upper 160 m of the core is the Layered Gabbro Sequence, mostly composed of olivine gabbro, interlayered with gabbro and a small amount of wehrlite, dunite, anorthosite and troctolite. From 160 to 310 m the Crust-Mantle Transition is divided into an upper 90 m Dunite Sequence and a lower 60 m Dunite with Gabbro Sequence containing small lenses of gabbro, troctolite and wehrlite. The dunites are highly serpentinized, and rodingite and diopsidite commonly replace minor gabbroic rocks in these sequences. The lower 80 m of the hole is the Mantle Sequence, with alternating layers of dunite and increasingly abundant, residual mantle harzburgite.

Hole CM2B is a vertical hole located 400 m north of CM1A, and samples the Crust-Mantle Transition and the Mantle Sequence. As in CM1A, the transition is divided into an upper Dunite Sequence and a lower Dunite with Gabbro Sequence. In contrast to Hole CM1A, a small amount of olivine has escaped complete serpentinization in the lower portions of the CM2B transition zone. In the Mantle Sequence, harzburgite is dominant. Dunite accounts for about 25% of this Sequence, less than in CM1A. The lowermost peridoties

in Hole CM2B are strongly altered to talc+carbonate.

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