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Petrologic nature of Moho in the northern Oman ophiolite

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Unraveling of the petrologic nature of suboceanic Moho and Moho transition zone (MTZ) is the main aim of Mohole (ultra-deep drilling on the ocean floor). It is a good way to research possible Moho and MTZ in the Oman ophiolite, which is a slice of crust-mantle formed at a kind of oceanic spreading center, in successful preparation for the Mohole. We have found varied gabbro-peridotite transitions, which may be representative of the Moho and MTZ, in the northern Oman ophiolite. The simplest (sharpest) is a transition from layered gabbro to harzburgite via a wehrlite and dunite portion of less than 20 m in thickness as seen in Wadi Fizh. The most diffuse is a gradual transition from layered gabbro to harzburgite with multiple interventions of dunite/wehrlite layers within the layered gabbro as seen in Wadi Thuqbah. The gabbro/dunite/wehrlite mixed portion is up to 1000 meters (Negishi et al., this session). The relationship between the gabbro and dunite/wehrlite is complicated; some gabbros are intruding in dunites/wehrlites, and vice versa in other cases. In addition, so-called late-intrusive dunite/wehrlite bodies invade vertically gabbros and other shallower crustal rocks (up to the sheeted dike complex) in various ways, seriously making the gabbro-peridotite transition relationship more complicated. The petrography of the dunites/wehrlites is almost constant, but shows upward magmatic evolution; pargasites appear in shallow ones.

Despite this complexity in mode of occurrence of dunites/wehrlites, their clinopyroxenes basically exhibit the same trace-element geochemical characteristics, equilibration with a MORB-like magma. Some harzburgites near the Moho are in equilibrium with the MORB-like magma, and are free of plagioclase and contains a few volume % of clinopyroxene (Akizawa et al., this session). They are interpreted as melt-impregnated harzburgites; they are distinct from abyssal MORB-impregnated harzburgites, which contain plagioclase. The involved melt in the dunite/wehrlite formation around the MTZ of the northern Oman ophiolite is MORB-like, but is different from the MORB in precipitation of clinopyroxene prior to plagioclase and in being hydrous.

Keywords: Moho, Moho transition zone, Oman ophiolite, harzburgite/MORB reaction, dunite/wehrlite