

## Important role of the ultramafic layers in the lower oceanic crust and Moho

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ICDP Oman Drilling Project drilled several parts of the crustal section and the mantle section in the Samail ophiolite and sampled continuous cores. Onboard core logging was conducted on D/V Chikyu for 4 months in total in the summers of 2017 and 2018. We analyzed the core samples of 3200 m total length from 9 holes. The cores from the lower crustal section (Holes GT1A and GT2A) are mainly composed of olivine gabbro and gabbro, and also with small amounts of ultramafic rocks (wehrlite and dunite) and olivine-rich gabbro and troctolite. Hereafter, we call those olivine-rich rocks in the lower crust as the “ultramafic layers”. The CM holes were drilled through the crust-mantle transition, from gabbroic lower crust, through the Moho Transition Zone (MohoTZ) dunite with minor gabbros, and into residual mantle harzburgite. The lower crustal section in the Hole CM1A also includes a small number of ultramafic layers.

Whole-round data, including X-ray CT images, natural gamma radiation (NGR), gamma-ray attenuation (GRA) density, magnetic susceptibility (MS), P-wave velocity (Vp) and noncontact electrical resistivity were obtained. Split core color spectroscopy data were also collected. Magnetic susceptibility, P-wave velocity, bulk/grain density, porosity, and thermal conductivity were measured in discrete samples. Nearly 100% core recovery allowed us to take a large data set of petrophysical data on the cores from Oman ophiolite including fault zones and highly altered intervals.

Ultramafic rocks in the lower crustal section and MohoTZ show significantly higher porosity, electrical conductivity, magnetic susceptibility and thermal conductivity than gabbros. The electrical and magnetic properties of ultramafic layers also show clear correlations with the bulk density and porosity. Significant differences of the physical properties within those lithologies suggest that the ultramafic layers in the lower crust and the MohoTZ are key to understanding the seafloor structure.

Keywords: ICDP Oman Drilling Project, D/V Chikyu, Ultramafic layer, Oceanic Crust, MohoTZ, Physical Properties