[EE] Evening Poster | S (Solid Earth Sciences) | S-CG Complex & General

[S-CG54]Hard-Rock Drilling: Oman to Oceanic Lithosphere to Island Arc Formation and Beyond

convener:Eiichi TAKAZAWA(Department of Geology, Faculty of Science, Niigata University), Katsuyoshi Michibayashi(Department of Earth and Planetary Sciences, Nagoya University), Peter B Kelemen (共同), Damon A H Teagle (Ocean &Earth Science, National Oceanography Centre Southampton, University of Southampton, SO14-3ZH, Southampton, UK)

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The on-going Oman Drilling Project (OmDP) has drilled numerous hard-rock cores of ancient oceanic lithosphere and the underlying subduction zone of the Samail ophiolite in Oman, with support from ICDP, IODP, the Sloan Foundation's Deep Carbon Observatory, and Japanese, US, and European research agencies. Moreover, a number of IODP expeditions have focused on hard-rock drilling over the last 5 years including Expedition 352 in 2014, which drilled the volcanic sequence associated with subduction initiation in the Bonin fore-arc, Expedition 357, which drilled the Lost City hydrothermal field, Expedition 360, which drilled the lithosphere associated with ultraslow-spreading at the Southwest Indian Ridge in 2016, and Expedition 366, which drilled the serpentinite seamounts in the Mariana fore-arc. In this session, we invite presentations on the scientific results of hard-rock drilling at these and other sites. We also invite related presentations on oceanic lithosphere, island arc formation, and any other significant issue that could be addressed by future hard-rock drilling. This includes marine studies of oceanic lithosphere and on-land geological investigations of ophiolites, accreted arcs, and subduction complexes. The session is intended to be interdisciplinary, including the fields of geophysics, geochemistry, petrology, engineering, and biology.

[SCG54-P04]Overview of Hole GT2A, ICDP Oman Drilling Project: Drilling middle gabbro in Wadi Tayin massif, Oman ophiolite

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Keywords:ophiolite, oceanic crust, gabbro, ICDP, Oman Drilling Project

Hole GT2A (UTM: 40Q 655960.7E / 2529193.5N) was drilled by the Oman Drilling Project (OmDP) into Wadi Gideah of Wadi Tayin massif in the Samail ophiolite, Oman. OmDP is an international collaboration supported by the International Continental Scientific Drilling Program, the Deep Carbon Observatory, NSF, IODP, JAMSTEC, and the European, Japanese, German and Swiss Science Foundations, with in-kind support in Oman from the Ministry of Regional Municipalities and Water Resources, Public Authority of Mining, Sultan Qaboos University, and the German University of Technology. Hole GT2A was diamond cored in 25 December 2016 to 18 January 2017 to a total depth of 406.77 m. The outer surfaces of the cores were imaged and described on site before being curated, boxed and shipped to the IODP drill ship Chikyu, where they underwent comprehensive visual and instrumental analysis. 33 shipboard scientists were divided into six specialized teams (Igneous, Alteration, Structural, Geochem, Physical Properties, Paleomag) to observe, describe, analyze the cores from Hole GT2A.

Hole GT2A drilled through the transition between foliated and layered gabbro. The transition zone occurs between 50 and 150 m curation corrected depth (CCD). The top 50 m of Hole GT2A is foliated gabbro whereas the bottom 250 m consists of layered gabbro. Brittle fracture is observed throughout the core. Intensity of alteration vein decreases from the top to the bottom of the hole. On the basis of changes in grain size and/or modal abundance and/or appearance/disappearance of igneous primary mineral(s) five lithological units are defined in Hole GT2A (Unit I to VI). Olivine gabbro is the most abundant lithology (65.4%). Grain size and modal layering present throughout and varies in thickness with most layers 0.5 - 30 cm (maximum thickness 130 cm). Dip of magmatic layering and foliation displays a shift around 150 m, below this the range of dip is more restricted. Brittle deformation structures are abundant in Hole GT2A, with 254 cataclastic zones and 190 fault zones logged. 20 main fault zones have been distinguished.

The uppermost part of Hole GT2A (Unit I) is dominated by fine-grained granular olivine gabbro accompanied by less dominant medium-grained granular olivine gabbro and rare coarse-grained varitextured gabbro. The lower part of Hole GT2A (Units II, III and V) is dominated by medium-grained granular olivine gabbro, olivine melagabbro and olivine-bearing gabbro. Modally-graded rhythmic layering with olivine melagabbro and olivine-bearing gabbro is well conspicuous in the bottom part of Unit II. The Unit VI occurs between 284.25 m and 293.92 m CCD from the top of the hole and is characterized by orthopyroxene-bearing lithologies such as fine-grained gabbronorite and coarse-grained troctolite. Discrete orthopyroxene crystals occur in these lithologies.