[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)

Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

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-P10]Petrology of V2 stage dykes In the northern Oman Ophiolite

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The Oman Ophiolite is the world largest and best preserved fragments of oceanic lithosphere obducted on land, that provides a geological record of formation of juvenile arc (V2 stage) on oceanic crust produced at a spreading ridge (V1 stage) [1,2]. Although volcanic stratigraphy and geochemical evolution of the V2 arc magmatism are well constrained, the V2 magma plumbing system is poorly understood. In the Fizh block of northern Oman, V2-stage extrusive rocks are underlain by intense swarms of dikes emanated from plutonic rocks beneath. This study focuses on the petrological and geochemical characteristics of the V2-stage dike swarms that supplied arc tholeiitic and boninitic series extrusive rocks.

The Fizh area in northern Oman is underlain by 96-94 Ma V2 arc volcanic rocks, which is in turn underlain by V1 volcanic rocks generated at a spreading axis at 98-96 Ma. The majority of V2 volcanics are tholeiitic flows and pyroclastic rocks, which are sporadically overlain by boninite-series rocks. The V1-stage sheeted dikes strike N-S, whereas the V2 dike swarms strike dominantly E-W and rarely N-S, and

were emanated from lower crustal plutonic rocks ranging from ultramafic cumulates through gabbronorite to diorite and plagiogranite.

A total of 57 samples randomly collected from the V2 stage dikes in the Fizh area were examined by polarizing microscope on thin sections. 28 samples were tholeiite series rocks and 29 samples were boninite series. Tholeiite-series rocks have phenocrysts of olivine, clinopyroxene, plagioclase and magnetite set in an intergranular to intersertal groundmass, while boninite-series rocks have phenocrysts of olivine, clinopyroxene, orthopyroxene, plagioclase and Cr-spinel set in a hyalo-ophitic groundmass. Tholeiite-series rocks pervasively suffered actinolite-prehnite to greenschist facies metamorphism that replaced almost all igneous minerals by secondary minerals. Boninite-series rocks are less affected by hydrothermal alteration and pyroxenes and Cr-spinel are generally preserved.

Whole rock compositions determined by XRF show that boninite-series rocks are significantly lower in TiO_2 and P_2O_5, which are positively correlated with SiO_2. Tholeiite-series rocks are discriminated from boninite by their higher Na_2O, TiO_2 and P_2O_5, which are highly varied. A negative correlation of Na_2O and CaO is consistent with the low-T hydrothermal alteration. Most of the latter plot within the range of V1 volcanic rocks by [1,2]. Some tholeiite-series samples plot outside of the V1 volcanics but are more akin to arc tholeiitic andesite. Higher degrees of alteration for the tholeiite-series rocks than for the boninite-series are consistent with their older age of intrusion. Most tholeiite-series rocks in Wadi Baqara strike E-W, which are intruded by rare N-S-striking tholeiite dikes. This indicates simultaneous activity of the MORB-like V1 and arc V2 magmas during the transitional stage from V1 to V1.

[1] Kusano et al. 2014. Geol. Soc. London Spec. Pub., 392, 177-193 [2] Kusano et al. 2017. Chemical Geol., 449, 206 – 225 [3] Weiler 2000. Marine Geophysical Res., 21, 195 – 210 [4] Umino et al. 2018. JpGU S-MP36.