Evolutionary processes of submarine volcano in an incipient arc reference from the Oman Ophiolite

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The Oman ophiolite belonging to the Tethys ophiolite zone is one of the best places to investigate magmatic and volcanic developing processes of an infant arc. The Ophiolite had formed on a spreading axis and followed by subduction stage magmatism at approximately 100 Ma. The volcanostratigraphy is similar to that of the Izu-Bonin-Mariana Arc (e.g. Starn, 2004). However, the latest U-Pb age of zircon in plutonic bodies shows that there is only 0.5 m.y. time gap between the spreading and subduction stages (Riuox et al., 2014), therefore, it seems to record short-spanned island arc magmatism. Progressive geochemical change from island arc tholeiite (LV2) to boninite (UV2) in this period showed us the evolutionary process of the high-T and ephemeral subduction zone (Kusano et al., 2015). To reveal the stress history during the subduction stage, we reconstructed accretionary process of the arc magmas at the northern Oman ophiolite.
The subduction stage volcanic rocks (V2) extend >350 km along the Oman Ophiolite. In Wadi Salahi area, the V2 consist of the 600-970 m thick lower LV2 and 0-140 m thick upper UV2. Pahoehoe and sheet flows are dominate in the LV2, while 50 m thick pyroclastic rocks are partly distributed upward. Plural flow units and sporadically distributed plugs and dikes at 1-3 km spaces are recognized in the LV2. These plugs are 1.5-3 m in diameter with cylindrical layering of fine-grained and coarse-grained parts. The distribution of plugs and dikes look unbiased in the stratigraphic horizon. Because the LV2 was erupted through cone sheets (Alabaster et al., 1982), these plugs might be distributed along the “ring conduit”. Similar bulk rock compositions of the LV2 including lava flows and pyroclastic rocks suggest the share in the magma chamber. However, E-W concentration of strike of plugs and dikes would be resulted from the regional E-W compression (Umino et al., 1990).

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