Along axis magmatic system at fast-spreading ridge: Example at northern Oman ophiolite

Sumio Miyashita[1], Yoshiko Adachi[2], Takashi Tomatsu[3]

[1] Dep. Geol., Fac. Sci., Niigata Univ., [2] Fac. Sci., Niigata Univ., [3] Dep.Geol.,Fac.Sci.,Niigata Univ.

Along-axis variations for 70 km long from the northern propagating tip at the Wadi Fizh to the southern margin of the Hilti block in the northern Oman ophiolite, are studied based on bulk rock and pyroxene compositions of the sheeted dike complex. Less evolved dikes with tight compositions predominate at the segment center (Wadi Thuqbah-Ays area), while dikes with much broader compositions occur at both northern and southern ends. Appearance of highly evolved rocks at the segment margin suggests more intensive fractional crystallization at the margin. Paradoxically primitive rocks occur at both ends, indicating other processes otherwise than simple crystallization. These features are interpreted as follows; more steady state melt lens at the segment center would result in less evolved melts with tight compositions, and smaller melt lens at the segment margin due to cooler conditions would result in two melts, evolved melts ascribed to more closed system fractional crystallization and primitive melts emplaced from depths without stagnant in the melt lens. Zr/Nb and Y/Nb ratios of the bulk analyses are constant over whole segment, indicating a comparatively uniform source along the segment. For quantitative considerations, 26 analyses were selected from 125 analyses. Na8.0 and Ti8.0 values are lower at the segment center than at the north and south parts. Partial melting degrees are estimated about 20% at the center and 16% at the segment boundary, respectively. This is consistent with clinopyroxene compositions of the sheeted dike complex and layered gabbros. The pyroxenes are lower in Na2O at the segment center than those at the segment margin as compared with the same Mg#, suggesting independently a higher degree of partial melting at the segment center. The trace element contents of the sheeted dike complex show MORB signatures. However, the Ti8.0 and Si8.0 of the sheeted dike complex are lower and slightly higher than modern N-MORBs, respectively. This implies that the source mantle beneath paleo-ridges which produced the Oman ophiolite was different from those of modern mid-ocean ridges.