

## Geochemistry of boninitic dike swarm and related ultramafic cumulate in the northern Oman ophiolite

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The northern part of Fizeh block in the northern Oman ophiolite exhibits an 'anomalous' crustal section, shown by the appearance of the dike swarms with WNW-trend crosscutting gabbro and sheeted dike complex, and of large gabbro-norite and wehrlitic intrusions (e.g. Smewing, 1980). In this area, the crustal section shows over 7km thick sequence consisting of layered gabbro, layered wehrlite, heterogeneous gabbro-norite, isotropic diorite-tonalite, foliated gabbro, isotropic and pegmatitic gabbro, sheeted dike complex and pillow lava, from the bottom to top. Besides three boninitic dike swarms are found from this area, and they intruded into the lower crust to pillow lava section. Layered wehrlite intrusions are also regarded as the late intrusive rocks intruding into layered gabbro and foliated gabbro. The boninitic dike swarms crosscut all earlier plutonic rocks including the late intrusive rocks. This study focused on the geochemical relationships between the boninitic dike swarm and the layered wehrlite intrusions.

Based on mineral and bulk chemistry, we propose that some of the layered wehrlite are plutonic facies of the boninitic dikes. Trace element and REE contents of the boninitic dike swarms indicate a very low-Ti ( $\text{TiO}_2 = 0.14\text{-}0.61$  wt.%) and a depleted spoon-like chondrite-normalized REE pattern ( $\text{La}_{[N]}/\text{Sm}_{[N]} = 0.63\text{-}1.67$ ). These characteristics indicate that the boninitic dike swarms have IAT affinity. Clinopyroxenes from the boninitic dike swarms are very low in  $\text{TiO}_2$  content ( $-0.33$  wt.%) in consistent with the bulk rock composition. Clinopyroxenes from the layered wehrlites have also very low  $\text{TiO}_2$  content ( $-0.37$  wt.%) and depleted REE patterns which are comparable with those of boninitic dike swarms. Chondrite normalized REE patterns of the parental magma calculated from clinopyroxene composition of the layered wehrlite have a closely resemblance to boninitic dikes. These results indicate that some ultramafic cumulates (layered wehrlite) within the gabbroic section in this area may correspond to the magma chamber of boninitic dike swarms. The occurrence of boninitic magma suggests that the tectonic setting of the Oman ophiolite was changed from accretion stage of MORB oceanic crust at mid-ocean ridge to IAT magmatism stage (Subduction related magmatism).