

## Ferrous intrusion in the Oman ophiolite: Large scale magma immiscibility?

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Abnormally ferrous-rich intrusion is found from south Wadi Hilti area of the northern Oman ophiolite. This ferrous intrusion appears between upper gabbro and sheeted dike complex with a scale about 100 m long with 30 m width. This body intrudes into the upper gabbros. Although the marginal part of the intrusion is fine-grained, there is no obvious chilled margin. Ferrous intrusion cuts dolerite dikes which intruded into the upper gabbro. These lines of evidence indicate that this ferrous complex intruded before the cooling of oceanic crustal succession. The ferrous intrusion consists mainly of coarse-grained and massive rocks. Several fine-grained dikes with 1 m to 20 cm width occur in this intrusions, but these dikes are limited only inside of this intrusion.

Under the microscope, coarse-grained parts and fine-grained part (dikes and marginal part of the intrusion) have similar petrographic features in terms of constituting minerals. The difference between them is only grain size. These rocks are mainly composed of ferrous chlorite with accessory amount of sphene, epidote, apatite, anatase and titanomagnetite. So, these rocks probably underwent hydrothermal alteration.

Major and minor elements were analyzed by XRF for 6 samples of coarse-grained parts and 3 samples of fine-grained parts. Surprisingly both coarse-grained and fine-grained parts show very similar bulk compositions, and characterized by low SiO<sub>2</sub> and high FeO\* content. Furthermore, the analysis of 9 samples exhibit a very narrow compositional range (= uniform); SiO<sub>2</sub> contents range from 25.7 to 27.7, TiO<sub>2</sub> 1.7 to 3.6, Al<sub>2</sub>O<sub>3</sub> 20.3 to 21.8, FeO\* 37.7 to 39.9, P<sub>2</sub>O<sub>5</sub> 0.10 to 0.25 and CaO 1.1 to 2.2 wt% on anhydrous basis. It should be emphasized that alkali contents (NaO+K<sub>2</sub>O) are extremely low less than 0.13 wt%.

Based on above descriptions, we conclude that the intrusion is very homogenous and shows abnormal composition. Furthermore dikes within this intrusion which may approximate the magma composition have the same composition with the coarse-grained main part. Although these rocks are modified by alteration, the original compositions are probably preserved. It is not unlikely that these abnormal compositions are produced by normal fractional crystallization. It seems to be that the abnormal ferrous compositions are produced by a liquid immiscibility. This ferrous intrusion may be one end member due to a large scale liquid immiscibility.