Root zone of sheeted dike complex in Oman ophiolite-dynamical model

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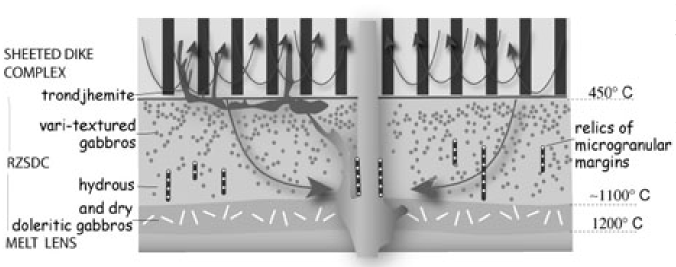
As in many other ophiolites, there is in Oman an horizon called the root zone of the sheeted dike complex (RZSDC) located below the volcanics and the diabase sheeted dike complex and above the gabbro unit. This RZSDC is described here based on structural and petrological observations carried during the extensive mapping of this ophiolite (Nicolas *et al.*, 2000) and on a new fine-scale mapping in a selected area. The Oman ophiolite is derived from a fast spreading ridge where a melt lens is located above the main gabbro unit and just below the RZSDC. With a few exceptions, the RZSDC thickness is rather constant, in the 100 m range, with a crude internal stratigraphy.

The base of RZSDC is a level of isotropic doleritic gabbros interpreted as a thermal boundary layer transitional between the magmatic system of the melt lens convecting at 1200°C, and a high temperature (HT) hydrothermal system convecting within the RZSDC at <1100°C. In this field of very sharp thermal gradient (~7°C/m), increasing seawater flux locally generates near total hydrous melting at the expense of these isotropic gabbros, at ~1100°C (companion abstract). The upper part of the RZSDC is richer in vari-textured doleritic and pegmatitic gabbros, with trondjhemitic intrusions, formed by a similar process at temperatures below 1000°C. The latter formations constitute screens between the lower dikes of the sheeted dike complex. At the very base of this complex a new boundary layer, with HT diabase dikes, separates the preceding HT convective system from the well known LT (T<450°C) hydrothermal system operating throughout the sheeted dike complex, to the seafloor.

Intruding the isotropic gabbros near the base of the RZSDC, protodikes with a distinctive microgranular border and a doleritic center testify that the RZSDC was generated by melt conduits issued from the melt lens. Each dike of the sheeted dike complex is thus fed by one protodike. However, protodike swarms are exceptional because, crystallizing ~1100°C, they are largely destroyed by dike-in-dike intrusions and by hydrous remelting



Reference

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Generation and emplacement of granitic magmas at the Paleocene Rum Igneous Complex, northwest Scotland

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The Isle of Rum is one of several igneous complexes within the British-Irish Paleocene Igneous Province that formed prior to the opening of the North Atlantic Ocean during a period of crustal stretching and thinning. An elliptical ring fault, 12km across, bounds the igneous centre enclosing remnants of an early granitic phase of intrusive and eruptive activity that is cross-cut by basic and ultrabasic intrusions. This activity consists of intra-caldera rhyodacitic ignimbrites and microgranitic to granitic shallow-level intrusive bodies that are all located within, and in close proximity to the Main Ring Fault.

These early granitic magmas show a strong involvement and interaction with crustal materials. Isotopic data implies 40-90% contamination of mantle-derived magmas by upper crustal Lewisian amphibolite-facies gneiss. Some of these felsic intrusions are intimately associated with mafic magmas. $^{87}Sr/^{86}Sr$ isotope data from basaltic margins and lobate inclusions, to and within the granitic rocks, indicate that very few of these mafic components have uncontaminated mantle-like values. Most of them also show varying degrees of crustal contamination ($^{87}Sr/^{86}Sr$ 0.7029 - 0.7140) by both Lewisian amphibolite-facies material and a component that is similar in isotopic composition to Lewisian granulite-facies gneiss.

This isotopic information provides a unique window into the crustal structure beneath the Rum Igneous Complex and combined with detailed field investigations allow for an integrated approach to interpreting the generation, emplacement and eruption of anorogenic granitic magmas. We propose that basic and ultrabasic intrusions at depth, migrating towards the surface, heated and partially melted the more felsic components of the surrounding crust which gave rise to a voluminous, but ultimately short-lived, episode of granitic magmatism on Rum.