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Trace element partitioning during partial melting of basic igneous rocks in a contact aureole (Fuerteventura, Canaries)

Holloway, M. I. & Bussy F.

Institute of Mineralogy & Geochemistry, Bâtiment Humense, University of Lausanne, CH-1015 Lausanne, Switzerland

(Isabelle.Holloway@unil.ch / Phone: +41-21-692-4448)

Low pressure partial melting of basanitic dykes in the contact aureole of a layered pyroxenite-gabbro intrusion, PX2, in the root zone of an ocean island (Basal Complex, Fuerteventura, Canary Islands), gave rise to the production of unusual zebra migmatites. Anatexis of these dykes was aided by the hydrothermal circulation of meteoric water, prior and contemporaneous to the initial stages of intrusion, as evidenced by oxygen isotope studies. These migmatites are characterised by a dense network of closely spaced, millimetre wide leucocratic veins, differentiated from those produced in regional metamorphic terrains by the formation of comb-like igneous textures in the leucosome. Their mineralogy consists of plagioclase (An_{32-38}), diopside, biotite, oxides (magnetite, ilmenite), +/- amphibole, dominated by plagioclase in the leucosome and diopside in the melanosome. The melanosome is almost completely recrystallised, with the preservation of large, relic igneous diopside phenocrysts in the centre of the dykes. Comparison of trace element mineral and whole-rock data, obtained using the LA-ICP-MS, allowed us to assess the redistribution of elements between different mineral phases and generations during contact metamorphism and partial melting.

Whole-rock analyses of dykes show that trace element concentrations of dykes within and outside the thermal aureole are comparable, hence they can be considered as closed systems, excluding transport of elements in or out of the system. Nevertheless, there is an evident redistribution of Zr, Hf & REE within the dykes, deduced by comparing the trace element contents of the various clinopyroxene generations within the migmatites and phenocrysts further outside the anatectic aureole. In general, REE

contents of relic phenocrysts are comparable, within and outside the aureole, differences noted between outer, exsolved and inner, clear parts of crystals. Recrystallised diopsides in the melanosome, leucosome and phenocryst rims in the migmatite zone, all have similar REE, Zr & Hf contents and are enriched compared to relic parts of phenocrysts. Major element compositions of diopsides in melanosomes and leucosomes are almost identical, signifying complete post-solidus reequilibration.