Variscan Moho beneath the French Massif central: A xenolith perspective from Puy Beaunit

D. DEMAIFFE, O. FÉMÉNIAS AND J. BERGER

Lab Géochimie Isotopique & Géodynamique chimique (CP 160/02), Univ. Libre de Bruxelles, Belgium (ddemaif@ulb.ac.be)

Puy Beaunit maar carries both mantle-derived and mafic-ultramafic plutonic xenoliths [1] highlighting the complexity of the shallow upper mantle and lower crust beneath the French Massif Central.

The population of plutonic xenoliths commonly shows asymmetric, mm to cm thick, layering. Layers are pyroxenitic to gabbro-noritic, less commonly peridotitic and anorthositic. They presumably derive from a layered intrusion (Beaunit Layered Complex, BLC), located at the crust–mantle boundary and emplaced at 257±6 Ma (SIMS U-Pb zircon age, [2]). BLC belongs to the large Permian within-plate mafic (high-Mg) calc-alkaline magmatic event recognized in W Europe and spatially controlled by post-Variscan transcurrent basin tectonics in an intracontinental setting [2]. Cumulate phases are ol, opx, cpx, gt [3], am and pl. Rare intercumulus accessory phases (phl, ilm, ap, ru, armacolite, srilankite and zircon) are observed in the most differentiated layers [4]. The trace element contents of the cumulates are similar to those of the Bushveld Lower Zone.

Mantle xenoliths range from fertile spinel lherzolites to refractory dunites. Fertile peridotites have registered a modal (amphibole-bearing) and cryptic (LILE and Pb enrichment, negative Nb and Ta anomalies) metasomatic event that took place before the Permian melting episode. Depletion processes are related to two melt extraction episodes. The first melting and metasomatic event is attributed to a fluid/liquid derived from a pre-Variscan subduction. It is sub-contemporaneous with the texture acquisition and deformation of the uppermost mantle (lithospheric delamination). The second melting event produced high-Mg basalts that gave rise to the BLC [5].

Sr and Nd isotopic data on the BLC ($^{87}Sr/^{86}Sr_{257Ma}$: 0.7027 to 0.7062 and εNd_{257Ma}: +6.2 to -6.4) and on the mantle suite ($^{87}Sr/^{86}Sr_{257Ma}$: 0.7033 to 0.7053 and εNd_{257Ma}: +5.4 to -2.4) are largely overlapping, confirming their genetic relationship. These values plot outside the French Massif Central mantle array and possibly record the pre-variscan subduction-related mantle metasomatic enrichment.

References

[1] Féménias et al. 2001, *CRAS*, 535-542.
[2] Féménias et al. 2003, *Chem Geol 199*, 293-315.
[3] Berger et al. *Eu J Min (submitted)*.
[4] Féménias et al. *Lithos (accepted)*.
[5] Féménias et al. 2004, *CMP 148*, 13-28.

Geochemistry and mechanic emplacement of late Proterozoic dyke swarms, Eastern Desert, Egypt

HUSSEIN A. HEGAZY

Geology Department, Faculty of Science, Assiut University, Assiut, Egypt (Hegazy512000@yahoo.com)

Geologic and geochemical data of intraplate late Pan-African (493±7Ma) dykes assemblage in the northern Eastern Desert of Egypt are presented. The dyke swarms consist of a bimodal mafic-felsic suite of transitional alkaline to subalkaline chemistry and exhibit a broad compositional range. Geochemical studies show that they can be subdivided into three distinct chemical groups with two distinct compositional gaps and correlate fairly well with other occurrences of late Pan-African dykes in Egypt This bimodal suite bears a genetic relation to corresponding rock types in the study area.

These dykes trend predominantly in NW and NNW directions and less frequently in NW and N orientations; parallel to the major fracture pattern and lineament trends. Despite of the small geographic area and limited time interval in which the dykes were extruded, their complex geochemistry requires multiple sources together with varying amounts of open system firactionation assimilation. It is believed that the crystallization of the studied dykes follow the one-step emplacement either in open or closed system under both brittle and ductile crustal conditions. The time (ts) required to solidify these types of dykes is generally longer in the acidic than the basic variety.