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The mafic-felsic blended Variscan Mg-K magmatism in the Vosges massif (France) as the result of mantle-crust interaction in a superhot orogen

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Mg-K magmatism displays a rather N-S discontinuous narrow ribbon on about 1500 km in the Moldanubian zone of the European Variscan Belt (EVB) from the Bohemian Massif, Black Forest, Vosges, some External Crystalline Massifs of the Alps and Corsica Batholith. In the Southern Vosges Mountains (SVB), high-K rock association is the earliest magmatic episode and is composed from North to South of a K-mafic end member (so called "durbachite") and a silicic end member made of porphyritic amphibole and biotite-bearing granite (the Crêtes and the Ballons intrusions). "Durbachite" was emplaced at 332 +3/-2 Ma (Schulmann et al, 2002; U-Pb zircon ages). It forms intrusive bodies parallel to NE-SW vertical fabrics in the surrounding felsic granulite and the so called "monotonous and variegated" gneissic units. The Crêtes granite, dated at 340 $\pm$ 1 Ma (Schaltegger et al, 1996; U-Pb zircon ages), is composed of two major bodies of which the NNE-SSW orientation is parallel to the fabrics of the lower crustal granulite whereas some small stocks display intrusive contact in upper crustal Visean sediments of the Markstein Unit. The Ballons granite, dated at 340 +4/-2 Ma (Schaltegger et al, 1996; U-Pb zircon ages), occurs in a single E-W striking body intrusive only in an upper crustal Visean volcano-sedimentary sequence of the Oderen Unit.

Rocks from this Mg-K plutonic association display monzonite to quartz monzonite composition and are characterized by K-feldspar megacrysts and augitic clinopyroxene, actinotic amphibole and biotite. Plagioclase shows composition ranging from andesine (An40) to albite (An0) and zonation is very weak. XMg (0.58-0.69) in biotite remains rather constant, according to increasing SiO2 that is characteristic of Mg-K magmatism.

The high contents in Cr and Ni in "durbachite", which is also the most K-rich rock, point to derivation from a mantle source. However, trace elements patterns show strong enrichment in light Rare Earth elements (LREE) (La/Yb)NC = 16-20), elevated concentrations of U, Th, large ion lithophile elements (LILE), depletion in Ti, Nb and Ta and weak Eu anomalies. This geochemical character and Nd isotopic value with initial $-6.65<\varepsilon Nd<-6.01$ and Sr initial ratios 0.7103<87Sr/86Sr<0.7137 require melting of anomalous lithospheric mantle sources, metasomatized and contaminated by mature crustal material (Janousek and Holub, 2007; Lexa et al., 2010). The REE content decreases according to increasing SiO2 content, in "durbachite" as in felsic end member and this trend characterises Mg-K associations where the REE content is controlled by mineral fractionation rather than differentiation of a melt.

The genesis of Mg-K associations have been interpreted at the light of their close association with HT/HP metamorphism (Janousek and Holub, 2007) and be related with a slab break off where magmas are originated from mantle domains which were previously metasomatized/ contaminated by mature crustal material and melted by advected heat from the asthenosphere (Janousek and Holub, 2007; Lexa et al, 2010).

Geochemical and petrological investigations on the Mg-K magmatism of the SVB, together with ASM and structural and metamorphic studies are used to better constrain a geodynamic scenario of the SVB that could be extended to the Moldanubian realm.