Localised fluid-induced, solid state dehydration in the lower crust: CO_2-rich fluids vs. concentrated brines

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Two localized dehydration zones occur in the Söndrum stone quarry, Halmstad, SW Sweden. Dehydration zone-1 (DZ1) consists of a central, 1 m thick granitic, pegmatoid dyke on either side of which extends a 2.8 m wide dehydration zone consisting of Opx-Cpx-Bt-Amph-Gt-bearing charnockite separated from the surrounding Amph-Bt-Gt migmatic, granitic gneiss by a patchy contact [1]. Dehydration zone-2 (DZ2), on the opposite wall of the quarry, consists of a 1.8 m wide, granitic Cpx-rich, Opx-absent zone (Cpx-Amph-Gt-Bt) with large Cpx crystals (> 1 cm) in sharp contact with a relatively coarse Amph-Bt-Gt granitic gneiss which grades gradually into the finer grained, granitic gneiss. Accessory minerals in DZ1, DZ2, and the granitic gneiss include zircon, FAp, and allanite. Systematic advective and diffusive trends are seen in the mineral chemistry in DZ1, relative to the granitic gneiss, going outwards from the center [1]. Similar trends are seen in DZ2 with the exception that Amph, Bt, and FAp in the Cpx-rich dehydration zone are enriched in Cl and depleted in F. The fluids responsible for DZ1 were demonstrated to be CO_2-rich with a minor brine component [1]. In contrast, the Cl signal seen in the Cpx-rich zone of the DZ2, along with the presence of abundant Cpx and no Opx, suggest that the fluids responsible were dominated by (K,Na)Cl and $CaCl_2$ supercritical brines with a minor CO_2 component [2, 3].

[1] Harlov *et al.* (2006) *J. Petrol.* **47**, 3. [2] Harlov & Förster (2003) *Am Mineral.* **88**, 1209. [3] Harlov (2004) *EOS Trans* V31A-1409.

Adakite-like magmas and Cu-Au porphyry deposits derived from an inherited subduction component, Apuseni Mountains, Romania

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We provide major, trace, and Sr-Nd-Pb isotopic data on fresh Miocene magmatic rocks, and Pb isotopic ratios from quartz-vein hosted fluid inclusions. These combined data suggest that the rich Cu-Au porphyry deposits and adakite-like magmas in the Apuseni Mountains, Romania, were derived in part from a fossil slab at depth. The position of this mineralized district ca. 200 km behind the existing Carpathian arc is somewhat enigmatic. Thus, its genesis was previously interpreted as related to rotation and associated extension, rather than to subduction [1, 2].

Bulk rock geochemical and isotopic signatures point toward a mantle source that we believe was metasomatized during Cretaceous subduction of neo-Tethys oceanic rocks and tapped during Miocene extension. Miocene subvolcanic stocks exhibit mainly calc-alkaline, andesitic compositions typical of subduction related rocks, with LILE, Sr and Pb enrichments, depleted HREE relative to LREE and Nb-Ta depletions. Some of these magmas show adakite-like geochemistries with high Sr/Y and primitive Sr and Nd isotopes, and trace element evidence (e.g. La/Sm vs. Th/Rb) suggesting the involvement of a supercritical liquid source component or sediment melt related to Cretaceous subduction. Pb isotopic signatures plot within the field of modern Atlantic sediments. Geophysical data identify a fast body at the upper to lower mantle transition, consistent with a detached slab.

Pb isotopic compositions of fluid inclusions from ore veins trend toward Pb isotopic signatures of the adakite-like magmas, suggesting a cogenetic source for the ore bearing fluids and adakitic magmas for the entire Apuseni ore district.

[1] Roşu *et al.* (2004) *SMPM* **84**, 153-172. [2] Seghedi *et al.* (2004) *Lithos* **72**, 117-146.