

Coupled Thermo-Chemo-Mechanical phenomena including genesis of COR from low-K psammopelites during syn-D2 HT-LP Variscan metamorphism and hydrous melting (Osor complex, CCR, NE Iberia).

Joan Reche, Mireia Traveria, and Francisco Martinez

Universitat Autònoma de Barcelona, Facultat de Ciències, Geologia, Spain (joan.reche@uab.cat)

The HT-LP Osor Variscan metamorphic high-grade complex is located in the Les Guilleries massif at the Catalan Coastal Ranges (CCR, NE. of Barcelona). Prograde, HT-LP processes and synchronous D2 deformation followed by syn-D-3 extension took place during late Carboniferous at 320 - 300 ma. [1]. High grade pelites and psammopelites show evidence of coupling at a variety of scales between deformation, high-T fluid flow, evolving bulk compositional domains, hydrous melting, melt loss/gain and compositional evolution of the segregated early trondhjemitic melts during a near isobaric heating-cooling episode followed by a final cooling and decompression stage. A comprehensive review of materials and a preliminary model of the large-scale processes involved were delivered in [2]. Focussing on milimetric to metric scales allows depiction of a detailed evolving sequence of coupled phenomena involving three main stages: A) isobaric heating syn-D2 stage with fluid flow + local hydrous melting of garnet-biotite-sillimanite psammopelites (QSP) at c. 6 kbar and 650-750°C produced early trondhjemitic (T) melts, growth of peritectic rotational garnets entrapping abundant melt inclusions and growth of peritectic high temperature cordierite. Ca and alkali depleted domains developed in nearby granulitic melanosomes giving rise to low-Ca/K Fe-Mg-amphibole bearing gneisses with g-bi-sil-cum-oam-cd and g-cum-oam-cd (cordierite-cumingtonite-orthoamphibole or COR rocks). B) In QSP, q-p-sill±bi±g±cd trondhjemitic leucosomes [3], with extreme sil-rich, mica-absent foliations may represent the compositional evolution of the T-melts during isobaric cooling (750-650°C) towards near-solidus conditions during persistent D2 shearing and syn deformational K-leaching due to fluid flow with an increasingly acidic/magmatic component. C) Later injection and crystallization of abundant late-D2 to inter-kinematic D2-3 leucogranites and calcalkaline granitoids induced widespread alkali-metasomatism with extensive growth of mu-pl probably linked with late extensional gravitational instability facilitating uplift, exhumation and decompression in the Osor high-grade core of CCR [4].

[1] Martínez et. al. (2008) C.R. Geoscience, 340, 223-232; [2] Reche and Martínez (2002) Tectonophysics, 348, 111-134; [3] Reche et. al. (2015) Geophysical Research Abstracts, 17, EGU2015-9836; [4] Goldschmidt 2013 Conference Abstracts-2034.