



Cooling during Crustal Underplating at the base of the Calar-Alto Unit (Nevado Filabride Complex, eastern Betics)

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The Nevado-Filabride Complex, structurally deepest terrain of the Betic Cordilleras (western Mediterranean, southern Spain); is formed by HP rocks exhumed by sequentially-developed core-complex-type extensional detachments. We present multi-equilibrium thermobarometric TWQ results from micro-structural domains of metapelites from the Calar-Alto unit that occupies an intermediate structural position within the Nevado-Filabride terrain. The base of the Calar-Alto unit underwent a complex P-T path that defines a clear cooling at intermediate pressures between the growth of the two main metamorphic fabrics, the S_1 and S_2 foliations. The S_1 foliation is preserved in microlithons of the S_2 crenulation cleavage that is axial-planar to mostly isoclinal folds. The S_1 foliation in light schists is locally formed by kyanite+Mg-rich chloritoid+chlorite+phengite+quartz, later overgrown by biotite+Zn-staurolite+chlorite+kyanite+quartz. These early parageneses grew during prograde metamorphism from 16-15 kbar at 450-500 °C to 10 kbar at 530-550 °C. An equivalent P-T evolution is observed in the S_1 foliation of garnet-bearing graphite schists from the base of the unit, although, reaching higher temperatures of up to 570 °C. Meanwhile, the S_2 crenulation cleavage and garnet strain shadows in graphite schists defined by chlorite + white K mica + quartz \pm chloritoid equilibrated during heating and decompression from 8 kbar and 400 °C to 4 kbar and 500 °C. Thus, development of the S_2 foliation, associated folds and the mylonitic-shear zone at the base of the Calar-Alto unit occurred during decompression and slight heating after a cooling event of approximately 100 °C, respect to the previous peak HP metamorphic conditions attained by the S_1 foliation.