



P-T, Effective Bulk Composition and microstructural Relations during decompressive Retrogression of Cordierite-Orthoamphibole Rocks from the Variscan metamorphic Basement of NE Iberia

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The assemblage $Ged-Ath \pm Grt \pm Crd \pm Chl$ occurs in centimetric to decametric rock lenses within the pre-Ordovician Sill-Crd-Kfs metapelites of the Osor metamorphic complex, in the Variscan low P - high T Guillerries massif (Catalan Coastal Ranges, NE Iberia). Reaction textures on some of this amphibolite lenses show evidences of Grt resorption and Crd growth, leading to the stabilization of various sub-assemblages: Grt-Crd, Ath-Ged-Crd, Ath-Crd or Ath-Crd-Chl inside mosaic-equilibrated micro-domains in the same thin section. Samples containing only one of the sub-assemblages also occur. Grt-absent samples with Ath-Ged-Crd, Ath-Crd, Chl-Crd or Chl-Ath-Crd are found in the Mg-richest bulk composition samples and Crd-absent samples with Grt-Ged and Grt-Ged-Chl are found in the Fe-richest samples. The fact that the characteristic mineral assemblages from the Mg or Fe richest samples appear also inside the mosaic micro-domains in thin sections of rocks with intermediate bulk compositions favours the hypothesis of progressive development of mosaic-like equilibrium generated by segregation of textural micro-domains each one characterized by its particular EBC (effective bulk composition) that progressively diverged from each other micro-domain bulk as well as from the bulk of the full rock sample. Each of the micro-domains can be characterized by its own reaction space governed by a characteristic independent set of net-transfer plus exchange reactions. Probably, as long as the independent reactions sets in each of the micro-domains progressively went to an arrest, the volume of the reacting domains progressively diminished due to decreasing efficiency of mass-transfer mechanisms (diffusion, grain boundary or micro-crack

transport) during cooling and decompression. A P-T path of cooling and decompression from 5 ± 1 kbar. and $640\pm 40^\circ\text{C}$ to 1.5 ± 1 kbar. and $540\pm 40^\circ\text{C}$ follows from the use of classical geothermometers and geobarometers and multiequilibrium geothermobarometric calculations applicable to this rocks and to interlayered metapelites. The locus of the high and low P-T parageneses, the modal trends that can be deduced from textures and the measured compositional trends shown by Grt, Crd and Oam are also in accordance with such a P-T path when compared with predictions using NCFMASH pseudosections constructed for low-Ca amphibolites. The occurrence of different amounts of biotite are attributed to K-infiltration during the earlier segment of the retrograde P-T path. The temporally open system behaviour can be related to the intrusion of the late D2 to syn-D3 granitoids and pegmatoids. Since biotite is the only K-bearing phase, its presence does not affect the behaviour of the system during retrogression, such as explained above.