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HP-LT Variscan metamorphism of the Cubito schists (Ossa-Morena Zone, southern Iberia)

G. Booth (1), F. Simancas (1), A. Azor (1), J.M. Azañón (1,2), F. González-Lodeiro (1) and P. Fonseca (3)

(1) Departamento de Geodinámica, Universidad de Granada, Spain, (2) Instituto Andaluz de Ciencias de la Tierra, C.S.I.C., Granada, Spain, (3) Departamento de Geologia, FCUL, Lisboa, Portugal (gbooth@ugr.es / Fax: +34 958243384 / Phone: +34 958240078)

The boundary between the Ossa-Morena and the South Portuguese Zones (Southern Iberia) is thought to be a suture, attesting the closure of the Rheic Ocean. An amphibolitic unit with oceanic affinity marks this major tectonic contact. North of this amphibolitic unit an allochthonous suture-related complex crops out. It includes a higher-anchizone to epizone metapelitic unit (Moura-Cubito schists) and discrete outcrops of eclogites and ophiolites in association with marble. Mica-chlorite local-equilibria thermobarometry shows that the Moura-Cubito schists from the Ossa-Morena Zone underwent HP-LT metamorphism in the Mg-carpholite stability field (340-380 ºC and 1.0-1.2 GPa). The metamorphic peak was reached at lower pressures (approx. 0.8 GPa at 450 ºC) during the growth of the main foliation, the S_2 crenulation cleavage. These higher temperatures or later post-orogenic heating must have destabilised carpholite, whose pseudomorphs occur in pre-S_2 quartz veins defining an early mineral lineation (Lm) with WNW/ESE orientation, parallel to the suture. These new data indicate that a large volume of allochthonous rocks situated next to the Beja-Acebuches ophiolite unit underwent HP/LT conditions during the Variscan orogeny. By contrast, the adjacent Beja-Acebuches ophiolite underwent only a LP-HT evolution, thus indicating that this ophiolite was not underthrust during the collision process that affected the Moura-Cubito schists. The parallelism between Lm and the suture, and the geometry of the field metamorphic gradient that increases towards the west suggests that the Moura-Cubito schists formed a HP/LT orogenic wedge emplaced from a westerly position during oblique collision between the Ossa-Morena and South Portuguese Zones.