P-T evolution of Devonian eclogites from the Cabo Ortegal Complex (NW Iberian Massif)

Irene Novo-Fernández[1], Antonio Garcia-Casco[2], Ricardo Arenas[1], José Ignacio Gil Ibarguchi[3], Rubén Díez Fernández[4], Sonia Sánchez Martínez[1]

[1] Universidad Complutense and Instituto de Geociencias (UCM, CSIC), 28040 MADRID, Spain;
[2] Universidad de Granada and Instituto Andaluz de Ciencias de la Tierra (UGR-CSIC), 18071 GRANADA, Spain;
[3] Universidad del País Vasco (UPV/EHU), 48940 BILBAO, Spain;
[4] Instituto Geológico y Minero de España (CSIC), 37001 SALAMANCA, Spain.

The convergence between Gondwana and Laurussia during mid-late Paleozoic times culminated with the assembly of Pangea and the formation of the Variscan Orogen, which can be tracked in Europe through the Iberian, Armorican, French Central and Bohemian massifs. In the NW Iberian Massif, the Cabo Ortegal Complex contains two high-P metamorphic terranes of continental affinity that are separated by Devonian ophiolites. At the top of this complex, the Upper Allochthon represents the remnants of a Cambrian peri-Gondwanan magmatic arc that remained attached to the margin until it was tectonically emplaced during the initial stages of the Variscan wedge (Arenas *et al.*, 2014). The lowermost section of the Upper Allochthon underwent high-P, high-T metamorphism at c. 390-400 Ma (Fernández Suárez *et al.*, 2007). It is composed by ultramafic rocks, high-P granulites and eclogitic gneisses that contain a thick layer of eclogite at their base. In this work, we study eclogite samples from this layer by means of XR mapping, mineral chemistry and thermodynamic modelling. Three types of eclogites were described according to their mineralogy and bulk composition by Mendia *et al.* (2001). XR maps show that the first type are fine-grained eclogites composed by unzoned garnet of almandine composition, omphacite, zoisite, phengite (Si up to 3.29 apfu) and rutile. The second type shares the same paragenesis except for zoisite, which is absent, and show phengite included in garnet reaching Si=3.56 apfu. Finally, the third type is coarse-grained and contains zoned garnet crystals of pyrope composition, omphacite, kyanite and phengite (Si up to 3.25 apfu). Thermodynamic modelling reveals a determining influence of Fe_2O_3 content of the rocks on phase equilibria and allows calculating the thermal peak conditions at ~800 ºC and ~20-22 kbar. The P-T conditions obtained indicate deep subduction of the peri-Gondwanan magmatic arc at the onset of the Variscan Orogeny. Since the tectonothermal evolution of the eclogites and the lithologic sequence of the Upper Allochthon are comparable to other high-P units in the Iberian, Armorican, French Central and Bohemian massifs, altogether these units define a single Early Devonian high-P, high-T metamorphic belt developed along thousands km during the earlier stages of the assembly of Pangea.

Arenas, R., Díez Fernández, R., Sánchez Martínez, S., Gerdes, A., Fernández-Suárez, J., Albert, R., 2014. Two-stage collision: Exploring the birth of Pangea in the Variscan terranes. *Gondwana Research* 25, 756-763.

Fernández-Suárez, J., Arenas, R., Abati, J., Martínez Catalán, J.R., Whitehouse, M.J., Jeffries, T.E., 2007. U-Pb chronometry of polymetamorphic high-pressure granulites: An example from the allochthonous terranes of the NW Iberian Variscan belt. *Geol. Soc. America Memoir* 200, 469–488.

Mendia, M., Gil Ibarguchi, J.I., Ábalos, B., 2001. Evolución metamórfica P-T-d-t y significado geodinámico de la unidad eclogítica del complejo de Cabo Ortegal (NO de España). *Cadernos do Laboratorio Xeoloxico de Laxe* 26, 155-178.