Palaeogene HP–HT eclogites in the Betics and the subduction-collisional evolution of the Western Mediterranean

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Résumé

Evidence of Paleogene subduction in the Western Mediterranean is scattered throughout high-pressure (HP) events in polymetamorphic basement terrains of disputed and differing provenance exposed along the margins of deep basins formed during Miocene to Quaternary slab retreat. The reconstruction of the original subduction geometry is often hindered by pervasive Miocene high-temperature (HT) ductile overprinting of earlier HP events. Here, we report rutile U–Pb ages, EBSD-determined microstructures and thermodynamic modeling in eclogites from the upper-plate domain of the Betics (Ojén nappe, Alpujárride complex). These data show that the Ojén eclogite peak mineral assemblage formed during HP (1.3 ±0.15 GPa) and HT (700 ± 25 ∘C) ductile flow in the early Oligocene (30 ± 2.5 Ma). We interpret this event as a collisional phase linking Ojén eclogites to the Paleogene subduction of the western Tethys. Contrasting P–T gradients of eclogites and arc volcanism between Corsica–Calabria and Kabylies–Betics point to a highly segmented orogenic system. NW–SE-oriented transform faults separated a continental collision domain to the South from an oceanic subduction to the NE, with two subducting slabs -Calabrian and Algerian– retreating respectively towards the E and SE. Early Eocene inversion of the European and Maghrebian margins and ensuing early Oligocene collision resulted in (U)HP–HT metamorphism in the Alpujárride and Kabylies. This orogen underwent extensional collapse in the late Oligocene-Aquitanian, before further shortening and the intracrustal emplacement of the Ronda peridotite. The upper plate Ojén eclogites and orogenic peridotites drifted westwards following the retreating Betics–Rif Tethys slab in the early Miocene, after transform collapse that induced HP subduction of the SE Iberian margin below the Alpujárrides.

Mots-Clés: Eclogite, Western Mediterranean, Alpujarride complex, Oligocene, Collision

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