Polycyclic thermochronological evolution of a continental nappe: the Bragança CAT (NE Portugal)

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The Continental Allochthonous Terrane is the uppermost unit of the Bragança Massif, which comprises 3 terranes emplaced during the Variscan. Structural information reveals a complex tectonic evolution interrupted by an extensive magmatic episode. HP-granulites and underlying eclogites display clockwise PTt paths. Geochemistry of eclogites indicate protoliths similar to NMORB or to basalts from suprasubduction settings. Sm-Nd geochronology indicates an age of 1.1Ga for the peak metamorphic assemblage on a HP-granulite, and suggests a minimum 508Ma age for eclogite facies metamorphism. Gabbroic intrusions do not record the first two deformation phases identified in the HP rocks nor clockwise PTt paths with HP metamorphism. Sm-Nd isotope data on gabbros indicate cooling by 545Ma. REE and isotope geochemistry reveals that gabbros crystallized from magmas similar to continental tholeiites. Ultramafic rocks are peridotites with interlayered pyroxenites. Geochemistry suggests that peridotites represent mantle refractory lithologies; pyroxenite layers would correspond to refertilization due to penetration of basaltic magmas in the upper mantle. Some pyroxenites have REE contents that indicate crystal segregation from alkaline magmas. A Sm-Nd internal isochron of 485 Ma was obtained in a garnet clinopyroxenite, showing that the rise of the alkaline magmas is at least of Lower Ordovician age. Considering structural, petrological and geochronological information, HP-granulites and eclogites have undergone a polycyclic evolution, from Grenville to Variscan, including Cadomian. Gabbros and pyroxenites represent magmatic events in the lower crust and upper mantle during the extensional period corresponding to the onset of the Variscan tectonic cycle.