Geophysical Research Abstracts, Vol. 8, 03823, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03823

Pseudotachylytes and ultramylonites as indicators of initial exhumation mechanisms of the HP granulite-facies Bacariza Formation (Cabo Ortegal, NW Spain)

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The Cabo Ortegal complex is a nappe stack formed by fragments of a variably subducted continental and oceanic lithosphere. It forms part of a larger exotic ensemble of the northwestern Iberian Peninsula (the Allochthonous Complexes) and was obducted onto the Gondwana edge during the Variscan orogeny. The nappe units of Cabo Ortegal were metamorphosed under different high-pressure (HP) conditions and currently are separated by ductile tectonic contacts. They include mappable ultramafic massifs, N-MORB eclogites, metagabbros, metaserpentinites, metaperidotites, ortho- and paragneisses, and the Bacariza Formation granulites. The primary structure consists of the ultramafic massifs tectonically resting on top of the granulites of the Bacariza Formation, which overlie eclogites and HP gneisses with eclogite boudins

It is in this HP granulite-facies formation where tectonites displaying characteristics that resemble those of ultramylonites and pseudotachylytes crop out. These tectonites occur as planar blankets close to the ductile peridotite sole thrust which conforms the upper tectonic boundary of the Bacariza Formation. They occupy the central, more strained parts of the developed shear zones and form planar to lensoidal blankets several mm to 1 m thick and meter to tens of m long. They can be parallel to the macroscopic foliation of the host granulites, to the bounding shear walls, and to the mylonitic foliation developed in their interiors.

The occurrence of a fine-grained matrix containing mineral and host rock fragments, the occurrence of folded laminations of possible fluidal origin and the absence of diagnostic features on the surfaces of the minerals studied by SEM indicate that the

origin of these rocks might be related to the frictional melting of granulites. This might have been the consequence of the shear heat originated during a seismic event at great depth (ca. 60 km) ca 390 Ma ago, close to the mantle wedge-orogenic channel boundary of a subduction zone, which would have affected the still hot and mechanically rigid granulites and provoked melt formation. The high P and T conditions (1.4 GPa and 740 ºC respectively) likely impeded a fast melt quenching and, instead, led to recrystallization and preferred orientation development due to fast, syntectonic, solid-state deformation. The rocks studied, thus, might represent a missed, rare example of pseudotachylyte formed under high-pressure granulite conditions and subsequently deformed and recrystallized.