



Laboratory measurements of seismic velocities of a continental lower crust and upper mantle analog in Cabo Ortegal, Spain.

D. Brown (1), S. Llana-Funez (2), R. Carbonell (1), J. Alvarez-Marron (1), M-Salisbury (3)

(1) Institute of Earth Sciences “Jaume Almera”, CSIC, Barcelona, Spain (dbrown@ija.csic.es, rcarbo@ija.csic.es, jalvarez@ija.csic.es)

(2) Department of Earth and Ocean Sciences, University of Liverpool, Liverpool, UK (S.Llanafunez@liverpool.ac.uk)

(3) Geological Survey of Canada-Atlantic, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada (MSalisbu@nrcan.gc.ca)

The Paleozoic Cabo Ortegal Complex of NW Spain provides an exposed analog of the continental lower crust and upper mantle. It is composed of an overturned section that, at its base, begins with quartzofeldspathic gneisses, followed upward by eclogites, mafic granulites, and ultramafic rocks. Peak metamorphic conditions reached c. 800°C and 1.7 GPa in the Middle to Late Devonian. Fifteen samples were analysed for P-wave and S-wave velocities (V_p and V_s , respectively), as well as density at the High Pressure Lab at Dalhousie University, Canada. Seismic velocities were measured at pressures up to 600 MPa at a temperature of 20°C. When appropriate, measurements were made parallel and perpendicular to banding and parallel to the lineation. The major element composition of each sample was measured by XRF at the University of Barcelona, Spain. In all samples, V_p and V_s display a broad range of velocities (6.2 to 8.2 kms^{-1} and 3.2 to 4.6 kms^{-1} at 600 MPa, respectively) that generally increase with density (2.7 to 3.4 g/cm^3), but which show scatter due to anisotropy. Between 200 and 600 MPa, P-wave anisotropy ranges from between 2% and 8%, whereas S-wave anisotropy ranges from <1% to around 8%. Both V_p and V_s show an overall

increase from middle to lower crustal velocities in the quartzofeldspathic gneisses and mafic granulites to mantle velocities in the eclogites and ultramafic rocks. P-wave reflection coefficients between the various lithologies range from 0.21 to 0.08. These data provide a calibration for the physical properties and the nature of reflectivity of the lower continental crust and upper mantle transition.