Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09392, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09392
EGU General Assembly 2008

Continental subduction and back-arc extension in the western Mediterranean. Insights from simple 1D PT path numerical models

Frédéric GUEYDAN (1), Guillermo BOOTH-REA (2, 3), José Miguel MARTÍNEZ-MARTÍNEZ (2, 3) and Carlos GARRIDO (2)

(1) Géosciences Rennes, Université Rennes 1, UMR CNRS 6118, Campus Beaulieu, Bat 15, 35000 Rennes, France- frederic.gueydan@univ-rennes1.fr, (2) Instituto Andaluz de Ciencias de la Tierra (CSIC-UGR) , (3)Departamento de Geodinámica, Universidad de Granada, Granada, Spain- gbooth@ugr.es

The Alborán Crustal Domain (ACD) crops out in the core of the Betic-Rif orogen where it forms great part of the Alboran sea basement. It is formed by several metamorphic units that have undergone different tectonometamorphic evolutions. Using a new approach that couples petrological/structural studies with thermal modelling of continental subduction, we show that the complex tectonic history of the ACD reflects successive continental subductions followed by delamination and back-arc extension. The ACD comprises in ascending order the Nevado-Filabride (NF), Alpujarride and Malaguide complexes. The two lowest complexes include polymetamorphic units, some of which have undergone high-pressure alpine metamorphism under eclogite and/or blueschists facies. The ages of peak metamorphism are around 60-22 Ma for the Alpujarrides and 30-15 Ma for the Nevado Filabrides. A compilation of peak pressure and temperature of the Alpujarride and Nevado-Filabride complexes reveals that NF metamorphic rocks are well aligned in a PT diagram with a P/T ratio of 0.04. The higher Alpujarride metamorphic units are also aligned but with a much lower P/T ratio of 0.02. Using a simple 1D thermal modelling of the burial of a continental margin, we investigate the role of the subduction velocity and subduction dip angle in defining the P/T ratio of HP/LT metamorphic rocks. Subduction velocity for the Alpujarride units is estimated around 0.5 cm/a while subduction velocity for Nevado Filabrides

is around 1.5-2 cm/a. The active slab-roll back or delamination during the Nevado-Filabride subduction explains the larger subduction velocity for the Nevado-Filabride HP/LT metamorphism, which was compensated with backarc extension and development of the Algero-Balearic basin during exhumation of the Alpujarride complex.