Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04833, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04833
EGU General Assembly 2008

Lithospheric slab breakoff and topographic regrowth of the Eastern Pyrenees: linking surface morphology with subcrustal processes through thermochronology

Y. Gunnell (1), H. Zeyen (2), M. Calvet (3), A. Carter (4), S. Brichau (4)

(1) Université Paris-Diderot, France, (2) Université Paris-Sud, France, (3) Université de Perpignan, France, (4) Birkbeck College, London, UK (gunnell@univ-paris-diderot.fr, hermann.zeyen@u-psud.fr, calvet@univ-perp.fr, a.carter@ucl.ac.uk, s.brichau@bbk.ac.uk)

When compared with other areas in Europe with similar crustal thicknesses of 25–35 km, or with the Central Pyrenees where the high topography is supported by 45–55 km-thick crust, the Eastern Pyrenees are anomalously elevated. We present 2-D and 3-D geophysical images of the thermal lithosphere below the Central and Eastern Pyrenees based on an inversion of geoid, gravity and heat flow data. Results show that the root of mantle lithosphere still present beneath the Central Pyrenees thins eastward and is associated with evidence of three other processes symptomatic of slab detachment: crustal extension, volcanism, and crustal uplift. Extension occurred in two stages: the first, starting after 32 Ma with the opening of the Western Mediterranean back-arc basin, is well documented, but a later episode confined to the eastern orogenic wedge occurred after $\sim$12 Ma when a second generation of extensional intermontane basins formed in association with unprecedented volcanic activity. These features suggest that lithospheric thinning beneath the Eastern Pyrenees occurred at that time. We relate the high elevation of East Pyrenean topography to the resurrection of what prior to $\sim$12 Ma was a low-relief landscape bevelling eroded stumps of the orogen. New apatite fission-track and (U–Th)/He signatures demonstrate the consistently young age ($<$20 Ma) of mappable remnants of that erosional surface irrespective of their current elevations. These relict land surfaces have survived as islands of low erosion in this high-energy mountain environment because of the youth and rapidity of vertical uplift which has outpaced opportunities for denudation to erode them entirely, even at their

currently observed maximum elevations of 2.4–2.9 km a.s.l. in the crest zone.