Geophysical Research Abstracts,
Vol. 10, EGU2008-A-01159, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-01159
EGU General Assembly 2008

The landscape in the western Cantabrian Mountains of NW Spain: the rates of landform evolution next to an incipient subduction margin

J. Alvarez-Marron (1), R. Menendez-Duarte (2), U.A. Glasmacher (3), F. Stuart (4), R. Grobe (3), S. Fernández (2) and D. Brown (1)

(1) Earth Sciences Institute, CSIC, Barcelona, Spain, (2) INDUROT, University of Oviedo, Spain, (3) Geologisch-Palaeontologisches Institut, Ruprecht-Karls Universität Heidelberg, Germany, (4) Isotope Geosciences Unit, SUERC, Glasgow, UK

Alpine convergence between Iberia and Eurasia resulted in formation of the Pyrenean orogen that extends westward in a mountain chain developed along the northern Spanish coastline with minor N-S shortening. Two crustal-scale underthrusts with opposing vergence underlie the Cantabrian Mountains; one caused south-directed incipient subduction beneath the margin, and the other a northward underthrusting of the foreland basin basement. The study of the landscape evolution in the Cantabrian Mountains focuses in obtaining information on rates of surficial processes, such as uplift and exhumation during initial stages of mountain growth.

The present topography of the Cantabrian Mountains reaches maximum elevations of 2700 m less than 50 km from the coastline, and lowers towards the west correlative with a progressive reduction in the amount of N-S shortening. The different components of the present landscape include landforms developed through a long-term history. The main landforms include 1) paleohorizontal markers, such as elevated surfaces of low relief, 2) a raised marine wave-cut platform, 3) relict glacial forms preserved in the highest elevations above 1200 m, and 4) a deeply incised fluvial system developed onto the previous landforms. We used digital elevation models in a 150-km-long section of the mountains for the analysis of the elevated surfaces of low relief that appear between elevations of 500 to 800 m, lowering towards the west. These are in-

terpreted to correspond to relicts of a single, ancient peneplain displaced by faults that reactivated existing structures within the bedrock. The raised marine platform reaches more than 3 km in width and appears above sea cliffs that are lower towards the west. A detailed DEM shows the shoreline angle, which rises eastward along the coastline from 100 to 220 m. This change in elevation occurs in several discrete steps interpreted to correspond to traverse faults with tens of meters of vertical displacement. Surface-exposure dating that combined three cosmogenic nuclides indicates that the marine platform emerged more than 1 Ma ago. A regional thermochronological study combining apatite fission track (AFT) and (U-Th)/He dating provided initial results with AFT ages that range form 270 (36) Ma (Permian) to 78 (4) Ma (Upper Cretaceous) that are recording a post-Variscan exhumation history, and are concordant with very low values of denudation since iniciation of Alpine shortening. Our data indicates that the present landscape of the western Cantabrian Mountains may register an evolution history spanning several tens of million of years with long-term preservation of topographic components. The area may represent a good example of the landscape corresponding to initial stages of mountain growth next to a margin that underwent incipient subduction related to slow convergence.