Geophysical Research Abstracts, Vol. 7, 03065, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03065

Late orogenic vertical movements in and around the Ligurian Alps (SW Alps): Coexistence and migration of km-scale subsidence and exhumation

G. Bertotti (1), B. Carrapa (2), J. Foeken (1,3), J. Juez-Larre‘ (1), P. Mosca (4)

(1) Vrije Universiteit Amsterdam, (2) University of Potsdam, (3) SUERC Glasgow, (4) CNR Torino

The northern part of convergence zone between Europe and Africa in the central Mediterranean is composed of an intricate puzzle of different domains. They are the extensional Ligurian Sea, the mainly S-vergent Eocene orogenic wedge of the Ligurian Alps and, further to the N the western Po Plain with its pre-Messinian substratum exposed at the transition zone with the Ligurian Alps. Along a transect from the Ligurian Sea to the western Po Plain we have resolved vertical movements and horizontal deformations integrating a large amount of low temperature thermochronology (fission tracks and U-Th)/He on apatites), seismic, structural and sedimentological data. Numerical modeling work is being carried out to quantitatively test, validate and integrate the data.

The most appealing and surprising result of this work is that the whole area, inclusive of the Ligurian Alps orogen, experienced kilometers-scale vertical movements (subsidence and uplift/exhumation) following major contraction. This pleads for a review of hitherto accepted tectonic scenarios of this and other orogens.

During the main shortening stages, rocks of the Ligurian Alps were rapidly exhumed and eroded as recorded by the very short lag time in the sedimentary record. Little morphology had remained at ca. 30Ma when subsidence started affecting the orogen itself and the adjacent regions. Orogenic shortening had ended and Oligocene sediments seal older tectonic boundaries. At 26Ma, vertical movements in the region of the present-day orogen changed and basement rocks experienced exhumation. Subsidence continued to the N, in the region of the Po Plain. In the Ligurian Alps exhumation is ongoing. The site of maximum exhumation migrated towards the N in the subsequent

millions of years affecting regions previously experiencing subsidence.

In general, the reconstructed movements reflect the following pattern

a) Upward and downward movements are active concurrently in different parts of the section

b) Sites of maximum exhumation and subsidence migrate across the structural grain through time

Similar kinematics have been proposed for the growth and late-stage evolution of other orogens such as the Carpathians. The derived pattern is incompatible with popular geodynamic models such as those invoking slab detachments.