AGU Fall Meeting, 5.-9. December 2011

T17: Formation and Deformation of the Mediterranean Basins, Margins and Arcs

Description: The Mediterranean region comprises a number of basins and associated arcs in different evolutionary phases. Slab roll-back has been the driving force of upper plate deformation, creating extended basins, tectonically thickened arcs, and volcanic arcs. Further, it is deformed by convergence between Africa and Eurasia and smaller units like Anatolia. The region includes excellent natural laboratories where hypotheses on the formation and Cenozoic deformation of basins and margins, plate subduction/collision, subduction initiation, and strike-slip deformation, can be tested. This session welcomes observational, numerical and experimental results on the evolution of the Mediterranean and other geodynamically-related regions

Convenors: **Alan Levander (Rice Univ.) et al.**

Abstract:

Fragmentation of the Adriatic Indenter and its bearing on changing slab configurations beneath the Alps-Carpathian-Dinaride chain

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The arcuate form of Alpine chains in central southern Europe (Alps, Apennines, Carpathians, Dinarides) reflect different modes of Miocene subduction and indentation, as inferred from plate motion studies, palinspastic reconstructions, seismic tomography and from slip line analysis of foliations and stretching lineations in basement domes of the Alps: WNW-directed motion of the Adriatic microplate with respect to Europe since 35 Ma effected counterclockwise (CCW) oroclinal bending of the Western Alps and ca. 240 km of E-W convergence, most of which was accommodated by shortening from 32-20 Ma. The N-S component of this convergence was smaller, amounting to some 63 km of shortening north of the Periadriatic Fault System from 32-20 Ma and another 50-60 km in the Southern Alps corresponding to the amount of N-S indentation since 25-20 Ma. In the Eastern Alps, however, indentation from 25-20 Ma to the present has been mainly N-directed and involved about 125 km of shortening, at least 70 km of which were accommodated by post-nappe folding and E-directed stretching in the basement core of the Tauern Window.

These differences in the shortening vectors between the E and W Alps reflect the Miocene fragmentation of the Adriatic indenter at ca. 25-20 Ma. This was accommodated along the Giudicarie Fault, which offets the MOHO of the Alpine orogenic root by some 70 km, and coincides with an inferred change in subduction polarity from S-directed subduction of Europe in the W Alps to subvertical to steeply N-directed subduction of Adria beneath the E Alps. Whereas the W fragment of the Adriatic indenter wedged into the European crust of the W Alps, the larger E fragment continued to rotate CCW while subducting to the N beneath the E Alpine orogen. We consider this Miocene reversal in subduction polarity, possibly combined with Miocene roll-back subduction in the Carpathians, to have triggered rapid exhumation and lateral escape of deeply buried European crust in the Tauern Window of the E Alps. The Miocene-present northward subduction of part of the E fragment of the Adriatic indenter may have been pre-conditioned by early-mid Tertiary breakoff of part of the S-dipping European slab beneath the E Alps and of part of the NE-dipping Adriatic slab beneath the Dinarides. We speculate that CCW rotation and N subduction of the eastern Adriatic fragment may have lead to opening of a slab window at the junction of the E Alps and northern Dinarides.