

FRAGMENTATION OF THE ADRIATIC INDENTER AND ITS BEARING ON A MIOCENE SWITCH IN SUBDUCTION POLARITY BENEATH THE EASTERN ALPS

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The Alps in map view have two striking features that were accentuated during Oligocene-Miocene collision and indentation of the rigid, continental part of the Adriatic microplate: (1) The arc of the W Alps and (2) a jog in the Alpine orogenic edifice along the NNE-striking Giudicarie Fault, which sinistrally offsets the MOHO, including the Periadriatic Fault System (PFS) by some 70 km. These late orogenic features reflect different modes of indentation in the W and E Alps, as inferred from plate motion studies (Handy et al. 2010), palinspastic reconstructions (Schmid et al. 1996) and from slip line analysis of foliations and stretching lineations in the basement cores of the Alps (Lepontine Dome, Tauern Window; Handy et al. 2005): WNW-directed motion of Adria with respect to Europe since 35 Ma effected counterclockwise (CCW) oroclinal bending of the W Alps and ca. 240 km of E-W shortening, most of which was accommodated before 20 Ma. The N-S component of this convergence was smaller, amounting to some 63 km north of the PFS from 35-20 Ma and another 50-60 km of shortening in the Southern Alps corresponding to the amount of N-S indentation since 25-20 Ma. In the E Alps, however, indentation from 25-20 Ma to the present has been mainly N-directed and involved about 125 km of shortening (Rosenberg & Berger 2009), 70 km of which were accommodated by post-nappe folding and E-directed stretching of the basement core of the Tauern Window.

These differences in the shortening vectors between the E and W Alps reflect the fragmentation of the Adriatic indenter at ca. 25-20 Ma along the Giudicarie Fault. This was associated with a change in subduction polarity beneath the E Alps from S-directed subduction of Europe to N-directed subduction of Adria. Whereas the W fragment of the 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 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 be responsible for the opening of a window in the Adriatic slab at the junction of the Eastern Alps and Dinarides.