



Plate boundary reorganization in the western-central Mediterranean: Initiation of subduction along the southern boundaries?

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The opening of the Algero-Provencal Basin (between Spain, Corsica-Sardinia and NW Africa) by roll-back of the African lithosphere led to collision of the migrating arc-trench system with the NW African (Maghrebian) continental margin, in the M. Miocene. Subsequently, in a second stage of opening, the Tyrrhenian Basin was formed. The TOPO-EUROPE ESF-EUROCORES Collaborative Research Project TopoMed addresses the intriguing process of plate boundary reorganization considered to be active in the western-central Mediterranean region.

Seismic activity along the NW African and southern Tyrrhenian-northern Sicily margins, indicates the possibility that a new subduction zone is being formed, accommodating the \sim N-S (component of the) continuing motion between Africa and Eurasia after arc-continent collision. Exploring the differences between the margins' settings on the basis of observations we conclude that the candidate processes involved are subduction polarity reversal and subduction initiation along a STEP fault (Subduction-Transform-Edge-Propagators [Govers and Wortel, EPSL 2005]), respectively.

In this contribution we present numerical model results concerning the plate boundary evolution after arc-continent collision, on the one hand, and after the inception of compression/convergence across STEP faults, on the other. Arc-continent collision may result in other types of response than polarity reversal, e.g. delamination and backstepping of the plate contact. Our parameter sensitivity studies have quantified the conditions under which the various modes of response are expected to occur. For the STEP fault setting a spectrum of lithospheric settings is investigated. The results indicate that a STEP fault may indeed be the weakness zone which allows subduction initiation.

The relevance of these findings for the western-central Mediterranean will be discussed.