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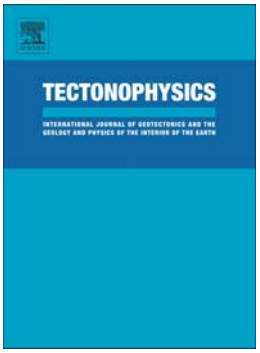

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ACCEPTED MANUSCRIPT

Upper plate deformation as marker for the Northern STEP fault of the Ionian slab (Tyrrhenian Sea, central Mediterranean)

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ABSTRACT

The Eastern Tyrrhenian margin (ETM), the active boundary of the Tyrrhenian Sea backarc basin, is the key for understanding the geodynamics of the central Mediterranean. Numerous seismic tomography studies have been carried out in this region, proposing different reconstructions of the lower subducting plate and cause of the slab-break-off existing beneath the Southern Apennines. However, the area and mode of the recent deformation of the Tyrrhenian Sea are still not fully defined and understood. In this study, we combine the analysis of a recent seismic tomography model and geological data, in order to understand the relationship between the subducting lower plate and the tectonic evolution of the sedimentary basins formed on the upper plate.

With this aim, we interpreted a large data set of seismic reflection profiles and several well logs. The results consist in 2D and 3D geological models of the basins, sedimentary infill, and fault networks. Taking into account the geological data of the ETM and those of the adjacent inner flank of the Apennines, we observe: (i) a system of linked sedimentary basins developed on a narrow deformation belt bounded by transform fault zones; (ii) a polyphase rifting within the upper plate; (iii) an abrupt change of the direction of extension (~ 90°), from NE-oriented in the Lower Pleistocene to SE-oriented in the Middle Pleistocene. Since these ETM features are not the typical expressions of the current backarc extensional models, we propose a link between the evolution of upper plate and the onset and development of a STEP (Subduction-Transform-Edge-Propagator) fault along the northern margin of the Ionian slab.

Keywords: Backarc extension, Tectono-stratigraphy, 3D visualization, STEP fault, Tyrrhenian Sea.

1. Introduction

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