Link between upper and lower plate deformation in the Tyrrhenian domain

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INTRODUCTION

The Tyrrhenian Sea in the eastern Mediterranean is the result of the collision between the African and European plates in the Neogene, which led to the formation of the Apennine Chain. The region is characterized by a complex tectonic setting, with a variety of plate boundaries and a significant amount of deformation. The study of the link between upper and lower plate deformation is crucial for understanding the tectonic evolution of the region.

RESULTS

We investigated the link between upper and lower plate deformation in the Tyrrhenian domain using a combination of seismic and borehole data, as well as a digital geological data base. Our results indicate that there is a strong correlation between the deformation in the upper plate and the structures in the lower plate. This suggests that the deformation in the upper plate is driven by processes in the lower plate, such as subduction and slab detachment.

DATA AND METHODS

We constructed a 3-D model of the substrate along the eastern Tyrrhenian margin using seismic and borehole data. The model was created using a geological data base that includes information from seismic profiles and boreholes. The model reveals a complex architecture due to the occurrence of several fault sets (NW-SE, NE-SW, E-W, and NNE-SSW).

REFERENCES


UPPER PLATE QUATERNARY EVOLUTION

During the Lower Pleistocene extensional tectonics affected the upper plate and two sets of extensional basins developed, in the Marsili and Paola basins, respectively. These basins were formed by NE-SW to NW-SE normal faults developed along the Marsili and Paola basins, respectively. These basins were formed by NE-SW to NW-SE normal faults. During this tectonic stage, a higher speed of the Marsili basin opening compared to that of the Paola basin (the inset shows the 3D model of the 1.0 Myr scenario).

LINK BETWEEN UPPER AND LOWER PLATE DEFORMATION

The deformation features of the upper plate can correspond to structures in the lower plate and vice versa. The proposed paradigm is that the deformation is generated by the interaction of the upper and lower plates, with the upper plate acting as a passive tectonic boundary.