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## The role of structural inheritance on Africa-Eurasia plate boundary evolution and neotectonics in the central Mediterranean sea

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Africa-Eurasia plate convergence and the retreat of the subducting slab led to the consumption of the Tethys ocean lithosphere, which has now mostly disappeared below or accreted/exhumed within the Alps/Apennines. Slab tearing plays a major role in plate boundary evolution, asthenospheric upwelling, dynamic topography and magmatism. However, the role played by structural inheritance on the Africa plate is not well constrained. Based on seismological, geodetic and marine geophysical data, we analyse the pattern of crustal deformation in the Calabrian Arc and Sicily Channel, two key regions to unravel the complex Africa/Eurasia plate interaction in the central Mediterranean Sea.

The Calabrian Arc subduction-rollback system accommodates Africa/Eurasia plate convergence along thrust faults developing both in the frontal and inner domains of the accretionary wedge. However, the most intriguing and tectonically active features are represented by arc-orthogonal faults deforming the subduction system along a complex strike-slip/transensional pattern that may have been the source of major earthquakes in the Calabrian Arc. Deformation along the lithospheric transensional faults is punctuated by buried sub-circular magnetized bodies aligned with Mt. Etna, that were interpreted as serpentinite/mud diapirs intruding the subduction system from the lower plate mantle. These faults are part of the overall dextral shear deformation, resulting from differences in Africa-Eurasia motion between the western and eastern sectors of the Tyrrhenian margin of northern Sicily, and accommodating diverging motions in the adjacent compartments of the Calabrian Arc. To the West, the Sicily Channel is part of the Pelagian block and experienced a lithospheric-scale continental rifting starting from the late Miocene with the development of NW-SE-trending tectonic depressions, bordered by crustal normal faults with variable throws. Our geophysical data, however, show that the most active tectonic feature in the area is a N-S trending and ~220-km-long lithospheric fault system characterized by volcanism, high heat flow and seismic activity. The NW-SE elongated rifting pattern, considered the first order structure in this region, appears currently inactive and sealed by undeformed Pleistocene deposits suggesting a recent change in structural development.

Seismological data show that the lithospheric boundaries present in the Calabrian Arc and Sicily Channel correlate well with spatial changes in the depth distribution of earthquakes and separate regions with different Moho depths and thickness of the seismogenic layer. We propose that these boundaries may represent long-lived inherited Mesozoic discontinuities controlling plate boundary evolution and neotectonics.