Deep view of the Subduction-Transform Edge Propagator (STEP) fault in the Calabrian Subduction Zone

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AIM OF THE STUDY

✓ Reconstruct the geometry of the STEP fault in the Calabrian Subduction Zone.
✓ Correlate deep and shallow deformation features
✓ Investigate STEP propagation mechanism

Tectonic setting

The Calabrian Subduction Zone is confined to the southeastern boundary of the Calabria Arc. Subduction of the Ionian plate across the Calabrian Arc is accommodated by a listric STEP fault, the Calabrian Arc Subduction Zone (CASZ).

Main tectonic features

- Normal fault (N1)
- Thrust fault (T1)
- Listric fault (L1)
- Deep subduction channel
- Thrust fault (T2)
- Thrust fault (T3)

Seismo stratigraphic scheme

- Plio-Pleistocene succession
- Ionian volcanics
- Mediterranean transgressive series
- Mediterranean carbonate succession
- Top Cenozoic erosional surface
- Top Mesozoic carbonate succession
- Top Mesozoic evaporites
- Top Cretaceous carbonate succession
- Top Paleozoic carbonate succession
- Top Paleozoic evaporites
- Top Paleozoic carbonate succession

Multichannel seismic reflection profiles

Control of STEP fault on Plio-Pleistocene basins

Inset 1 – section H

1. Plio-Pleistocene succession
2. Lower Pliocene pre-STEP fault succession
3. Pliocene – Lower Pleistocene (3) syn-STEP fault turbidites
4. Pleistocene growth strata
5. Bounding moment fault related to deep STEP fault

Preliminary results of this study shed light on the nucleation and the evolution of a STEP fault in the Calabrian Subduction Zone. Nucleation currently occurs in the southeastern sector, where bending (Section a) and fracturing (Section b) of the oceanic crust are observed. The propagation of the STEP fault up the upper crust occurs in the southern sector (Section e) with progressively increasing displacement. In the northern sector the deformation, at a mature stage, is accommodated by a series of sub-parallel faults. The age of inception in the northern sector is confined within the Pliocene by the presence of syn-sedimentary turbidites (Section h). The STEP fault shallow features (listric faults and syntectonic basins), although controlled by the master fault at depth, are not directly connected with it (Sections b-h).