
Detailed structure of the North Alfeo strike slip fault offshore Eastern Sicily: ultra-high resolution micro-bathymetry and analog modeling

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Résumé

The North Alfeo fault extends from the SE flank of Mount Etna, offshore Eastern Sicily 150 km to the SE. It is interpreted to be the primary surface expression of a lateral slab tear fault (a lithospheric scale fault which bounds the W edge of the subducting Ionian slab). Ultra high-resolution micro-bathymetric data (1m grid) were acquired during the FocusX1 and FocusX2 cruises by the ROV Victor and AUV idexX. These data image the fine structure of a dextral strike-slip fault, with transpressive ridges and narrow lozenge shaped pull apart basins. A network of N-S oriented normal faults are also observed throughout, most prominently on a triangular plateau, but also further south along the horse-tail termination of a NW-SE oriented splay of the Malta Escarpment. Analog modeling using granular materials tested a range of boundary conditions (layer thickness, pre-existing plateaus above the fault trace, an oblique fault with respect to a step in the morphology and layer thickness, 15° change in orientation of the fault orientation below the layer of granular material, etc.). Certain large-scale features observed in the natural example can be reproduced; e.g. - regularly spaced transpressive ridges with 30° oblique fault splays (clockwise with respect to the fault trace at depth) and an imbricated pop-up within a larger transpressive plateau. Other features, like the pervasive N-S oriented domino faults are not easily reproduced. Their characteristic spacing (about 150m) implies the presence of a shallow detachment for these structures, probably ≤ 1 km.

Mots-Clés: East Sicily, morpho, bathymetry, strike, slip faults, analog modeling

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