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Late Quaternary activity and lateral variability of regional deformation belts in marine foreland settings: the South-Western Adriatic margin case study

D. Ridente (1), D. Di Bucci (2), F. Foglini (3), E. Campiani (3), U. Fracassi (4), and F. Trincardi (3)

(1) Istituto di Geologia Ambientale e Geoingegneria (CNR-IGAG), Rome, Italy (domenico.ridente@igag.cnr.it), (2) Dipartimento della Protezione Civile, Rome, Italy, (3) Istituto di Scienze Marine (CNR-ISMAR), Bologna, Italy, (4) Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy

Defining the activity and seismogenic potential of offshore faults has ever since proved demanding, unveiling how both the nature of a fault and the offshore setting may challenge marine investigation techniques, posing serious limitation to our capability of constraining the timing of deformation and the slip rates along definite fault planes. Typically, the long-term activity of a fault is imaged on seismic profiles through the displacement of old strata buried at depth below the seafloor; such evidence however, becomes more subtle as deformation propagates in shallow units, both because of the limits affecting data resolution and because the amount of displacement is supposed to decrease within progressively shorter and recent time intervals. In the case of regional deformation belts, fault systems may strand through very different tectonic settings and environmental domains, their lateral expression reflecting, on one hand, the different behaviour of distinct fault segments and, on the other, the variable styles of syn-tectonic sediments. Therefore, despite modern high-resolution techniques allow to easily detect shallow faults as an expression of recent activity, the classification of such faults as seismogenic is not straightforward.

With these problems in mind, we discuss a case from the Adriatic Foreland of Italy (SW Adriatic margin) where the Gondola Fault Zone (GFZ), a regional deformation belt extending ca. 120 km, variably affects and shapes the continental shelf and slope.

The GFZ parallels a morphological high, known as the Gondola Ridge, which shows no seafloor expression along the E-W segment of the fault, extending ca. 70 km across the shelf. A significant relief is instead observed down-slope, along the ca. 50-km long WNW-ESE portion of the GFZ.

Based on the integration of seismic and morpho-bathymetric data, we define:

1) the Late Quaternary activity along the distinct shallow fault segments that compose this complex deformation belt;

2) the fault plane geometry and geomorphic expression in the light of constraining a plausible kinematic model for the GFZ as whole (both E-W and WNW-ESE portions);

3) the possible relationship between fault activity (both seismicity and sediment deformation) and slope failure in this region.