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Chasing evidence of recent tectonic activity in a foreland region: the South Apulia Fault System

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Peripheral foreland basins are usually considered among the slowly deforming regions of the world, especially in comparison with the activity of the surrounding mountain chains. Nonetheless, foreland regions are subjected to lithospheric scale deformation processes in response to the loading of the chain, isostatic rebound, and regional convergence, all of which can produce brittle structures in the upper crust.
The southernmost end of the Adria microplate is the foreland in between the Albanides-Hellenides and Apennines chains facing off against each other in the Otranto Channel (central Mediterranean Sea). In its southern part, the preserved Mesozoic paleomargin shows the transition between the Apulian carbonatic platform and the Ionian oceanic crust which is being subducted under the Calabrian Arc, to the west, and the Hellenic Arc, to the east.
Despite the instrumental seismicity shows only few and scattered small earthquakes and the geodetic data reveal very slow strain rates in this region, the historical catalogues recall us about an Mw 6.7 earthquake occurred in the 1743 that spread damage in southern Italy, Albania, and Greece, together with hints about a tsunami in the Brindisi harbor. The source of this earthquake is very uncertain and raises compelling questions on how to treat this type of seismic sources in hazard maps.
In this contribution, we present the interpretation of a dense network of multichannel seismic profiles (part of which are provided by Spectrum Geo), multibeam high-resolution bathymetry, and CHIRP profiles recently acquired by R/V OGS Explora. The analysis of this multiscale dataset allowed us to identify a major NW-SE fault system, here named South Apulia Fault System (SAFS), whose activity must have started in the Plio-Pleistocene and likely carries on today based on the evidence of recent deformation at and near the seafloor. We argue that the SAFS is a possible candidate source for the 1743 earthquake and may represent a step forward in the assessment of seismic and tsunami hazard in this cross-border region.