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Morpho-bathymetric and seismic-stratigraphic investigation in the Messina Straits (Southern Italy). The search for geomorphic and stratigraphic evidence of shallow seismogenic faults

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The 28 December, 1908 Reggio Calabria and Messina earthquake was one of the strongest (Mw 7.1) ever occurred in Italy, and was also followed by a tsunami that severely impacted the coasts of the Messina Straits. Although most workers agree that its epicentre locates in the Messina Straits, the source fault has never been detected; a century long question is therefore pending on the source of both the 1908 earthquake and tsunami. Within the ongoing debate on this question, little attention has been given, in recent time, to insights from very high resolution morpho-bathymetric data, particularly as regarding the question on whether a submarine landslides may had been the cause of the tsunami. We aim at filling this gap by presenting the results of a detailed geomorphic analysis in the area of the Messina Straits, integrated with high-resolution MC seismic profiles recently acquired during Cruise M86/2 on board R/V Meteor.

The primary morpho-structural feature in this area is the axial channel of the Messina Canyon, toward which inflow several tributary canyons that incise the steep continental slope on the Calabrian and Sicilian margins. These canyons deeply cut into a very narrow continental shelf and merge laterally forming a continuous erosional margin rimming the Messina Straits. This giant, composite canyon environment is the locus of intense erosional and mass failure processes that superimpose on active tectonic deformation, resulting in a complex geomorphology that hinders the distinction between tectonic and sedimentary features. Based on detailed morpho-bathymetric and seismic-stratigraphic analysis, we discuss on the evidence of possible geomorphic and stratigraphic expression of tectonic deformation compatible with the 1908 Mw 7.1 earthquake.