

GEOLOGICAL RISK AND CLIMATIC CHANGES ON THE IONIAN CALABRIAN COASTAL ENVIRONMENT: A CASE STUDY

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Abstract

The recent origin and the active dynamism of the Italian margins, associated to the sea level variations and the climate, represent an important aspect connected to the actual coastal environment. Recent Morpho-Bathimetric survey allows to map a wide area of the Calabrian margin, pointing out interesting features and characteristics suitable for the geomorphology and the possible coast modification comprehension.

Keywords: *Coastal Systems, Swath Mapping, Active Margins*

The tectonic evolution of the Italian region, connected to the climate impact and to the sea level oscillation [1], make the coastal domain a very variable and interesting zone to study and comprehend.

Going beyond this environmental point of view, the strong colonization of the coasts in the past decades has strongly impacted its actual conformation, pushing both the research and politic interests to a deeper consideration of this zone [2]. One of the main aim of these studies is based on the comprehension and evaluation of the coastal zone evolution, in function of climate changes and of the directly connected suitable risks [3]. From this point of view, the Geologic Sciences and Geotechnologies Department of the Milano Bicocca University has been recently involved in the study of a sector of the Ionian Calabrian Margin, first with the VECTOR Project (Vulnerability of the Italian coastal area and marine Ecosystems to Climatic changes and Their role in the Mediterranean carbon cycles), and more recently by the MAGIC Project (Marine Geohazards Along the Italian Coast).

These two projects lead to the realization of an high detail Morpho-Bathimetric data mapping on a wide sector of the Calabrian seafloor, realized using a Multibeam Echosounder System (Reson Seabat 8160).

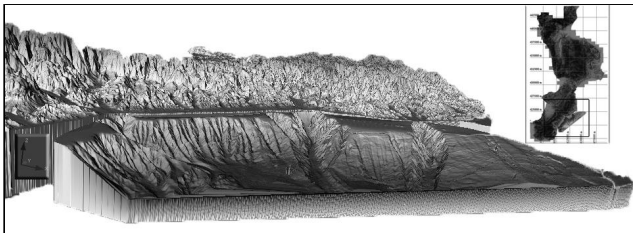


Fig. 1. Location and detail of the realized swath survey on the Ionian Calabrian Margin (Magic-Vector Projects)

The data processing and elaboration allow to investigate the shelf and slope domains, recognizing interesting features developed at different scale (Canyons, incisions, slope and slide scars and deposits... [4]), and to advance preliminary hypothesis about the local margin evolution.

The actual configuration of this margin is in fact the result of the traslation of the Calabrian Arc linked to the Tyrrhenian basin opening (Miocene), and of the coupled occurrence of compressive stress on the Eastern advancing front, cause of the local high relief, of the narrow shelf, and of the still active tectonic [5], with an evaluated uplift trend of 0.89 – 1.4mm/y [6].

These elements, coupled to climate regime, contribute to the occurrence of mass wasting episodes on the shelf and upper slope, increasing the local instability of the whole submerged margin, and stressing the possibility of risks, for the human infrastructures and cities wide extended on the coastal zone, whose comprehension is the main aim of the indicated studies.

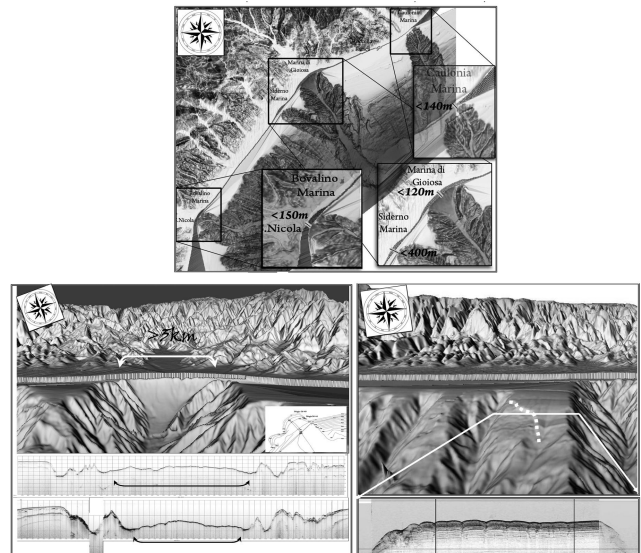


Fig. 2. Risk elements on the considered margins: the canyons head, deep incised on the shelf and very close to the coastal line, and the seismo-stratigraphic evidence of creep like, instable features, observed on channel rim.

References

- 1 - F. Antonioli et al. 2006. Elevation of the last interglacial highstand in Sicily (Italy): A benchmark of coastal tectonics, *Quat. Int.* 145–146, pp. 3–18.
- 2 - F. ZOLEZZI, C. M. TRAVERSO, E. C. J. PARKER. 2009. Offshore Geohazards and their Implication to Industry. *Rend. online Soc. Geol. It.*, 7.
- 3 - F.L. Chiocci et al. Ed. 2009. *Rendiconti Online Società Geologica Italiana – Volume 7 Extended abstract – International Conference on Seafloor mapping for Geohazard Assessment.*
- 4 - C. Tessarolo, E. Malinverno, M. Agate, G. Di Grigoli and C. Corselli. June 2008. Preliminary data concerning the morphology of a Calabrian Ionian margin area: Caulonia and Marina di Gioiosa canyons. *Chemistry and Ecology Vol. 24, No. S1*, 225–242.
- 5 - Jenny, S. et al., 2006. Seismic potential of Southern Italy. *Tectonophysics*, 415,81-101.
- 6 - R. Westaway, 1993. Quaternary uplift of southern Italy, *J. Geophys. Res. B* 98 pp. 21741–21772.