

SLOPE-TO-BASIN SEDIMENTARY PROCESSES IN TECTONICALLY ACTIVE SETTINGS : A COMPARATIVE ANALYSIS OF THE CALABRIAN AND LIGURIAN MARGIN DURING THE LAST 5MA

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Abstract

This study aims to better understand the processes of formation and evolution of six submarine canyons along the western margin of the Ligurian Basin, in relation to the regional geological context and to do a comparative preliminary analysis with the Calabrian Margin.

Keywords: Geomorphology, Continental Slope, Continental Margin, Ligurian Sea, Sediment Transport

Sediment transfer from continental shelves to deep-water basins is an important control on the morphological and architectural evolution of continental margins. Downslope transfer of sediments via processes of erosion and deposition result in the construction of typical features such as submarine canyons. This study aims to better understand the processes of formation and evolution of six submarine canyons along the western margin of the Ligurian Basin, within an offshore area extending from Nice (France) to Imperia (Italy). Processes of slope failure are analyzed within the same zone in order to investigate a wide range of gravity-driven sediment transfer processes.

Analyses of seabed morphology, subsurface structures and present-day sedimentary processes are based respectively on swath bathymetric data, seismic-reflection profiles (24-channel) and side-scan sonar imagery, acquired during the MALISAR 1 and 2 surveys. These data allow an analysis of the main geomorphic characteristics of the canyons and of failure scars (width, depth, incision shape), and of their internal structures, in order to better understand their origin, construction mechanisms and evolution in relation to the regional geological context. We show that submarine canyons adjust to the general evolution of the margin topography, via processes including regressive erosion and deviation of the thalweg axis. Canyons can therefore be used as markers of deformation of the Ligurian Basin margin, which is an example of a passive margin that has been reactivated in a compressive sense since later Pliocene time. Deformation of the Ligurian Basin increases eastward and basinward, in response to uplift of the Ligurian coast. Thus, canyons in the west are considered as mature canyons, with concave longitudinal profiles, their upper parts characterized by V-shaped thalwegs (in cross-sections), and high slope-gradients, while their lower parts by U-shaped and low slope-gradients. In contrast, canyons in the east present convex longitudinal profiles and V-shaped thalwegs (in cross-sections), with increasing slope-gradients towards their lower parts, and are described as immature canyons that are being readjusted by regressive erosion.

A similar study is in progress for the Ionian continental margin of Calabria, using similar data to undertake a first analysis of slope-to-basin sedimentary processes over Pliocene timescales. This will facilitate a comparative analysis of these two tectonically active margins, the Ligurian Margin (passive margin reactivated in compression) and the Calabrian Margin (active subduction margin).

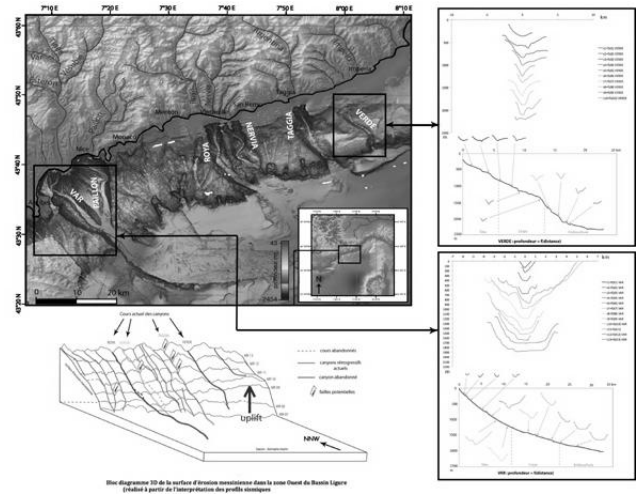


Fig. 1. Bathymetry of the Western Ligurian Margin, longitudinal profiles and cross-sections of thalwegs of the Var canyon and the Verde canyon

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