

SEDIMENT DRAINAGE PATTERN IN THE CATALAN MARGIN, WESTERN MEDITERRANEAN SEA: A VIEW FROM MULTIBEAM AND HIGH-RESOLUTION SEISMIC REFLECTION DATA

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Abstract

New multibeam data from the Catalan margin, Western Mediterranean Sea, reveal with unprecedented detail its seafloor morphology. Debris flow deposits, canyon-channel and channel-levee systems on the slope and base of the slope, and a deep-sea channel parallel to the continental margin, are the main sediment-bypass structures in the study area. A fine description of these features based on swath bathymetry data, combined with the interpretation of high-resolution seismic reflection profiles, allows to improve the understanding of seascape evolution mechanisms, sediment transfer and depositional architecture.

Keywords: Submarine canyons, channel-levee systems, multibeam data, Catalan margin, Mediterranean Sea.

The detailed seafloor morphology of the entire outer Catalan continental margin, Western Mediterranean Sea, has been unveiled by new multibeam data. The data show a continental slope and base-of-slope dissected by several canyons deeply incised into the continental shelf. This canyon head morphology differs from the northern part of the Ebro margin, to the south, where canyons are shorter and restricted to the slope. Canyons in the Catalan margin, which generally evolve downslope to well-developed channel-levée systems, substantially differ in their morphology. Some (i.e. the Foix Canyon) are sinuous in their upper course and evolve to a more lineal morphology downslope, while others (i.e. the Blanes Canyon) start with a roughly lineal morphology that becomes sinuous downslope. In-between these end members there is a wide range of canyon morphologies and sizes.

At about 2.000 to 2.500 m water depth these canyon-channel systems are connected to a deep-sea channel known as the Valencia Channel. This deep-sea channel trends northeastwards following the Valencia Trough axis, an early Miocene-Pleistocene extensional basin (1) separating the Iberian margin to the west and the Balearic margin to the east. The Valencia Channel not only collects sediment transported from the canyons eroded into the Catalan margin but also from the Ebro turbidite system channels (2) and by large unconfined mass-wasting events. Among the later, the BIG'95 debris flow is the most prominent one, with a volume of ~26 km³, released from the Ebro slope (3). Its subsequent deposit partially buried the uppermost course of the Valencia Channel. This deep-sea channel finally vanishes into the Valencia Fan 400 km away from its head.

The refined and systematic description of the sea-floor and subsea-floor character of the Catalan margin drainage pattern, based on the new multibeam and very high and high-resolution seismic reflection profiles, could provide necessary inputs for development of novel conceptual and numerical seascape evolution models from mid-latitude areas.

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