

Crescentic-shaped bedforms in the Garrucha submarine Canyon: when canyon topography and density flows interplay

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Submarine canyons are deep incisions acting as sediment pathways that connect shallow continental shelves to deep basins. The sediment from shallow waters can mix with seawater to form downslope running submarine density flows that are extremely powerful. These flows carry crucial nutrients to submarine life, control the hydrocarbon reservoir distribution, and mobilise the seabed sediment to form erosional and depositional features such as bedforms. Previous works have suggested links among the characteristics of the bedforms (e.g. size, shape, grain-size), density flow dynamics and submarine canyon architecture. Recent progress in monitoring technology has allowed a better understanding those links but field measurement are key to correlating that complex interplay. Here we show field measurements collected in the Garrucha Canyon (SW Mediterranean Sea) within the framework of FAUCES project. The measurements comprise: 1) high-resolution bathymetry data acquired by an autonomous underwater vehicle to characterise the submarine canyon; 2) video images recorded by a remote operated vehicle (ROV) of erosional and depositional features; and 3) grain size analysis of 5 micro-cores collected in each ROV dive at different settings within the canyon. The high-resolution bathymetry data show that crescentic-shaped bedforms are common in a section of the canyon floor at 1,500-2,000 m of water depth. The wavelength and wave height of those bedforms spreads from 15 to 120 m and from 1 to 10 m respectively. These bedforms suggest that the floor of the Garrucha Canyon is active. Previous observations in other submarine canyons of similar crescentic-shaped bedforms have been suggested to be related to the transition between supercritical and subcritical flows, and interpreted as cyclic steps. A further analysis of the video images and grain size of the micro-cores might point out the sedimentary process that controls the bedforms of the Garrucha Canyon. The outcome of this work highlights the difficulties to identify a particular bedform as the unique signature of submarine canyon dynamics. It will also provide additional results to achieve an enhanced knowledge of the sedimentary processes within submarine canyon and have potential implications to identify spatial geohazards and benthic ecosystem niches in these submarine environments. Contribution from Project FAUCES CTM2015-65461-C2-R (MINECO/FEDER), Spain.