

# A 16 YEAR MORPHOBATHYMETRIC EVOLUTION OF BLANES AND CAP DE CREUS SUBMARINE CANYON HEADS (NW MEDITERRANEAN SEA)



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## INTRODUCTION

Submarine canyons are steep valleys on the continental slopes and shelves sculpting continental margins around the world. They can undergo major changes over geological time, which are subject to variations in tectonics and climate, which in turn control changes in sea level, sedimentary input and oceanographic conditions. These changes are reflected in the wide variety of morphologies resulting along submarine canyon path. Seafloor erosion is one of the most important processes and is of great significance at canyon head regions, especially during low-stand sea level. However, the current high-stand sea level situation does not necessarily imply a cessation of canyon activity, since submarine canyons on narrow shelves can remain active in relation to the prevailing meteorological and oceanographic conditions (e.g. alongshore currents, severe coastal storms and dense shelf water cascading).

## STUDY AREA

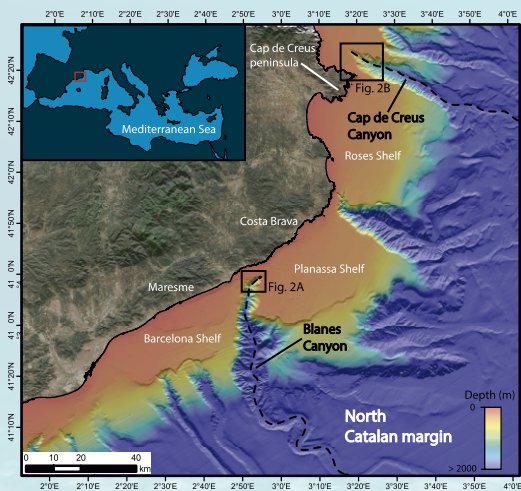


Fig 1. Location of the study area on the northern Catalan margin (NW Mediterranean Sea) showing the location of Blanes and Cap de Creus submarine canyons. Both canyon heads are deeply incised in the shelf, ergo they are located at shallow water depths and a short distance from the shoreline.

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## GOALS AND METHODS

High resolution multibeam bathymetric data with a 16-year time contrast have been compared and analyzed for Blanes and Cap de Creus canyon heads. The main objective is to obtain a detailed morphological evolution of these canyon heads in relation to the surrounding shelf deposits and to the occurrence of different extreme sediment transport events for this short time period. For this purpose, the bathymetry obtained in Cap de Creus Canyon in September 2020 (CRIMA project) and in Blanes Canyon in April 2021 (ABRIC project) have been superimposed on the 2004 bathymetry (ESPACE project) and their values have been subtracted using the minus ArcGIS tool.

## RESULTS

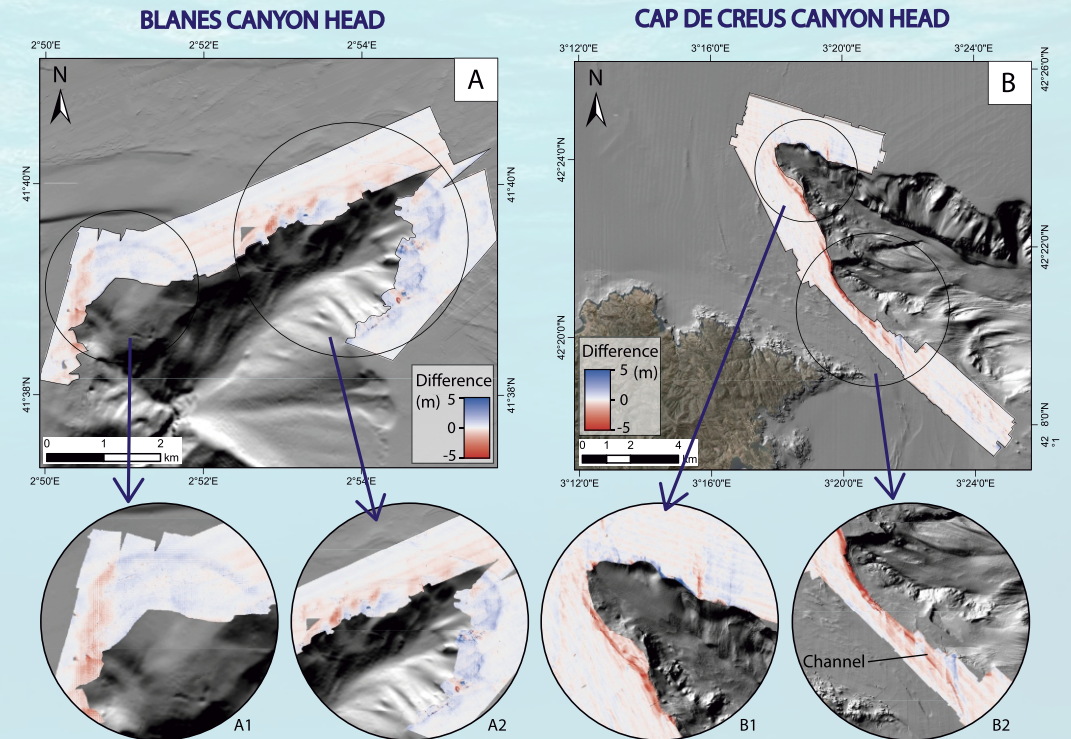


Fig 2. Minus maps of Blanes and Cap de Creus canyon heads resulting from the bathymetry comparison, in which red colour corresponds to negative values or sediment erosion, while blue colour represents positive values or sediment aggradation. A: At the Blanes canyon head has been observed a predominant of erosion on the western canyon rims, while deposition prevails on the eastern canyon rims (reaching < 5 m difference in both situations). This can be noted at the main canyon head (A2) and also on canyon tributary headwall (A1). B: At the Cap de Creus canyon head, erosion is more accentuated than in Blanes (up to > 10 m), although it follows the same trend, negative values on the western rims and positive on the eastern (B1). The erosion on the western canyon rim can be traced down to the Cap de Creus headland, and continues with the excavation of a preexisting outer shelf channel (B2).

**CONCLUDING REMARKS:** The comparison of the two datasets revealed a noticeable short-term morphological evolution at the shelf-to-canyon transition. Their morphological evolution is presumably related to the sediment dynamics prevailing on the adjacent continental shelf. Several strong storms and dense self-water cascading events occurred during the studied time interval, which likely were the main sediment transport mechanisms reshaping the canyon head rims. The different morphological evolution on each submarine canyon also seems to be related to the type of geological substrate on which the canyon heads develop, Blanes canyon head incises a succession of relict sediment bodies whereas the continental shelf in the vicinity of the Cap de Creus canyon head is characterized by a rocky substratum with limited sediment coverage.