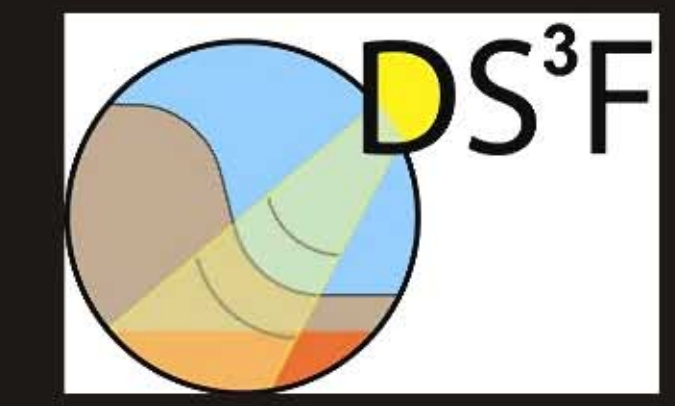


# Geomorphology of the Foix submarine canyon system, NW Mediterranean Sea

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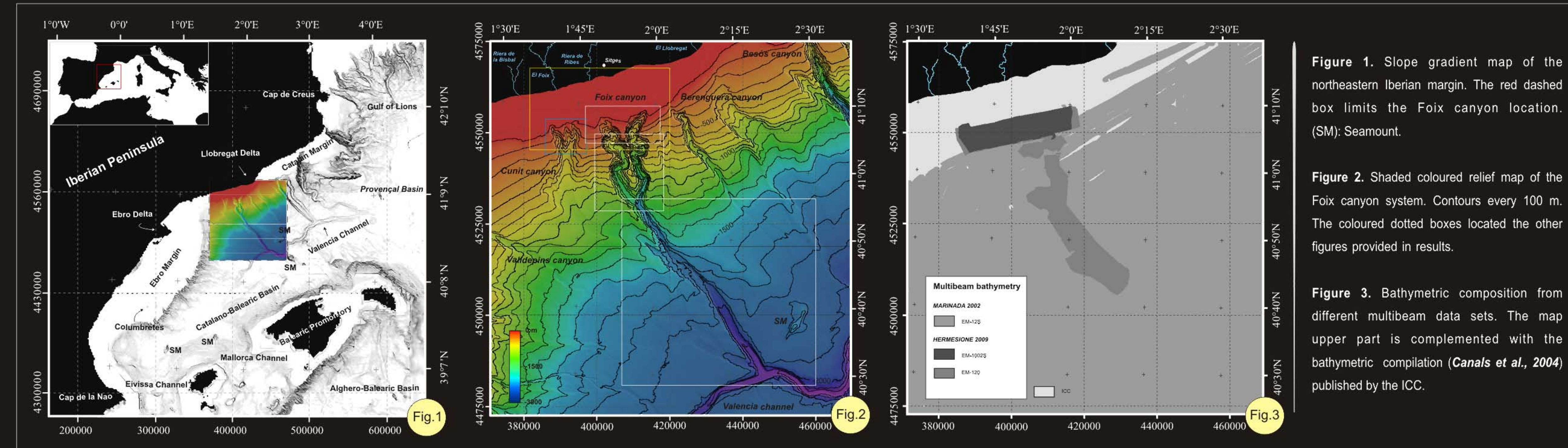
## 1. ABSTRACT

The Foix canyon system is a 97 km long submarine valley that dissects the passive northeastern Iberian margin (NW Mediterranean Sea) from the Catalan continental shelf down to the Valencia channel (Fig.1). It consists of two highly sinuous branches (northern and southern) and two partially in-filled tributaries (Cunit and Valdepins canyons). In this study, we present the first integration of acoustic data from the Foix canyon in order to show its striking geomorphology (Fig.2). The dataset comprises very-high resolution swath bathymetry data (up to 4 m grid size) and TOPAS parametric seismic reflection profiles acquired onboard BIO Hespèrides during MARINADA and HERMESIONE cruises in 2002 and 2009 (Fig.3).

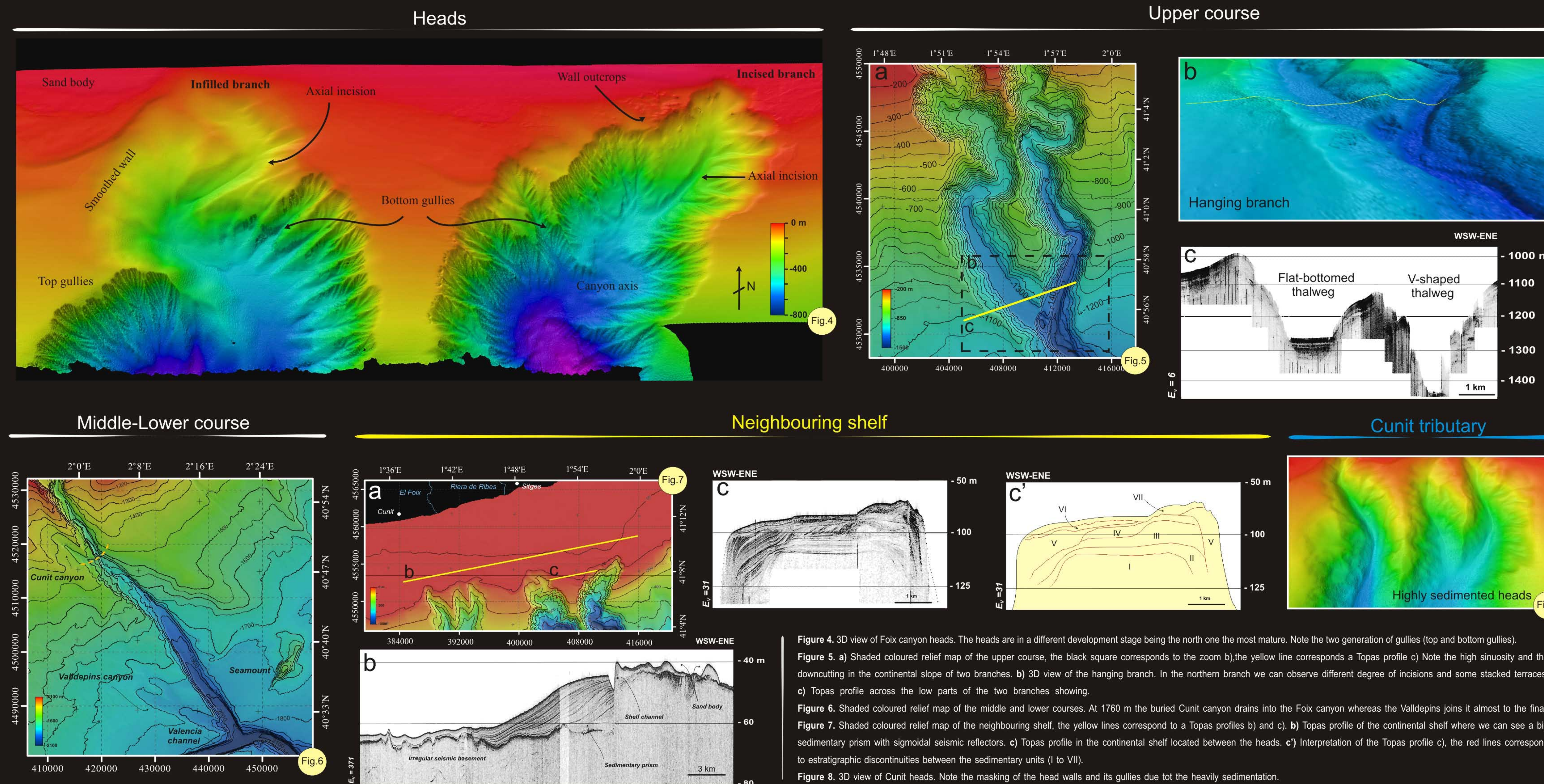
In order to perform the morphological analyses, the Foix submarine canyon system has been divided into upper, middle and lower course domains according to slope gradient, slope profile, sinuosity, degree of incision, and other morphometric and physiographic parameters. The heads of the two canyon branches, which incise the continental shelf up to 11 km off the coastline, are characterised by multiple and well-developed gully networks dissecting the canyon walls (Fig.4). These gullies exhibit contrasting morphologies and different degrees of incision and retrogression. The upper courses of the two branches are strongly meandering. The southern branch displays a characteristic U-shaped axial profile and hangs ~230 m over the northern one (Fig.5). In turn, the northern branch shows several isolated, perched and stacked terraces. The partially buried Cunit canyon joins Foix canyon at its middle course, which starts where the two main branches converge. The lower canyon presents a very straight course when compared to the upper canyon, has a flat-bottomed thalweg, and is joined by Valdepins canyon at its lowest reach. The Foix canyon ends into the margin-parallel Valencia channel at a depth of 2200 m (Fig.6).

The objective of this study is to describe the Foix canyon, its tributaries and the neighbouring shelf (Fig.7 and 8), and to understand canyon shaping processes and their spatial relationships within each domain in order to ultimately constrain its geological evolution.

## 2. GENERAL SETTING



## 3. RESULTS



## 4. CONCLUSIONS

- The Foix submarine canyon system has been divided into upper, middle and lower course domains according to slope gradient, slope profile, sinuosity, degree of incision, and other morphometric and physiographic parameters.
- Axial incision, lower-wall gullies and the dendritic drainage pattern show how the Foix canyon system is still active, being the northern branch in a mature stage of development whereas the southern branch and the Cunit tributary are in an early stage.
- Erosive processes persist in the upper courses and depositional processes occur in middle-lower courses.
- The multiple and well-developed gully networks have a retrogressive origin. In this sense the bottom gullies suggest this origin for the top gullies.
- Infilled and buried canyon sections and the neighboring shelf confirm the high sedimentary activity in this sector of the south Catalan margin during the Plio-Quaternary. The continental shelf display progradant clinoforms, whereas the continental slope is aggradant.
- Sand bodies occur along the shelf-break recording sea-level oscillations.

## 5. ACKNOWLEDGEMENTS

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