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MORPHOSEDIMENTARY CHARACTERIZATION FROM MULTIBEAM BATHYMETRIC RESEARCH OF THE AVILÉS CANYON SYSTEM (CANTABRIAN CONTINENTAL MARGIN)

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GRUPO DE GEOLOGÍA MARINA INDEMARES - MADRID

PROJECT

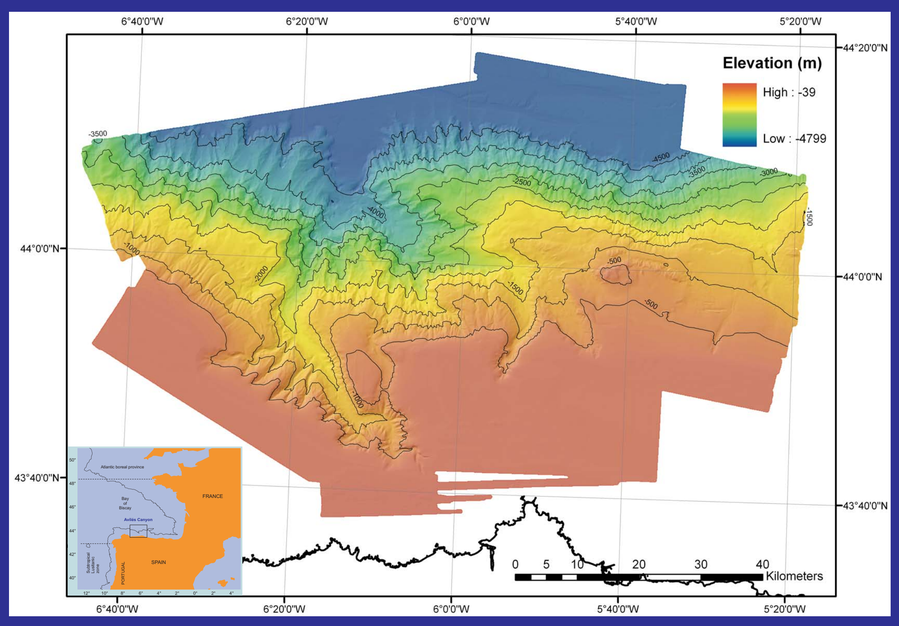
The complex Avilés canyon´s system are located in the Cantabrian Sea (southern Bay of Biscay), whose study is currently being carried out by the INDEMARES (LIFE+) project.

The global objective of this project is identifying and charting its habitats and the biological communities that inhabit them. It is also framed within the urgent need to identify, study, and describe vulnerable marine habitats, which are currently more accessible due to the new fishing technologies. These habitats are typically extremely important as a refuge for sensitive species or are essential for juveniles or reproducing individuals of species which are exploited in adjacent areas.

The main objective of this project is identifying and charting its habitats and the biological communities that inhabit them.

In summary, the main issues of the INDEMARES project are:

- Morpho-sedimentary and bathymetric study
- Dynamic and characteristics of the water masses
- Characterization of the benthic and demersal communities.
- Trophic ecology of fish and crustaceans
- Generate Trophodynamic models of the ecosystem
- Study of the impact of fisheries working in the area



LOCATION MAP

METODHOLOGY

Several datasets have been used for the present study, which were acquired within the framework of INDEMARES project. The study the geomorphologic features of the canyon is based on multibeam bathymetry, parametric system Topas high resolution profiles, sedimentological analyses of boxcore samples and submarine photographs. A high-resolution bathymetric map was obtained with the Kongsberg Simrad EM 300 multibeam system. Survey speed was between 8 and 10 knots depending on water depth and wave conditions in the first cruise Aviles 0410, and between 4 and 6 knots during the second cruise Aviles 0511, where collected a new bathymetric dataset to elaborate a high resolution map with a redundant coverage data in determinate areas.

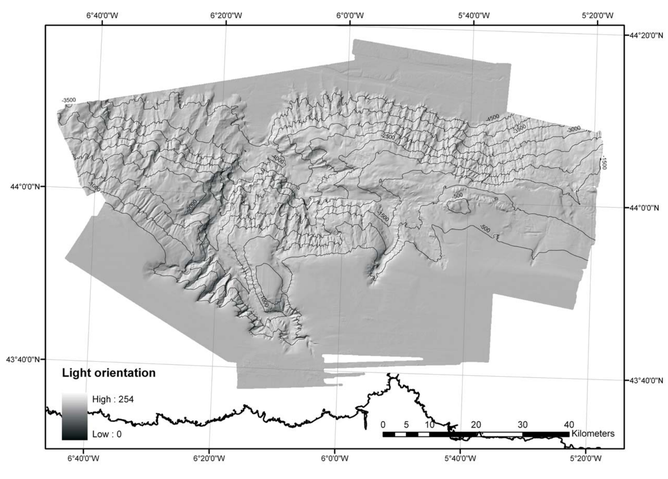
In total, an area of 6253.34 km² along the Cantabrian margin was mapped in water depths between 40 m and 4800 m. The acquired data was processed using the CARIS Hips&Ships package, obtaining a bathymetry grid of 75*75 m resolution for the Avilés Canyon system.

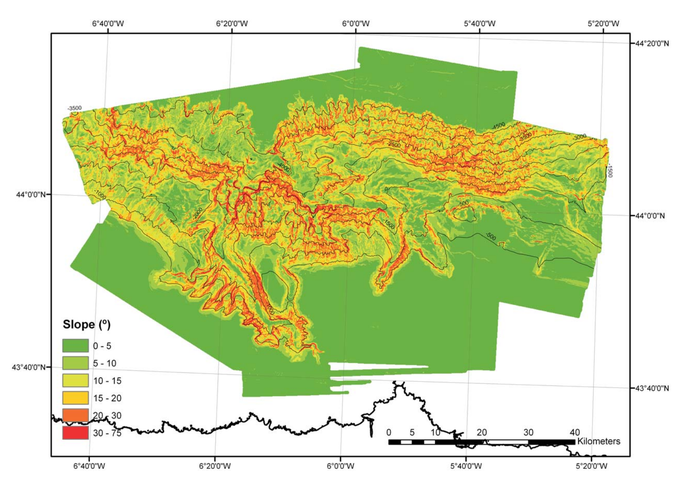
The geomorphologic detailed analysis is focused on swath bathymetry data and derivative products as shaded relief, and backscatter maps. The backscatter data obtained from multibeam data were processing with a Geocoder modul from Feldermaus software package. The seismic profiles were collected using 3.5 kHz topographic parametric source, TOPAS PS 18. The data were processing by standard seismic processing Topas packages software, design specially for the digital acquisition, processing and store.

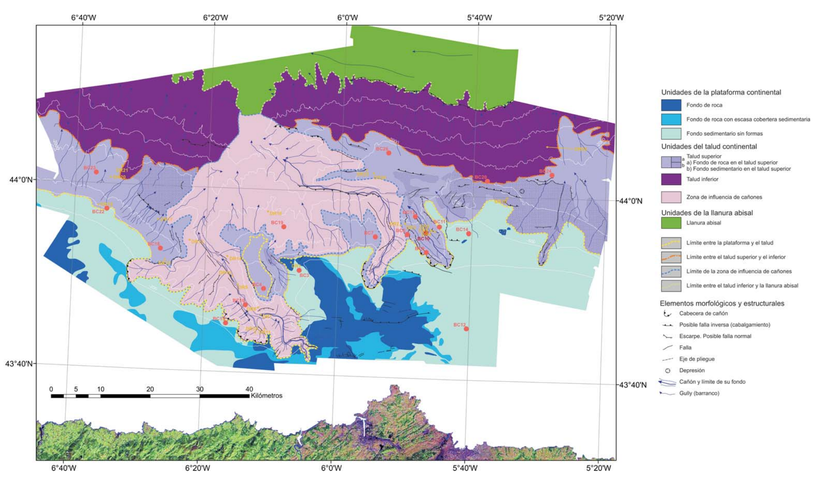
BATHYMETRIC ANALYSIS

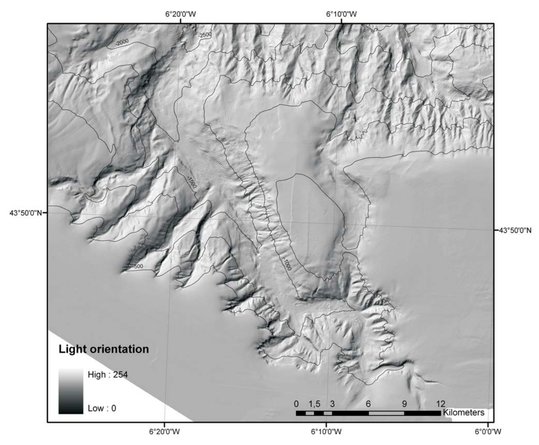
GRADIENT ANALYSIS

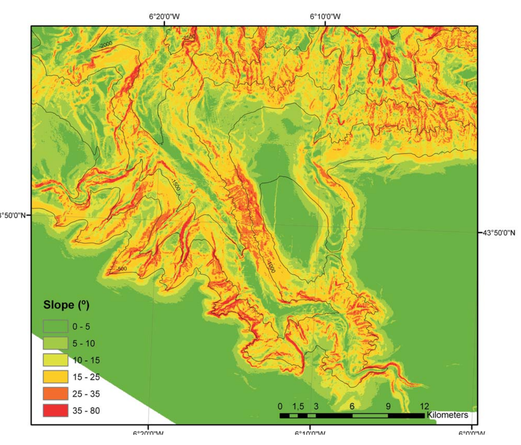
GEOMORPHOLOGIC ANALYSIS

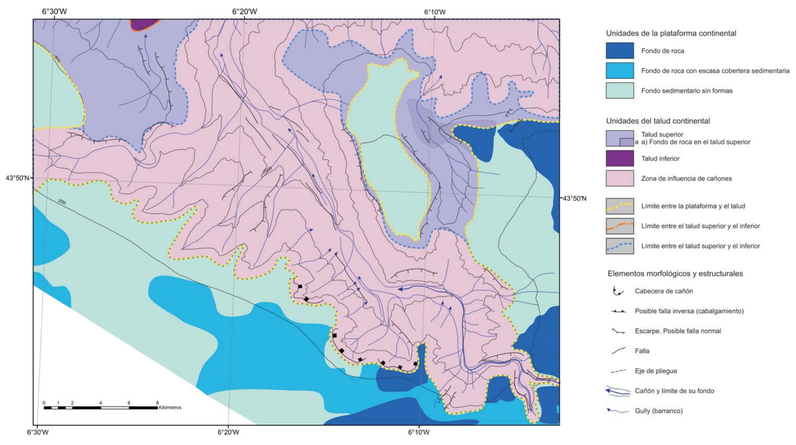


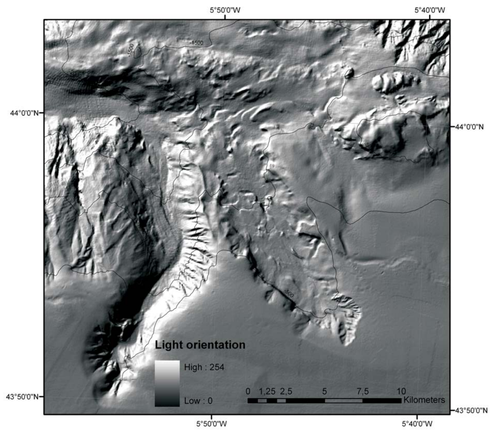


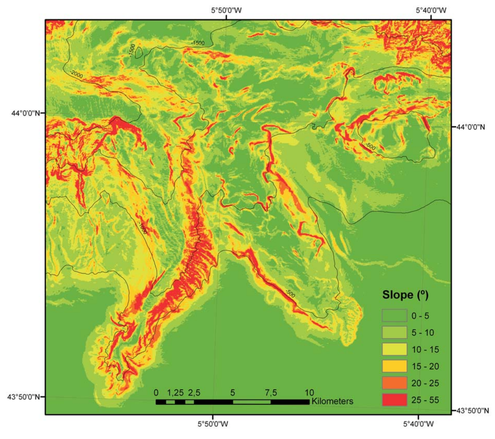


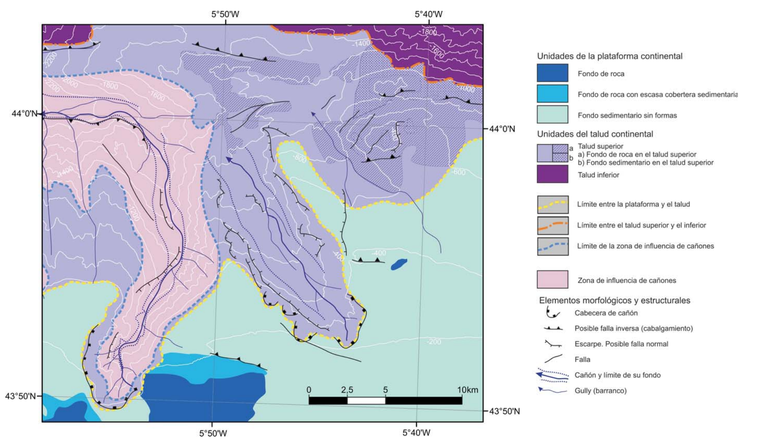












UTM Proyection, 30 N. Maps elaborated with ArcGIS software.

A detailed geomorphologic analysis, based on multibeam bathymetry, parametric seismic profiles and submarine photographs, has allowed interpreting the morphosedimentary processes in the Avilés Canyon region. The main objectives have been to recognize the detailed seabed morphology and characterize the processes generating these morphological features. Five physiographic domains have been recognized in the studied sector of the Cantabrian margin, corresponding to: narrow continental shelf, complex upper and abrupt lower slope, continental rise and complex canyon system incised from shelf to rise.

The continental shelf is generally narrow (15 to 58 km wide) as occur along the Cantabrian margin, feature characteristic of compressive margins. Its maximum water depth is 670 m, with a variable gradient between 0 and 8.3º in the shelf break, located at about 500 m water depth. The continental shelf displays an irregular edge and seafloor with many folded and fractured outcrops and deposits as a consequence of an intensive tectonic activity and comprises the flat high (marginal platform) known as Canto Nuevo. The 62% of the continental shelf correspond to sediment seafloor without notorious features.

The upper slope presents a regular variable gradient between 3.2º-25º, and is cut by a complex system of narrow rectilinear gullies. Two major domains have been identified: an eastern domain with a complex physiography between 200 and 3500 m water depth, with a low density of gullies and the noticeable Agudo de Fuera High and La Gaviera hanging canyon; and a western domain down to 500 and 2900 m water depth characterized by a high density of gullies.

The lower slope presents a high gradient (14º-73º), displaying a canyon system N-S oriented in its northern flank, and E-W oriented in the southwestern flank. The base of lower slope is at about 4500 m water depth, where the continental rise starts showing two complex E-W channels of flat bottom.

The Aviles canyon system, with its tributaries, display from continental shelf where are located their headwalls to upper slope connecting with the continental rise. The sharp pathways changes indicate a tectonic control. The canyon walls are affected by well-developed drainage features that form a network of gullies.