



Contents lists available at ScienceDirect

Deep-Sea Research II

journal homepage: www.elsevier.com/locate/dsr2

Geomorphology of the Avilés Canyon System, Cantabrian Sea (Bay of Biscay)



María Gómez-Ballesteros^{a,*}, María Druet^a, Araceli Muñoz^b, Beatriz Arrese^a, Jesús Rivera^a, Francisco Sánchez^c, Javier Cristobo^d, Santiago Parra^e, Ana García-Alegre^c, César González-Pola^c, Jorge Gallastegui^f, Juan Acosta^a

^a Instituto Español de Oceanografía, C/Corazón de María 8, 28002 Madrid, Spain

^b Tragsa-SGP, C/Julian Camarillo 6B, 28037 Madrid, Spain

^c Instituto Español de Oceanografía, C.O. de Santander, Promontorio San Martín s/n, Apdo. 240, 39080 Santander, Spain

^d Instituto Español de Oceanografía, C.O. de Gijón, Av. Príncipe de Asturias 70 bis, 33212 Gijón, Spain

^e Instituto Español de Oceanografía, C.O. de A Coruña, Paseo Marítimo Alcalde Francisco Vázquez 10, 15001A Coruña, Spain

^f Facultad de Geología, Universidad de Oviedo, C/J. Arias de Velasco s/n, 33005 Oviedo, Spain

ARTICLE INFO

Available online 16 October 2013

Keywords:

Aviles Canyon System
La Gaviera and El Corbiro
Geomorphology
Cantabrian Margin (Bay of Biscay)
Multibeam bathymetry
Sediment transport

ABSTRACT

The Avilés Canyon System (ACS) is a complex, structurally-controlled canyon and valley system constituted by three main canyons of different morphostructural character. They are, from east to west: La Gaviera Canyon, El Corbiro Canyon and Avilés Canyon. In addition to this ACS, a new canyon has been surveyed: Navia Canyon.

We present for the first time a high resolution multibeam map showing with great detail the morphological and structural complexity of this segment of the Cantabrian margin.

ACS presents a tectonic imprint marked by NW–SE, NNE–SSW and E–W structures. The morphology of their reaches as well as their single mouth, in addition to some rock dredges in their major valleys, demonstrates active down-slope flushing.

The continental shelf shows a flat, uniform slope with local and well defined rock outcrops south of Aviles Canyon head. Sedimentary zones are limited, showing thin unconsolidated sedimentary cover.

Strong continental margin water dynamics avoid thicker sediment deposition, being littoral sedimentary dynamics responsible for transport to the canyons heads and conduit to the Biscay Abyssal plain.

Biscay Abyssal Plain shows evidence of a strong westward current affecting the surveyed strip of this more than 10 km wide plain. Presence of two parallel deep sea channels, erosive scarps, and erosion of gully divides on the lower slope, may indicate that this is part of the distal fan at the termination of the large turbiditic system fed by Cap Ferret, Capbreton and other large canyons (Santander, Torrelavega, Lastres and Llanes) to the west of ACS.

© 2013 Elsevier Ltd. All rights reserved.

1. Introduction

Within the framework of the EU-funded INDEMARES (LIFE+) project “Inventory and designation of marine Natura 2000 areas in Spanish sea”, the R/V Vizconde de Eza, of the Spanish Secretariat General of Fisheries (SGP), carried out two cruises in 2010 and 2011 in the Avilés Canyon area, in the central Cantabrian Sea (North Iberian continental margin). During these cruises, R/V Vizconde de Eza mapped 6282 km² of the seafloor of the margin, from 43° 37.60'N to 44° 18.37'N and from 006° 46.75'W to 005° 18.70'W, including continental shelf, continental slope

and a narrow band of abyssal plain attached to the base of the continental slope (Figs. 1 and 2).

The main objective of the investigation was to locate and map possible Vulnerable Marine Ecosystems (VME) and, as the project specifies, “...to increase knowledge on marine species and habitats, their conservation status and threats, and this will make possible the selection and proposal of sites to be included in the existing Natura 2000 network”.

Following the ecosystemic approach, the investigation was multidisciplinary, involving geology–geophysics, biology (benthic and pelagic), ecology and physical oceanography. This paper deals with the geomorphology and shallow structure of the area. Others will publish elsewhere on the results of the sedimentation, biological, oceanographic and ecologic investigations.

The results of this study, in turn, will provide an essential base for the other investigators. For example, knowledge on the configuration

* Corresponding author. Tel.: +34 915107516; fax: +34 915974770.

E-mail address: maria.gomez@md.ieo.es (M. Gómez-Ballesteros).