QUATERNARY MASS-MOVEMENTS ON THE ALMERIA MARGIN AND ADJACENT ALBORAN TROUGH (ALBORAN SEA-SW MEDITERRANEAN)

B. Alonso [1]*, G. Ercilla [1], F. Estrada [1], D. Casas [2], M. Garcia [3], J. T. Vázquez [4], M. Yenes [5] and M. Farran [1]
[1] Instituto de Ciencias del Mar, CSIC, Barcelona (Spain) - belen@icm.csic.es
[2] Instituto Geológico y Minero de España, Madrid (Spain)
[3] Ifremer, Brest (France)
[4] Instituto Español de Oceanografía, Málaga (Spain)
[5] EPS Zamora, Universidad de Salamanca, Zamora (Spain)

Abstract
Based on new multibeam bathymetric data and high and ultrahigh resolution seismic-reflection profiles, different types of mass-movement deposits have been mapped in three geomorphological environments (seamounts, valley walls and open slope) of the Almeria margin and adjacent Alboran Trough. Different factors have been invoked to explain the triggering of theses mass-movements.
Keywords: Alboran Sea, Stratigraphy, Western Mediterranean, Sedimentation, Acoustics

Introduction

Mass-movement deposits of various types and sizes have been described in different sectors of the NW Mediterranean Sea as for example in the Balearic Islands, Ebro margin, and Gulf of Lion (1). But few examples have been studied in the SW Mediterranean Sea (2, 3) in spite of mass-movements represent an important process in shaping its margins. The present study focuses on the Quaternary mass-movement deposits of the Almeria margin and adjacent Alboran Trough in the eastern Alboran Sea (SW Mediterranean) which is a tectonically active area characterised by a complex morphostructure with margins, basins, and seamounts.To analyse the morphologies and distribution of the mass-movements as well as to examine their relationship between sliding and the environment where they occur, a large data set including multibeam bathymetry, ultrahigh resolution seismic profiles (Topas system) and high resolution seismic profiles (Airguns) have been analysed.

Results and discussion

Mass-movements have been identified in three geomorphological environments, seamounts, open slopes, and valley walls in the Almeria margin and adjacent Alboran Trough (Figs.1 and 2).

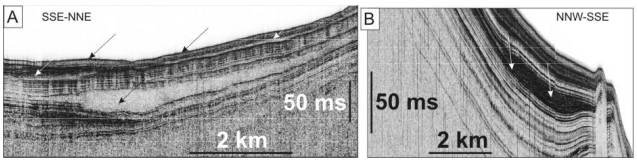

Fig. 1. Topas seismic profiles illustrating the mass movements in (A) the Sabinar Seamount and (B) the open slope environment.

The mass-movement deposits affecting to the seamounts (i) comprise slides scars and slides on the walls (10º-27º) that evolve downslope to mass-flow deposits resting on the slope break. These mass-flow deposits show a lobate shape in plan view and a lenticular geometry in cross-section and acoustically are characterized by semitransparent facies. Within the Quaternary sequence, the lobes of mass-flow deposits are vertically stacked and their size decrease progressively upward suggesting the occurrence of successive episodes of failure and their decrease in importance with time. These mass-movement deposits can be divided into two groups based on their size: small-scale (few km in length) and medium-scale (tens of km in length). The smaller deposits are identified in the Pollux, Sabinar, Gata, Maimonides, El Monsour, Yusuf, and Adra seamounts. With respect to the large-scale mass-movement deposits they have been mapped in the south flanks of the Sabinar and Pollux seamounts (Fig.1A).

In the open slope environment (ii) a buried isolated body of mass-flow deposits has been identified at 800 m water depth, where the slope gradient is about 3º. It is located close to NE-SW La Serrata fault and to WNW-ESE anticline structures, both with surficial expression. This body displays a lenticular shape and seismically is defined by chaotic facies with reflections of high reflectivity that interrupt the lateral continuity of the stratified surrounding open slope deposits (Fig.1B).

In the Almeria canyon-channel mass movement deposits (iii) include mostly slides scars, and mass flow deposits and that are identified on their walls. Here, the occurrence of mass-movement processes is also evidenced by the canyon/channel fill deposits whose seismofacies reveal ancient cut and fills features, and mass-flow deposits (Fig.2).

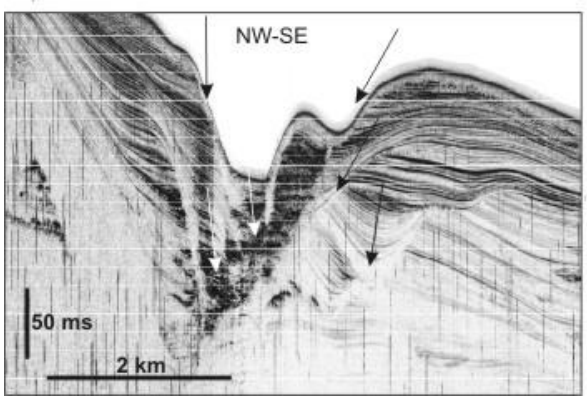

Fig. 2. Topas seismic profile illustrating the mass-movement deposits identified in the walls of the Almeria Canyon.

Different factors have been invoked to explain the triggering of mapped mass-movements. Those deposits in the seamounts and open slope environments result from the interplay of earthquake activity associated to fault activity and/or slope overstepping. While in the canyon-channel environment, the mass-movement deposits are mainly related to the erosion activity and/or the slope overstepping. The different size of the mass- movement deposits in the seamount environment is conditioned by the available run-out distances and their topography profile morphology and slope gradients.

References
1 - Stoker M.S, Evans D. and Cramp A., 1998. (eds.), Geological processes on continental margins: sedimentation, mass-wasting and stability. *Geol. Soc. Spc. Publ.*, 129, pp. 355.
2 - Muñoz A, Ballesteros, M., Montoya, I., Rivera, J., Acosta, J. and Uchupi, E. 2008. Alboran Basin, southern Spain-Part I: Geomorphology. *Mar. and Petrol. Geol.*, 25: 59-73.
3 - Ercilla G., Estrada F., Yenes M., Casas D., Alonso B., Farran F. and SAGAS TEAM., 2009. The Baraza slide, defining its dynamic. International Conference on Seafloor Mapping for Geohazard Assessment. *Ischia Island/Rend. Online Soc, Geol. It.*, pp. 163-165.