EGU2020-18904
https://doi.org/10.5194/egusphere-egu2020-18904
EGU General Assembly 2020

How deep does sand deposits in the Alentejo basin (Gulf of Cadiz) reach? Evaluating slope stability from bottom-current activities through time

Davide Mencaroni[1], Roger Urgeles[1], Jonathan Ford[2], Jaume Llopart[1], Cristina Sànchez Serra[1], Alcinoe Calahorrano[1], Pedro Brito[3], Claudio Lo Iacono[1], Rafael Bartolomè[1], Eulàlia Gràcia[1], Michele Rebesco[2], Angelo Camerlenghi[2], and Benjamin Bellwald[4]

[1]Institut de Ciències del Mar - ICM - CSIC, Marine Geoscience, Barcelona, Spain
[2]Istituto Nazionale di Oceanografia e Geofisica Sperimentale - OGS, Trieste, Italy
[3]Instituto Português do Mar e da Atmosfera - IPMA, Lisbon, Portugal
[4]Volcanic Basin Petroleum Research AS - VBPR, Oslo, Norway

Contourite deposits are generated by the interplay between deepwater bottom-currents, sediment supply and seafloor topography. The Gulf of Cadiz, in the Southwest Iberian margin, is a famous example of extensive contourite deposition driven by the Mediterranean Outflow Water (MOW), which exits the Strait of Gibraltar, flows northward following the coastline and distributes the sediments coming from the Guadalquivir and Guadiana rivers. The MOW and related contourite deposits affect the stability of the SW Iberian margin in several ways: on one hand it increases the sedimentation rate, favoring the development of excess pore pressure, while on the other hand, by depositing sand it allows pore water pressure to dissipate, potentially increasing the stability of the slope.

In the Gulf of Cadiz, grain size distribution of contourite deposits is influenced by the seafloor morphology, which splits the MOW in different branches, and by the alternation of glacial and interglacial periods that affected the MOW hydrodynamic regimes. Fine clay packages alternates with clean sand formations according to the capacity of transport of the bottom-current in a specific area. Generally speaking, coarser deposits are found in the areas of higher MOW flow energy, such as in the shallower part of the slope or in the area closer to the Strait of Gibraltar, while at higher water depths the sedimentation shifts to progressively finer grain sizes as the MOW gets weaker. Previous works show that at present-day the MOW flows at a maximum depth of 1400 m, while during glacial periods the bottom-current could have reached higher depths.

In this study we derived the different maximum depths at which the MOW flowed by analyzing the distribution of sands at different depths along the Alentejo basin slope, in the Northern sector of the Gulf of Cadiz.

Here we show how changes in sand distribution along slope, within the stratigraphic units deposited between the Neogene and the present day, are driven by glacial – interglacial period

alternation that influenced the hydrodynamic regime of the MOW.

By deriving the depositional history of sand in the Alentejo basin, we are able to correlate directly the influence that climatic cycles had on the MOW activity. Furthermore, by interpreting new multi-channel seismic profiles we have been able to derive a detailed facies characterization of the uppermost part of the Gulf of Cadiz.

An accurate definition of sand distribution along slope plays an important role in evaluating the stability of the slope itself, e.g. to understand if the sediments may be subjected to excess pore pressure generation. As sand distribution is a direct function of the bottom-current transport capacity, the ultimate goal of this study is to understand how climate variations can affect the stability of submarine slope by depositing contourite-related sand.