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Seabed morphology along the rocky shore of the Barlavento Coast, southern Portuguese continental shelf

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The coastal area between Galé and Olhos de Água, in the southernmost coast of the Algarve (Portugal) is characterized by shore platforms and sandy beaches where the carbonate rocky cliffs are undergoing a dramatic recession (Marques, 2008; Nunes et al., 2009). Such crenulated coast plays an important morphological control on alongshore drift. In order to understand the sedimentation patterns in this area and characterize the seabed morphology and subsurface geology, a detailed sidescan sonar (100 and 400 kHz) and high-resolution seismic (Chirp Sonar, 05-12 kHz) survey was carried out, complemented with sediment sampling, along the rocky shore of the Barlavento Coast, southern Portuguese continental shelf, in the scope of the EROS project. The acquired data concentrate in two main areas: Olhos de Água and Galé. The sidescan sonar data were processed and analyzed using the integrated Triton perspective software and the mosaics were gridded at a cell size of 0.5 m. 27 seabed sediment grab samples were used to ground-truth the sidescan mosaics and produce a semi-quantitative seabed classification map. The seismic data were processed using the SPW and RadExPro softwares.

Preliminary results show that the seafloor of the area Galé (2.25 km2) is characterized by: (1) a field of ripples that occurs on the flat portions and in the deeper part of the study area between 10 and 18 m depth; these ripples are symmetric, 3-400 m long and have wavelengths up to 2.5 m; most of the ripples can be classified as straight or sinuous in phase, and they are generally sub-parallel to the slope with a NW-SE trending; (2) bedrock outcrops that are present from the coastline until 12 m water depth; and (3) anthropogenic features associated to small scale fishing activities, observed at the border between fine sand with high concentration of shells and low concentration. In the Olhos de Água area (3.1 km2) the seafloor is generally characterized by (1) asymmetrical E-W trending sandwaves in deeper water, changing in NE-SW orientation between 7-8 m depth, superimposed by symmetric ripples with crests perpendicular or sub-perpendicular to the sandwaves crest; these sandwaves are 160-240 m long and their wavelength average 60 m in the deeper part and 35 m in the shallower part; (2) a field of ripples between 5 and 7 m water depth that has similar characteristics to those found in the Galé area; and (3) bedrock outcrops which are present from the coastline until 7 m water depth.

The combined interpretation of the sidescan sonar mosaics with the seismic profiles and the sediment textural analysis allow a detailed interpretative cartography of the seabed morphology, a better understanding of the morphological coastline control on waves and currents propagation and therefore on sediment transference between littoral binds, and to define the closure depth. Additionally, the identification of relict deposits and underwater fans as a result of cliffs erosion provides relevant information on coastline evolution driven by both mean sea level rise and sub-aerial weathering.