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The ALBACORE oceanographic cruise: tectonic and sedimentary processes at distinct temporal and spatial scales in the Alboran Sea

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The Alboran Sea (Western Mediterranean) is a relatively small ocean basin connected with the Atlantic that provides a rich archive of tectonic and sedimentary processes at distinct temporal and spatial scales during the Quaternary. Since the collisional boundary of the Eurasia-Nubia plates crosses the Alboran Sea, this basin is also the locus of active geohazards: the constant seismic activity, concentrated mostly along the Al Idrissi strike-slip fault system and submarine landslides, that can cause tsunami hazards affecting the entire Alboran coasts and damages to submarine cables and infrastructures. Previous understanding of the Alboran Sea has been based on seafloor and subsurface geophysical data of differing resolution and scale, combined with very short sediment coring and IODP and industrial boreholes. In order to obtain new constraints on the geology of the Alboran Sea, the ALBACORE cruise was held in October and November 2021 onboard the R/V Pourquoi Pas? In addition to sites in the northern Alboran Sea targeting contourites, several sites in the southern Alboran Sea were selected as key study areas: the Al-Idrissi active fault zone, the Al-Hoceima shelf, the Xauen/Tofiño and the Francesc Pages banks.

The scientific work of the ALBACORE campaign included the acquisition of Calypso cores (up to 28m long), sampling of consolidated strata with Cnexoville, in situ geotechnical measurements (Penfeld) with a seabed cone penetration test device (up to 50m long), heat flow measurements (up to 6m long), swath bathymetric imaging of the seafloor and water column, and sub-bottom profiling. The total length of sediments recovered reached 734m. Results from the ALBACORE cruise address the following scientific objectives:

- To understand better the causal relationships between the present-day morpho-structural pattern and date Quaternary tectonic pulse and associated sedimentary systems
- To determine the Late Pleistocene-Holocene stratigraphic pattern and the paleo-oceanographic implications of contourites.
- To explore the chronological evolution of cold-water coral mounds and their paleoceanographic and palaeoclimatic signature since the Middle Pleistocene.
- To investigate the causal factors of slope instability processes and evaluate the geological hazard associated with tectonic pulses and fluid seepage.
- To determine the recent high-resolution sequence stratigraphy of the Al-Hoceima shelf in order to decode the late Pleistocene and Holocene sea-level changes at millennial scale.

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