

# A seismic survey in the South Alboran Sea: past and present active sedimentary systems and tectonics

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Since the Tortonian, the thinned continental crust and the overlying sedimentary cover of the Alboran Sea are submitted to tectonic inversion due to the convergence between Eurasia and Africa. The past and present deformation is significant along the Moroccan margin where the MARLBORO-1 cruise in 2011, acquired 1100 km of mid-resolution seismic reflection along 20 profiles perpendicular and parallel to the margin, off Al Hoceima, to latitude 36°N. The study area located on the Xauen/Tofino banks and the South Alboran ridge off Morocco, shows signs of both past and present strong tectonic deformation, submarine landslides, and contourites. The lateral and longitudinal evolution of contourites and Mass Transport Deposits (MTDs) and the geometric relationships between these objects and active tectonic structures have been studied.

In the distal margin, contourites and gravitational instabilities are the depositional systems that best represent the tectonic signal of the area since at least the Messinian,. On the two flanks of the Xauen/Tofino and South Alboran ridge, the sedimentary architecture affected by growth-faults is mainly composed of contourites. Internal strata pattern, spatial and temporal distribution of thickness and depocenters, and discontinuities help to infer sedimentary processes and their interaction with tectonics. In the southern Alboran Sea where the bathymetry shows abrupt slopes, the recurrent seismic activity could induced mass wasting as witnessed by the Mass transport complexes (MTCs). These MTCs originate from escarpments on the edge of the contourites. However, in most cases the seismic reflection data show the depositional bodies of numerous slides and giant-slides linked to the activity of growth-faults and thrusts observed on the Xauen and Tofino Bank's north flanks. Tectonic inversion is recorded since the late Miocene with an acceleration of the uplift and compressional activity evidenced during Messinian. The Xauen/Tofino and Alboran highs have a strong internal complexity with tight folds, thrusts, unconformities, intruded magmatic and mud bodies showing different stages and mode of deformation. Offshore Al Hoceima, between the South Alboran Ridge and the adjacent Tofino Bank, a network of active normal faults and strike-slip faults have been imaged that change in direction close to the Morocco coast.