



## The Alboran Sea revisited

A. Mauffret (1), A. Ammar (2)

1 UMR 7072, Lab Tectonique, Univ. P et M. Curie, Case 129 4 Place Jussieu 75254 Paris  
Cedex 05

2 Departement des Sciences de la Terre Universite Mohamed V, Morocco

The seismic profiles kindly provided by the Office National des Hydrocarbures du Maroc (ONYM) allow us to clarify the tectonic history of the Alboran Sea. This area can be divided into two parts: the eastern part has a shallow calc-alkaline volcanic basement, mainly 12-6 Ma old, whereas the western part is underlain by a very deep basement (14 km), which is old (late Oligocene-early Miocene). There are strong geological and geophysical evidences that the Western Alboran Basin has been formed eastwards of its present position, south of the Balearic Islands. During the Oligocene-early Miocene a subduction zone dips northwards beneath the Balearic Islands where is located the volcanic arc. Therefore, the Western Alboran and probably several Algerian Basins were placed in a forearc position between the volcanic arc and the accretionary prism. Behind the volcanic arc back arcs basins (Provencal and Valencia) opened during the early Miocene and an oceanic crust was generated in the Provencal basin from the middle Burdigalian (20 Ma) to the early Langhian 16 Ma). During the Middle Burdigalian the Algerian Internal Massifs collided with the Africa Plate. However, the Western Alboran Basin has been preserved from this collision. The observations of the Spanish and the Moroccan margins of this basin suggest that the fore-arc underwent an extension coeval to the rifting of the back-arc basins and induced by the rollback of the subduction zone. Therefore, on the top of the accretionary prism the 5 km thick Oligo-Miocene deposits is made of olistostromes, early Miocene overpressured shale and, Late Cretaceous, to Eocene clasts. These clasts and the olistostromes belong to the top of the accretionary prism. After the collision with Africa (16 Ma) the Alboran Block driven by its volcanic arc began its migration towards the west and the Western Alboran Basin is transported in the front of the block. Behind the volcanic arc, which is presently located around Alboran Island and trends N-S, the Algerian

back-arc basin opened between 16 Ma and 8 Ma (late Tortonian) or 6 Ma (Messinian). Then the westwards motion of the volcanic arc stopped and a slab that trends N-S, is imaged by the tomography and outlined by a stripe of intermediate depth (50 to 150 km) earthquakes at the eastern boundary of the Western Alboran Basin. The contact between the Eurasia and Africa (Nubia) convergent plates generates NW-SE compression although the focal mechanisms show a strike-slip and normal regime maybe related to an E-W tectonic escape. Our depth to basement map shows that the Alboran Ridge and the Tofino-Xauen banks are 30 km offset by a left-lateral strike-slip fault that is related to Al Hoceima earthquakes swarm. Between this fault and an offshore extension of the El Jebha fault the Tofino and Xauen banks form a restraining bend where the sedimentary layers of the Western Alboran Basin are folded and uplifted. We traced a main Messinian canyon from the Gibraltar Strait to the Algerian Basin with several tributaries that are affected by the recent tectonics (compressional and mud diapirs).