

## Al Idrissi Active Fracture Zone

**A. Mauffret<sup>1</sup>, A. Ammar<sup>2</sup>, and C. Gorini<sup>3</sup>**

<sup>1</sup> Lab Tectonique, UMR 7072, Case 129, Univ. P. et M. Curie, 4 Place Jussieu, 75252, Paris Cedex 05

<sup>2</sup> Departement de Geologie, Universite Mohamed V Faculte des Sciences, Avenue Ibn Batouta, BP 1014, Rabat, Maroc

<sup>3</sup> Lab. Sedimentologie et Geodynamique, Univ. Lille 1-SN5 F-59655, Villeneuve d'Asq, France

In the center of the Alboran Sea the Alboran Ridge is a complex structure with late Miocene and Pliocene sedimentary layers uplifted along the two flanks and folded. In the core of the anticline late Miocene (9 Ma) volcanic rocks outcrop and form the small island of Alboran. These calc-alkaline volcanic rocks belong to the volcanic arc that extends in a NE-SW direction from Spain (Cabo de Gata Cape) to Morocco (Mellila Peninsula and Ras Tarf). The Messinian erosional surface that has an anticlinal shape is a good marker to estimate the deformation and the shortening is evaluated to 11.7 km. To the southwest the Alboran Ridge becomes narrow then disappears as a continuous feature. A small bank is offset to the south and separated from the Alboran Ridge by a sill. This bank is limited to the northwest and southeast by reverse faults with an opposite vergence. The shortening is estimated to 4 km. To the southwest of the bank the Al Idrissi High that trends NE-SW is in strike with the Ras Tarf volcanic feature. Several normal faults suggest that the Al Idrissi High is a horst with a left-lateral component. The area where the normal faulting is evidenced is offshore of Al Hoceima where the seismicity is very important. The focal mechanisms suggest normal faults and strike-slip faults with normal component. Most of the faults trend NE-SW and this orientation is compatible with a left-lateral motion. However the radar interferometry has shown that the 24/02/2004 earthquake occurred on a conjugate fault with a NW-SE orientation and dextral motion. Only one earthquake has a thrust mechanism at the southern end of the Alboran Ridge and the other part of the ridge is aseismic. The other earthquakes show normal and strike-slip focal mechanisms even in the areas where the compression is evident like the Tofino Bank, whereas the Xauen Bank is aseismic. The Tofino Bank is 30 km offset relative to the Alboran Ridge. The shortening of this structure is 7 km whereas the shortening on the Xauen Bank is only 3.7 km. The two banks formed by two main E-W folds that have been 1.2 km eroded at the flat top of the bankstop and are limited to the north by prominent thrusts. The two banks are offset by a right-lateral fault. The Xauen Bank is mainly formed by sedimentary folded layers and the Jebha well shows that these layers have been originally deposited in the early Miocene Western Alboran Basin and an uplift of 3.5 km is estimated since the Messinian. The Al Idrissi F. Z. is a major crustal structure that trends NE-SW and shows a 30 km left-lateral displacement of the Alboran Ridge. A similar 30 km offset is observed between the Ibn Batouta seamount and the Djibouti Bank. The aeromagnetic map shows clearly the analogy between the two features. Two hypotheses are discussed. In one case the Al Idrissi F. Z. is related to the Carboneras Fault and this fault zone crosses the Alboran Sea. In the second case the Al Idrissi F. Z. is limited to the Alboran Ridge and this fracture may be the boundary of a Rif block moving towards the southwest as suggested by some GPS studies.