

## **Intermediate depth and deep earthquakes: complexity of the Ibero-Magrhebian region.**

Bufo E. (1), Cesca S.(2), M. Bezzeghoud(3), del Fresno C.(4) and Udías, A. (1)

(1) Dpt. Geofísica y Meteorología. Universidad Complutense, Madrid (Spain)

(2) Institute of Geophysics, University of Hamburg, Germany

(3) Dpt. de Física & CGE, Universidade de Évora, Évora (Portugal)

(4) Instituto Geográfico Nacional, Madrid (Spain)

### ***Abstract***

The Ibero-Magrhebian region is located at the plate boundary between Eurasia and Africa and it is a tectonically complex region. A sign of the complexity, is the occurrence of intermediate depth earthquakes ( $40 < h < 150$  km), located in south Spain, between Granada- Malaga and at the west part of Alboran Sea, together with the occurrence of very deep earthquakes ( $h \approx 650$  km) near Dúrcal (Granada). Intermediate depth shocks are mostly confined within a relatively narrow region (50 km width) located East of Gibraltar, extending NNE-SSW from the Malaga (Spain) area to a region offshore the Moroccan coast. We have studied focal mechanisms of these earthquakes from inversion of body wave. The stress pattern in the Ibero-Maghrébian region obtained from solutions of selected shallow, intermediate depth and deep shocks show the complexity of the region. The seismotectonic scheme show horizontal compression in NNW-SSE direction in the Gulf of Cádiz. In northern Africa, the stress pattern changes and it corresponds to strike-slip motion, with extends from west of the Gibraltar Strait until the western Algeria, where in the Oran region the horizontal compression N-S reappears, with a clear domain of the thrusting faults in Algeria. In the Alboran Sea there is horizontal extension in E-W direction for shallow events. The intermediate depth shock located at the western part of the Alboran Sea show a change on the stress pattern: to the west of  $4.5^\circ$ W, focal mechanisms show vertical tension axis, while to the east, they show vertical pressure axis. These stress orientations are not present in deep earthquakes, where the pressure axes dip  $45^\circ$  to the east. The intermediate and deep earthquakes may be related to some kind of subduction or delamination processes, more recent for the intermediate depth shocks and older for the very deep activity.