

by Stephan MUELLER*-

Over the past two years a number of seismological investigations has been carried out in order to elucidate in more detail the nature of the contact between the Eurasian and African plates from the Mid-Atlantic Ridge to the western Mediterranean region. The distribution of seismicity gives a rather clear picture of this contact from the triple junction west of the Azores Islands towards the approaches of the Strait of Gibraltar. There the pattern of seismicity is rather confused and several complications arise.

Since it is quite certain now that the boundary of the two plates cannot be traced through the Strait of Gibraltar - as done previously - other solutions must be sought. One possibility is that the fracture zone extends into Guadalquivir river valley of southern Spain. Another alternative postulates that this zone continues through the South Atlas Mountains of Morocco to the east inferring an offset by a large north-south transform fault whose existence has not yet been confirmed. The suggestion of a small subplate comprising the Alboran Sea and the immediately adjacent regions resolves most of the difficulties. It explains in particular the focal depth pattern around the Alboran Sea.

Extensive seismic refraction studies in the southwestern part of the Iberian Peninsula and along the Atlantic coast of Portugal have shown that the crust dips towards the south and reaches its maximum thickness near the coast of the Algarve. In southern Portugal the crust has been uplifted considerably since Permo-Triassic times. Internally the crust in that part of the Iberian Peninsula is characterized by a pronounced velocity reversal with an indication of fine structure at intermediate depths. As in other areas the focal depths of earthquakes seem to be concentrated near the top and bottom of the zone of velocity inversion.

An attempt has been made to bring the seismic refraction results in accord with the observation based on focal mechanism studies that a continuous change occurs from right lateral strike slip to compressional dip-slip motion along the fracture zone between the Azores Islands and the Strait of Gibraltar. The obvious explanation

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is that the Iberian sub-plate is underthrust under the African plate and the Gibraltar arc - contrary to earlier postulates in the literature.

The present evidence from surface-wave dispersion measurements suggests that the lithosphere thickens notably as the coast of the western Mediterranean basin is approached from the continental side of the Eurasian plate. Its thickness then must drop rapidly to about half the value it has under the margin of the basin. At the same time the asthenospheric channel in the upper mantle becomes much more intensive in thickness and velocity contrast.