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Active tectonics and related stress fields of northern Libya

A. Ben-Suleman
Geophysics Department-Al-Fateh University
(abdunnurs@yahoo.com / Phone: 0925025390)

Libya, located on the central Mediterranean margin of the African shield, covers platform containing a number of intra-cratonic basins. The northern part of Libya, including its offshore area, is one of the few remaining parts of the Mediterranean regions where present-day tectonic deformation has not already been resolved. In this study, the seismic activity and the seismotectonics of this region are investigated. Libya is usually not considered as seismically active; however, the country has experienced earthquakes of magnitude greater than 6 in the past. Most of the seismic activity located in the northern on-/off-shore areas, with noticeable seismic clusters. The first located in the northwestern onshore part of the country and concentrates along the NW-SE trending Hun Graben. A second cluster of seismicity is located in the offshore area in extension of the first one. Another region of noticeable seismic activity located in the northeastern part of the country known as Cyrenaica platform. In the northwestern on-/off-shore region the large number of strike-slip earthquakes suggest that the existing normal faulting is being reactivated in a stress regime related to the convergence of the African plate with the Eurasian plate. Inversions of six focal mechanisms for northwestern Libyan earthquakes for stress directions suggest a near horizontal (plunge=15^0) maximum compressive stress oriented N97^0E and a minimum compressive stress with strike and plunge of 195^0 and 25^0, respectively. Focal mechanisms in the northeastern Libya earthquakes have a wide range of P-axis, with a common dip-slip faulting and a N-S to NE-SW trending P axes. In the northeastern part of the country, the stress direction changes to a more NE-SW orientation, as evidenced by the 1963 Al-Maraj and the 1967 Al-Jabal Al- Akhdar mainshocks. There also appears to be a change in the stress regime across Libya. While a strike-slip faulting is dominant in the northwestern part of Libya, the dip-slip faulting is more

prevalent in northeastern part of the country. The relatively aseismic central portion of the Sirt Basin rift system appears to divide these stress regimes.