

Spatial distribution of the seismicity parameters in the Red Sea regions

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Abstract

The spatial distribution of the seismicity parameters of the magnitude-frequency relation has provided preliminary quantitative basis for establishing different zones of seismic activities in the southern Red Sea regions. Four zones were constructed from application of proposed models that yielded approximate b value range for each zone, thus, providing relative bases for preliminary classification as follows: zone III has b value ≤ 0.6 ; zone II has b value ≤ 0.8 ; zone I has b value ≤ 1.0 ; and zone 0 has b value > 1.0 . The zones were characterized through correlation to seismotectonic and some geophysical configuration in the study area. Narrow contour spacing among zones are observed to occur along intersections of areas of probably different seismic source zones, while wider spacing occurs seemingly for a prominently dominating source of seismic activity. Corresponding spatial distribution of estimated maximum magnitude and expected magnitude at 90% non-exceedance in 50 years were prepared. Likely occurrence of a major earthquake is spread over a wider area of coverage which are characterized by presence of rift zones, structural discontinuities, and dislocations in the study area. Broad confidence limits for the parameter values are encountered, but correlation to primary tectonic structures are seen to be possible.

Comparison of the present results to previous relevant studies indicates general agreement with regards to tectonics and related phenomena. The spatial distribution of the parameters seemed to provide appropriateness as basis of analysis to the observed complexities of seismic occurrences in the Red Sea and adjacent shield areas.