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Title: Fractal Dimension and b-value Mapping in the Northeast India Regior Seismotectonic Implications

Abstract:

The northeast India and the adjoining areas, latitude 240-280N and longitude 890-980E, fall in the most intense seismic zone of India1 .T great earthquakes (M> 8.0), the 1897 great Shillong earthquake (M 8 the 1950 great Assam earthquake (M 8.7), occurred in this region. Th Himalayan arc binds the region to the north and the Burmese arc to t An attempt has been made to map the fractal dimension and the b-va using teleseismic and local microearthquake data. The earthquake phenomenon possess non-linear relation with respect to space and magnitude . The earthquake epicentres in space are represented by s similar mathematical construct, the fractal , and the scaling paramete called fractal dimension. The fractal dimensions are estimated using t correlation dimension. The correlation integral is related to the standa correlation function as : C(r) ~ rD2, where C(r) is the correlation func and D2 is the fractal dimension, more strictly the correlation dimensic Using this relation the D2 of spatial distribution of the earthquakes ar estimated. In frequency – magnitude relation of earthquakes, which displays a power law, the b-value is estimated by the maximum likeli method : b = log10e / M-M0, where M = average magnitude, and M0 lower limit or threshold magnitude3 . In order to map b and fractal dimension, the study area was grided at 20 with an over lapping of 1(teleseismic events, and at 10 with an over lapping of 0.50 for the microearthquake events. The b-value maps clearly depict the spatial variation of earthquake frequency in the region. The higher b-value c are observed in the Indo-Burma ranges, Kopili fault and in the Shillon Plateau, and the lower contours in the upper Assam valley. The NW-S of higher b-value along the Kopili fault is most prominent, and it exte from the Mikir Hills to Arunachal Himalaya. The Indo-Burma ranges al a NW-SE trend of higher b-value contour, and it extends in the dip dir of the subducted Indian plate. The estimated fractal dimensions (1.1(1.80) suggest that the faults are spatially distributed in the whole reg and the whole region is seismically active. A positive correlation betw and D2 is observed. The higher D2 values in the Kopili fault (1.65 – 1 indicate more heterogeneity possibly due to the deep-rooted seismog Kopili fault4, a transverse structure to the Himalayan trend. The highe values in the Indo-Burma ranges (1.70 – 1.80) indicate clustering of epicentres in 2-D space due to greater stress concentration. The max