

D-30 Exponential distribution of brittle fracture lineaments in the basement of Sri Lanka

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The crystalline crust of Sri Lanka is criss-crossed by a network of lineaments. In order to understand the nature and the distribution of the fracture lineaments of Sri Lanka, a detailed analysis was undertaken on the satellite imagery (MSS, Band 7, scale: 1:100,000), covering the area demarcated by Puttalam, Kalutara, Kumana and Kalkudah. Lineaments of ductile origin were excluded in this study.

The analysis shows that the fracture lineaments make about 7 sets oriented in the directions of NNW-SSE, NNE-SSW, NW-SE, NE-SW, WNW-ESE, ENE-WSW and E-W. Over 4,300 lineaments with lengths varying from 1.2 km to over 100 km were traced. About 73% of them were shorter than 10 km, and only about 0.5% were longer than 50-100 km. The length of the rest vary between 10 and 50 km. Longer lineaments with a low density were found in low elevated areas and smaller ones with a higher density were located in high elevated areas.

Field studies show that these lineaments are zones of sub-parallel brittle fractures, joints and faults and that they post-date the large-scale folds.

The length-frequency distributions of the total lineaments and lineaments of different sets showed near exponential distributions as shown by the equation:

$$f = A.e^{-Bl}$$

where f is the frequency, l is the length, and A and B are constants. The NNW-SSE and E-W lineaments showed no such relationship. Longer fracture

lineaments may have formed at somewhat deeper levels in the crust and may have propagated simultaneously upwards and laterally. The vertically propagated lineaments could have been segmented into branches as they reached the surface, possibly due to changes in the orientation of principal stresses. It is shown that the upward branching or forking of the lineaments may be attributed to the exponential length-frequency distribution