



## **Earthquake Hazard Assessment Based on Geological Data: An approach from Crystalline Terrain of Peninsular India**

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Peninsular India was for long considered as seismically stable. But the recent earthquake sequence of Latur (1993), Jabalpur (1997), Bhuj (2001) suggests this region is among one of the active Stable Continental Regions (SCRs) of the world, where the recurrence intervals is of the order of tens of thousands of years. In such areas, earthquake may happen at unexpected locations, devoid of any previous seismicity or dramatic geomorphic features. Even moderate earthquakes will lead to heavy loss of life and property in the present scenario. So it is imperative to map suspected areas to identify active faults and evaluate its activities, which will be a vital input to seismic hazard assessment of SCR area.

The region around Wadakkanchery, Kerala, South India has been experiencing micro seismic activities since 1989. Subsequent studies, by the author, identified a 30 km long WNW-ESE trending reverse fault, dipping south ( $45^\circ$ ), that influenced the drainage system of the area. The macroscopic and microscopic studies of the fault rocks from the exposures near Desamangalam show an episodic nature of faulting. Dislocations of pegmatitic veins across the fault indicate a cumulative dip displacement of 2.1m in the reverse direction. A minimum of four episodes of faulting were identified in this fault based on the cross cutting relations of different structural elements and from the mineralogic changes of different generations of gouge zones. This suggests that an average displacement of 52cm per event might have occurred for each event. A cyclic nature of faulting is identified in this fault zone in which the inter-seismic period is characterized by gouge induration and fracture sealing aided by the prevailing fluids. Available empirical relations connecting magnitude with displacement and rupture length show that each event might have produced an earthquake of magnitude  $\geq 6.0$ , which could be a damaging one to an area like peninsular India. Electron Spin Resonance dating of fault gouge indicates a major event around 430ka. In the present stress regime this fault can be considered as seismically active, because the orientation of the fault is favorable for reactivation.