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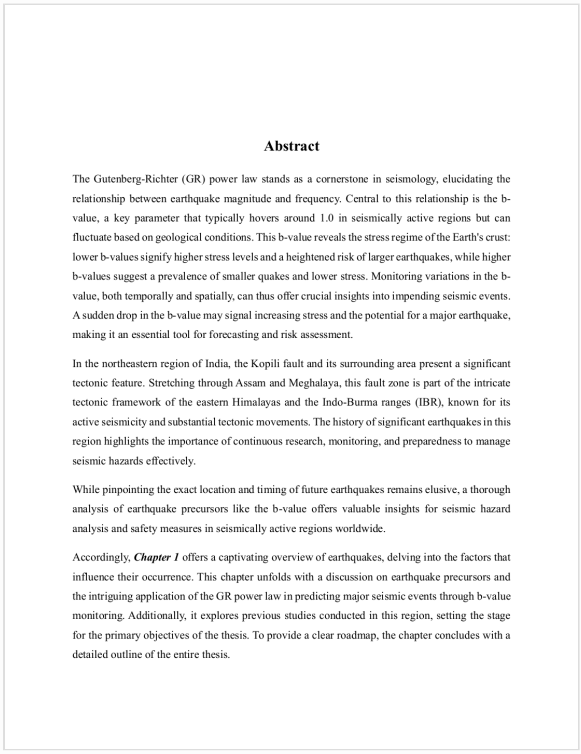

Abstract

The Gutenberg-Richter (GR) power law stands as a cornerstone in seismology, elucidating the relationship between earthquake magnitude and frequency. Central to this relationship is the b-value, a key parameter that typically hovers around 1.0 in seismically active regions but can fluctuate based on geological conditions. This b-value reveals the stress regime of the Earth's crust: lower b-values signify higher stress levels and a heightened risk of larger earthquakes, while higher b-values suggest a prevalence of smaller quakes and lower stress. Monitoring variations in the b-value, both temporally and spatially, can thus offer crucial insights into impending seismic events. A sudden drop in the b-value may signal increasing stress and the potential for a major earthquake, making it an essential tool for forecasting and risk assessment.

In the northeastern region of India, the Kopili fault and its surrounding area present a significant tectonic feature. Stretching through Assam and Meghalaya, this fault zone is part of the intricate tectonic framework of the eastern Himalayas and the Indo-Burma ranges (IBR), known for its active seismicity and substantial tectonic movements. The history of significant earthquakes in this region highlights the importance of continuous research, monitoring, and preparedness to manage seismic hazards effectively.

While pinpointing the exact location and timing of future earthquakes remains elusive, a thorough analysis of earthquake precursors like the b-value offers valuable insights for seismic hazard analysis and safety measures in seismically active regions worldwide.

Accordingly, ***Chapter 1*** offers a captivating overview of earthquakes, delving into the factors that influence their occurrence. This chapter unfolds with a discussion on earthquake precursors and the intriguing application of the GR power law in predicting major seismic events through b-value monitoring. Additionally, it explores previous studies conducted in this region, setting the stage for the primary objectives of the thesis. To provide a clear roadmap, the chapter concludes with a detailed outline of the entire thesis.

Frequency magnitude distribution of large earthquakes with special reference to Kopili fault and surrounding regions of NER, India

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