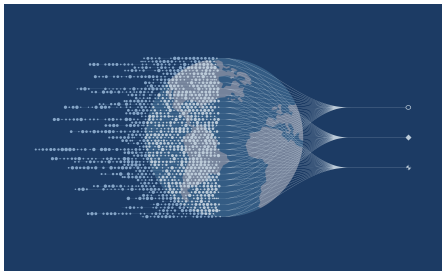

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Seismic Study of North Sulawesi Indonesia : b-Value, z-Value, and Earthquake Recurrence Time

The aim of this research is to explore seismic activity in the North Sulawesi Indonesia, which lies within the Pacific Ring of Fire and is highly susceptible to significant earthquakes and tsunamis. The study involved calculating and mapping the distribution of b-values and z-values, as well as identifying the recurrence times of earthquake events. The earthquake data used were sourced from the United States Geological Survey catalog for the years 1925–2024 (100 years) and use ZMap Version 7 to analyse the data. This research found that the b-value ranged from 0.7 to 1.3, with lower values indicating the dominance of major earthquakes in subduction zones or areas of high stress accumulation. The study also found that the z-value ranged from -0.3 to -0.7, reflecting increased small earthquake activity, such as aftershock clusters or background seismicity, due to local stress release. The region has the potential for large earthquakes (M > 7.0), which are projected to occur every 50 years, while extremely large earthquakes (M > 8.0) have a recurrence time of around 150 years. Based on these findings, high risk zones can be identified by integrating these parameters, providing essential insights for seismic risk mitigation in disaster prone areas.

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