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linked to magmatism: The 2024 earthquake sequence in the Fentale volcanic zone, Northern Main Ethiopian Rift

From 27 September to 2 November 2024, a sequence of moderate earthquakes (magnitudes 4.2 to 5.3) occurred in the Fentale volcanic zone, Northern Main Ethiopian Rift. This region is characterized by active magmatism and volcanism, making it a critical area for studying tectono-volcanic interactions. The seismic events were localized near Fentale, an active stratovolcano, suggesting a potential relationship between fault activity and magmatic processes. Preliminary analysis shows that the earthquakes were concentrated within a narrow zone, likely influenced by magma migration beneath the surface. This seismic sequence may indicate fault slip triggered by magmatic intrusions, providing insights into the dynamic interplay between tectonics and volcanism in the rift system. Key parameters such as hypocentral locations, focal mechanisms, and temporal clustering were used to investigate faulting and stress orientations in the area. The findings contribute to the understanding of rift-related seismicity and volcanic hazard assessment in Ethiopia. Given the proximity of human settlements and infrastructure to the Fentale volcanic zone, these results highlight the need for continuous monitoring and enhanced risk mitigation strategies in the region.

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