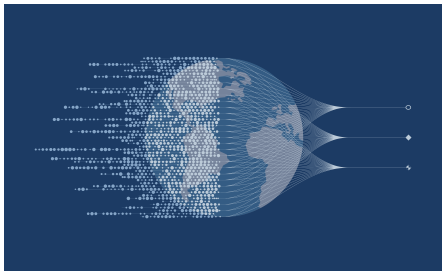

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# of ETAS Parameters and Their Relationship with Physical Processes for Earthquake Forecasting in Africa

Seismicity of Africa is moderate by global standards, primarily due to limited recorded earthquakes. However, moment-magnitude Mw larger than 6.0 events frequently occur along poorly understood fault lines, posing significant risks, such as the Mw 6.9 Moroccan earthquake on 8 September 2023. This underscores the urgent need to improve earthquake forecasting on the continent.

Epidemic-Type Aftershock Sequence (ETAS) models, which estimate seismic clustering in space, time, and magnitude, offer the best solution to this challenge but are hampered by catalog deficiencies, particularly in regions with sparse seismic networks. ETAS parameters may also reflect the spatial variability of crustal geophysical properties. However, tailored ETAS estimates for Africa are currently lacking.

To address this, we divided Africa into subregions and fitted ETAS models to earthquakes in each one. Parameters were compared across subregions and correlated with crustal properties. Results showed significant regional variability, particularly in parameters describing aftershock productivity (α), temporal decay (c), and spatial distribution (d, γ), likely influenced by missing events in the catalog. Positive correlations were observed between the aftershock decay parameter p, heat flow, and the compressional-to-shear wave velocity ratio, while a negative correlation was noted with Curie depth. These findings provide a foundation for operational earthquake forecasting in Africa.

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