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Mechanism of the 26s and 28s Tremors in the Gulf of Guinea from Statistical Analysis of Magnitudes and Event Intervals

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The Earth is a dynamic planet with abundant vibrating processes. Besides the earthquakes, volcanos and other activities, there is a special type of source called a persistent localized microseismic source, with long period almost harmonic signals and fixed location. The 26s (0.038Hz) and 28s (0.036Hz) tremors in the Gulf of Guinea are two typical persistent localized microseismic sources in the world, but their generation mechanisms are still enigmatic. Moreover, understanding the behaviors of these two sources helps to reduce their interference in ambient noise tomography. We implemented an algorithm to detect events in the persistent localized microseismic signals for the past 30 years, and then performed statistical analysis of magnitude-cumulative number and interval time-number. We found that the magnitude distribution is similar to the Gutenberg-Richter relation (G-R relation or power law) and the distribution of interval between events is consistent with a Poisson process. We propose that the two sources are probably related to underground complex crack networks featuring fractal characteristics and are dominantly driven by temporally random dynamic processes. However, ocean swell might affect the 26s source occasionally while the primary microseism seems to modulate the two persistent localized microseismic sources.

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Promotional text

There is a special type of sources called persistent localized microseismic source (PL) with long-period almost harmonic signals and fixed location on the earth. Two PL sources in the Gulf of Guinea are probably related to underground complex crack networks.

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