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Source location and evolution of the 26 s microseism from 3-C beamforming

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The interest in ambient noise has increased in the recent years due to its applications in imaging and monitoring the subsurface without the use of an active source. One of the major unknowns in this field is the origin of the noise used for these analyses. Better constraints on the location and behavior of noise sources will help us understand the ocean-solid Earth interaction processes driving them and improve our applications of ambient noise. One of the most enigmatic noise sources is the 26 s microseism. This very monochromatic source has been identified in the 1960's and seems to come from a fixed location in the Gulf of Guinea. The source mechanism of this signal is unknown.

To investigate the origin and physical mechanisms responsible for the 26 s microseism, data from permanent broadband stations in Germany, France and Algeria, and temporary arrays in Morocco and Botswana is used for spectral analysis and 3-component beamforming. The source exhibits a strong temporal variation in spectral amplitude. The signal is not always detectable, but occasionally it becomes so strong it can be detected on stations all around the world. Such burst events can last for a couple of hours up to a couple of days. From January to April 2013, the peak was detected globally 28 percent of the time. The beamforming results confirm that the energy is coming from the Gulf of Guinea, as shown in previous studies, and the direction is temporally stable. Whenever the signal is detectable, both Love and Rayleigh waves are generated. Looking into the 26 s microseism over different time periods and using different arrays, the source is expected to be temporally stable in frequency and location, but varying in energy.