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## Strain to Ground Motion Conversion of DAS Data for Earthquake Magnitude and Stress Drop Determination

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The use of Distributed Acoustic Sensing (DAS) presents unique advantages for earthquake monitoring compared with standard seismic networks: spatially dense measurements adapted for harsh environments and designed for remote operation. However, the ability to determine earthquake source parameters using DAS is yet to be fully established. In particular, resolving the magnitude and stress drop, is a fundamental objective for seismic monitoring and earthquake early warning. To apply existing methods for source parameter estimation to DAS signals, they must first be converted from strain to ground motions. This conversion can be achieved using the waves' apparent phase velocity, which varies for different seismic phases ranging from fast body-waves to slow surface- and scattered-waves. To facilitate this conversion and improve its reliability, an algorithm for slowness determination is presented, based on the local slant-stack transform. This approach yields a unique slowness value at each time instance of a DAS time-series. The ability to convert strain-rate signals to ground accelerations is validated using simulated data and applied to several earthquakes recorded by dark fibers of three ocean-bottom telecommunication cables in the Mediterranean Sea. The conversion emphasizes fast body-waves compared to slow scattered-waves and ambient noise, and is robust even in the presence of correlated noise and varying wave propagation directions. Good agreement is found between source parameters determined using converted DAS waveforms and on-land seismometers for both P- and S-wave records. The demonstrated ability to resolve source parameters using P-waves on horizontal ocean-bottom fibers is key for the implementation of DAS based earthquake early warning, which will significantly improve hazard mitigation capabilities for offshore and tsunami earthquakes.