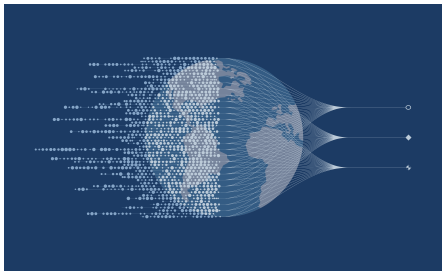

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near-source physical parameters of buried explosion sources using deep learning

Characterizing seismic sources is critical to accurately constraining important seismic source features of interest. Many factors affect seismic far-field waveforms (FFWFs) used for source characterization, including physical characteristics near the source, such as emplacement or ground material properties. How near-source characteristics and the methods with which we estimate source features affect FFWFs, however, is poorly understood, especially when considering near-source, nonlinear effects. We present our progress in developing deep learning methods to characterize near-source characteristics, including emplacement, ground material, yield strength, and fracture pressure. We outline our workflow for training data generation, where we use a nonlinear shock physics code coupled to a linear wave propagation code to simulate buried chemical explosions and the FFWFs they generate at the local scale (<~700 m distance). We vary numerous factors, including source depth, chemical explosion size, and receiver locations, in addition to the physical near-source characteristics we aim to characterize. We demonstrate success in our preliminary development of deep learning models for near-source characterization of emplacement, ground material, yield strength, and fracture pressure, and we discuss potential areas for improvement.
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