Detection and clustering of seismic events in continuous seismic data with scattering transform

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We develop a strategy suitable for unsupervised detection and clustering of seismic events in continuous seismic data. We propose to tackle the feature selection problem with using the deep scattering transform framework. This transform consists in a deep neural network with analytically-defined filters, and have shown to perform high-quality classification on images and audio signals. The strength of this strategy is that no prior knowledge is needed to perform the clustering, the definition of relevant features are straightforward and the features contain information over several times scales (from seconds to several minutes). We apply our method to the June 2017 landslide that occurred in Nuugaastiaq, Greenland, to a single seismic station located at 30 km from the landslide. Among the recovered clusters, the methods reveals seismic precursors to the landslide that were previously reported. We end up with a decomposition of the continuous waveforms into intelligible clusters that can lead to a better understanding of the physical process of the landslide.