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Industrial applications of ambient seismic noise imaging and monitoring

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Over the last decade ambient seismic noise correlations has become an increasingly popular method to image and monitor the earth on a crustal scale. In recent years the method has slowly been adopted and used in industrial and other small-scale applications. In this presentation I will show our efforts in using the method to image and monitor underground and open-pit mines, carbon capture and storage (CCS) sites, earthen dams, underground nuclear storage facilities and other geotechnical areas. The presentation will discuss the differences in the data collected in these environments compared to that of crustal seismology and also address the modifications required to the standard processing workflow to account for these differences. In particular the presence of persistent mechanical noise sources can retard or even prevent the retrieval of the seismic Green's functions between sensors, unless drastic modifications to the processing workflow are adopted. The use of ambient seismic noise correlations has enabled time-lapse monitoring in industrial environments where conventional seismic monitoring (or other geophysical methods) has not been very successful.