

Distributed acoustic sensing: opportunities, challenges, and data highlights from railway installations in Austria

Fuchs, Florian

Sensonic GmbH R&D team, Bahnhofstraße 57a, A-4780 Schärding, Austria.

Distributed Acoustic Sensing (DAS) is an emerging technology showing huge potential for seismological applications. The opportunities that rise from having a distributed vibrational sensor with meter-scale sampling over tens of kilometres may revolutionise the way we look at seismic wavefields. DAS may provide new and unprecedented observational windows for both imaging and monitoring the Earth's surface and subsurface. However, the amount of data generated by current DAS systems also introduces new challenges and requires intelligent and innovative data handling and analysis. At Sensonic GmbH we are global pioneers in applying DAS technology for railway applications. Using both anthropogenic and natural seismic signals we infer relevant information about trains, railways, and natural hazards in real-time. Here we introduce some of our current activities, and highlight several seismic events recorded by our installations in Austria, including earthquakes in Upper Austria and blasts from the Semmering tunnel construction site. Earthquakes recorded by our DAS systems highlight the amount of detail that is contained in the seismic traces, such as near surface reflections or refracted waves. At the same time the earthquake records reveal new challenges regarding the limited directional sensitivity of fiber optic sensors. We also highlight the struggles that originate from the huge amounts of data that we are collecting: a single DAS device collects 10 times more samples per second than all seismometers worldwide.