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Publication date:
2020-05

Permanent link:
https://doi.org/10.3929/ethz-b-000461812

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Originally published in:
EGUsphere, https://doi.org/10.5194/egusphere-egu2020-8225

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EGU2020-8225
https://doi.org/10.5194/egusphere-egu2020-8225
EGU General Assembly 2020
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Urban Distributed Acoustic Sensing Using In-Situ Fibre Beneath Bern, Switzerland

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Anticipating the risks natural hazards pose to an urban environment requires an understanding of the shallow Earth structure of the region. While urban infrastructure often hinders the deployment of a traditional seismic array, Distributed Acoustic Sensing (DAS) technology facilitates the use of existing telecommunication fibre-optic cables for seismic observation, with spatial resolution down to the metre scale.

Through collaboration with the SWITCH foundation, we were able to use existing, in-situ fibres beneath Bern, Switzerland for seismic data acquisition over two weeks, covering a distance of 6 km with a spatial resolution of 2 m. This allowed for not only real-time visualisation of anthropogenic noise sources (e.g. road traffic), but also of the propagation of resulting seismic waves.

Data is analysed in the time and frequency domain to explore the range of signals captured and to assess the consistency of data quality along the cable. The local velocity structure can be constrained using both noise correlations and deterministic signals excited by traffic.

Initial results reveal the ability of DAS to capture signals over a wide range of frequencies and distances, and show promise for utilising urban DAS data to perform urban seismic tomography and hazard analysis.