EGU22-11864
https://doi.org/10.5194/egusphere-egu22-11864
EGU General Assembly 2022

Distributed Acoustic Sensing in the Athens Metropolitan Area: Preliminary Results

Krystyna T. Smolinski[1], Daniel C. Bowden[1], Konstantinos Lentas[2], Nikolaos S. Melis[2], Christos Simos[3], Adonis Bogris[4], Iraklis Simos[4], Thomas Nikas[5], and Andreas Fichtner[1]

[1]Institut für Geophysik, ETH Zürich, Zürich, Switzerland (krystyna.smolinski@erdw.ethz.ch)
[2]Institute of Geodynamics, National Observatory of Athens, Athens, Greece
[3]Department of Physics, University of Thessaly, Lamia, Greece
[4]Department of Informatics and Computer Engineering, University of West Attica, Athens, Greece
[5]Department of Informatics and Telecommunications, National and Kapodistrian University of Athens, Athens, Greece

Once a niche technology, Distributed Acoustic Sensing (DAS) has gained increasing popularity over the last decade, due to its versatility and ability to capture extremely dense seismic datasets in a wide range of challenging environments. While DAS has been utilised in some particularly remote locations, such as on glaciers and volcanoes, it also holds a great deal of potential closer to home; beneath our cities. As DAS is able to be used with existing telecommunication fibres, urban areas contain huge potential networks of strain or strain-rate sensors, right beneath our feet. This data enables us to monitor the local environment, recording events such as earthquakes, as well as characterising and monitoring the shallow subsurface. DAS experiments using dark fibres are unintrusive and highly repeatable, meaning that this method is ideal for long-term site monitoring.

In collaboration with the OTE Group (the largest telecommunications company in Greece), we have collected urban DAS data beneath North-East Athens, utilising existing, in-situ telecommunication fibres. This large dataset contains a wide range of anthropogenic signals, as well as many seismic events, ranging from small, local events, to an internationally reported Magnitude 6.4 earthquake in Crete.

We conduct a preliminary analysis of the dataset, identifying and assessing the earthquake signals recorded. This will be compared with the event catalogue of the local, regional network in Athens, to determine our sensitivity to events of different magnitudes, and in a range of locations. We hope to gain an understanding of how DAS could be combined with the existing network for seismic monitoring and earthquake detection.

Moving forward, we aim to also apply ambient noise methods to this dataset in order to extract dispersion measurements, and ultimately invert for a shallow velocity model of the suburbs of Athens.