Geophysical Research Abstracts
Vol. 21, EGU2019-17699, 2019
EGU General Assembly 2019

Exploring Fibre-Optic Distributed Acoustic Sensing for Shallow Underwater Applications

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Fibre-Optic Distributed Acoustic Sensing (FO-DAS) transforms up to tens of kilometres of fibre-optic in a meter spaced array of microphones simultaneously measuring. Being the sensing element (i.e. the fibre-optic) relatively inexpensive, barely invasive, and long-lasting once deployed, such technology has immediately revealed a huge potential and promoted itself as a real game changer. Initially exploited by the Oil & Gas industry mainly for geophysical characterization of deep reservoirs, in the last few years FO-DAS has become more accessible to universities and research centres, making possible to investigate a handful of new applications in several sectors, including the environmental.

Silixa Ltd, manufacturer of the fibre-optic intelligent Distributed Acoustic Sensing (iDAS) system, has collaborated with Deltares to investigate the ability and the sensitivity of the iDAS to detect and track sound generated by different underwater sound sources. A series of trials have been performed in an indoor water pool set-up at Deltares' premises, equipped with a fast drainage system and water level control to simulate water movements. Different fibre-optic cables have been deployed both linearly and tightly wrapped around pipes (to increase the spatial resolution along the pipe direction) in the sediments at the bottom of the water pool, and connected together for a total length of 1.2km, to be measured simultaneously by the iDAS during the tests.

Geophysical analysis of the different tests will be presented, along with some of the most meaningful results and with speculations about if/how iDAS applied in real shallow underwater environments could lead to critical benefits to the monitoring of canals, waterways and harbours.