

# Advances in Distributed Acoustic Sensing for Applications in the Earth Sciences

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Over the past decade, distributed acoustic sensing (DAS) has evolved from a novel to established tool in the earth sciences with still ever-expanding applications. The adoption of DAS for geophysical investigations has been facilitated by advanced optoelectronic architectures with amplitude and phase coherent, broadband measurement capability over a few tens of kilometers. The development of high precision engineered sensing fiber and associated DAS systems has allowed DAS system noise for an individual sensing channel to match that of point sensors. The inherent capabilities of DAS for monitoring and characterization of earth processes have generated an increasing level of interest in retrofitting DAS to existing optical fiber infrastructure to create vast terrestrial sensing arrays. A suite of methods has been recently developed that further expand sensor range and coverage, offering a significant capability and economic improvement for both retrofit and new infrastructure installations. The application of range extending methods for interrogation of dark fiber networks is discussed. Based on these developments, the next few years are expected to mark an era of rapidly expanding adoption of DAS, with exciting opportunities and challenges on the horizon for maximizing value from spatially and temporally expansive data.

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