ID: **O3.1-384** Type: **Oral**

Optical Fiber Sensing and its Potential Application for IMS Hydroacoustic Stations

Wednesday, 30 June 2021 15:20 (15 minutes)

Distributed optical fiber sensors (DOFSs) utilize specialized source and detection systems to convert optical fibers into linear arrays of sensors. Since early experiments in the 1980s, a range of methodologies has been developed to sense a diverse set of variables with varying sensitivities and precisions based on communication-grade as well as purpose-built optical fiber cables. Over the last decade, methods have been developed that use existing telecommunications cables to measure seismic, acoustic and temperature signals with surprising sensitivity, to sub-meter spatial resolution in some cases and with cable runs greater than 100 km in others. We review three principal techniques used to derive these measurements, together with their strengths and weaknesses, performance trade-offs, and system and environmental implementation constraints. We provide examples of existing and planned subsea implementations, and discuss the potential application of such technologies for integration into IMS hydroacoustic system sensor packages or as additional science sensors.

Promotional text

The fundamentals and applications of distributed optical fiber sensors (DOFSs) are reviewed in light of their potential for integration into IMS hydroacoustic systems.

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Session Classification: T3.1 - Design of Sensor Systems and Advanced Sensor Technologies

Track Classification: Theme 3. Verification Technologies and Technique Application: T3.1 - Design of Sensor Systems and Advanced Sensor Technologies