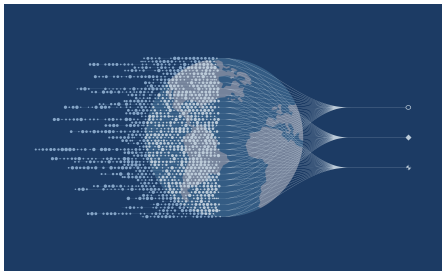

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Cover Monitoring with Distributed Acoustic Sensing (DAS)

Ice cover monitoring has been recognized as a critical task in environmental studies for hazard mitigation and critical alerts reporting. Current observation methods of changeable ice thickness often fall short in terms of accuracy, completeness, and cost-efficiency. Distributed acoustic sensing (DAS) uses fiber optic cables as sensitive elements and presents a promising alternative to the traditional point based seismic deployments providing affordable capabilities for real-time ice cover monitoring over extended areas, specifically, along the coastlines.

We report our experimental results aimed at evaluating the efficiency of the DAS system for ice active monitoring at the Klyazma Reservoir. The study involves comparison of the DAS hardware performance with the co-located geophones in reconstruction of dispersion curves for flexural-gravity waves by using data analysis based on inversion methods. Inferred dispersion presents a snapshot of the ice condition, its thickness and elastic properties.

The DAS monitoring approach consents application of both active (source based) and environmentally friendly passive monitoring techniques based on the ambient noise imaging. The results indicate that the DAS system can effectively capture temporal changes of the ice properties, thus contributing to the environmental monitoring and providing information to develop resilience strategies in response to climate changes.

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