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## Measuring floating ice thickness with optical fibers and DAS, a test case study on a frozen mountain lake.

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Accurate monitoring of floating ice thickness is an important safety issue for northern countries where lakes, fjords, and coasts are covered with ice in winter, and used by people to travel. For example in Finland, 15-20 fatal accidents occur every year due to ice-related drowning. We have explored the potential of fiber optics to measure the propagation of seismic waves guided in the ice layer, in order to infer its thickness via the inversion of the dispersion curves. An optical fiber was deployed on a frozen lake at Lacs Roberts (2400m) above Grenoble and we measured with a DAS the signal generated by active sources (hammer) and ambient noise. We demonstrate that we can retrieve the ice thickness. This monitoring method could be of interest since the deployment of a fiber on ice is quite simple (e.g. using a drone) compared to other techniques for ice thickness estimation such as seismic survey or manual drilling.