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Sudden disappearance of winter ice from Caldera Lake Öskjuvatn, Iceland

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The caldera Lake Öskjuvatn lies in the remote Dyngjufjöll Mountains in Iceland's interior. The lake is at 1050 m elevation, it is 11 km² and 217 m deep. The lake developed after an eruption in 1875. From 1921 to 1926 there were volcanic eruptions in and around the lake. The lake is cold but thermal activity at has been observed at 80 m depth which generally maintains a small opening in the winter ice. There are furthermore several warm marginal springs and seeps (Ólafsson 1980). In February 2012 remote sensing data unexpectedly revealed progressively disappearing ice cover which resulted in Lake Öskjuvatn being totally ice-free by late March. This normally occurs in late June. We investigated the ice-free lake in early April 2012 and again when the lake was ice covered in April 2013. Using SeaBird Sea Cat CTD instrument and Niskin bottles for water sampling we acquired data to compare the state of the lake under ice-free and ice-covered conditions. From April 2012 to July 2014, we had a moored string of Star-Oddi recording temperature sensors from surface to 60 m depth at a location in the deepest part of the lake. We examined the lake water chemical composition for evidence of active volcanism. The differences in the temperature structure 2012 and 2013 yield signs of circulation and the moored temperature recorders illustrate seasonal variations. With this data combined we seek to explain why the lake became ice free in 2012 but was mostly covered with 80 cm thick ice at the same time the following year.

Ólafsson, J. (1980). "Temperature structure and water chemistry of the caldera Lake Öskjuvatn, Iceland." *Limnology and Oceanography* **25**: 779-788.