



Project acronym: ICEWave

Project title: Ice Cover Extinction by WAVE motions in polar lakes

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Discipline: Earth Sciences & Environment: Water sciences/Hydrology

Station(s): Kilpisjärvi Biological Station (Finland)

A consistent trend to shortening of the ice season on lakes during the last 100-150 years was reported in a large number of recent studies and was attributed to global climate warming. Estimation of the consequences of these phenological changes on water resources requires the quantification of the physical mechanisms that control the formation and melting of ice. The heat and mass transfer at the ice-water interface is the least studied among these mechanisms. Recent findings of the team suggest a crucial role of the previously unattended mixing mechanism—the basin-scale waves (seiches)—in heat transport from water to ice.

The major objective of the study is to perform the first detailed observations of ice cover formation and melting in a polar lake resolving the heat transport processes at spatial scales of millimeters and covering the entire ice-covered period of several months with a several second resolution. A fundamental scientific question targeted by this effort consists in elucidating the effect on ice properties of small-scale physical mechanisms produced by waves beneath the ice.

The main research site is Lake Kilpisjärvi, where an autonomous observational station will be deployed. The configuration of the station will allow obtaining information on the ice-water interactions in polar lakes at an unprecedented level of details. By this, the hypotheses on the wave effects under lake ice can be tested with a high level of accuracy.