

Knowledge of the ice-surface temperature (IST) of the Great Lakes is important for weather prediction, surface energy balance, ice formation and breakup, evaporation, effluent dilution as well as transportation and industrial issues. IST is affected by many factors including air temperature, water temperature, thermal conductivity of ice, ice thickness, snow cover, and surface emissivity. We have developed an IST dataset of the Great Lakes for the near-record (during the satellite era) ice season of 2013 – 2014. Here we focus on the IST of Lake Michigan, from 1 December 2013 through 31 May 2014.

Presence or absence of ice influences weather and can affect the formation and intensity of lake-effect snowstorms, impacting large cities such as Buffalo and Rochester, New York City, New York and Cleveland, Ohio. Furthermore the amount of ice in a given winter can also affect lake levels because the relatively warm lake water is easily evaporated by cold air flowing above, leading to more cold-weather evaporation. Water levels are important because, in some lakes, ships can carry less cargo, and more dredging can be required to keep shipping channels navigable when water level is low. Low ice years, such as have occurred in many recent years, can also lead to an increase in phosphorus concentration, affecting lake eutrophication.

We developed daily maps of ice and water temperature of the Great Lakes from 1 December 2013 through 31 May 2014 using the standard IST algorithm for the Aqua MODIS, MYD29. Based on an IST cutoff value of 0°C, we map ice extent in Lake Michigan for the six-month study period, and compare our IST-derived ice extents with ice extent mapped by the Great Lakes Environmental Research Laboratory (GLERL).

Future work includes developing a MODIS Aqua IST dataset from the 2002 – 2003 winter through the 2013 – 2014 winter for all of the Great Lakes.