

# Great Lakes Ice Cover from MODIS

Lake Superior

Lake Michigan

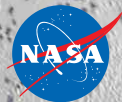
Lake Huron

Lake Ontario

Lake Erie

December 25, 2013

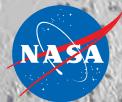




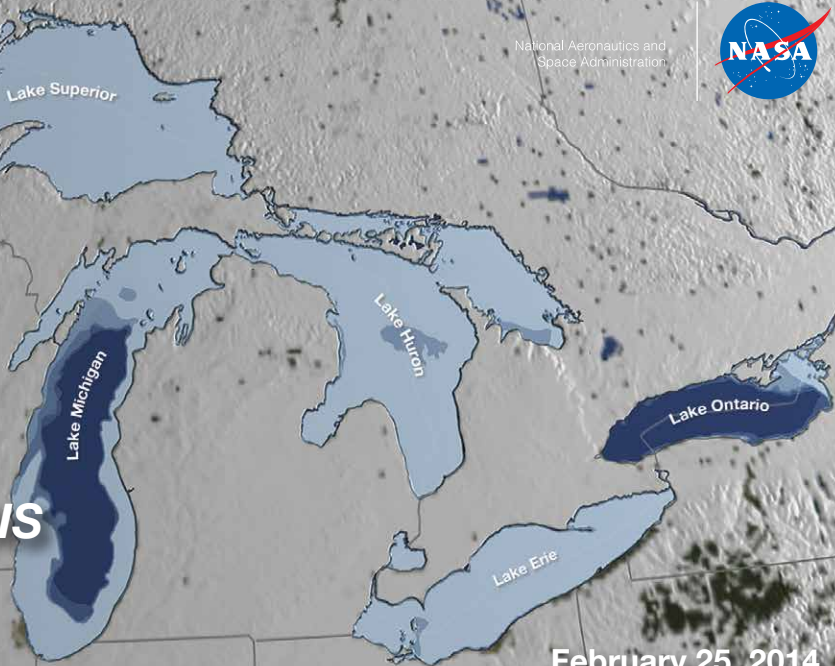
# Great Lakes Ice Cover from MODIS



January 25, 2014

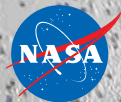


# Great Lakes Ice Cover from MODIS



February 25, 2014

National Aeronautics and  
Space Administration



# Great Lakes Ice Cover from MODIS

Lake Superior

Lake Michigan

Lake Huron

Lake Ontario

Lake Erie

March 25, 2014





# Great Lakes Ice Cover from MODIS

Ice cover on North America's Great Lakes formed early during the 2013-2014 winter, and persisted until the official *ice-off* date in Lake Superior on June 6, 2014. Ice cover plays an important role in the regional climate, and also affects lake water levels, water temperature, and the development of spring algal blooms on the Great Lakes.

These images show the daily percentage of the lake area covered by ice as derived using data from NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) on December 25, 2013, and January 25, February 25, and March 25, 2014.

The maximum ice extent occurred on March 6 when 92.5% of the surface of the Great Lakes was covered with ice. This is the second most extensive ice cover observed over the lakes since the satellite record began in 1973. The greatest extent occurred in 1979 when 94.7% of the surface was covered, according to the National Oceanic and Atmospheric Administration's Great Lakes Environmental Research Laboratory (GLERL). Four of the Great Lakes (Superior, Michigan, Huron, and Erie) became 90% or more ice covered for the first time since 1994. The extensive and thick ice cover caused significant difficulties and shipping delays throughout the ice season.

MODIS, onboard the Terra and Aqua satellites, is a scanning imaging radiometer that images the entire surface of the Earth every 1-2 days, making observations in 36 co-registered spectral bands at spatial resolutions of 250 meters to 1 kilometer, of the land, ocean, and atmosphere. In orbit since late 1999, MODIS is particularly well-suited to studying the Earth's *cryosphere*—places on the Earth where water is in its solid form for all or most of each year, frozen into ice or snow.

U.S. Coast Guard Icebreaker



Photo Credit: George Leshevich/NOAA

The United States Coast Guard icebreaker *Mackinaw* assists in keeping channels and harbors open to facilitate winter shipping on the Great Lakes under conditions of extensive ice cover.

U.S. Coast Guard Icebreaker Ship Track



Credit: NASA's Scientific Visualization Studio

The route of the USCGC *Mackinaw* (red line), from Sault Ste. Marie, Michigan to Duluth, Minnesota, is shown for selected dates in March 2014 while the *Mackinaw* was operating under heavy ice conditions in Lake Superior during the opening of the navigation season.

For more information, visit:  
[modis-snow-ice.gsfc.nasa.gov](http://modis-snow-ice.gsfc.nasa.gov)

NOAA/GLERL, visit:  
[coastwatch.glerl.noaa.gov](http://coastwatch.glerl.noaa.gov)

