Great Lakes Surface Ice Reports from U.S. Coast Guard, Version 1

USER GUIDE

How to Cite These Data

As a condition of using these data, you must include a citation:

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FOR QUESTIONS ABOUT THESE DATA, CONTACT NSIDC@NSIDC.ORG

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National Snow and Ice Data Center

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1 DATA DESCRIPTION

1.1 Summary

Data consist of visual ice observations from U.S. Coast Guard vessels operating on the Great Lakes, and from Coast Guard shore stations reported via teletype messages and ice logging forms. Observations include ice thickness and concentration, weather conditions, and ice breaking activity.

Data from 1961/1962 through 1966/1967 have been processed to a standard format and sorted by year and stations, and are available via FTP as *.dat files, one for each of the five lakes. These data were provided to NSIDC by the Great Lakes Environmental Research Laboratory, along with documentation. The documentation, Great Lakes Environmental Research Laboratory (GLERL) Great Lakes Surface Ice Reports, 1961-1966, is reproduced below (in Detailed Data Description) in slightly edited form.

Teletype ice reports and weekly ice observation logs, from 1970/1971 irregularly through 1993/1994, are available on microfilm as follows (note gaps in 1878/1979, 1984/1985, and 1990/1991):

Data from 1970/1971 through 1977/1978 are available on 14 reels of 16mm microfilm. These 14 reels contain, in addition to ice conditions and meteorological observations, the Great Lakes ice operations files for the Ninth District U.S. Coast Guard Ice Navigation Center, Cleveland, OH. There is an index to the approximate film location of the surface ice reports (GLERL-1 through GLERL-14).

Data from 1979/80 through 1982/83 are available on 1 reel of 16mm microfilm (GLERL-15).

Data for 1980/81 exclusively are available on 1 reel of 16mm microfilm (GLERL-41).

Data for 1983/84 exclusively are available on 1 reel of 16mm microfilm (GLERL-44).

Data for 1991/92 through 1993/94 are available on 1 reel of 16mm microfilm (GLERL-46).

Data from 1994/1995 through the last ice season are available via ftp as .tar files for each ice season. These ice files are in the raw native format used by the USCG (i.e. teletype message format). These data have not been quality checked in any way at NSIDC and are provided to the user only in this raw form.

No Coast Guard shore station reports are available after 1991.

These data were provided to NSIDC by the NOAA Great Lakes Environmental Research Laboratory (GLERL), along with documentation. The documentation, Great Lakes Environmental Research Laboratory Great Lakes Surface Ice Reports, 1961-1966, is included here. Data from 1970/1971 through 1993/1994 are available on microfilm. The original ice reporting forms for these years were filed as part of the ice operations files of the Ninth District U.S. Coast Guard Ice Navigation Center, Cleveland, OH. Data from 1994/1995 through 2003/2004 are available via FTP in a single .tar file for each ice season.

Note that no editing or quality control has been performed on this data set. Microfilmed records are difficult to use, as they are sorted by date and time only, and contain extraneous information. The electronic data from 1994/1995 forward are raw teletype reports. These are not in a consistent format, and also contain extraneous information. NSIDC obtained these data from a NOAA National Weather Service public FTP server. The National Weather Service obtained the data from the United States Coast Guard Headquarters. NSIDC was unable to locate a responsible party within NOAA who could provide NSIDC with a new source for the data. Therefore, the records end in 2004. Users may wish to contact the U.S. Coast Guard for information on obtaining the individual ship reports.

1.2 File Information

1.2.1 Format

The information that follows is from documentation provided to NSIDC by Dr. Raymond A. Assel. It pertains to the 1961 to 1967 data that were given to NSIDC by Dr. Assel. The documentation provided by Dr. Assel has been reformatted but is otherwise unchanged.

The original data file from GLERL was split at NSIDC into five files corresponding to each of the Great Lakes. Lake St. Clair is included in the erie.dat file. The straits of Mackinac, following the convention from the station directory, are included in the huron.dat file.

No data on wind speed, wind direction, cloud type, cloud concentration, lake ice thickness, snow ice thickness, or slush thickness exist in the data file. These measurements were not recorded before the 1973-1974 ice season. These columns exist within the data files but are blank.

The convention -99 is used as an indicator for missing data.

The given location of the observation was checked against the list of stations in the Great Lakes Hydrometeorological Station Directory, NOAA data report ERL GLERL-22, Feb. 1983 and the list of Coast Guard stations in the United States Coast Pilot #6, Great Lakes, April 1982, U.S. Department of Commerce, NOAA. The ice reports were taken by both shore stations and ship reports. There is no factor which allows the user to tell from which observing platform each observation came from. A list of the U.S. Coast Guard stations within the Great Lakes is included, as are some selected Coast Guard light station locations. Many of the locations of observations map to known Coast Guard station locations, however some do not and the validity of long-term measurements from these sites should be suspect. See Table 2 for the list of stations.

1.2.2 File Contents

The data are in ASCII text format. Table 1 describes the information contained within each file of Great Lakes Surface Ice reports.

Table 1. File Description

Column	Description
Season	The winter season of the data reports.
Location	The location of the USCG data station. See Table 2 for specific latitudes and longitudes.
Month	The month of the data report.
Day	The day of the data report.
Type	A term describing the size of the ice and if the ice is attached to the shore. Up to three ice types can be given to more fully describe the ice. See Table 3 for description of the ice types.
Age	A term describing the stage of melting or thickness of the ice cover. See Table 4 for description of the ice age terms.
Surface	The surface condition of the ice. See Table 5 for list of definitions.
TI	Ice thickness in inches.
LI	Lake Ice thickness in inches (empty field).
SI	Snow Ice thickness in inches (empty field).
SL	Slush thickness in inches (empty field).
SN	Thickness of snow cover on the ice in inches.
CONC	The percent of total observed water surface area that is covered by ice.
NAVIG	A description of the type of navigation possible given the reported ice conditions. See Table 6 for definitions of terms.
HI	Maximum air temperature in degrees Fahrenheit recorded during the previous 24 hours.
LO	Minimum air temperature in degrees Fahrenheit recorded during the previous 24 hours.
The remaining fields; WS, WD, CT, and CC, are all empty as this data was not recorded until the winter of 1973-1974.	

Table 2. Data Station Locations: Ontario

Ontario	
Alexandria Bay	44-19.9N 75-56.1W
Oswego	43-27.8N 76-31.0W
Sodus Bay	43-16.4N 76-58.5W
Rochester	43-15.4N 77-36.2W
Youngstown, Niagara R.	43-15.7N 79-03.8W
Cape Vincent LTSTA	44-07N 76-20W
Tibbets Point LTSTA	44-06N 76-22W

Table 3. Data Stations Locations: Erie

Erie	
Buffalo	42-52.6N 78-32.2W
Erie	42-09.2N 80-04.7W
Ashtabula	41-54.1N 80-47.9W
Fairport	41-45.6N 81-16.9W
Cleveland	41-30.6N 81-41.6W
Lorain	41-28.2N 82-10.7W
Marblehead	41-32.6N 82-43.8W
Toledo	41-41.6N 83-28.4W
Detroit, Belle Is.	42-20.4N 82-57.7W *Detroit River
St. Clair Shores	42-28.4N 82-52.8W *Lake St. Clair
Toledo	41-41.6N 83-28.4W

Table 4. Data Station Locations: Huron

Huron	
St. Clair Flats	42-33.1N 82-39.0W *St. Clair River
Port Huron	43-00.3N 82-25.3W
Harbor Beach	43-51.0N 82-38.6W
Saginaw River	43-38.1N 83-51.0W
East Tawas	44-15.3N 83-26.2W
St. Ignace	45-51.3N 84-42.2W *near Mackinac Straits
Thunder Bay LTSTA	45-02N 83-12W

Table 5. Data Station Locations: Michigan

Michigan	
Charlevoix	45-19.0N 85-14.7W
Frankfort	44-37.8N 86-14.6W
Manistee	44-15.0N 86-20.4W
Ludington	43-57.2N 86-27.6W
Muskegon	43-13.7N 86-20.3W
Grand Haven	43-03.6N 86-14.8W
Holland	42-46.5N 86-12.1W
St. Joseph	42-06.8N 86-29.1W
Michigan City	41-43.4N 86-56.4W *near Indiana Harbor
Calumet Harbor	41-43.0N 87-31.6W
Wilmette	42-04.6N 87-41.0W
Kenosha	42-35.4N 87-49.0W
Milwaukee	43-00.1N 87-53.2W
Sheboygan	43-45.0N 87-42.3W
Two Rivers	44-08.8N 87-33.7W
Sturgeon Bay	44-47.7N 87-18.7W
Green Bay	44-32.2N 88-00.2W
Beaver Island LBSTA	45-45N 85-30W

Table 6. Data Station Locations: Superior

Superior	
Sault Ste. Marie	46-30.0N 84-20.3W
Grand Marais	46-40.6N 85-58.4W
Munising	46-24.9N 86-39.7W
Marquette	46-32.7N 87-22.7W
Keweenaw Waterway	47-13.5N 88-37.4W
Bayfield	46-48.5N 90-48.8W
Duluth	46-46.3N 92-05.4W
Whitefish Point LTSTA	46-46N 84-57W
North Manitou LTSTA	45-01N 85-57W

Table 7. Ice Type Terms

Term	Description
FIELD	An area of pack ice consisting of any size of floes which is greater than ten kilometers across.
PANCAK	Predominantly circular pieces of newly formed ice from three meters in diameter, and up to nine centimeters in thickness, with raised rims due to collisions.
FLOE	Any relatively flat piece of ice ten meters or more across. A floe may consist of a single unbroken fragment or many consolidated fragments.
CAKE	Any relatively flat piece of ice less than ten meters across. Cake implies a single unbroken fragment of ice.
BRASH	Accumulations of floating ice made up of fragments not more than 2 meters across, the wreckage of other forms of ice.
SLUSH	Snow which is saturated and mixed with water, a viscous floating mass in water after a heavy snowfall. It is an accumulation of ice crystals which may or may not be slightly frozen together. Slush has no degree of hardness.
FAST/SHORE	Stretches of unbroken ice which are fast to the shore.

Table 8: Ice Age Terms

Term	Description
BLUE	Fairly level, flat sheet of clear ice, blue appearance, may be fast.
WHITE	First stage of thawing or ice formed largely of snow.
ROTTEN	Honeycombed due to melting-needle ice.

Table 9. Ice Surface Conditions

Term	Description
WINDRO	Ice which has been pressed into heavy ridges or layers by strong winds, often piled up against the shore or other obstruction.
JAMMED	(1) An accumulation of broken river ice in a narrow channel. (2) Fields of lake ice separated from the shores in early spring may be blown against the shore, exerting great pressures. Also, masses of broken-up ice may drift with the wind and produce jams on and against the shore.

Table 10. Navigation Terms

Term	Description
CLOSED	From the Coast Guard the documentation it is unclear whether this refers to Closed Craft, when navigation closed to small craft and craft with poor icebreaking hulls, or Closed, when all navigation is closed.
DIFF	Navigation possible by large vessels with fair to good icebreaking hull configurations. HP/L ratio less than 6:1.
STEAMR	This flag is undocumented within the Coast Guard documentation. The flag may refer to navigation only possible by large vessels constructed to withstand ice pressure and with fair to good icebreaking hull configurations. HP/L ratio 6:1 or greater.
ICEBKR	Navigation only possible with the assistance of icebreakers.
UNOBST	Navigation unobstructed.

2 VERSION HISTORY

Table 11. Version History Summary

Version	Release Date	Description of Changes
1.0	1995	Initial release
	October 1998	Jason Wolfe revised this document based on a review of NSIDC's data holdings.
	July 2006	The document was edited by Florence Fetterer to state why the data were no longer being updated. At this time the document was reformatted.
	July 2017	A. Windnagel fixed broken links in the References section.
	November 2020	Converted to PDF

3 CONTACTS AND ACKNOWLEDGMENTS

Acknowledgments

Dr. Raymond A. Assel, NOAA Great Lakes Environmental Research Laboratory, Ann Arbor, MI, provided NSIDC with the data for 1961-1967, and with documentation for the data. This data set is maintained at NSIDC with support from the NOAA National Geophysical Data Center.

4 REFERENCES

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Great Lakes Hydrometeorological Station Directory*, NOAA data report ERL GLERL-22*, Feb. 1983 .

US Coast Pilot #6; Great Lakes, April 82, US Department of Commerce, NOAA.

5 DOCUMENT INFORMATION

5.1 Author

The information in Detailed Data Description was authored by Dr. Raymond A. Assel, GLERL. The information was compiled by NSIDC Technical Writers.

5.2 Publication Date

1995

5.3 Revision History

30 November 2020

APPENDIX A – SAMPLE DATA

Sample Data Record

1

USCG ICE REPORTS BY STATION: 1962-63 ASHTABULA

MO	DA	ICE TYPES		AGE	SURF	TI	LI	SI	SL	SN	C	NAVIG	HI	LO	WS	WD	CT	CC
12	15	SLUSH		WHITE		0				0	0	UNOBST	-99	-99				
12	16	FAST	PANCAK	WHITE	JAMMED	2				1	8	UNOBST	38	18				
12	17	FAST	FIELD	ROTTEN		2				0	7	UNOBST	24	10				
12	18					0				0	0	UNOBST	-99	-99				
12	19					0				0	0	UNOBST	52	20				
12	20					0				0	0	UNOBST	44	26				
12	22	FAST	PANCAK	WHITE	JAMMED	3				0	10	CLOSED	31	18				
12	23	DRIFT	PANCAK	ROTTEN		2				3	5	UNOBST	33	15				
12	24	DRIFT	PANCAK	WHITE		1				1	1	UNOBST	27	16				
12	25	FAST	PANCAK	WHITE		2				0	3	UNOBST	23	11				