

Visualizing Laurentian Great Lakes Ice Cycles

In 1994, under the auspices of the National Oceanic and Atmospheric Administration's (NOAA) Earth System and Data Information Management (ESDIM) Program, a project was initiated to update a 20-winter digital ice concentration database and ice concentration climatology (see Internet at http://www.glerl.noaa.gov/res/Task_rpts/ccassel11-2.html). The data reduction phase of that project is now complete. The National Ice Center (NIC) and the Canadian Ice Service (CIS) contributed the historic ice charts used in this project. The first analysis product from the updated database is a set of computer animations of the seasonal progression of ice cover extent and concentration for 23 individual winter seasons.

A daily time series of ice concentration grids was produced by interpolating between consecutive ice charts for a given winter season. These data were used to produce color-coded GIF files of daily ice concentration, the percent of a unit of surface area covered by ice, and subsequently, to make computer animations for each winter in AutoCAD Flic (FLC) and Audio Video Interleave (AVI) formats. The animations portray the spatial and temporal

patterns of Great Lakes ice cover for each winter season from 1973 to 1995. The interannual variability of ice cover for a given date or period in the winter is portrayed by comparing animations for that date or period to different winters. Interannual and same-season variations in ice cover are of interest for analysis of other lake-related phenomena such as the frequency and extent of lake-effect snowfall, fish recruitment, and the timing of the spring coastal processes associated with the loss of ice cover.

These animations are a benchmark of current Great Lakes winter regional climate and they should be useful in placing the future regional climate of the Great Lakes basin in a historical perspective. For example, will large inter-annual variations in ice cover that exist under the current climate continue into the 21st century or will they be attenuated by a milder climate? Will changes in the ice cover regime produce significant changes in the lake ecosystem?

The database contains 29 computer animations, 23 of which are based on historic CIS ice charts (for winters 1973 to 1995) and 6 on historic NIC ice charts (for winters 1989 to 1995).

Each computer animation has a standard length of 182 days beginning on December 1 and ending on May 31 (May 30 for leap years). The grids prior to the date of the first ice chart and after the date of the last ice chart each winter are coded as zero ice concentration. The dates of the first (last) ice charts each winter vary from early December to early January (early April to mid-May). The ice concentration on the date of the first (last) ice chart is less than 10% (3%) most winters. The computer animations are available over the Internet at <ftp://ftp.glerl.noaa.gov/ice/animations/>.

For more information and details on the historical ice chart data, data reduction procedures, the animations, and planned further analysis of these data, see the supplement to this news item, available on the *Eos* Electronic Supplement at http://www.agu.org/eos_elec/as00259e.html.

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