

Simulated 12-month Ice Parcel Tracks from Gridded Sea Ice Motion, Version 1.1

Technical Reference

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May, 2024

Summary

This data set—[NSIDC-0790](#)—contains simulated ice parcel tracks derived from a weekly ice motion product—[NSIDC-0116](#)—provided as text comma separated value (.csv) files.

Method of Production

Each simulated ice parcel starts at the center point of a grid cell on a subset of the original 25 km Northern Hemisphere EASE grid. This is the same grid used in the ice motion product and is described in detail in [section 1.3 of the NSIDC-0116 User Guide](#). An ice parcel will only be initialized if the ice concentration of the grid cell is greater than 15%, as determined by 25 km gridded sea ice concentrations from the NASA Team algorithm—[NSIDC-0051](#)—and if no other ice parcel is currently located within that grid cell. Information about the ice parcel on a particular week consists of its location on the grid, and the sea ice concentration at that location.

For each one-week time step, there are three columns in the CSV file: the fractional i-index, fractional j-index, and concentration value of each parcel. Each row provides the time history of the ice parcel trajectory as a series of these “i-j-c” triplets. Each week, the location of each parcel that existed in the prior week is updated by advecting the parcel by the weekly ice motions provided by NSIDC-0116. The sea ice concentration is computed by bilinearly interpolated surrounding grid cell values. If this new concentration value is below 15%, the ice parcel is considered to have melted and its grid column (i), grid row (j), and concentration value will be listed as 999.0 for all subsequent columns in the data file.

After each previously existing parcel is advected, a check is made to determine if any grid cell (a) has an ice concentration of >15%, and (b) does not currently have an active ice parcel within it. Everywhere these conditions occur, a new ice parcel is created at the center of the grid cell. As the CSV data format requires an entry for every column, the columns for this ice parcel prior to the current week are filled with the value -999.0, meaning that the ice parcel did not yet exist during the week described by that i-j-c triplet. Note that it is possible for more than one ice parcel to exist in the same grid cell at the same time.

Description of Data File contents

Currently the data are generated in 53-week increments starting on a specified date in one year and advecting the parcels to that date in the following year. This results in CSV files with 159 (= 3 parameters * 53 weeks) columns and one row for each parcel (> 60,000 per year). In practice, users can use these simulated ice parcels to track associated parameters by re-apportioning the parameter estimates at the end of one 53-week period to the new parcels initialized at the beginning of the next 53-week period. The last week of one data file is the same as the first week of the subsequent data file.

The first row of the CSV file contains a label of the form “[jic]_<YYYYMMDD>” where [jic] is either “i”, “j”, or “c” indicating fractional grid cell column index “i”, fractional grid cell row index “j,” or bilinearly interpolated sea ice concentration “c.” The date of the middle of the week for this time step is given by an 8-digit timestamp consisting of a 4-digit year, 2-digit month, and 2-digit day-of-month. This product uses the same time-step convention used by the underlying sea ice motion product in which the first month of each 52-week year is Jan 1-7, the second week is Jan 8-14, and so on.

Sample sections of nsidc0790_imparsels_20190801_20200801_v1.0.csv for illustration:

[Row 0]	...	i_20190809	j_20190809	c_20190809	i_20190816	j_20190816	c_20190816	...
[Row 1000]	...	172.209	133.772	18.657	171.07	132.813	15.321	...

In this subset, an ice parcel that existed the week of Aug 9, 2019 persisted to the week of Aug 16, 2019 and its (i,j) location changed from (172.209, 133.772) to (171.07, 132.813) while the sea ice concentration at the parcel location decreased from 18.657% to 15.321%.

[Row 0]	...	i_20190726	j_20190726	c_20190726	i_20190802	j_20190802	c_20190802	...
[Row 1]	...	199.0	101.0	21.2	999.0	999.0	999.0	...

In this subset, a new ice parcel of sea ice concentration 21.2% was initialized at (199, 101) on the 25 km EASE-grid during the week with a middle date of 7/26/2019. However, the next week, the parcel had melted out and is then found in a location without sea ice. Therefore, the i, j, c column values for this parcel will be 999.0 for all further columns.

[Row 0]	...	i_20190830	j_20190830	i_20190830	i_20190906	j_20190906	i_20190906	...
[Row 10000]	...	-999.0	-999.0	-999.0	139.0	148.0	60.4	...

In this subset, an ice parcel that did not exist during the week of Aug 30, 2019 was created at grid cell (139, 148) with an initial concentration of 60.4%. This can occur if either (a) all ice parcels in grid cell (139, 148) [e.g., (138.5, 148.1) or (139.4, 147.9)] advected out of that grid cell, or (b) if grid cell (139, 148) had sea ice concentration <15% on Aug 30, but a concentration >15% on the following week.

The start dates for sets of data files in this data set were determined by the needs of researchers interested in using these data. Currently, two sets of start-dates are provided: August 1 and October 1.

See [NSIDC-0789](#) for an example of a data set that used these data to simulate the advection of geophysical parameters across the sea ice.

The data are expected to be updated as needed by users.

Tools

User-contributed tools that may be adapted for use with this data set include those available at: https://github.com/sc0tts/nsidc0790_tools.

Version History

Version 1.1 May 2024	Corrected dates in CSV headers; Removed data files for 2022-2023 because they contained some near-real-time data.
Version 1.0 April 2024	Initial release of data.