



## PRODUCT USER MANUAL

For global sea ice concentration, edge, type and drift

Near real time observations

**SEAICE\_GLO\_SEAICE\_L4\_NRT\_OBSERVATIONS\_011\_001**

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**Issue:** 1.2

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**MyOcean version scope :** Version 2.2

**Approval Date :** September 2012

Project N°: FP7-SPACE-2007-1

**Work programme topic:** SPA.2007.1.1.01 - development of upgraded capabilities for existing GMES fast-track services and related (pre)operational services. **Duration:** 39 Months

**CHANGE RECORD**

Issue	Date	§	Description of Change	Author	Validated By
1.0	03/11	All	First version	Thomas Lavergne	Steinar Eastwood
1.1	11/11		Change of template for V2 release.	Dominique Obaton	Steinar Eastwood
1.2	09/12		Inputs of OSI documents Change in file naming and file content	Steinar Eastwood	Steinar Eastwood

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## **GLOSSARY AND ABBREVIATIONS**

Directgetfile	MyOcean service tool (FTP like) to download a NetCDF file
NetCDF	Network Common Data Form
NRT	Near Real Time
OSI SAF	OSI SAF Ocean and Sea Ice Satellite Application Facility
PC	Production Centre
PU	Production Unit
PUM	PUM Product User's Manual
SAF	Synthetic Aperture Radar
SIW	Satellite Application Facility
Subsetter	MyOcean service tool to download a NetCDF file of a selected geographical box using values of longitude, latitude and time range
TAC	Thematic Assembly Center



## I INTRODUCTION

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This guide describes the global sea ice concentration, edge, type and drift product SEAICE\_GLO\_SEAICE\_L4\_NRT\_OBSERVATIONS\_011\_001 from the MyOcean Sea Ice and Wind Thematic Ensemble Centre, what data services are available to access them, and how to use the files and services.

It pertains of:

- sea ice concentration (0-100%);
- sea ice edge (open water, open ice, closed ice)
- sea ice type (open water, first year ice, multiyear ice)
- sea ice drift (displacement over 48 hours)

## II HOW TO DOWNLOAD A PRODUCT

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### II.1 Download a product through the MyOcean Web Portal Subsetter Service

You first need to register. Please find below the registration steps:

<http://www.myocean.eu/web/34-products-and-services-faq.php#1>

Once registered, the MyOcean FAQ <http://www.myocean.eu/web/34-products-and-services-faq.php#2> will guide you on How to download a product through the MyOcean Web Portal Subsetter Service.

### II.2 Download a product through the MyOcean Web Portal Directgetfile Service

You first need to register. Please find below the registration steps:

<http://www.myocean.eu/web/34-products-and-services-faq.php#1>

Once registered, the MyOcean FAQ <http://www.myocean.eu/web/34-products-and-services-faq.php#2> will guide you on How to download a product through the MyOcean Web Portal Subsetter Service.

### III DESCRIPTION OF THE PRODUCT SPECIFICATION

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#### III.1 General Information

The delivered products are daily means centered at noon. The sea ice products are derived from SSM/I data from the DMSP F13, F14 and F15 satellites acquired at the OSI SAF High Latitude processing centre and from ASCAT data received via EUMETCast.

#### Physical definition

Sea ice concentration: Indicates the areal fraction of a given grid point covered by ice. It is a continuous variable (0-100%)

Sea ice edge: Indicates whether a given grid point is ice free or not. For the ice edge analysis three classes are defined: open water, open ice and closed ice. The limit between water and open drift ice is defined to be 35% ice concentration. The limit between open drift ice and close drift/very close drift ice is defined around 70 % ice concentration.

Sea ice type: Indicates the dominant ice type in terms of first year (FY) or multiyear ice (MY). Multiyear ice has by definition survived one yearly cycle of freeze and melt, first year ice has been formed during the past year.

The sea ice properties influencing the measurements vary over the seasons. To account for seasonal variations, statistics are derived for each month.

The first step of the analysis is performed successively as the data arrive. In this the step the probabilities for ice classes (closed ice, open ice, open water, first year ice and multi-year ice) and ice concentration (only SSM/I) are calculated on each observation point in satellite projection. In the next step, daily calculations are then performed each day at 0400 UTC and are based on data collected from the previous day. The offset of four hours is used because the SSM/I data are delayed by up to 4 hours.

For each of the three daily sea ice products, data users will have access to the following categories of data:

- a sea ice parameter
- a quality index field

Sea ice drift: Expresses that a parcel of ice which was at position lat0, lon0 at time t0, is at position lat1, lon1 at time t1. Although they too can be retrieved from the above mentioned 6 quantities, the drift components along the X and Y axis of the product grid (dX and dY) are included in the product file.

The only information contained in the dataset is that an ice parcel observed at position (lat0, lon0) is at another position (lat1, lon1) at the end of the drift period (48 hours). Particularly, the dataset does not say anything about the trajectory (hence the velocities) of the ice between the two reference times t0 and t1. Although an arrow-shaped symbol is commonly used for representing the displacement, a straight line trajectory is not implied.

In summer, surface melting and a denser atmosphere preclude from the retrieval of meaningful information. From October to Mai-June, however, the excellent coverage makes it possible to extract

48 hours global ice drift vectors at a spatial resolution of 62.5 km. Sea ice drift vectors are not processed during summer (May, 1st to September, 30th) but product files are distributed all year long.

Product timeliness is at present approximately 7 hours (from last recorded swath). This means that, on day 0 around 0600 UTC, low-resolution ice drift datasets are distributed which cover the period from day -3 to day -1. For example, ice drift from 2008/02/16 to 2008/02/18 is delivered on 2008/02/19 around 0600 UTC.

<b>Product Specification</b>	SEAICE_GLO_SEAICE_L4_NRT_OBSERVATIONS_011_001
<b>Geographical coverage</b>	Northern, Southern Hemisphere, and high latitude
<b>Variables</b>	Concentration Edge Type Drift (only for northern hemisphere)
<b>Analysis</b>	Yes
<b>Near real time</b>	Yes
<b>Available time series</b>	Concentration, edge, type : from 6 November 2009 – on going Drift: from 3 September 2011 –on going
<b>Temporal resolution</b>	24 hours averaged fields
<b>Target delivery time</b>	Concentration, edge, type: 0040 UTC, <i>based on data collected the previous day</i> Drift : 0600 UTC, <i>covers the period from day -3 to day -1</i>
<b>Delivery mechanism</b>	MyOcean Information System
<b>Horizontal resolution</b>	Concentration, edge, type : 10 km Ice drift: 62.5 km
<b>Number of vertical levels</b>	-
<b>Format</b>	Netcdf CF1.0

**Table 1: SEAICE\_GLO\_SEAICE\_L4\_NRT\_OBSERVATIONS\_011\_001 Product Specification**

Detailed information on the systems and products are on MyOcean web site: [www.myocean.eu](http://www.myocean.eu)



## III.2 Details of datasets and variables

SEAICE\_GLO\_SEAICE\_L4\_NRT\_OBSERVATIONS\_011\_001

### Units and range

Sea ice concentration is given as a real number:

- 0 -100.0: Area fraction of ice
- -99.0: Over land
- -199.0: Unclassified
- -32767.0: No data.

Sea ice edge is given as an integer code, with the following significance:

- 0: No data
- 1: Ice free
- 2: Open ice (35 -70% concentration)
- 3: Closed ice (70-100% concentration)
- 9: Over land
- 10: Unclassified.

Sea ice type is given as an integer code, with the following significance:

- 0: No data
- 1: Ice free
- 2: First year ice
- 3: Multiyear ice
- 4: Ambiguous
- 9: Over land
- 10: Unclassified.

All geographical coordinate fields of sea ice drift are given as degrees (latitude or longitude). The X and Y drift components have unit of km.

Note there is no drift variable in the Southern hemisphere.

## IV NOMENCLATURE OF FILES

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The nomenclature of the downloaded files differs on the basis of the chosen download mechanism **Subsetter** or **Directgetfile** service.

File name convention

Ice concentration : ice\_conc\_<area>\_polstere-100\_multi\_<date12>.nc

Ice edge : ice\_edge\_<area>\_polstere-100\_multi\_<date12>.nc

Ice type : ice\_type\_<area>\_polstere-100\_multi\_<date12>.nc

### IV.1 Nomenclature of files when downloaded through the MyOcean Web Portal **Subsetter** Service

SEAICE\_GLO\_SEAICE\_L4\_NRT\_OBSERVATIONS\_011\_001 files nomenclature when downloaded through the MyOcean Web Portal Subsetter is based on product dataset name and a numerical reference related to the request date on the MIS. An example for ice drift is given below:

**4103ae1e03255e184c56a3d62ed82fd9\_ice\_drift\_north\_aggregated\_ee086b87eac62a05a93a94a007877d5d.nc**

The datasets are proposed by variables and then by region this way:

Ice concentration

- METNO-GLO-SEAICE\_CONC-NORTH-L4-NRT-OBS
- METNO-GLO-SEAICE\_CONC-SOUTH-L4-NRT-OBS

Ice edge

- METNO-GLO-SEAICE\_EDGE-NORTH-L4-NRT-OBS
- METNO-GLO-SEAICE\_EDGE-SOUTH-L4-NRT-OBS

Ice type

- METNO-GLO-SEAICE\_TYPE-NORTH-L4-NRT-OBS
- METNO-GLO-SEAICE\_TYPE-SOUTH-L4-NRT-OBS

Ice drift

- METNO-GLO-SEAICE\_DRIFT-NORTH-L4-NRT-OBS

### IV.2 Nomenclature of files when downloaded through the MyOcean Web Portal **Directgetfile** Service

An example of SEAICE\_ARC\_SEAICE\_L4\_NRT\_OBSERVATIONS\_011\_001 files nomenclature when downloaded through the MyOcean Web Portal Directgetfile is:

e74467391d3f8abdc76e4921174317c5\_ice\_conc\_north\_2657ff7065bc2557fc8fd66cddaf9939.zip

with datasets given by variables and by region following:

Ice concentration

- METNO-GLO-SEAICE\_CONC-NORTH-L4-NRT-OBS
- METNO-GLO-SEAICE\_CONC-SOUTH-L4-NRT-OBS

Ice edge

- METNO-GLO-SEAICE\_EDGE-NORTH-L4-NRT-OBS
- METNO-GLO-SEAICE\_EDGE-SOUTH-L4-NRT-OBS

Ice type

- METNO-GLO-SEAICE\_TYPE-NORTH-L4-NRT-OBS
- METNO-GLO-SEAICE\_TYPE-SOUTH-L4-NRT-OBS

Ice drift

- METNO-GLO-SEAICE\_DRIFT-NORTH-L4-NRT-OBS

### IV.3 grid characteristics

<b>Geographical definition for Northern Hemisphere grid (NH) –concentration, edge, type</b>	
projection	Polar stereographic projection true at 70°N
resolution	10 km
size	760 columns, 1120 lines
General meridian	45°W
Lower left corner	33.9755°N; 80.7299°W
Radius of earth	6378273 x 6356889.44891 m
PROJ-4 string	+proj=stere +a=6378273 +b=6356889.44891 +lat_0=90 +lat_ts=70 +lon_0=-45

<b>Geographical definition for Northern Hemisphere grid (NH) –ice drift</b>	
projection	Polar stereographic projection true at 70°N
resolution	62.5 km
size	119 columns, 177 lines

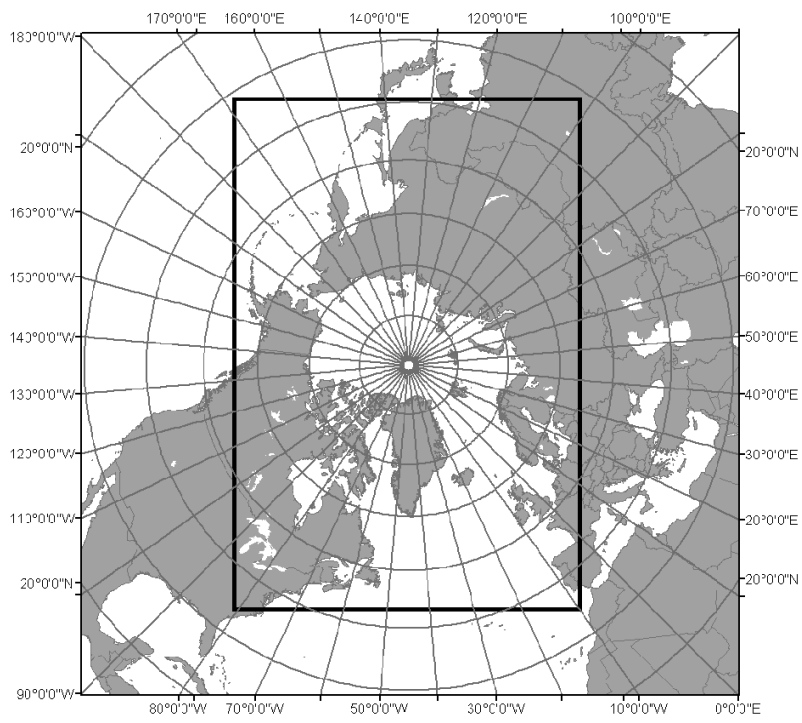
General meridian	45°W
Lower left corner	35.14838°N; 10.30485°W
Radius of earth	6378273 x 6356889.44891 m
PROJ-4 string	+proj=stere +a=6378273 +b=6356889.44891 +lat_0=90 +lat_ts=70 +lon_0=45

<b>Geographical definition for Southern Hemisphere grid (SH)</b>	
projection	Polar stereographic projection true at 70°S
resolution	10 km
size	790 columns, 830 lines
General meridian	0°
Lower left corner	41.5015°S; 135.0000°W
Radius of earth	6378273 x 6356889.44891 m
PROJ-4 string	+proj=stere +a=6378273 +b=6356889.44891 +lat_0=-90 +lat_ts=-70 +lon_0=0

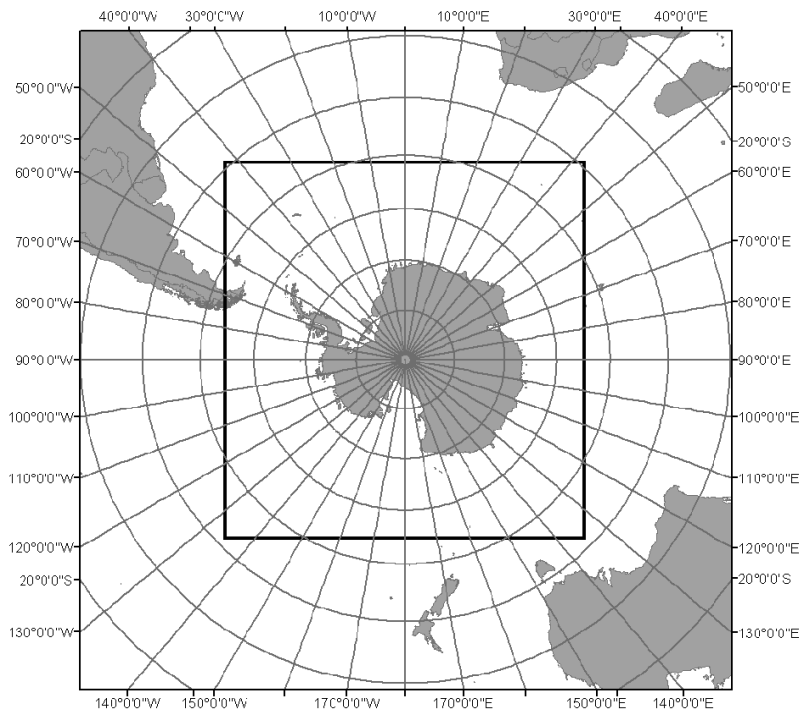
#### **IV.4 Domain coverage**

Coverage of the Northern and Southern grids are shown by the black, thick boxes (from NSIDC).

Northern hemisphere:



Southern hemisphere



## V FILE FORMAT

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### V.1 Netcdf

The products are stored using the NetCDF format.

NetCDF (network Common Data Form) is an interface for array-oriented data access and a library that provides an implementation of the interface. The netCDF library also defines a machine-independent format for representing scientific data. Together, the interface, library, and format support the creation, access, and sharing of scientific data. The netCDF software was developed at the Unidata Program Center in Boulder, Colorado. The netCDF libraries define a machine-independent format for representing scientific data.

Please see Unidata netCDF pages for more information, and to retrieve netCDF software package.

NetCDF data is:

- \* Self-Describing. A netCDF file includes information about the data it contains.
- \* Architecture-independent. A netCDF file is represented in a form that can be accessed by computers with different ways of storing integers, characters, and floating-point numbers.
- \* Direct-access. A small subset of a large dataset may be accessed efficiently, without first reading through all the preceding data.
- \* Appendable. Data can be appended to a netCDF dataset along one dimension without copying the dataset or redefining its structure. The structure of a netCDF dataset can be changed, though this sometimes causes the dataset to be copied.
- \* Sharable. One writer and multiple readers may simultaneously access the same netCDF file.

### V.2 Structure and semantic of NetCDF maps files

Below is given an example of the NetCDF header of a sea ice concentration file. The header parameters are similar for sea ice edge and sea ice type.

```
netcdf ice_conc_nh_polstere-100_multi_201205101200 {
dimensions:
  time = 1 ;
  nv = 2 ;
  xc = 760 ;
  yc = 1120 ;
variables:
  int Polar_Stereographic_Grid ;
    Polar_Stereographic_Grid:grid_mapping_name="polar_stereographic" ;
    Polar_Stereographic_Grid:straight_vertical_longitude_from_pole = -45.f ;
    Polar_Stereographic_Grid:latitude_of_projection_origin = 90.f ;
    Polar_Stereographic_Grid:standard_parallel = 70.f ;
    Polar_Stereographic_Grid:false_easting = 0.f ;
    Polar_Stereographic_Grid:false_northing = 0.f ;
    Polar_Stereographic_Grid:semi_major_axis = 6378273.f ;
```

```

Polar_Stereographic_Grid:semi_minor_axis = 6356890.f ;
Polar_Stereographic_Grid:proj4_string = "+proj=stere +a=6378273 ",
"+b=6356889.44891 +lat_0=90 +lat_ts=70 +lon_0=-45" ;
double time(time) ;
    time:axis = "T" ;
    time:long_name = "reference time of product" ;
    time:standard_name = "time" ;
    time:units = "seconds since 1978-01-01 00:00:00" ;
    time:calendar = "standard" ;
    time:bounds = "time_bnds" ;
double time_bnds(time, nv) ;
    time_bnds:units = "seconds since 1978-01-01 00:00:00" ;
double xc(xc) ;
    xc:axis = "X" ;
    xc:units = "km" ;
    xc:long_name = "x coordinate of projection (eastings)" ;
    xc:standard_name = "projection_x_coordinate" ;
double yc(yc) ;
    yc:axis = "Y" ;
    yc:units = "km" ;
    yc:long_name = "y coordinate of projection (northings)" ;
    yc:standard_name = "projection_y_coordinate" ;
float lat(yc, xc) ;
    lat:long_name = "latitude coordinate" ;
    lat:standard_name = "latitude" ;
    lat:units = "degrees_north" ;
float lon(yc, xc) ;
    lon:long_name = "longitude coordinate" ;
    lon:standard_name = "longitude" ;
    lon:units = "degrees_east" ;
short ice_conc(time, yc, xc) ;
    ice_conc:long_name = "concentration of sea ice" ;
    ice_conc:standard_name = "sea_ice_area_fraction" ;
    ice_conc:units = "%" ;
    ice_conc:_FillValue = -999s ;
    ice_conc:valid_min = 0s ;
    ice_conc:valid_max = 10000s ;
    ice_conc:grid_mapping = "Polar_Stereographic_Grid" ;
    ice_conc:coordinates = "lat lon" ;
    ice_conc:scale_factor = 0.01f ;
    ice_conc:add_offset = 0.f ;
byte confidence_level(time, yc, xc) ;
    confidence_level:long_name = "confidence level" ;
    confidence_level:valid_min = 0b ;
    confidence_level:valid_max = 5b ;

```

### V.3 Reading software

NetCDF data can be browsed and used through a number of software, like:



- ✓ ncBrowse: <http://www.epic.noaa.gov/java/ncBrowse/>,
- ✓ NetCDF Operator (NCO): <http://nco.sourceforge.net/>
- ✓ IDL, Matlab, GMT...