

SIWTAC netCDF common data product file structure (v3)

Products delivered from the SIW TAC to the MyOcean project shall follow the Climate and Forecasting (CF) netCDF convention. The netCDF data format is extremely flexible and regulates only major issues. This document gives some recommendations of the format of attributes and variables that should be included in products delivered from the SIW TAC. Not all variables and attributes are needed in each product but this will be up to the producer. The recommendation is based on the CF-1.4 version.

The following reference gives a general overview of the netCDF CF-1.4 standard.

<http://cf-pcmdi.llnl.gov/documents/cf-conventions/1.4>

SIWTAC netCDF global attributes

Tag name	Format	Mandatory/ Recommended	Description
title	String	M	A descriptive title for the data set
Conventions	String	M	The SIWTAC products shall follow the CF-1.4 convention.
product_id	String	R	A unique product identification. If possible use the official product id from MyOcean product catalogue. http://catalogue.myocean.eu.org ie. SEAICE_ARC_SEAICE_L4_NRT_OBSERVATIONS_011_002
product_name	String	M	Name of product
product_status	String	R	Recommended values operational/preoperational
abstract	String	M	Description of product
topiccategory	String	R	A blank separated list of topic keywords describing the dataset. http://gcmd.nasa.gov/User/difguide/iso_topic_category.html
keywords	String	R	A comma separated list of WMO keywords describing the dataset. http://www.wmo.ch/pages/prog/www/metadata/WMO-keywords.html
gcmd_keywords	String	R	This will be used to categorize the datasets according to the "Topics and variables". http://gcmd.gsfc.nasa.gov/Resources/valids/archives/keyword_list.html
activity_type	String	R	Comma separated list of activity types. In practice for SIW TAC: "Space borne instrument".
area	String	M	Northern Hemisphere
start_date	String	M	Start date and time of the dataset in the form "2007-06-12 12:30:00 UTC" or "2009-10-01T14:01:05Z"
stop_date	String	M	Stop date and time of the dataset in the form described above.
project_name	String	R	EUMETSAT OSI SAF
PI_name	String	M	Name of the person responsible for the data set.

distribution_statement	String	R	A distribution statement. ("Free")
references	String	M	Document reference title or web link
history	String	M	Modification history of the dataset. Should be of the form describe in the start_date above.
netcdf_version_id	String	M	
valid_date	String	R	Date of valid product (UTC). Should be of the form describe in the start_date above.
product_version	String	R	Release number of the datafile
software_version	String	R	
comment	String	R	Miscellaneous information
satellite	String	R	Satellite identifier. If several satellites are used this must also be reflected in sensor list.
sensor	String	R	Sensor identifier.
spatial_resolution	String	R	Resolution of the product
southernmost_latitude	float	R	Southernmost latitude in degrees.
northernmost_latitude	float	R	Northernmost latitude in degrees.
westernmost_longitude	float	R	Westernmost longitude in degrees.
easternmost_longitude	float	R	Easternmost longitude in degrees.
production_frequency	String	R	Product frequency. eg. Daily, Workingdays, subdaily
institution	String	M	Name of production center.
institution_references	String	R	Reference to web page of production center
contact	String	M	e-mail address to production center

SIWTAC netCDF variable and attribute definitions

This table describes the variables and attributes from products delivered from the SIWTAC. Examples values are taken from the ice concentration product and ice drift product produced at met.no.

Variable name	Attribute name	Format	Description with some example values
time		float	
	long_name	string	A descriptive name that indicates a variable's content. This name is not standardized. eg. "reference time of product file"
	standard_name	string	A standard name that references a description of a variable's content in the standard name table. eg. "time"
	units	string	Units of a variable's content. seconds since yyyy-mm-dd hh:MM:ss eg. 1981-01-01 00:00:00
	axis	string	Identifies latitude, longitude, vertical, or time axes.

			eg. "T"
	bounds	string	The value of bounds is the name of the variable that contains the vertices of the cell boundaries eg. "time_bnds"
	comment	string	Miscellaneous information about the data or methods used to produce it.
yc		float	
	axis	string	Y
	long_name	string	y-coordinate of projection
	units	string	eg. "m" or "km"
	standard_name	string	projection_y_coordinate
	grid_spacing	string	
xc		float	
	axis	string	X
	long_name	string	x-coordinate of projection
	units	string	eg. "m" or "km"
	standard_name	string	projection_x_coordinate
	grid_spacing	string	
lat		float	
	long_name	string	Latitude coordinate
	standard_name	string	latitude
	units	string	degrees_north
lon		float	
	long_name	string	Longitude coordinate
	standard_name	string	longitude
	units	string	degrees_east
crs		string	
	grid_mapping_name	string	polar_stereographic
	straight_vertical_longitude_from_pole	float	0
	latitude_of_projection_origin	float	90
	standard_parallel	float	90
	false_easting	float	0
	false_northing	float	0
	semi_major_axis	float	
	semi_minor_axis	float	
	proj4_string	string	proj=stere lon_0=0.0 lat_ts=90.0 lat_0=90.0 a=6371000.0 b=6371000.0
ice_concentration		short	
	long_name	string	sea ice concentration
	standard_name	string	sea_ice_area_fraction

	units	string	%
	coordinates	string	lon lat
	grid_mapping	string	crs
	_FillValue	short	A value used to represent missing or undefined data.
	scale_factor	float	1
	add_offset	float	0

Appendix

This appendix shows output from ncdump of an ice drift file and a ice concentration file on netCDF format

Ice drift:

```
netcdf ice_drift_nh_polstere-625_amsr-aqua_200911301200-200912021200 {
dimensions:
    time = 1 ;
    nv = 2 ;
    xc = 19 ;
    yc = 177 ;
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:long_name = "reference time of product" ;
        time:standard_name = "time" ;
        time:units = "seconds since 1978-01-01 00:00:00" ;
        time:axis = "T" ;
        time:bounds = "time_bnds" ;
        time:comment = "As of version 1.3 of the product, the 'time' scalar dataset contains the _end_
date of motion (was begin date in previous versions)." ;
    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" ;
        xc:grid_spacing = "62.50 km" ;
    double yc(yc) ;
        yc:axis = "Y" ;
        yc:units = "km" ;
        yc:long_name = "y coordinate of projection (northings)" ;
        yc:standard_name = "projection_y_coordinate" ;
        yc:grid_spacing = "62.50 km" ;
    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" ;
    int dt0(time, yc, xc) ;
        dt0:long_name = "delta time for start of displacement" ;
        dt0:standard_name = "start_time_displacement" ;
        dt0:units = "seconds" ;
        dt0:_FillValue = -2147483648 ;
        dt0:valid_min = -43200 ;
        dt0:valid_max = 43200 ;
        dt0:grid_mapping = "Polar_Stereographic_Grid" ;
```

```

    dt0:coordinates = "lat lon" ;
float lon1(time, yc, xc) ;
    lon1:long_name = "longitude at end of displacement" ;
    lon1:standard_name = "end_longitude_displacement" ;
    lon1:units = "degrees_east" ;
    lon1:_FillValue = -1.e+10f ;
    lon1:grid_mapping = "Polar_Stereographic_Grid" ;
    lon1:coordinates = "lat lon" ;
float lat1(time, yc, xc) ;
    lat1:long_name = "latitude at end of displacement" ;
    lat1:standard_name = "end_latitude_displacement" ;
    lat1:units = "degrees_north" ;
    lat1:_FillValue = -1.e+10f ;
    lat1:grid_mapping = "Polar_Stereographic_Grid" ;
    lat1:coordinates = "lat lon" ;
int dt1(time, yc, xc) ;
    dt1:long_name = "delta time for end of displacement" ;
    dt1:standard_name = "end_time_displacement" ;
    dt1:units = "seconds" ;
    dt1:_FillValue = -2147483648 ;
    dt1:valid_min = -43200 ;
    dt1:valid_max = 43200 ;
    dt1:grid_mapping = "Polar_Stereographic_Grid" ;
    dt1:coordinates = "lat lon" ;
float dX(time, yc, xc) ;
    dX:long_name = "component of the displacement along the x axis of the grid" ;
    dX:standard_name = "sea_ice_x_displacement" ;
    dX:units = "km" ;
    dX:_FillValue = -1.e+10f ;
    dX:grid_mapping = "Polar_Stereographic_Grid" ;
    dX:coordinates = "lat lon" ;
float dY(time, yc, xc) ;
    dY:long_name = "component of the displacement along the y axis of the grid" ;
    dY:standard_name = "sea_ice_y_displacement" ;
    dY:units = "km" ;
    dY:_FillValue = -1.e+10f ;
    dY:grid_mapping = "Polar_Stereographic_Grid" ;
    dY:coordinates = "lat lon" ;
short status_flag(time, yc, xc) ;
    status_flag:long_name = "rejection and quality level flag" ;
    status_flag:standard_name = "ice_drift_x_displacement status_flag" ;
    status_flag:_FillValue = -1s ;
    status_flag:grid_mapping = "Polar_Stereographic_Grid" ;
    status_flag:coordinates = "lat lon" ;
    status_flag:valid_range = 0s, 30s ;
    status_flag:flag_values = 0s, 1s, 2s, 3s, 4s, 10s, 11s, 12s, 13s, 20s, 21s, 22s, 30s ;
    status_flag:flag_meanings = "missing_input_data over_land no_ice close_to_coast_or_edge
summer_period processing_failed too_low_correlation not_enough_neighbours filtered_by_neighbours
smaller_pattern corrected_by_neighbours interpolated nominal_quality" ;

```

// global attributes:

```

:title = "OSI SAF Low Resolution Sea Ice Displacement" ;
:product_id = "OSI-405" ;
:product_name = "osi_saf_lr_ice_drift" ;
:product_status = "preoperational" ;
:abstract = "Gridded ice displacement fields obtained from satellite image\n",
    "processing. It is a low resolution product (62.5km resolution).\n",
    "The time span of the ice displacement is approximately 48\n",
    "hours. This dataset is intended both for process studies and\n",
    "data assimilation. Daily products are freely available from\n",
    "the OSI SAF distribution chain." ;
:topiccategory = "Oceans ClimatologyMeteorologyAtmosphere" ;
:keywords = "Sea Ice Motion,Sea Ice,Oceanography,Meteorology,Climate,Remote Sensing" ;
:gcmd_keywords = "Cryosphere > Sea Ice > Sea Ice Motion\n",
    "Ocean > Sea Ice > Sea Ice Motion\n",
    "Geographic Region > Northern Hemisphere\n",

```

```

"Vertical Location > Sea Surface\n",
"EUMETSAT/OSISAF > Satellite Application Facility on Ocean and Sea Ice, European
Organisation for the Exploitation of Meteorological Satellites" ;
:northernmost_latitude = 90.f ;
:southernmost_latitude = 32.20287f ;
:easternmost_longitude = 180.f ;
:westernmost_longitude = -180.f ;
:activity_type = "Space borne instrument" ;
:area = "Northern Hemisphere" ;
:start_date = "2009-11-30 12:00:00" ;
:stop_date = "2009-12-02 12:00:00" ;
:project_name = "EUMETSAT OSI SAF" ;
:institution = "EUMETSAT OSI SAF" ;
:PI_name = "Thomas Lavergne" ;
:contact = "osisaf-manager@met.no" ;
:distribution_statement = "Free" ;
:references = "OSI SAF Low Resolution Sea Ice Drift Product Manual, Lavergne, T., Eastwood
S., v1.3, November 2009, Validation and Monitoring of the OSI SAF Low Resolution Sea Ice Drift Product,
Lavergne, T., v1.0, February 2009, http://saf.met.no, http://www.osi-saf.org" ;
:history = "2009-12-03 creation" ;
:product_version = "1.3" ;
:software_version = "4.0" ;
:netcdf_version = "3.6.3" ;
:Conventions = "CF-1.4" ;
}

```

Ice concentration:

```

netcdf ice_conc_svalbard_200906171500 {
dimensions:
    time = 1 ;
    xc = 3812 ;
    yc = 2980 ;
variables:
    int time(time) ;
        time:long_name = "reference time of sea ice file" ;
        time:units = "seconds since 1981-01-01 00:00:00" ;
    float yc(yc) ;
        yc:axis = "Y" ;
        yc:long_name = "y-coordinate in Cartesian system" ;
        yc:units = "m" ;
    float xc(xc) ;
        xc:axis = "X" ;
        xc:long_name = "x-coordinate in Cartesian system" ;
        xc:units = "m" ;
    float lat(yc, xc) ;
        lat:long_name = "latitude" ;
        lat:units = "degrees_north" ;
    float lon(yc, xc) ;
        lon:long_name = "longitude" ;
        lon:units = "degrees_east" ;
    char crs ;
        crs:grid_mapping_name = "polar_stereographic" ;
        crs:straight_vertical_longitude_from_pole = 0.f ;
        crs:latitude_of_projection_origin = 90.f ;
        crs:standard_parallel = 90.f ;
        crs:false_easting = 0.f ;
        crs:false_northing = 0.f ;
        crs:proj4_string = "proj=stere lon_0=0.0 lat_ts=90.0 lat_0=90.0 a=6371000.0 b=6371000.0" ;
    short ice_concentration(time, yc, xc) ;
        ice_concentration:long_name = "sea ice concentration" ;
        ice_concentration:standard_name = "sea_ice_area_fraction" ;
        ice_concentration:units = "%" ;
        ice_concentration:coordinates = "lon lat" ;
        ice_concentration:grid_mapping = "crs" ;
        ice_concentration:source = "met.no" ;
}

```

```

ice_concentration:_FillValue = -99s ;
ice_concentration:scale_factor = 1.f ;
ice_concentration:add_offset = 0.f ;
short concentration_range(time, yc, xc) ;
concentration_range:long_name = "concentration range" ;
concentration_range:units = "%" ;
concentration_range:coordinates = "lon lat" ;
concentration_range:grid_mapping = "crs" ;
concentration_range:_FillValue = -99s ;
concentration_range:comments = "Range of the analyzed ice concentration value" ;

// global attributes:
:title = "Total Sea Ice Concentration from national ice services." ;
:Conventions = "CF-1.4" ;
:netcdf_version_id = "3.6.3" ;
:creation_date = "2009-06-17T14:01:10Z" ;
:produced_date = "2009-06-17T14:00:00Z" ;
:valid_date = "2009-06-17T14:00:00Z" ;
:product_version = "1.0" ;
:software_version = "1.0" ;
:comment = "The ice concentration is based on a manual interpretation of different satellite data. For more
information about the the product contact the national ice service" ;
:satellite = "Radarsat" ;
:sensor = "ASAR" ;
:spatial_resolution_latitude = 1000.f ;
:spatial_resolution_longitude = 1000.f ;
:southernmost_latitude = 54.36565f ;
:northernmost_latitude = 88.10237f ;
:westernmost_longitude = -80.36474f ;
:easternmost_longitude = 85.30225f ;
:field_type = "daily" ;
:institution = "met.no" ;
:institution_references = "http://www.retro.met.no" ;
:contact = "iceservice@met.no" ;
:operational_status = "operational" ;
data:
.....

```
