PRODUCT USER MANUAL

For Wind- Global Ocean L3 Wind

WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002

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CHANGE RECORD

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2.0	15 Sept. 2011		Changes are template change	Tilly Driesenaar	Ad Stoffelen
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2.3	10 Feb 2015		U10S, curl, divergence	Ad Stoffelen, Jos de Kloe	Lars-Anders Breivik L. Crosnier
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2.8	12 Jul. 2016		NetCDF format changes and addition of wind curl and divergence fields	Jos de Kloe	B. Hackett
2.9	13 Jul 2016		Minor updates on MOTU and FTP URL/filenames examples	V Forneris	B. Hackett

TABLE OF CONTENTS

I INTRODUCTION *5*

II HOW TO DOWNLOAD A PRODUCT *6*

II.1 Download a product through the CMEMS Web Portal Subsetter Service **6**

II.2 Download a product through the CMEMS Web Portal CMEMS FTPService **6**

III DESCRIPTION OF THE PRODUCT SPECIFICATION *7*

III.1 General Information **7**

III.1.1 L3 Global Ocean wind and stress 9

III.2 Details of datasets **12**

IV NOMENCLATURE OF FILES *15*

IV.1 Nomenclature of files when downloaded through the CMEMS Web Portal Subsetter Service **15**

IV.2 Nomenclature of files when downloaded through the CMEMS Web Portal CMEMS FTPService **16**

IV.3 Grid **16**

IV.4 Domain coverage **17**

IV.5 Update Time **17**

IV.6 Other information: mean centre of Products, land mask value, missing value **18**

V FILE FORMAT *19*

V.1 Netcdf **19**

V.2 Structure and semantic of NetCDF maps files **19**

V.3 Reading software **37**

GLOSSARY AND ABBREVIATIONS

ECMWF	European Centre for Medium-Range Weather Forecasts
KNMI	Royal Netherlands Meteorological Institute
IFREMER	Institut Français pour la Recherche et l'Exploitation de la MER
ISRO	Indian Space Research Organisation
NetCDF	Network Common Data Form
CF	Climate Forecast (convention for NetCDF)
NRT	Near Real-Time
PC	Production Center
PU	Production Unit
Wind Meridional Component	West to East component of wind-to vector
Wind Zonal Component	South to North component of the wind-to vector
ftp	File Transfer Protocol (protocol to download and upload files)
OpenDAP	Open-Source Project for a Network Data Access Protocol. Protocol to download subset of data from a n-dimensional gridded dataset (ie: 4 dimensions: lon-lat,depth,time)
OSI SAF	Ocean and Sea Ice Satellite Application Facility of EUMETSAT
Subsetter	CMEMS service tool to download a NetCDF file of a selected geographical box using values of longitude, latitude and time range
Directgetfile	CMEMS service tool (FTP like) to download a NetCDF file
WVC	Wind Vector Cell

I INTRODUCTION

This guide describes the data product files from the CMEMS KNMI Production Unit, what data services are available to access them, and how to use the files and services.

The WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002 product contains L3 gridded sea surface wind observations from scatterometer. The product is produced by KNMI and distributed by CNR.

The CMEMS product contains L3 global daily gridded scatterometer observations relying on upstream L2 scatterometer products from the EUMETSAT Ocean and Sea Ice Satellite Application Facility (OSISAF) Wind Centre at KNMI. The different datasets within the product may have different grid spacings, varying from 12.5 km and 25km (Metop-A and B) to 50 km (Oceansat-2), depending on the scatterometer and upstream processing. Data from ascending and descending passes are gridded into separate files. Only upstream OSISAF L2 observations that have passed KNMI Quality Control are used for the current CMEMS L3 product.

The CMEMS L3 global wind product also contains gridded model winds from ECMWF. This model wind information is first stored in the OSISAF upstream L2 ASCAT wind product. The model wind in the CMEMS L3 global wind product is then sampled and processed in exactly the same way as the scatterometer winds, so subject to identical space and time sampling errors. Comparing scatterometer-sampled ECMWF winds with uniformly-sampled ECMWF winds over a period of interest, reveals these spatio-temporal scatterometer sampling errors.

It must be noted that a significant file format change has been implemented in the NRT L3 production, which leads to differences in file formats between different products. The Oceansat-2 based products which ended in 2014 have not been updated, and keep their original file format. The ASCAT on METOP-A/B based products have significant changes, which are referred to as version V2 of the datasets. The changes include addition of wind stress, addition of curl and divergence of wind and wind stress, introduction of stress equivalent reference winds and the associated air density field, and some more technical changes in the definition of dimensions and attributes.

This change is the result of progress in understanding how the scatterometer measurements should be used (stress equivalent reference winds), and addition of user required fields (stress, rotation, divergence). It will be used from now on for all new near real time and reprocessed data sets.

In the tables that define the file format, the different options are indicated by the data source (Oceansat-2 or ASCAT on METOP-A/B).

II HOW TO DOWNLOAD A PRODUCT

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

You first need to register. Please find below the registration steps:
http://marine.copernicus.eu/web/56-user-registration-form.php

Once registered, the CMEMS FAQ http://marine.copernicus.eu/web/34-products-and-services-faq.php will guide you on How to download a product through the CMEMS Web Portal Subsetter Service.

II.2 Download a product through the CMEMS Web Portal CMEMS FTPService

You first need to register. Please find below the registration steps:
http://marine.copernicus.eu/web/56-user-registration-form.php

Once registered, the CMEMS http://marine.copernicus.eu/web/34-products-and-services-faq.php will guide you on How to download a product through the CMEMS Web Portal CMEMS FTPService.

III DESCRIPTION OF THE PRODUCT SPECIFICATION

III.1 General Information

The different instruments available in this product have been updated for different CMEMS releases and have different file formats. Details are given in the flowing table (Table 1).

Product Specification	WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002	
Geographical coverage	0°W → 360°E ; 90°S → 90°N	
Temporal resolution	Daily files with instantaneous measurements	
Target delivery time	Daily	
Delivery mechanism	CMEMS Information System: SUBSETTER, FTP	
Number of vertical levels	1 at 10 meters	
Analysis or processing	Processing	
Forecast	No	
Data Source	ASCAT on Metop-A ASCAT on Metop-B Oceansat-2	ASCAT on Metop-A ASCAT on Metop-B
Product Version	V1	V2
Format	Netcdf CF1.4	Netcdf CF1.6
Horizontal resolution	0.25 degrees (Metop-A and B) 0.125 degrees (Metop-A and B) 0.5 degrees (Oceansat-2)	0.25 degrees (Metop-A and B) and 0.125 degrees (Metop-A and B)
Available time series	From 12 March 2012 to 19 Oct 2016 (Metop-A)	From 26 Jun 2016 to on-going (Metop-A and Metop-B)

	From 14 May 2013 to 19 Oct 2016 (Metop-B) From 18 March 2013 to 23 February 2014 (Oceansat-2)	
Dimensions	Time, height, lat, lon	Time, lat, lon
Variables		Air Density [kg/m^3]
		Backscatter Distance [n.a.]
		Zonal (Eastward) Model Wind Stress [N/m^2]
		Zonal (Eastward) Wind Stress [N/m^2]
	Zonal (Eastward) (Stress Equivalent) Wind Velocity [m/s]	Zonal (Eastward) (Stress Equivalent) Wind Velocity [m/s]
	Time [seconds since 1990-01-01 00:00:00]	Measurement Acquisition Time [seconds since 1990-01-01 00:00:00]
		Model Wind Stress Curl [N/m^3]
		Model Wind Stress Divergence [N/m^3]
		Model Wind Stress Magnitude [N/m^2]
		Meridional (Northward) Model Wind Stress [N/m^2]
		Meridional (Northward) Wind Stress [N/m^2]
	Meridional (Northward) (Stress Equivalent) Wind Velocity [m/s]	Meridional (Northward) (Stress Equivalent) Wind Velocity [m/s]
	Model Meridional (Northward) Wind Velocity [m/s]	Model Meridional (Northward) Stress Equivalent Wind Velocity [m/s]
	Model Zonal (Eastward) Wind Velocity [m/s]	Model Zonal (Eastward) Stress Equivalent Wind Velocity [m/s]
	Model Wind Speed [m/s]	Model Stress Equivalent Wind Speed [m/s]

	Model Wind-to Direction [degree]	Model Wind-to Direction [degree]
		Model Stress Equivalent Wind Curl [1/s]
		Model Stress Equivalent Wind divergence [1/s]
	(Stress-equivalent) Wind Speed [m/s]	(Stress-equivalent) Wind Speed [m/s]
		Wind Curl [1/s]
		Wind Divergence [1/s]
		Wind Stress Divergence [N/m^3]
		Wind Stress Curl [N/m^3]
		Wind Stress Magnitude [N/m^2]
	Wind-to Direction [degree]	Wind-to Direction [degree]
		Wvc-index [no unit]
		Wvc-quality-flag [no unit]

Table 1: WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002 Product Specification

III.1.1 L3 Global Ocean wind and stress

The global ocean L3 wind and stress product relies on L2 scatterometer ocean wind vectors which are regridded to a regular lat-lon grid with fixed spacing. The global ocean L3 wind product contains different datasets depending on satellite, grid spacing and whether the data is originating from ascending or descending passes. The latter is done to avoid temporal averaging in a basic product, as dynamical and transient changes in the wind field are much larger over a day than the required accuracy level. The L3 grid spacing matches the resolution of the input L2 product. The input L2 products are operational products from the EUMETSAT OSI-SAF produced at KNMI using the EUMETSAT NWP SAF wind processors. The production of the CMEMS L3 global ocean wind product is appended to the OSI SAF production system at KNMI (Production Centre). The resulting NetCDF product files are then made available by the CMEMS Information System at CNR.

The OSI SAF L2 NetCDF input data is generated from the original L2 BUFR products and contains several additions. The model wind is converted to 10m-height stress-equivalent winds, U10S, by

taking the air density into account (taken from the ECMWF NWP model). The scatterometer wind itself already is a stress equivalent wind by definition because the CMOD function used for wind retrieval reflects ocean surface roughness and no atmospheric effects. In a next step the spatial derivatives of the U10S are calculated on a half grid coordinate system defined by the swath grid and later rotated to a standard north-south oriented coordinate system for user convenience. The wind rotation and divergence and wind stress rotation and divergence is calculated on this half grid.

This innovation was chosen to enable study of error properties. Earlier versions reported only the end result of wind stress and rotation, which contains errors from both calculation of the numerical derivatives and from interpolation from swath to regular grid. The new method splits this. All calculations of numerical derivatives are now done at level 2 without any (L2 to L3) interpolation errors. Moreover, the errors caused by the L2 to L3 regridding can now be studied separately.

The L2 to L3 regridding uses the exact same algorithm as in the previous version of the product and has already been tested. For the actual wind stress calculation, the drag coefficient is taken to be linear with U10S now, and has been derived by fitting a line to a drag versus U10S comparison for a full year of ERA-Interim wave model data. The resulting drag relation is very close to the well known COARE3 relation[1].
In addition we have chosen to only include the stress equivalent wind fields. If a user needs the equivalent neutral winds, they can be derived from these using the supplied air mass density. The equations needed for this are detailed in the QUID document.

The various datasets of the global ocean L3 wind and stress product in CMEMS and the L2 products they are based on, are listed in Table 2 . The various OSI SAF L2 wind products are visualized and fully described at http://www.knmi.nl/scatterometer. As new satellite instrument data will become available within the OSI SAF, the CMEMS L3 functionality will be added and the CMEMS portfolio extended.

The L3 product is derived from the L2 wind product by a gridding tool called nc_L2_to_L3 which sorts the wind vector cell measurements into cells defined by a regular lat-lon grid. The measurements from ascending and descending passes are gridded into separate datasets.

[1] J. B. Edson et al., “On the Exchange of Momentum over the Open Ocean”, 2013, DOI: 10.1175/JPO-D-12-0173.1, Journal of Physical Oceanography,43, pp.1589-1610.

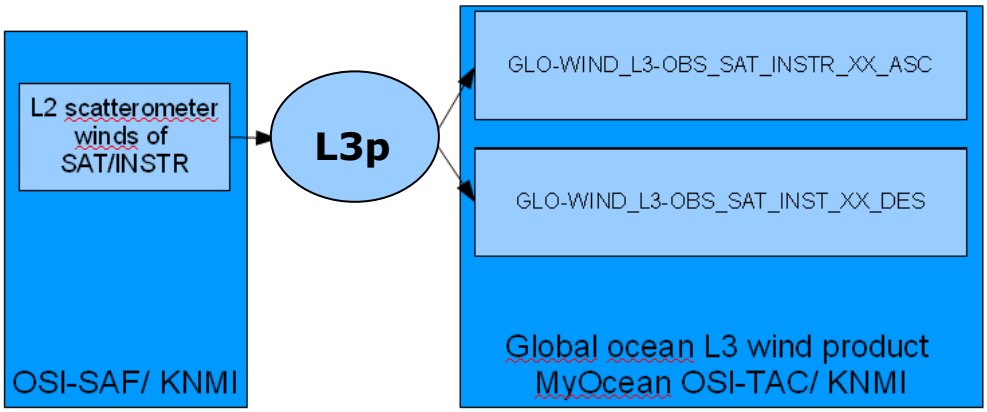

Figure 1 Schematic view of the L3 processing (L3P) interfaces for scatterometer" INST" on satellite "SAT".

III.2 Details of datasets

The following tables give details on the datasets that are available in the WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002 product.

Table 2 gives the L3 file names that are produced for the different scatterometer instruments.

Table 3 defines the variable names and their corresponding NetCDF standard names.

SATELLITE / INSTRUMENT	DATASETS
Metop-A/ASCAT	KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_25_ASC
	KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_25_DES
	KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_12_ASC
	KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_12_DES
	KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_25_ASC_V2
	KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_25_DES_V2
	KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_12_ASC_V2
	KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_12_DES_V2
Metop-B/ASCAT	KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_25_ASC
	KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_25_DES
	KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_12_ASC
	KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_12_DES
	KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_25_ASC_V2
	KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_25_DES_V2
	KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_12_ASC_V2
	KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_12_DES_V2
Oceansat-2/OSCAT	KNMI-GLO-WIND_L3-OBS_Oceansat2_OSCAT_50_ASC
	KNMI-GLO-WIND_L3-OBS_Oceansat2_OSCAT_50_DES

Table 2: List of datasets

VARIABLES AND UNIT	**NAME OF VARIABLES IN THE NETCDF FILE**		**STANDARD NAME ACCORDING TO CF STANDARD**
Data Source	Oceansat-2	ASCAT on Metop-A/B	
Air Density [kg/m^3]		air_density	air_density
Backscatter Distance [n.a.]		bs_distance	[proposed new name] backscatter_distance_to_model-function
Zonal Model Wind Stress [N/m^2]		eastward_model_stress	surface_downward_eastward_-stress
Zonal Wind Stress [N/m^2]		eastward_stress	surface_downward_eastward_-stress
Stress Eq. Zonal Wind Velocity [m/s]	eastward_wind	eastward_wind	eastward_wind
Measurement Acquisition time [seconds since 1990-01-01 00:00:00]	time	Measurement time	time
Model Wind Stress Curl [N/m^3]		model_stress_curl	[proposed new name] vertical_component_of_surface_downward_stress_curl
Model Wind Stress Divergence [N/m^3]		model_stress_divergence	[proposed new name] divergence_of_surface_down-ward_stress
Model Wind Stress Magnitude [N/m^2]		model_stress_magnitude	magnitude_of_surface_down-ward_stress
Model Wind-to Direction [degree]	model_wind_to_dir	model_wind_to_dir	wind_to_direction
Meridional Model Wind Stress [N/m^2]		northward_model_stress	surface_downward_northward_-stress
Meridional Wind Stress [N/m^2]		northward_stress	surface_downward_northward_-stress
Stress Eq. Meridional Wind Velocity [m/s]	northward_wind	northward_wind	northward_wind
Stress Eq. Zonal Model Wind Velocity [m/s]	eastward_model_-wind	se_eastward_model_wind	eastward_wind
Stress Eq. Model Wind Velocity [m/s]	model_speed	se_model_speed	wind_speed

Stress Eq. Model Wind Curl [1/s]		se_model_wind_curl	atmosphere_relative_vorticity
Stress Eq. Model Wind Divergence [1/s]		se_model_wind_diver-gence	divergence_of_wind
Stress. Eq. Merid. Model Wind Velocity [m/s]	northward_model_-wind	se_northward_model_-wind	northward_wind
Wind Stress Curl [N/m^3]		stress_curl	[proposed new name] vertical_component_of_surface_downward_stress_curl
Wind Stress Divergence [N/m^3]		stress_divergence	[proposed new name] divergence_of_surface_down-ward_stress
Stress Eq. Wind Curl [1/s]		wind_curl	atmosphere_relative_vorticity
Stress Eq. Wind Divergence [1/s]		wind_divergence	divergence_of_wind
U10S / Stress Eq. Wind Speed [m/s]	wind_speed	wind_speed	wind_speed
Wind Stress Magnitude [N/m^2]		wind_stress_magnitude	magnitude_of_surface_down-ward_stress
Wind-to Direction [degree]	wind_to_dir	wind_to_dir	wind_to_direction
WVC index [n.a.]		wvc_index	[proposed new name] across_swath_cell_index
WVC quality flag [n.a.]		wvc_quality_flag	status_flag

Table 3: List of the variable for each dataset (column 1), their names in the NetCDF files (columns 2 and 3), and their standard names (column 4) for the WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002 product

IV NOMENCLATURE OF FILES

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

IV.1 Nomenclature of files when downloaded through the CMEMS Web Portal Subsetter Service

WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002 files nomenclature when downloaded through the CMEMS Web Portal Subsetter is based on product dataset name and a numerical reference related to the request date on the MIS.

The scheme is: **datasetname_extractionID.nc**

where :

· **datasetname** is a character string within one of the following :

.

- KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_25_ASC
- KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_25_DES
- KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_12_ASC
- KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_12_DES
- KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_25_ASC
- KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_25_DES
- KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_12_ASC
- KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_12_DES
- KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_25_ASC_V2
- KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_25_DES_V2
- KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_12_ASC_V2
- KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_12_DES_V2
- KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_25_ASC_V2
- KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_25_DES_V2
- KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_12_ASC_V2
- KNMI-GLO-WIND_L3-OBS_METOP-B_ASCAT_12_DES_V2
- KNMI-GLO-WIND_L3-OBS_Oceansat2_OSCAT_50_ASC
- KNMI-GLO-WIND_L3-OBS_Oceansat2_OSCAT_50_DES

where the name indicates the satellite (METOP-A, METOP-B or Oceansat-2), the intrument (ASCAT or OSCAT), the scatterometer

wind resolution (25, 12.5 or 50km), and whether the data are coming from ASCending or DEScending pass.

· **extractionID**: 13 digit integer corresponding to the extraction (subsetting) operation (uniquely identified)

.nc: standard NetCDF filename extension.

Example:

KNMI-GLO-WIND_L3-OBS_METOP-A_ASCAT_12_ASC_V2_1468420761203.nc

IV.2 Nomenclature of files when downloaded through the CMEMS Web Portal CMEMS FTP Service

You can also download files through the FTP Interface. WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002 files nomenclature when downloaded through the CMEMS Web Portal FTP is based as follows:

{finename }-{valid_date}.nc

where

· **valid date** YYYYMMDD is the validity day of the data in the file

· filename is:

- GLO-WIND_L3-OBS_METOP-A_ASCAT_25_ASC_
- GLO-WIND_L3-OBS_METOP-A_ASCAT_25_DES_
- GLO-WIND_L3-OBS_METOP-A_ASCAT_12_ASC_
- GLO-WIND_L3-OBS_METOP-A_ASCAT_12_DES_
- GLO-WIND_L3-OBS_METOP-B_ASCAT_25_ASC_
- GLO-WIND_L3-OBS_METOP-B_ASCAT_25_DES_
- GLO-WIND_L3-OBS_METOP-B_ASCAT_12_ASC_
- GLO-WIND_L3-OBS_METOP-B_ASCAT_12_DES_
- GLO-WIND_L3-OBS_Oceansat2_OSCAT_50_ASC_
- GLO-WIND_L3-OBS_Oceansat2_OSCAT_50_DES_

example:

GLO-WIND_L3-OBS_METOP-A_ASCAT_12_ASC_20150305.nc

IV.3 Grid

The grid that is used is a regular lat-lon grid covering the whole earth.

The grid spacing used is:

- 0.125 degrees for the gridded 12.5 km L3 scatterometer products,
- 0.25 degrees for the gridded 25 km L3 scatterometer products
- and 0.5 degrees for the gridded 50 km L3 scatterometer products.
- For the 12.5 km datasets the grid centre points go from 89.9375 degrees South to 89.9375 degrees North latitude and from 0.0625 degrees East to 359.9375 degrees East longitude.
- For the 25 km datasets the grid centre points go from 89.875 degrees South to 89.875 North latitude and from 0.125 degrees East to 359.875 degrees East longitude.
- For the 50 km datasets the grid centre points go from 89.75 degrees South to 89.75 North latitude and from 0.25 degrees East to 359.75 degrees East.

IV.4 Domain coverage

The L3 global wind product consists of sea surface winds from scatterometer that are interpolated to a regular lat-lon grid. Consequently the L3 wind covers the global ocean and a regular projection is used with a constant longitude and latitude step of 0.25 degrees, resp. 0.125 degrees or 0.5 degrees.

Regular projection : longitude and latitude step is constant	

IV.5 Update Time

WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002 products: the gridded sea surface wind observations are updated daily at around 07:00 AM UTC with gridded observations of the day before.

IV.6 Other information: mean centre of Products, land mask value, missing value

The L3 global wind product WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002 products only contain observations at sea surface in the measurement swath of the satellite. The variable values for grid cells that are on land or outside the measurement swath are filled with the attribute missing_value or _FillValue. Also grid cells that contain only L3 measurements which are rejected by the OSISAF KNMI quality control in the L2 processing (KNMI QC flag set), are filled with the attribute missing_value or _FillValue (see V.2). For more information about the quality control in the OSISAF L2 processing see the scatterometer product handbooks at http://www.knmi.nl/scatterometer .

V FILE FORMAT

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

As already mentioned in the introduction of this document, significant changes have been implemented as dataset version V2. This format is currently only applicable for the current NRT product based on the ASCAT on METOP-A/B data sets, but it will be used from now on for all new near real time and reprocessed datasets as well.

Since the Oceansat-2 based dataset has been discontinued, and the archives for NRT data sets will not be updated, the file format for that data set will not change.

The original Oceansat-2 based NetCDF file format is detailed in subsection V.2.1.

The new ASCAT on METOP-A/B NetCDF file format is detailed in subsection V.2.2.

V.2.1 Structure and semantic of original Oceansat-2 NetCDF maps files

De L3 wind product for the original Oceansat-2 data products has the following NetCDF structure (as generated by "ncdump –h"):

```
netcdf GLO-WIND_L3-OBS_Oceansat2_OSCAT_50_ASC_20140223 {
dimensions:
        height = 1 ;
        lat = 360 ;
        lon = 720 ;
variables:
        int time(height, lat, lon) ;
                time:_FillValue = -2147483647 ;
                time:missing_value = -2147483647 ;
                time:valid_min = 0 ;
                time:valid_max = 1576800000 ;
                time:long_name = "time" ;
                time:units = "seconds since 1990-01-01 00:00:00" ;
                time:calendar = "gregorian" ;
                time:axis = "T" ;
        float height(height) ;
                height:_FillValue = -999999.9f ;
                height:missing_value = -999999.9f ;
                height:valid_min = 10.f ;
                height:valid_max = 10.f ;
                height:standard_name = "height" ;
                height:long_name = "height" ;
                height:units = "m" ;
                height:axis = "Z" ;
                height:positive = "up" ;
        float lat(lat) ;
                lat:_FillValue = -999999.9f ;
                lat:missing_value = -999999.9f ;
                lat:valid_min = -90.f ;
                lat:valid_max = 90.f ;
                lat:standard_name = "latitude" ;
                lat:long_name = "latitude" ;
                lat:units = "degrees_north" ;
                lat:axis = "Y" ;
```

float lon(lon) ;

lon:_FillValue = -999999.9f ;

lon:missing_value = -999999.9f ;

lon:valid_min = 0.f ;

lon:valid_max = 360.f ;

lon:standard_name = "longitude" ;

lon:long_name = "longitude" ;

lon:units = "degrees_east" ;

lon:axis = "X" ;

short eastward_wind(height, lat, lon) ;

eastward_wind:_FillValue = -32767s ;

eastward_wind:missing_value = -32767s ;

eastward_wind:valid_min = -5000s ;

eastward_wind:valid_max = 5000s ;

eastward_wind:standard_name = "eastward_wind" ;

eastward_wind:long_name = "ascending pass eastward wind at 10 m" ;

eastward_wind:units = "m s-1" ;

eastward_wind:scale_factor = 0.01 ;

eastward_wind:add_offset = 0. ;

eastward_wind:coordinates = "height lat lon" ;

short northward_wind(height, lat, lon) ;

northward_wind:_FillValue = -32767s ;

northward_wind:missing_value = -32767s ;

northward_wind:valid_min = -5000s ;

northward_wind:valid_max = 5000s ;

northward_wind:standard_name = "northward_wind" ;

northward_wind:long_name = "ascending pass northward wind at 10 m" ;

northward_wind:units = "m s-1" ;

northward_wind:scale_factor = 0.01 ;

northward_wind:add_offset = 0. ;

northward_wind:coordinates = "height lat lon" ;

short wind_speed(height, lat, lon) ;

wind_speed:_FillValue = -32767s ;

wind_speed:missing_value = -32767s ;

wind_speed:valid_min = 0s ;

wind_speed:valid_max = 5000s ;

wind_speed:standard_name = "wind_speed" ;

wind_speed:long_name = "ascending pass wind speed at 10 m" ;

wind_speed:units = "m s-1" ;

wind_speed:scale_factor = 0.01 ;

wind_speed:add_offset = 0. ;

wind_speed:coordinates = "height lat lon" ;

short wind_to_dir(height, lat, lon) ;

wind_to_dir:_FillValue = -32767s ;

wind_to_dir:missing_value = -32767s ;

wind_to_dir:valid_min = 0s ;

wind_to_dir:valid_max = 3600s ;

wind_to_dir:standard_name = "wind_to_direction" ;

wind_to_dir:long_name = "ascending pass wind to direction at 10 m" ;

wind_to_dir:units = "degree" ;

wind_to_dir:scale_factor = 0.1 ;

wind_to_dir:add_offset = 0. ;

wind_to_dir:coordinates = "height lat lon" ;

short eastward_model_wind(height, lat, lon) ;

eastward_model_wind:_FillValue = -32767s ;

eastward_model_wind:missing_value = -32767s ;

eastward_model_wind:valid_min = -5000s ;

eastward_model_wind:valid_max = 5000s ;

eastward_model_wind:standard_name = "eastward_wind" ;

eastward_model_wind:long_name = "ascending pass eastward model wind at 10 m"
;

eastward_model_wind:units = "m s-1" ;

eastward_model_wind:scale_factor = 0.01 ;

eastward_model_wind:add_offset = 0. ;

eastward_model_wind:coordinates = "height lat lon" ;

eastward_model_wind:background_wind_source = "ECMWF" ;

short northward_model_wind(height, lat, lon) ;

northward_model_wind:_FillValue = -32767s ;

northward_model_wind:missing_value = -32767s ;

northward_model_wind:valid_min = -5000s ;

northward_model_wind:valid_max = 5000s ;

northward_model_wind:standard_name = "northward_wind" ;

northward_model_wind:long_name = "ascending pass northward model wind at 10 m" ;

northward_model_wind:units = "m s-1" ;

northward_model_wind:scale_factor = 0.01 ;

northward_model_wind:add_offset = 0. ;

northward_model_wind:coordinates = "height lat lon" ;

northward_model_wind:background_wind_source = "ECMWF" ;

short model_wind_speed(height, lat, lon) ;

model_wind_speed:_FillValue = -32767s ;

model_wind_speed:missing_value = -32767s ;

model_wind_speed:valid_min = 0s ;

model_wind_speed:valid_max = 5000s ;

model_wind_speed:standard_name = "wind_speed" ;

model_wind_speed:long_name = "ascending pass model wind speed at 10 m" ;

model_wind_speed:units = "m s-1" ;

model_wind_speed:scale_factor = 0.01 ;

model_wind_speed:add_offset = 0. ;

model_wind_speed:coordinates = "height lat lon" ;

model_wind_speed:background_wind_source = "ECMWF" ;

short model_wind_to_dir(height, lat, lon) ;

model_wind_to_dir:_FillValue = -32767s ;

model_wind_to_dir:missing_value = -32767s ;

model_wind_to_dir:valid_min = 0s ;

model_wind_to_dir:valid_max = 3600s ;

model_wind_to_dir:standard_name = "wind_to_direction" ;

model_wind_to_dir:long_name = "ascending pass model wind to direction at 10 m" ;

model_wind_to_dir:units = "degree" ;

model_wind_to_dir:scale_factor = 0.1 ;

model_wind_to_dir:add_offset = 0. ;

model_wind_to_dir:coordinates = "height lat lon" ;

model_wind_to_dir:background_wind_source = "ECMWF" ;

// global attributes:

:title = "Oceansat-2 OSCAT Level 3 0.500 degrees Ocean Surface Wind Vector Product (MyOcean)" ;

:product_name = "OSCAT-MyOcean-L3-0.50deg" ;

:Conventions = "CF-1.4" ;

:product_id = "WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002" ;

:institution = "KNMI" ;

:institution_references = "http://www.knmi.nl" ;

:contact = "servicedesk@myocean.eu.org" ;

:product_status = "preoperational" ;

:processing_type = "O" ;

:abstract = "The L3 global wind product of MyOcean is composed of daily gridded observations of the scatterometer on a regular lat-lon grid, using Gouraud shading interpolation technique. Data from ascending and descending passes are gridded into separate files." ;

:topiccategory = "Climatology/Meteorology/Atmosphere Oceans" ;

:keywords = "daily, gridded, data, satellite, remote, sensing, observation, direction, speed, ocean, surface, wind" ;

:gcmd_keywords = "Oceans>Ocean Winds>Surface Winds, Atmosphere>Atmospheric Winds>Surface Winds" ;

:activity_type = "Space borne instrument" ;

:area = "global" ;

:project_name = "EUMETSAT OSI SAF, MyOcean" ;

:PI_name = "Ad Stoffelen" ;

:distribution_statement = "free" ;

:satellite = "Oceansat-2" ;

:sensor = "OSCAT" ;

:production_frequency = "Daily" ;

:software_identification_level_1 = 1102 ;

:instrument_calibration_version = 0 ;

:software_identification_wind = 1102 ;

:pixel_size_of_l2_data = "50.0 km" ;

:service_type = "" ;

:contents = "owv" ;

:file_name = "GLO-WIND_L3-OBS_Oceansat2_OSCAT_50_ASC_20140223.nc" ;

:processing_level = "L3" ;

:start_date = "2014-02-23" ;

:start_time = "00:00:03" ;

:stop_date = "2014-02-23" ;

:stop_time = "23:59:58" ;

:southernmost_latitude = "-89.7500" ;

:northernmost_latitude = "89.7500" ;

:westernmost_longitude = "0.2500" ;

:easternmost_longitude = "359.7500" ;

:grid_resolution = "0.500 degrees" ;

:history = "N/A" ;

:netcdf_version_id = "4.0" ;

:references = "L3 Global Wind Product User Manual, http://www.myocean.eu.org/, http://www.knmi.nl/scatterometer/" ;

:comment = "All wind directions in oceanographic convention (0 deg. flowing North)" ;

:source = "produced at 2014-02-24" ;

:creation_date = "2014-02-24" ;

:creation_time = "06:14:23" ;

:file_quality_index = "1" ;

:swath_direction = "ascending" ;

}

V.2.2 Structure and semantic of new ASCAT on METOP-A/B NetCDF maps files

De L3 wind product for the updated ASCAT on METOP-A/B products has the following NetCDF structure (as generated by "ncdump –h"):

netcdf GLO-WIND_L3-OBS_METOP-A_ASCAT_25_ASC_20160710-v2.2 {

dimensions:

time = 1 ;

lat = 720 ;

lon = 1440 ;

variables:

int time(time) ;

time:standard_name = "time" ;
time:long_name = "Validity time" ;
time:units = "seconds since 1990-01-01 00:00:00" ;
time:calendar = "Gregorian" ;
time:axis = "T" ;
float lat(lat) ;
lat:valid_min = -90.f ;
lat:valid_max = 90.f ;
lat:standard_name = "latitude" ;
lat:long_name = "latitude" ;
lat:units = "degrees_north" ;
lat:axis = "Y" ;
float lon(lon) ;
lon:valid_min = 0.f ;
lon:valid_max = 360.f ;
lon:standard_name = "longitude" ;
lon:long_name = "longitude" ;
lon:units = "degrees_east" ;
lon:axis = "X" ;
int measurement_time(time, lat, lon) ;
measurement_time:_FillValue = -2147483647 ;
measurement_time:missing_value = -2147483647 ;
measurement_time:valid_min = 0 ;
measurement_time:valid_max = 2147483647 ;
measurement_time:standard_name = "time" ;
measurement_time:long_name = "measurement acquisition time" ;
measurement_time:units = "seconds since 1990-01-01 00:00:00" ;
measurement_time:coordinates = "time lat lon" ;
short wvc_index(time, lat, lon) ;
wvc_index:_FillValue = -32767s ;
wvc_index:missing_value = -32767s ;
wvc_index:valid_min = 0s ;
wvc_index:valid_max = 999s ;
wvc_index:standard_name = "across_swath_cell_index" ;

wvc_index:long_name = "cross track wind vector cell number" ;

wvc_index:units = "1" ;

wvc_index:coordinates = "time lat lon" ;

short air_density(time, lat, lon) ;

air_density:_FillValue = -32767s ;

air_density:missing_value = -32767s ;

air_density:valid_min = 0s ;

air_density:valid_max = 2000s ;

air_density:standard_name = "air_density" ;

air_density:long_name = "air density at 10 m" ;

air_density:units = "kg m-3" ;

air_density:scale_factor = 0.001 ;

air_density:add_offset = 0. ;

air_density:coordinates = "time lat lon" ;

air_density:air_density_source = "ECMWF (Operational Model)" ;

int stress_divergence(time, lat, lon) ;

stress_divergence:_FillValue = -2147483647 ;

stress_divergence:missing_value = -2147483647 ;

stress_divergence:valid_min = -500000000 ;

stress_divergence:valid_max = 500000000 ;

stress_divergence:standard_name = "divergence_of_surface_downward_stress" ;

stress_divergence:long_name = "divergence of ocean surface stress" ;

stress_divergence:units = "N m-3" ;

stress_divergence:scale_factor = 1.e-07 ;

stress_divergence:add_offset = 0. ;

stress_divergence:coordinates = "time lat lon" ;

int stress_curl(time, lat, lon) ;

stress_curl:_FillValue = -2147483647 ;

stress_curl:missing_value = -2147483647 ;

stress_curl:valid_min = -500000000 ;

stress_curl:valid_max = 500000000 ;

stress_curl:standard_name = "vertical_component_of_surface_downward_stress_curl" ;

stress_curl:long_name = "rotation of ocean surface stress" ;

stress_curl:units = "N m-3" ;

stress_curl:scale_factor = 1.e-07 ;

stress_curl:add_offset = 0. ;

stress_curl:coordinates = "time lat lon" ;

int model_stress_divergence(time, lat, lon) ;

model_stress_divergence:_FillValue = -2147483647 ;

model_stress_divergence:missing_value = -2147483647 ;

model_stress_divergence:valid_min = -500000000 ;

model_stress_divergence:valid_max = 500000000 ;

model_stress_divergence:standard_name = "divergence_of_surface_downward_stress" ;

model_stress_divergence:long_name = "model divergence of ocean surface stress" ;

model_stress_divergence:units = "N m-3" ;

model_stress_divergence:scale_factor = 1.e-07 ;

model_stress_divergence:add_offset = 0. ;

model_stress_divergence:coordinates = "time lat lon" ;

model_stress_divergence:background_wind_source = "ECMWF (Operational Model)" ;

int model_stress_curl(time, lat, lon) ;

model_stress_curl:_FillValue = -2147483647 ;

model_stress_curl:missing_value = -2147483647 ;

model_stress_curl:valid_min = -500000000 ;

model_stress_curl:valid_max = 500000000 ;

model_stress_curl:standard_name = "vertical_component_of_surface_downward_stress_curl" ;

model_stress_curl:long_name = "model rotation of ocean surface stress" ;

model_stress_curl:units = "N m-3" ;

model_stress_curl:scale_factor = 1.e-07 ;

model_stress_curl:add_offset = 0. ;

model_stress_curl:coordinates = "time lat lon" ;

model_stress_curl:background_wind_source = "ECMWF (Operational Model)" ;

int wind_divergence(time, lat, lon) ;

wind_divergence:_FillValue = -2147483647 ;

wind_divergence:missing_value = -2147483647 ;

wind_divergence:valid_min = -50000 ;

wind_divergence:valid_max = 50000 ;

wind_divergence:standard_name = "divergence_of_wind" ;

wind_divergence:long_name = "divergence of stress equivalent wind at 10m" ;

wind_divergence:units = "s-1" ;

wind_divergence:scale_factor = 0.0001 ;

wind_divergence:add_offset = 0. ;

wind_divergence:coordinates = "time lat lon" ;

int wind_curl(time, lat, lon) ;

wind_curl:_FillValue = -2147483647 ;

wind_curl:missing_value = -2147483647 ;

wind_curl:valid_min = -50000 ;

wind_curl:valid_max = 50000 ;

wind_curl:standard_name = "atmosphere_relative_vorticity" ;

wind_curl:long_name = "rotation of stress equivalent wind at 10m" ;

wind_curl:units = "s-1" ;

wind_curl:scale_factor = 0.0001 ;

wind_curl:add_offset = 0. ;

wind_curl:coordinates = "time lat lon" ;

int se_model_wind_divergence(time, lat, lon) ;

se_model_wind_divergence:_FillValue = -2147483647 ;

se_model_wind_divergence:missing_value = -2147483647 ;

se_model_wind_divergence:valid_min = -50000 ;

se_model_wind_divergence:valid_max = 50000 ;

se_model_wind_divergence:standard_name = "divergence_of_wind" ;

se_model_wind_divergence:long_name = "model divergence of stress equivalent wind at 10m" ;

se_model_wind_divergence:units = "s-1" ;

se_model_wind_divergence:scale_factor = 0.0001 ;

se_model_wind_divergence:add_offset = 0. ;

se_model_wind_divergence:coordinates = "time lat lon" ;

se_model_wind_divergence:background_wind_source = "ECMWF (Operational Model)" ;

int se_model_wind_curl(time, lat, lon) ;

se_model_wind_curl:_FillValue = -2147483647 ;

se_model_wind_curl:missing_value = -2147483647 ;

se_model_wind_curl:valid_min = -50000 ;

se_model_wind_curl:valid_max = 50000 ;

se_model_wind_curl:standard_name = "atmosphere_relative_vorticity" ;

se_model_wind_curl:long_name = "model rotation of stress equivalent wind at 10m"
;

se_model_wind_curl:units = "s-1" ;

se_model_wind_curl:scale_factor = 0.0001 ;

se_model_wind_curl:add_offset = 0. ;

se_model_wind_curl:coordinates = "time lat lon" ;

se_model_wind_curl:background_wind_source = "ECMWF (Operational Model)" ;

short se_model_speed(time, lat, lon) ;

se_model_speed:_FillValue = -32767s ;

se_model_speed:missing_value = -32767s ;

se_model_speed:valid_min = 0s ;

se_model_speed:valid_max = 5000s ;

se_model_speed:standard_name = "wind_speed" ;

se_model_speed:long_name = "stress equivalent model wind speed at 10 m" ;

se_model_speed:units = "m s-1" ;

se_model_speed:scale_factor = 0.01 ;

se_model_speed:add_offset = 0. ;

se_model_speed:coordinates = "time lat lon" ;

se_model_speed:background_wind_source = "ECMWF (Operational Model)" ;

short model_wind_to_dir(time, lat, lon) ;

model_wind_to_dir:_FillValue = -32767s ;

model_wind_to_dir:missing_value = -32767s ;

model_wind_to_dir:valid_min = 0s ;

model_wind_to_dir:valid_max = 3600s ;

model_wind_to_dir:standard_name = "wind_to_direction" ;

model_wind_to_dir:long_name = "model wind direction at 10 m" ;

model_wind_to_dir:units = "degree" ;

model_wind_to_dir:scale_factor = 0.1 ;

model_wind_to_dir:add_offset = 0. ;

model_wind_to_dir:coordinates = "time lat lon" ;

model_wind_to_dir:background_wind_source = "ECMWF (Operational Model)" ;

int wvc_quality_flag(time, lat, lon) ;

wvc_quality_flag:_FillValue = -2147483647 ;

wvc_quality_flag:missing_value = -2147483647 ;

wvc_quality_flag:valid_min = 0 ;

wvc_quality_flag:valid_max = 8388607 ;

wvc_quality_flag:standard_name = "status_flag" ;

wvc_quality_flag:long_name = "wind vector cell quality" ;

wvc_quality_flag:coordinates = "time lat lon" ;

wvc_quality_flag:flag_masks = 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768, 65536, 131072, 262144, 524288, 1048576, 2097152, 4194304 ;

wvc_quality_flag:flag_meanings = "distance_to_gmf_too_large data_are_redundant no_meteorological_background_used rain_detected rain_flag_not_usable small_wind_less_than_or_equal_to_3_m_s large_wind_greater_than_30_m_s wind_inversion_not_successful some_portion_of_wvc_is_over_ice some_portion_of_wvc_is_over_land variational_quality_control_fails knmi_quality_control_fails product_monitoring_event_flag product_monitoring_not_used any_beam_noise_content_above_threshold poor_azimuth_diversity not_enough_good_sigma0_for_wind_retrieval" ;

short wind_speed(time, lat, lon) ;

wind_speed:_FillValue = -32767s ;

wind_speed:missing_value = -32767s ;

wind_speed:valid_min = 0s ;

wind_speed:valid_max = 5000s ;

wind_speed:standard_name = "wind_speed" ;

wind_speed:long_name = "stress equivalent wind speed at 10 m" ;

wind_speed:units = "m s-1" ;

wind_speed:scale_factor = 0.01 ;

wind_speed:add_offset = 0. ;

wind_speed:coordinates = "time lat lon" ;

short wind_to_dir(time, lat, lon) ;

wind_to_dir:_FillValue = -32767s ;

wind_to_dir:missing_value = -32767s ;

wind_to_dir:valid_min = 0s ;

wind_to_dir:valid_max = 3600s ;

wind_to_dir:standard_name = "wind_to_direction" ;

wind_to_dir:long_name = "wind direction at 10 m" ;

wind_to_dir:units = "degree" ;

wind_to_dir:scale_factor = 0.1 ;

wind_to_dir:add_offset = 0. ;

wind_to_dir:coordinates = "time lat lon" ;

short eastward_wind(time, lat, lon) ;

eastward_wind:_FillValue = -32767s ;

eastward_wind:missing_value = -32767s ;

eastward_wind:valid_min = -5000s ;

eastward_wind:valid_max = 5000s ;

eastward_wind:standard_name = "eastward_wind" ;

eastward_wind:long_name = "stress equivalent wind u component at 10 m" ;

eastward_wind:units = "m s-1" ;

eastward_wind:scale_factor = 0.01 ;

eastward_wind:add_offset = 0. ;

eastward_wind:coordinates = "time lat lon" ;

short northward_wind(time, lat, lon) ;

northward_wind:_FillValue = -32767s ;

northward_wind:missing_value = -32767s ;

northward_wind:valid_min = -5000s ;

northward_wind:valid_max = 5000s ;

northward_wind:standard_name = "northward_wind" ;

northward_wind:long_name = "stress equivalent wind v component at 10 m" ;

northward_wind:units = "m s-1" ;

northward_wind:scale_factor = 0.01 ;

northward_wind:add_offset = 0. ;

northward_wind:coordinates = "time lat lon" ;

short se_eastward_model_wind(time, lat, lon) ;

se_eastward_model_wind:_FillValue = -32767s ;

se_eastward_model_wind:missing_value = -32767s ;

se_eastward_model_wind:valid_min = -5000s ;

se_eastward_model_wind:valid_max = 5000s ;

se_eastward_model_wind:standard_name = "eastward_wind" ;

se_eastward_model_wind:long_name = "stress equivalent model wind u component at 10 m" ;

se_eastward_model_wind:units = "m s-1" ;

se_eastward_model_wind:scale_factor = 0.01 ;

se_eastward_model_wind:add_offset = 0. ;

se_eastward_model_wind:coordinates = "time lat lon" ;

se_eastward_model_wind:background_wind_source = "ECMWF (Operational Model)" ;

short se_northward_model_wind(time, lat, lon) ;

se_northward_model_wind:_FillValue = -32767s ;

se_northward_model_wind:missing_value = -32767s ;

se_northward_model_wind:valid_min = -5000s ;

se_northward_model_wind:valid_max = 5000s ;

se_northward_model_wind:standard_name = "northward_wind" ;

se_northward_model_wind:long_name = "stress equivalent model wind v component at 10 m" ;

se_northward_model_wind:units = "m s-1" ;

se_northward_model_wind:scale_factor = 0.01 ;

se_northward_model_wind:add_offset = 0. ;

se_northward_model_wind:coordinates = "time lat lon" ;

se_northward_model_wind:background_wind_source = "ECMWF (Operational Model)" ;

int wind_stress_magnitude(time, lat, lon) ;

wind_stress_magnitude:_FillValue = -2147483647 ;

wind_stress_magnitude:missing_value = -2147483647 ;

wind_stress_magnitude:valid_min = 0 ;

wind_stress_magnitude:valid_max = 5000 ;

wind_stress_magnitude:standard_name = "magnitude_of_surface_downward_stress" ;

wind_stress_magnitude:long_name = "wind stress" ;

wind_stress_magnitude:units = "N m-2" ;

wind_stress_magnitude:scale_factor = 0.01 ;

wind_stress_magnitude:add_offset = 0. ;

wind_stress_magnitude:coordinates = "time lat lon" ;

int model_stress_magnitude(time, lat, lon) ;

model_stress_magnitude:_FillValue = -2147483647 ;

model_stress_magnitude:missing_value = -2147483647 ;

model_stress_magnitude:valid_min = 0 ;

model_stress_magnitude:valid_max = 5000 ;

model_stress_magnitude:standard_name = "magnitude_of_surface_downward_stress" ;

model_stress_magnitude:long_name = "model stress" ;

model_stress_magnitude:units = "N m-2" ;

model_stress_magnitude:scale_factor = 0.01 ;

model_stress_magnitude:add_offset = 0. ;

model_stress_magnitude:coordinates = "time lat lon" ;

model_stress_magnitude:background_wind_source = "ECMWF (Operational Model)" ;

int eastward_stress(time, lat, lon) ;

eastward_stress:_FillValue = -2147483647 ;

eastward_stress:missing_value = -2147483647 ;

eastward_stress:valid_min = -5000 ;

eastward_stress:valid_max = 5000 ;

eastward_stress:standard_name = "surface_downward_eastward_stress" ;

eastward_stress:long_name = "wind stress u component" ;

eastward_stress:units = "N m-2" ;

eastward_stress:scale_factor = 0.01 ;

eastward_stress:add_offset = 0. ;

eastward_stress:coordinates = "time lat lon" ;

int northward_stress(time, lat, lon) ;

northward_stress:_FillValue = -2147483647 ;

northward_stress:missing_value = -2147483647 ;

northward_stress:valid_min = -5000 ;

northward_stress:valid_max = 5000 ;

northward_stress:standard_name = "surface_downward_northward_stress" ;

northward_stress:long_name = "wind stress v component" ;

northward_stress:units = "N m-2" ;

northward_stress:scale_factor = 0.01 ;

northward_stress:add_offset = 0. ;

northward_stress:coordinates = "time lat lon" ;

int eastward_model_stress(time, lat, lon) ;

eastward_model_stress:_FillValue = -2147483647 ;

eastward_model_stress:missing_value = -2147483647 ;

eastward_model_stress:valid_min = -5000 ;

eastward_model_stress:valid_max = 5000 ;

eastward_model_stress:standard_name = "surface_downward_eastward_stress" ;

eastward_model_stress:long_name = "model stress u component" ;

eastward_model_stress:units = "N m-2" ;

eastward_model_stress:scale_factor = 0.01 ;

eastward_model_stress:add_offset = 0. ;

eastward_model_stress:coordinates = "time lat lon" ;

eastward_model_stress:background_wind_source = "ECMWF (Operational Model)" ;

int northward_model_stress(time, lat, lon) ;

northward_model_stress:_FillValue = -2147483647 ;

northward_model_stress:missing_value = -2147483647 ;

northward_model_stress:valid_min = -5000 ;

northward_model_stress:valid_max = 5000 ;

northward_model_stress:standard_name = "surface_downward_northward_stress" ;

northward_model_stress:long_name = "model stress v component" ;

northward_model_stress:units = "N m-2" ;

northward_model_stress:scale_factor = 0.01 ;

northward_model_stress:add_offset = 0. ;

northward_model_stress:coordinates = "time lat lon" ;

northward_model_stress:background_wind_source = "ECMWF (Operational Model)"
;

short bs_distance(time, lat, lon) ;

bs_distance:_FillValue = -32767s ;

bs_distance:missing_value = -32767s ;

bs_distance:valid_min = -500s ;

bs_distance:valid_max = 500s ;

bs_distance:standard_name = "backscatter_distance_to_modelfunction" ;

bs_distance:long_name = "backscatter distance" ;

bs_distance:units = "1" ;

bs_distance:scale_factor = 0.1 ;

bs_distance:add_offset = 0. ;

bs_distance:coordinates = "time lat lon" ;

// global attributes:

:title = "MetOp-A ASCAT Level 3 25.0 km Ocean Surface Wind Vector Product (Copernicus)" ;

:title_short_name = "ASCATA-L3-25km" ;

:Conventions = "CF-1.6" ;

:institution = "EUMETSAT/OSI SAF/KNMI" ;

:source = "MetOp-A ASCAT" ;

:software_identification_level_1 = 1000 ;

:instrument_calibration_version = 0 ;

:software_identification_wind = 2401 ;

:pixel_size_on_horizontal = "25.0 km" ;

:service_type = "N/A" ;

:processing_type = "O" ;

:contents = "ovw" ;

:granule_name = "GLO-WIND_L3-OBS_METOP-A_ASCAT_25_ASC_20160710.nc" ;

:processing_level = "L3" ;

:orbit_number = 50453 ;

:start_date = "2016-07-10" ;

:start_time = "00:00:00" ;

:stop_date = "2016-07-10" ;

:stop_time = "23:59:56" ;

:equator_crossing_longitude = " 328.246" ;

:equator_crossing_date = "2016-07-09" ;

:equator_crossing_time = "23:35:50" ;

:rev_orbit_period = "6081.7" ;

:orbit_inclination = "98.7" ;

:history = "N/A" ;

:references = "ASCAT Wind Product User Manual, http://www.osi-saf.org/, http://www.knmi.nl/scatterometer/" ;

:comment = "Orbit period and inclination are constant values. All wind directions in oceanographic convention (0 deg. flowing North)" ;

:creation_date = "2016-07-11" ;

:creation_time = "08:11:18" ;

}

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/
- ✓ Panoply: http://www.giss.nasa.gov/tools/panoply/
- ✓ Python: https://github.com/Unidata/netcdf4-python
- ✓ IDL, Matlab, GMT…