



GLOBAL ANALYSED OCEAN SURFACE WIND PRODUCTS

Description

The analysed winds have been generated at $0.5^{\circ} \times 0.5^{\circ}$ interval over the global oceans. For the generation of these analysed winds products, we have used (Oceansat-2 SCATterometer) OSCAT data for daily Analysed Wind Vector (AWV) and combined OSCAT and Advanced Scatterometer (ASCAT) onboard MetOP-A data for generating 12 hourly AWV. Along with wind vector and wind stress, other parameters of interest, wind divergence and vertical component of curl of wind stress have also been computed and provided.

OSCAT was launched by the ISRO on 23rd September 2009 carrying a Ku band (13.515 GHz) pencil beam scatterometer along with two other payloads (Ocean Color Monitor, OCM and Radio Occultation Sounder for Atmospheric Studies, ROSA) into a near polar sun-synchronous orbit of 720 km altitude, inclination 98.250 and the local time of equatorial crossing in the descending node at 12 noon \pm 10 minutes. The scatterometer (OSCAT) has a repeat cycle of 2-days at incidence angles 48.90 (HH- polarization) and 57.60 (VV-polarization) and the corresponding swaths are 1400 km and 1840 km respectively with a nominal spatial resolution of 50 km. In present study, we have used well Level- 2B (L2B) operational wind products (version 1.3, October 2011) from OSCAT available freely from National Remote Sensing Centre (www.nrsc.gov.in).

ASCAT as one of the payloads onboard first Meteorological Operational Platform (MetOP-A), was launched by EUMETSAT on 19th October 2006. The ASCAT is a C-band (5.3 GHz) fan beam scatterometer with six fan beam antennas providing two swaths 550km wide, located on each side of the satellite track, separated by a nadir gap of 700 km. For operational generation of AWV products, L2B data (with 25 km resolution) of ASCAT provided by EUMETSAT's broadcast system for environmental data (EUMETCAST) are being used.

In order to construct global synoptic wind fields from the along track wind observations (e.g. wind vector and wind stress), spatial interpolation of the missing data grids is performed. In our study, we have used interpolation algorithm based on simple eight grid averaging technique, known as box averaging interpolation. If the growth of wind field over oceans is assumed to be stochastic, the predicted value for a missing grid can be fairly specified by the average of surrounding eight grids with equal weights. This method is comparatively fast and can be used operationally for all regions and all seasons.

This box averaging technique is physically applicable only on the scalar spatial functions. Hence, first of all, we have prepared gridded data for each of the two (zonal and meridional) components of the wind vectors and wind stress. Then the missing grids over global oceans are filled up using the above averaging technique. This method iteratively fills up all the missing data grids on global scale. If the number of iterations increases after an optimal value, the accuracy in the resultant product decreases. Being a very simple iterative interpolation technique, box-averaging method fills up all the missing data grids on NRT basis. The method is tested for high gradient of wind fields (e.g. tropical cyclones) and found to produce satisfactory results.

The gridded wind fields are computed in near real time with a delay of 24 hours for daily winds and 12hours for 12hourly winds. Every product also contains a log file for the quality of analysed wind products. Sometimes, swath data are not available due to unforeseen circumstances, even then analysed fields are generated which contains wider gaps or larger spatial interpolation. In such cases, analysed winds may not be of good quality and it is mentioned in the Log file. This version is a test dataset to provide insight for near real time generation of high spatial and temporal resolutions at later stage. The data are available at MOSDAC (<http://www.mosdac.gov.in/>) and can be freely distributed (Contact persons: rksharma@sac.isro.gov.in and abhisek1984@sac.isro.gov.in). The data files are in BINARY (GrADS) format.

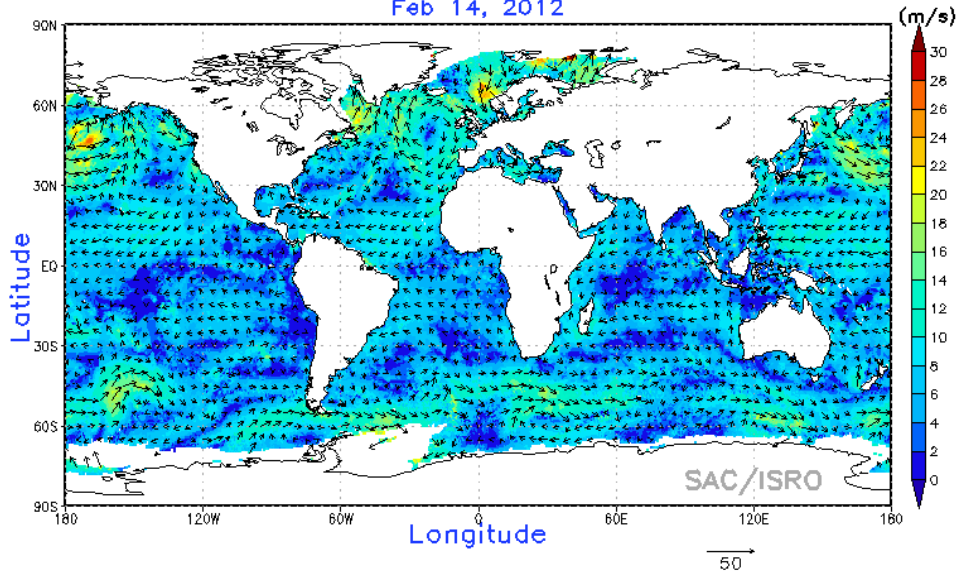
Acknowledgements

The ASCAT level2B data used for these products are made available by EUMETSAT through EUMETCAST. The sample GIF images are produced through GrADS Software.

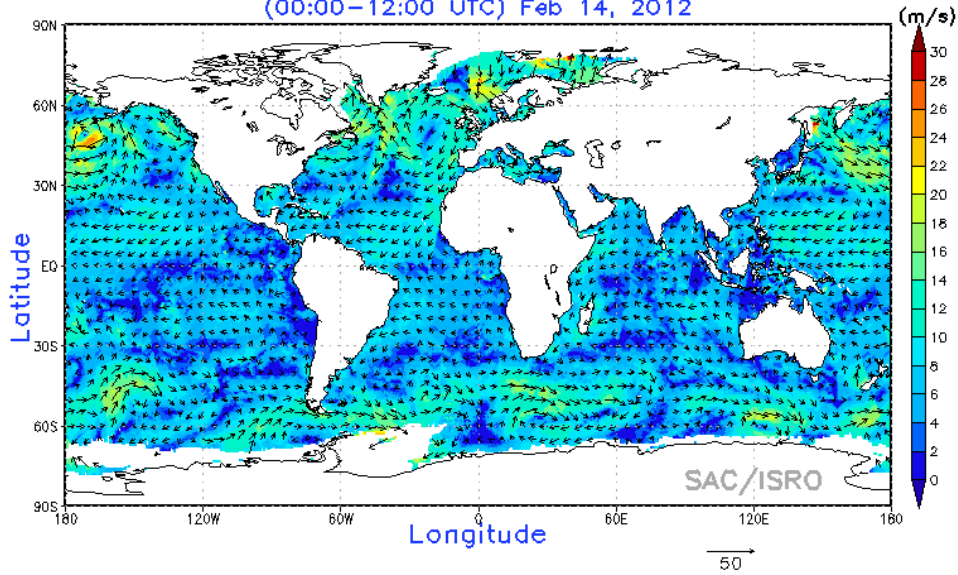
The processing software for this analysed wind product is developed within the ISRO under OSCAT utilization project.

SAMPLE PRODUCTS

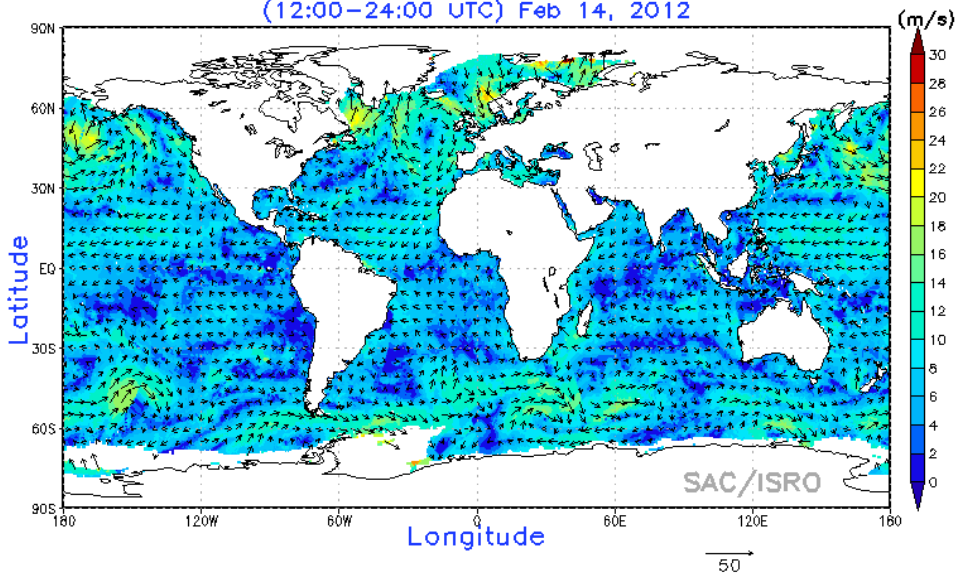
OSCAT Daily Analysed Winds Feb 14, 2012



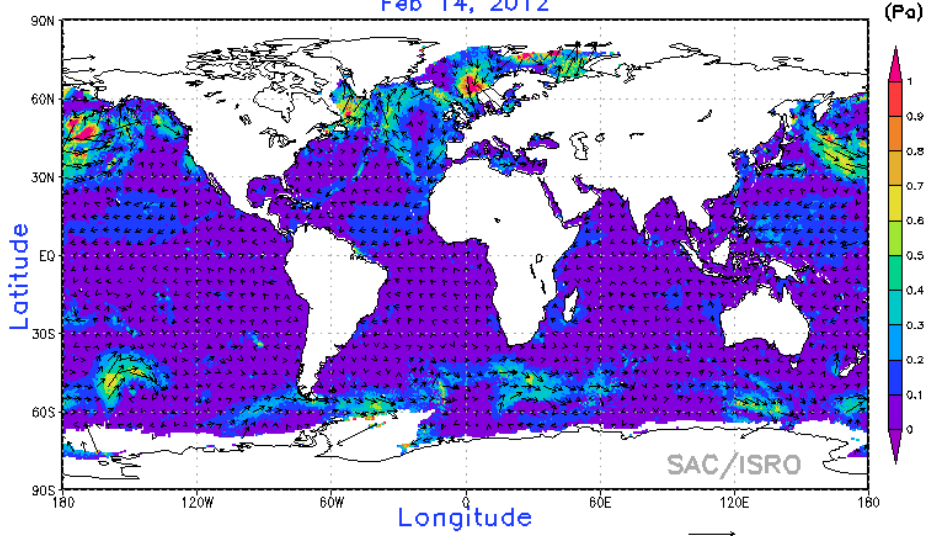
OSCAT 12-Hourly Analysed Winds (00:00–12:00 UTC) Feb 14, 2012



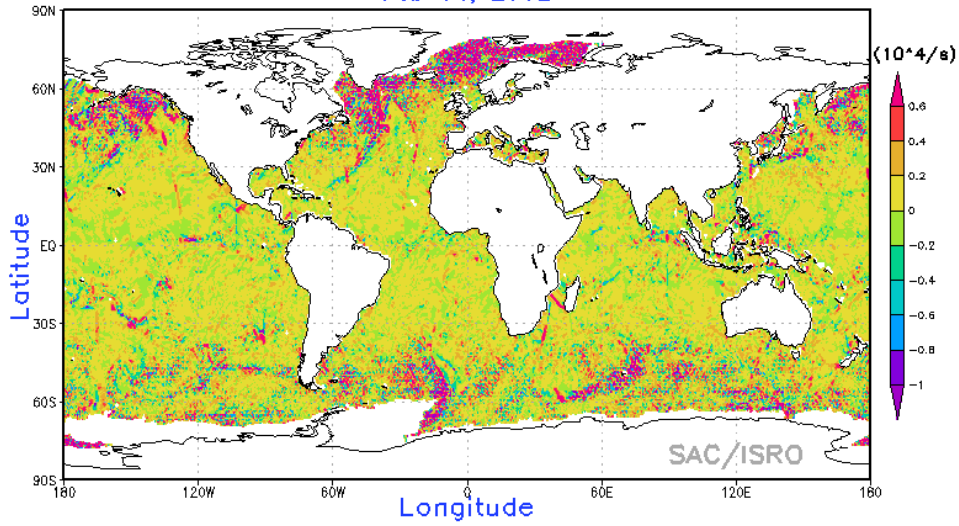
OSCAT 12-Hourly Analysed Winds (12:00–24:00 UTC) Feb 14, 2012



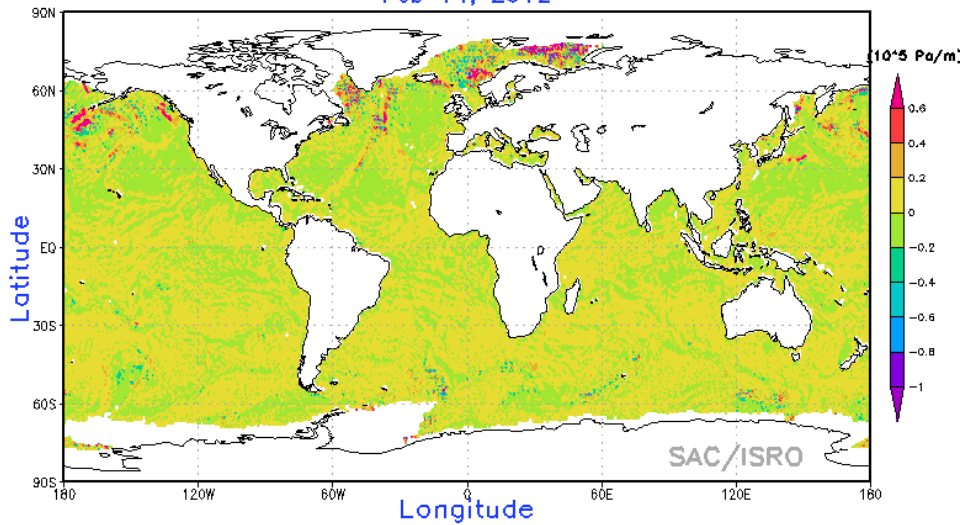
OSCAT Daily Analysed Wind Stress
Feb 14, 2012



OSCAT Daily Analysed Wind Divergence
Feb 14, 2012



OSCAT Daily Analysed Wind Stress Curl
Feb 14, 2012



Comparison statistics of daily analyzed wind vectors with NDBC, TAO and ECMWF (Nov'2009 – Jun'2010)

Parameter	NDBC			TAO			ECMWF		
	NP	Bias (m/s)	Std (m/s)	NP	Bias (m/s)	Std (m/s)	NP	Bias (m/s)	Std (m/s)
Wind Speed	14386	-0.73	2.06	11168	-0.50	1.77	5111330	-0.66	2.19
Wind Direction		0.04	22.26		0.02	18.59		-0.04	19.42

Comparison statistics of 12 hourly analyzed wind vectors with NDBC, TAO and ECMWF (Nov'2009 – Jun'2010)

Parameter	NDBC			TAO			ECMWF		
	NP	Bias (m/s)	Std (m/s)	NP	Bias (m/s)	Std (m/s)	NP	Bias (m/s)	Std (m/s)
Wind Speed	17960	-0.45	1.88	12284	-0.17	1.64	10947450	-0.40	2.18
Wind Direction		0.01	19.33		0.03	17.50		-0.03	17.15

Sample Control File to Plot the Binary Analysed Products in GrADS

```
DSET O2SCT_20110723_DAILY_L04_AWV50.grd
UNDEF -999.
TITLE CONTROL FILE FOR OSCAT WIND
XDEF 721 LINEAR -180.0000 0.5000000
YDEF 361 LINEAR -90.00000 0.5000000
ZDEF 1 LINEAR 1.00 1.00
TDEF 1 LINEAR 00:00Z01JUL2010 1dy
VARS 8
ws 0 99 Wind Speed Magnitude (m/s)
u 0 99 U-component of Wind (m/s)
v 0 99 V-component of Wind (m/s)
tau 0 99 Wind stress (Pa)
taux 0 99 Zonal wind stress (Pa)
tauy 0 99 Meridional wind stress (Pa)
divg 0 99 Wind Divergence (s^-1)
curl 0 99 Curl of wind stress (Pa/m)
ENDVARS
```

Daily 3 Products

- 2 Products of 12 Hourly Analysed Winds for 0-12 and 12-24 UTC**
- 1 Product of Daily Analysed Winds**

Parameters

1. Wind Speed Magnitude (m/s)
2. U-component of Wind (m/s)
3. V-component of Wind (m/s)
4. Wind stress (Pa)
5. Zonal wind stress (Pa)
6. Meridional wind stress (Pa)
7. Wind Divergence (s^{-1})
8. Curl of wind stress (Pa/m)

Total 3 Files for each Product

- 1) Binary File O2SCT_25MAY2011_DAILY_L04_AWV50.grd (~8MB) for Daily
- 2) Log File O2SCT_25MAY2011_DAILY_L04_AWV50.Log (~1KB)
- 3) Wind GIF File O2SCT_25MAY2011_DAILY_L04_AWV50.gif (~39KB)

For 12 Hourly

O2SCT_25MAY2011_0600_L04_AWV50.grd for 00-12 UTC
and O2SCT_25MAY2011_1800_L04_AWV50.grd for 12-24 UTC