



# **OCEANSAT-2 SCATTEROMETER**

# -Status and Value added Products

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## **Quikscat Annual Average and Std Deviation**





IOVWST Meet, Utrecht, June 12-14, 2012



60 N

30N

EQ

30\$

60S

905 ╄ 0

# OSCAT Sigma0 (dB) VV April 2012





90N 60 N 30N EQ 30S 60S 905 ╄ 0 60E 12DE 180 120W 60W n Longitude ō 0.25 0.75 1 1.25 1.5 2 3 4 5 7 8

180

-24

120W

-12

-15

-18

бów

-9

-6

12DE

-27

-30

6ÓE

-33

-36

## **Std Dev**

# SAG

# Average Sigma0 (Nov09-Jun10)

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# Amazon Sigma-0 (Asc – Des)









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#### Amazon (5S; 304E) Level3 HH Pol



#### Amazon (5S; 304E) Level3 VV Pol





### **Comparison of OSCAT and Buoy Winds**





#### ΔX= 0.5 deg; Δt=30 min Statistics of comparison between OSCAT and Buoys

Wind speed	No. of		Wind speed		V	Vind direction	
range (m/s)	collocated	Bias	RMSE	Corr.	Bias	RMSE	Cor.
	data						
ALL	56123	0.223	1.564	0.911	-0.336	26.694	0.845
3-30	<b>53967</b>	0.141	1.449	0.917	- <b>0.419</b>	23.385	0.860
4 - 24	51039	0.091	1.393	0.917	-0.447	21.261	0.871



## Statistics of comparison between OSCAT and ECMWF/NCEP





<b>ΔX=</b>	0.25	5 deg;
Δt	=30	min

Speed	No of collocations		Wind speed (m/s)				Wind direction (deg)			
	NCEP	ECMWF	. NCEP		P ECMWF		NCEP		ECMWF	
			Bias	RMS	Bias	RMS	Bias	RMS	Bias	RMS
All	33804474	32197672	0.06	1.86	0.04	1.55	-0.42	22.29	-0.64	19.86
3-30	32314881	31100127	0.01	1.78	0.02	1.48	-0.46	19.75	-0.67	18.02
4-24	30161211	29313079	-0.02	1.74	0.02	1.44	-0.48	18.65	-0.69	17.17

Regions	No of collocations		Wind speed (m/s)				Wind direction (deg)			
	NCEP	ECMWF	NCEP		NCEP ECMWF		NCEP		ECMWF	
			Bias RMS		Bias	RMS	Bias	RMS	Bias	RMS
NH	5066631	4921398	0.15	2.07	0.32	1.79	2.19	24.19	2.03	22.80
TR	13248001	12928774	0.33	1.36	0.20	1.19	0.34	14.61	-0.11	13.02
SH	11846579	11462907	-0.49	2.00	-0.32	1.56	-2.55	21.10	-2.51	19.36



## **Comparison of OSCAT and ASCAT Winds**





## **REGION: TROPIC (40S – 40 N)**

ΔX= 0.5 deg; Δt=3 HR

## Statistics of comparison between OSCAT and ECMWF

Wind	No. of		Wind speed	l	Wind direction				
speed	collocated data	Bias	RMSE	Corr.	Bias	RMSE	Cor.		
range									
(m/s)									
ALL	11,01,429	0.173	1.281	0.93	0.451	22.71	0.88		
3-30	10,54,870	0.167	1.197	0.93	0.475	20.11	0.89		
4 - 24	9,78,455	0.192	1.144	0.93	0.497	18.39	0.91		



# **OSCAT** Validation





#### Statistics of OSCAT comparison with Buoys, Model and ASCAT for 4-24 m/s

OSCAT	Temporal	No. of	No. of Wind		Wind dir	Wind direction			
with	Difference	collocated data	Bias	RMSE	Bias	RMSE			
Buoy	30 min	51039	0.091	1.393	-0.447	21.261			
ASCAT	3 hr	9,78,455	0.19	1.14	0.49	18.39			
ECMWF	6 hr	29290996	0.018	1.439	-0.69	17.16			
NCEP	6 hr	33951459	-0.076 1.754		-0.46	18.83			
	IOVWST Meet, Utrecht, June 12-14, 2012								



25

-15

-25 --25

15

-15

-25 -25

 $R^{2}_{xz}$ 

-15 -5 5

Buoy V (m/s)

ECMWF V (m/s)

-15

5 15

25

15 25

5 -5 5 Buoy U (m/s)

ECMWF U (m/s)

3

2

n

3

2



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meridional wind	1.29	1.28	1.01	4.54	4.79	4.46	0.91	0.92	0.93
zonal wind	1.29	1.36	0.96	4.94	5.13	4.93	0.91	0.94	0.93
									4

OSCAT/BUOY Comparison Jan2012 Bin Wise Bias and Std for Jan 2012 Speed Bin=1m/s; Direction Bin=10 deg OSCAT BU0Y 360-360 330 330 4143 145 3**0**0 -300 119 119 ିଜ 270 270 Ś 102 102 240-240 ~ Ê È 85 210-210 180-180 150 Bias 150 Std 120 120 -2 90 90 -3 60-60--4 30 30 -5 15 21 24 27 12 18 -â ģ. 30 ÷ 12 15 1B 21 24 27 ЗĽ ÷ ģ 12 15 1B 21 24 27 30 wind speed (m/s)20 30 360 20 NP=3291 NP=3667 15 Blas=-0.30 m/s Blas=-1.66 \* 6 280 🖸 300 Std=1.40 m/s Std=20.71 \* 10 <u></u>
<sup>15</sup> R\*=0.81 R\*=0.88 227 20 ত Range of X( 0.0: 19.2) Range of X( 0.0:359.6) ٢ 196 240 172 Range of Y( 0.0:359.0) Range of Y( 0.0: 18.5) spee Bias 165 145 10 <mark>Std</mark> 2 10 180 -5134 118 OSCAT 20 103 72 -15ε ε 41 60 -20 60 120 180 240 300 360 H10 wind direction (\*) 10 15 180 240 300 20120 360 -5 0 60 (X) Buoy wind speed (m/s) (X) Buoy wind direction (\*) SAC/ISRO SAC/ISRO Monthly validation for MOSDAC OSCAT/QSCAT Comparison Jan2012 OSCAT/ASCAT Comparison Jan2012 OSCAT ASCAT OSCAT QuikSCAT (10yr Climatology) 90N-90N 90N 90N 60N 60N 608 60N 30N 30N 30N 30N ΕQ· EQ ΕQ EQ 30S 30S 305 30S 60S 60S 60S 60S 905 <del>|--</del> 905 <del>|--</del> 905 <del>|--</del> 905 <del>|--</del> 6DE 120E 6DE 120E 6ÓW 6DE 120E 6DE 120E 180 120W 6ÓW 180 120% 6ÓW 180 120% 180 120% 607 25 25 25 25 360 360 NP=112373 NP=73794 NP=96460 NP=62673 Blas=-0.28 m/s Blas=0.05 \* Blas=0.28 m/s Blas=-1.92 \* ø 9338 4342 5547 Std=1.13 m/s Std=9.36 \* Std=1.35 m/s Std=10.92 \* 300 8 300 <u>È</u> 15 R\*=0.85 R\*=1.00 <mark>ا</mark> ال R\*=0.74 R\*=1.00 8178 3810 4880 3838 Range of X( 0.0: 15.3) Range of X( 0.0:360.0) Range of X( 0.0: 15.3) Range of X( 0.0:360.0) speed 3304 7024 240· 3280 4160 Range of Y( 0.0:360.0) Range of Y( 0.0: 15.7) 240 (ange of Y( 0.0:360.0) Range of Y( 0.0: 13.4) 2750 2770 5870 3500 2 10· 180 2 10 180 4716 τ 2220 2820 τ 2236 OSCAT 1690 1702 3562 2140 OSCAT 120 🗧 120 2408 1160 14-80 1168 1254 630 780 634 Ξ 8 ε 60 ε 60 H100 100 100 100

240

(X) ASCAT wind direction (deg) SAC/ISRO

300

360

e

5

10

(X) QSCAT wind speed (m/s)

15

20

180

6D

0

120

10

(X) ASCAT wind speed (m/s)

15

20

5

4374

240

(X) QSCAT wind direction (deg) SAC/ISRO

300

360

6D

0

120

180



OSCAT/BUOY Comparison Mar2012 Bin Wise Bias and Std for Mar 2012 Speed Bin=1m/s; Direction Bin=10 deg OSCAT BU0Y 360-360-330 330 121 121 300 300 106 106 270 270 ິທີ Ś <u>)</u> 240 240 È 210 210 180 180 Bias 150 150 Std 120 120 -290-90 -3 60-60--4 30 30--5 12 15 18 21 24 27 30 12 -â ģ. ÷ Ġ. 12 15 1B 21 24 27 30 3 Ġ. ģ 15 1B 21 24 27 30 wind speed (m/s)20 30 360 20 NP=3647 NP=3219 15 Blas=-0.27 m/s Blas=-0.88 \* 9 22A © 300 Std=1.36 m/s Std=22.19 \* 10 <mark>گ</mark> <sub>15</sub>. R\*=0.83 R\*=0.88 20 ত Range of X( 0.0: 17.6) Range of X( 0.0:359.8) ٢ 172 240 190 Range of Y( 0.0:359.0) Range of Y( 0.0: 16.5) spee Bias 145 160 10 <mark>Pt</mark>S 2 10 180 - 5 118 130 OSCAT 20 100 -10 84 -15 ε 37 ε 60 -20 60 120 180 240 300 360 H10 wind direction (\*) 10 15 180 240 300 20е'n 120 360 -5 0 (X) Buoy wind speed (m/s) (X) Buoy wind direction (\*) SAC/ISRO SAC/ISRO Monthly validation for MOSDAC OSCAT/QSCAT Comparison Mar2012 OSCAT/ASCAT Comparison Mar2012 OSCAT ASCAT OSCAT QuikSCAT (10yr Climatology) 90N -90N 90N 60N 60N RON 60N 24.4 92.4 18.4 18.4 18.4 18.4 10.4 8.4 8.4 24,4 92,4 18,4 18,4 14,4 10,4 10,4 8,4 30N 30N 30 30N ΕQ· EQ ΕQ EQ 30S 30S 305 30S 60S 60S -60S 60S 905 <del>|--</del> 905 <del>|--</del> 905 <del>|--</del> 905 -6ĎE 120E 6ÓW 6DE 120E 180 6ÓW 6DE 120E 6DE 120E 120W 6ÓW 180 120% 120% 180 120% 607 180 25 25 25 25 360 360 20 NP=71329 Blas=0.07 \* NP=92534 Blas=0.50 m/s NP=55927 Blas=0.19 \* NP=111728 Blas=-0.17 m/s ø 8274 5636 5711 4599 Std=1.08 m/s Std=8.67 \* Std=1.33 m/s Std=10.03 \* 岩 300 · 🖁 300 · <u>È</u> 15 R\*=0.87 R\*=1.00 <mark>ا</mark> ا R\*=0.78 R\*=1.00 7247 4937 6007 4034 Range of X( 0.0: 14.1) Range of X( 0.0:360.0) Range of X( 0.0: 12.2) Range of X( 0.0:360.0) speed 4246 3472 6226 240· 4306 Range of Y( 0.0: 14.4) Range of Y( 0.0:360.0) Range of Y( 0.0: 11.1) 240 Range of Y( 0.0:360.0 2910 5206 3556 3606 2 10· 180 2 10 180 4184 τ 2864 2904 τ 2348 OSCAT 2173 1786 3163 2203 OSCAT 120 🗧 120 2142 1482 1502 1224 -1121 791 801 662 Ξ 8 ε 60 ε 6 H100 100 100 100 10 240 240 5 15 6D 120 180 300 360 5 10 15 6D 120 180 300 360 20 20 0 e

(X) QSCAT wind speed (m/s)

(X) QSCAT wind direction (deg) SAC/ISRO

(X) ASCAT wind direction (deg) SAC/ISRO

(X) ASCAT wind speed (m/s)







# Evaluation of OSCAT derived wind speeds in the Antarctic ocean



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using in-situ ship measurements



recht, June 12-14, 2012



# OSCAT Operational and Value-added Products







# OSCAT High-Resoln Winds (Dec 28, 2011)



# Comparison with ECMWF Winds for Jan-2012







# Prediction of Tropical Cyclogenesis using OceanSat-2 Scatterometer Data



# Decadal changes observed in surface melting over the Antarctic Ice-shelves using scatterometer data



 (a) & (b) Maximum MI observed over the Antarctic continent and (c)&(d) Average MI observed for the Antarctic continent

Melting Index MI: Temporal reduction in Sigma-0 during summer from its average (preceding) winter value



Antarctic Ice Shelves (1) Amery, (2) West and (3) Shackleton; QuikSCAT Data: 1999-2009; OSCAT Data: 2009-10

Amery, West and Shackleton ice shelves are prone to significant melting

Decadal Average values observed for the West and Shackleton ice shelves are comparable with that obtained for the Larsen ice shelf of West Antarctica

This indicates that, like western parts of Antarctica, the ice shelves in the eastern part of the Antarctica are also not immune to warming

Data available from the OSCAT scatterometer onboard Oceansat-2 provides the seamless continuity of time-series data



# **Determination of sea ice melt onset**

Rational: (i) Melting of sea an important thermodynamical process in the polar regions; (ii) Melt onset and freeze is associated with meaningful alterations in the shortwave albedo





Data sets: OSCAT daily average sigma-0 (L3S); Daily gridded V-pol 19 & 37 GHz SSM/I Tb IOVWST Meet, Utrecht, June 12-14, 2012







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## MIKE 21 SW MODEL Laila Cyclone

# Synoptic map of model derived wind speed and wave height with altimeter track overlaid



# **SUMMARY**



- Monitoring of OSCAT Sigma0 for homogeneous targets being performed
- ➤Variation observed between 2010 and 2012 datasets
- >Analysis with full dataset is in progress
- ➤Validation of OSCAT derived winds performed with buoys, other
- scatterometer and numerical models
- >Wind validation is also being performed with buoys on monthly basis
- ➤Value added products (High resolution winds and 12 hrly/daily Analysed
- winds being generated regularly and are routinely being made available on www.mosdac.gov.in
- >Impact of OSCAT winds on ocean models studied with limited datasets
- Prediction of Tropical Cyclogeneis performed with OSCAT data
- Ice melt onset date (sector-wise) being determined for Antarctica region





# Discussions