

Validation of Satellite-Derived Surface Wind Fields

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July 5-7, 2006

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Overview

- Data and processing
- QuikSCAT/WindSAT
 - Overall comparison
 - Spatial variability
 - Temporal variability
- Summary of statistics
- Future analysis

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Data

Satellite

- QuikSCAT
- WindSAT
- ASCAT – when available

In situ

- NDBC – ?? (28)
- TAO – ~70(55)
- PIRATA – 17(13)
- JMA – 3(3)
- ORS – 3+2(1)
- VOS – 3

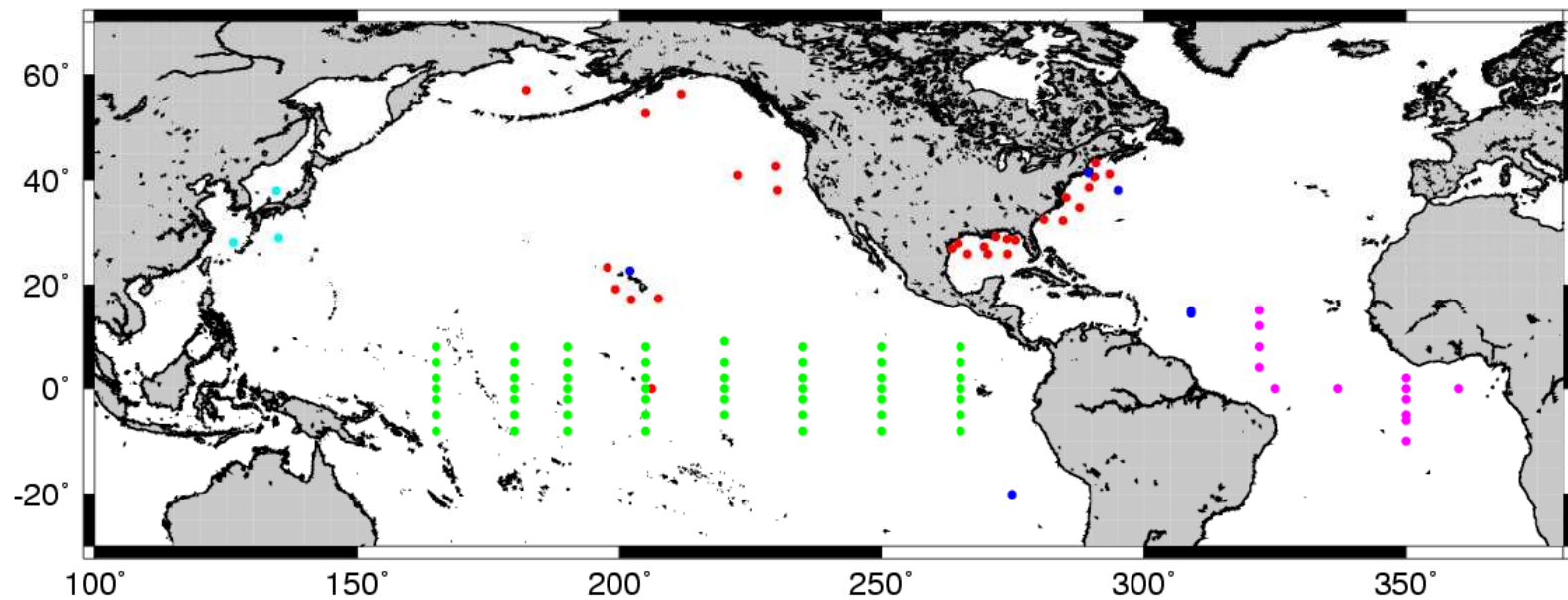


Processing

- QuikSCAT L2B – All quality flags checked except high and low winds, WVCs 3 – 74.
- WindSAT EDR – All quality flags checked except high and low winds.
- Selected vectors within 25 km and 10 minutes.
- Deep water buoys flagged according to source.

In situ data

Buoy locations



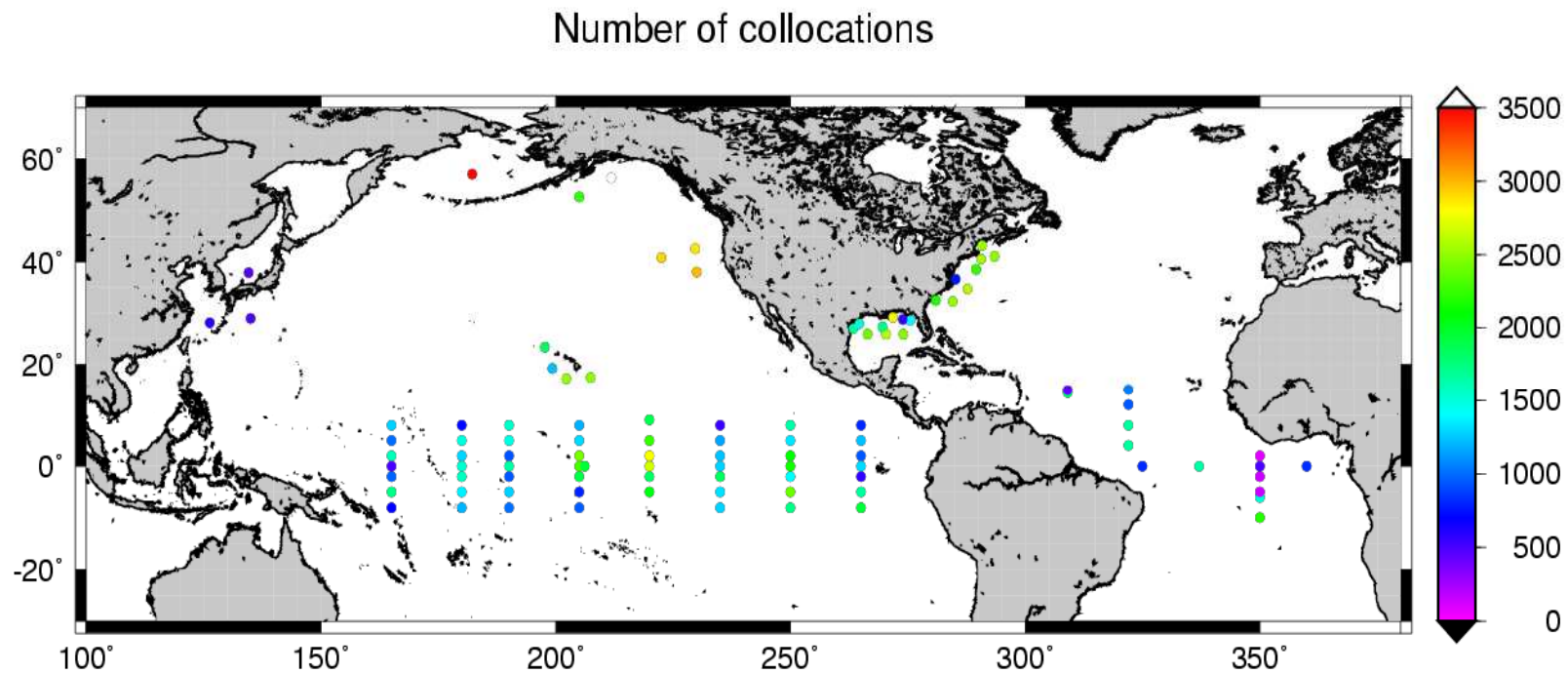
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QuikSCAT



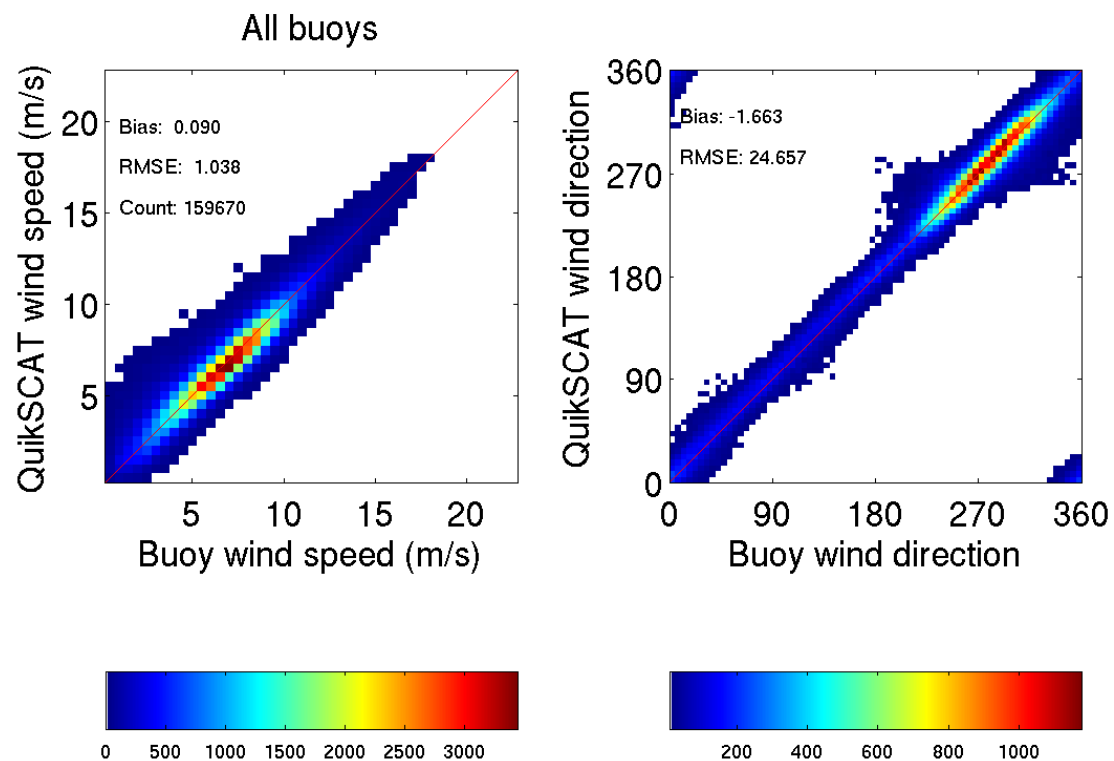
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QuikSCAT

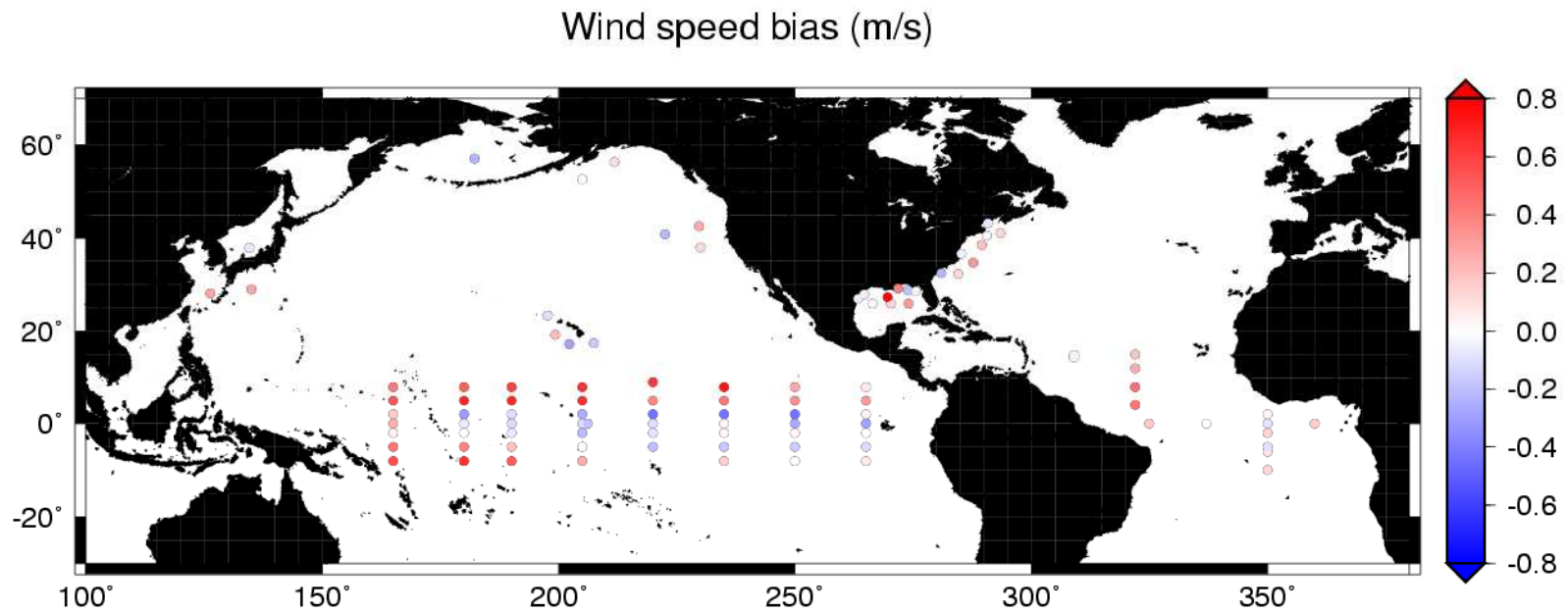


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QuikSCAT



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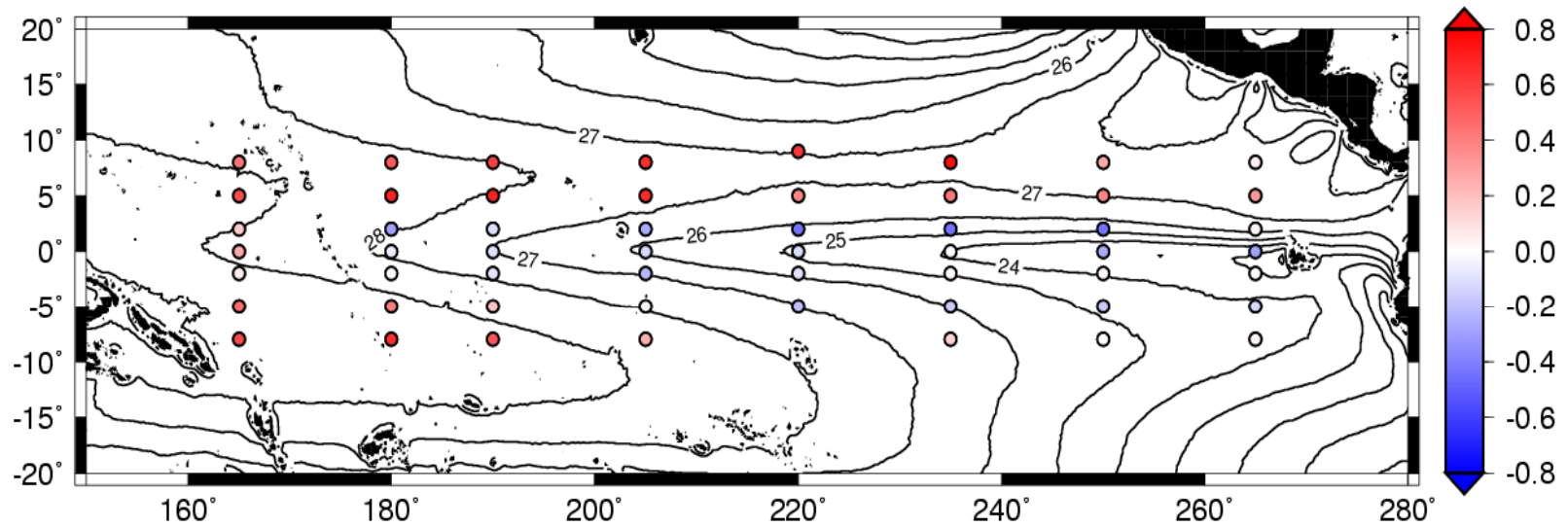
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QuikSCAT

Wind speed bias (m/s), TMI SST



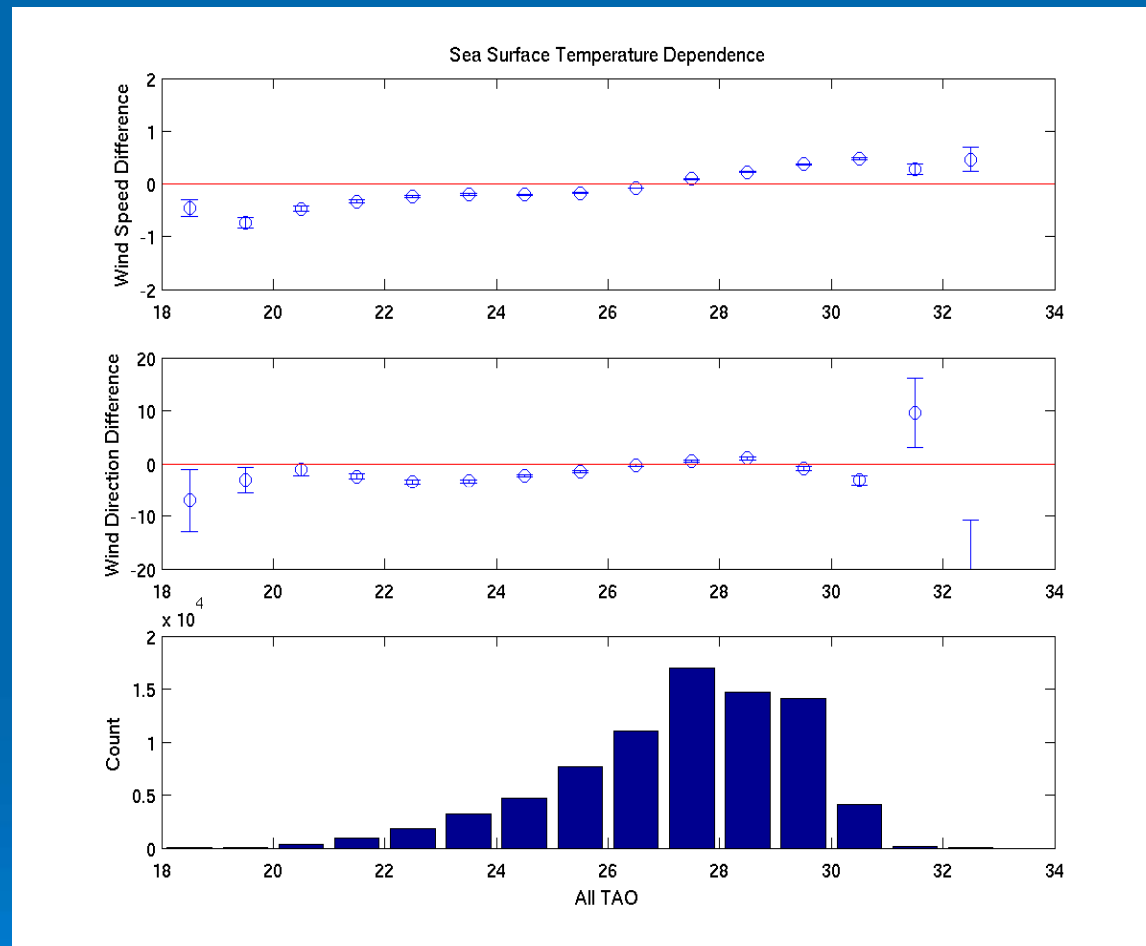
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QuikSCAT SST dependence



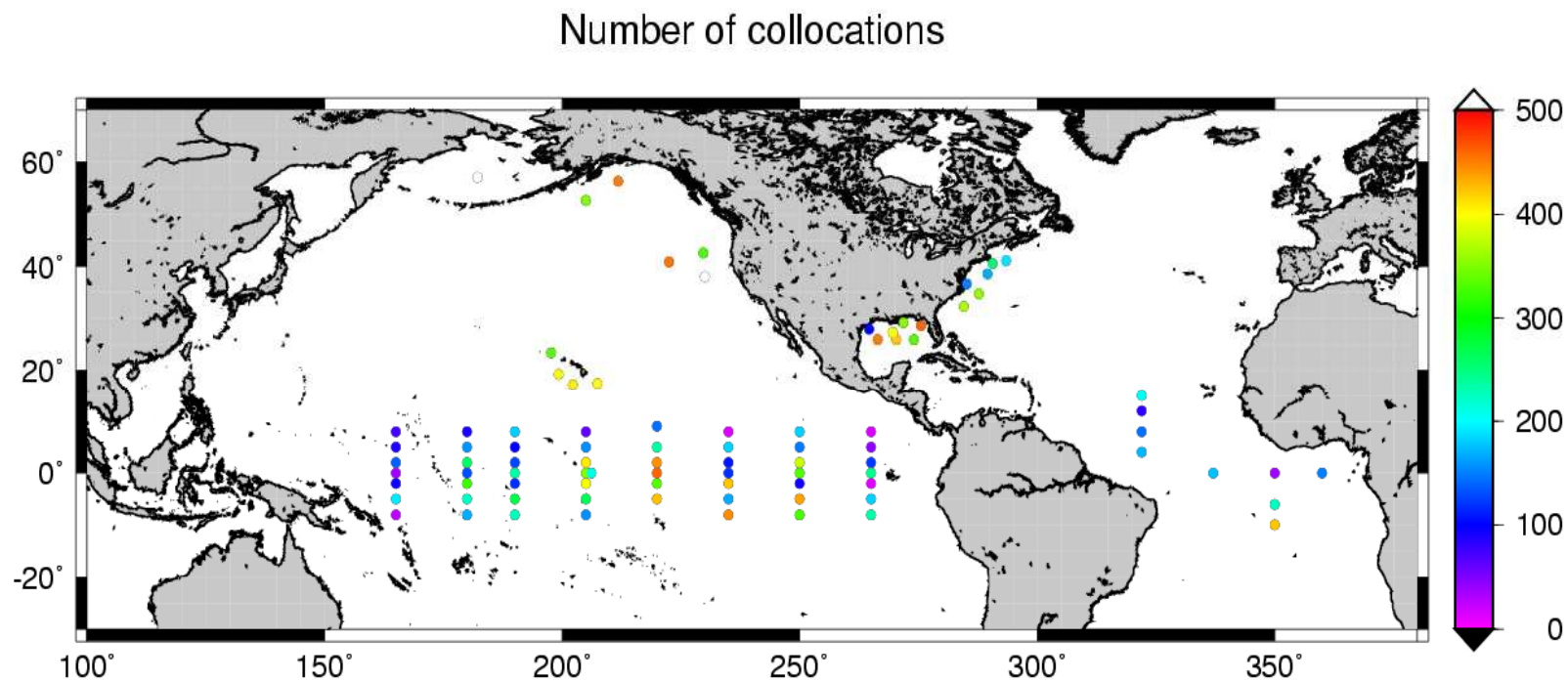
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WindSAT

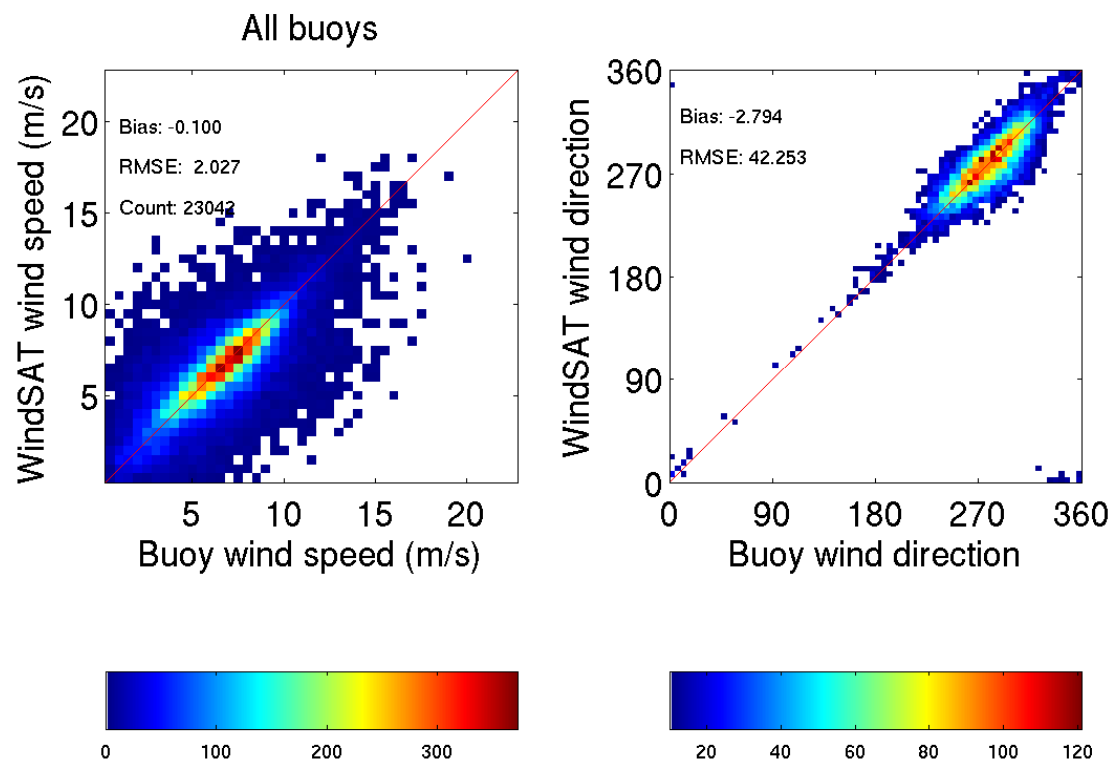


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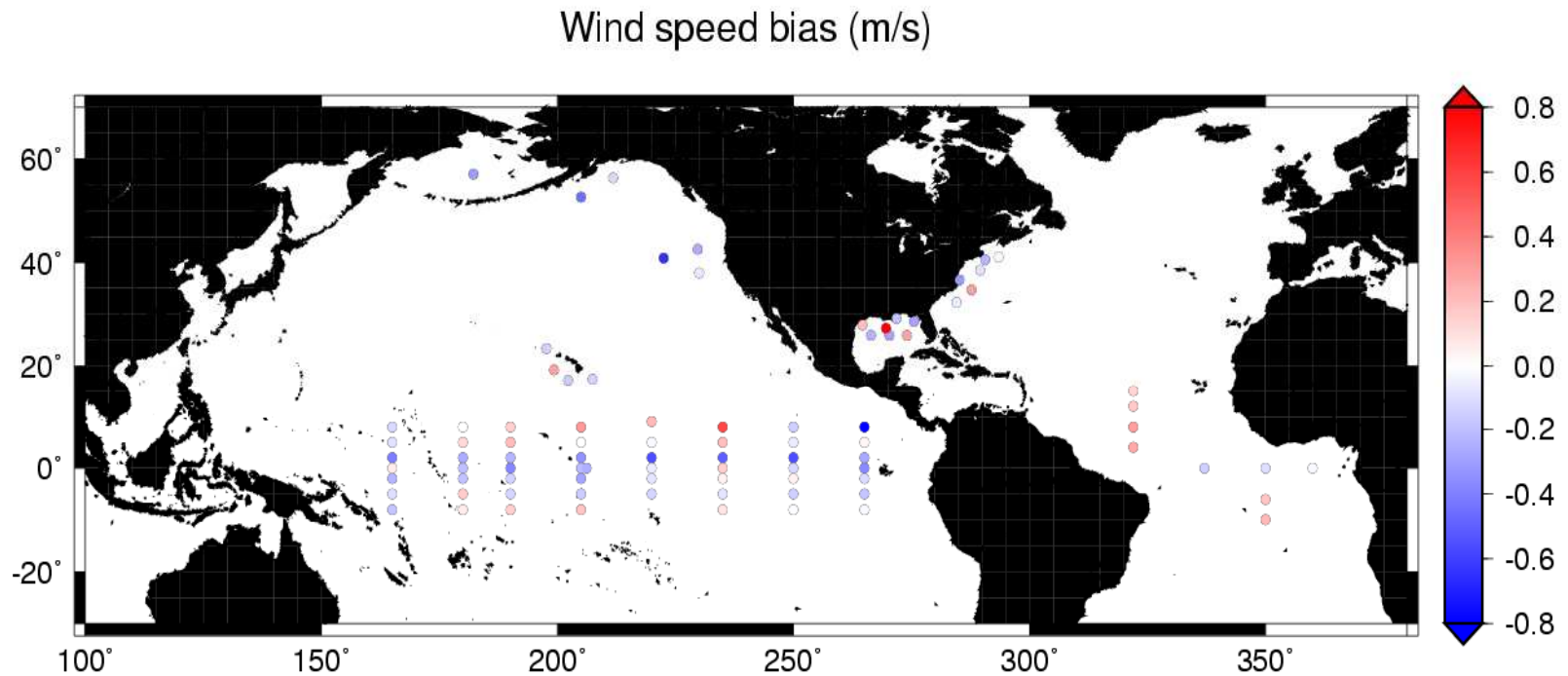


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WindSAT



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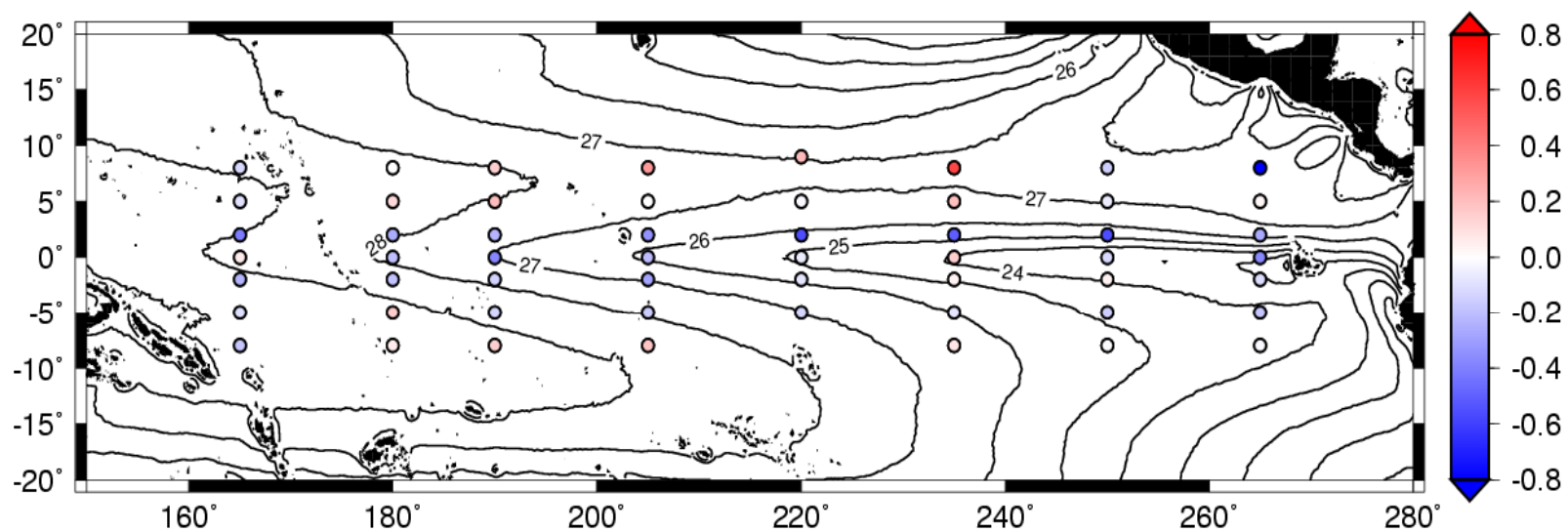
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WindSAT

Wind speed bias (m/s), TMI SST



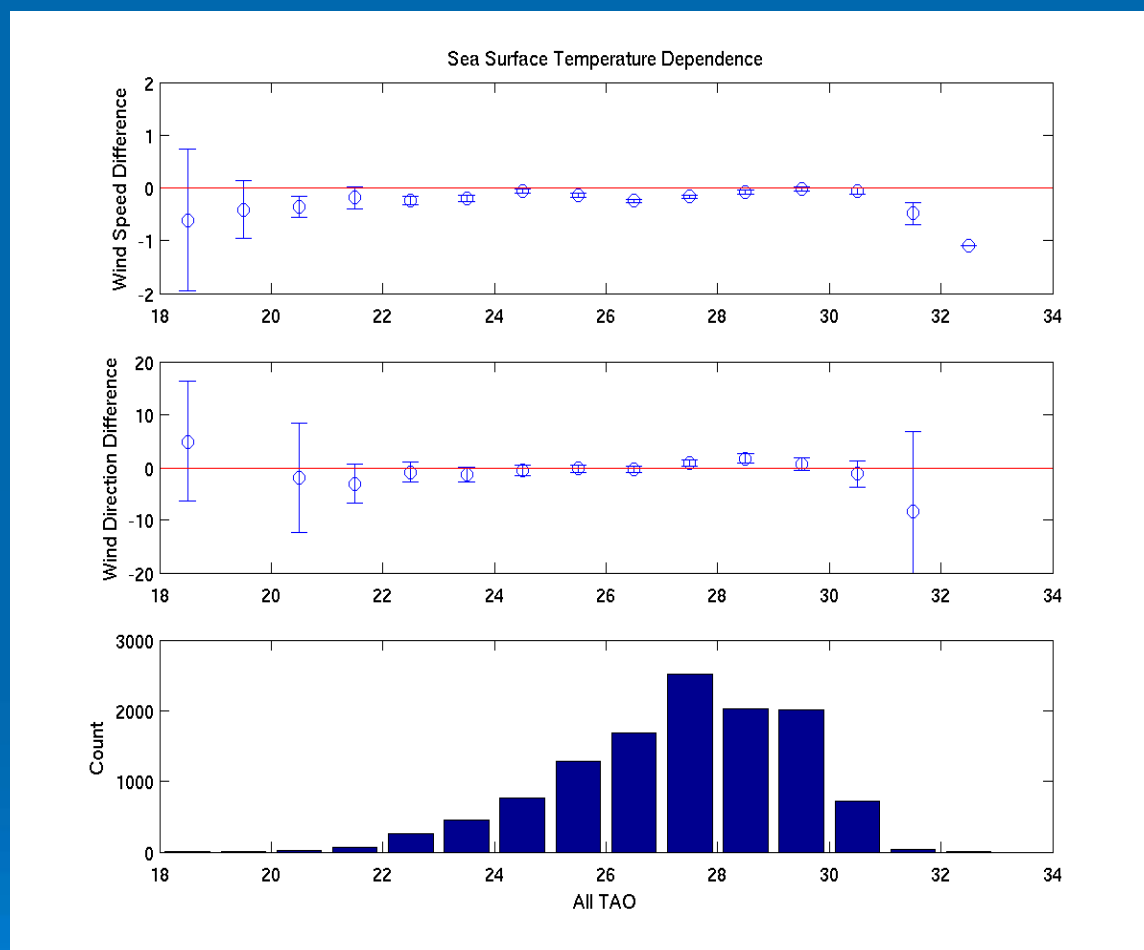
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WindSAT SST dependence

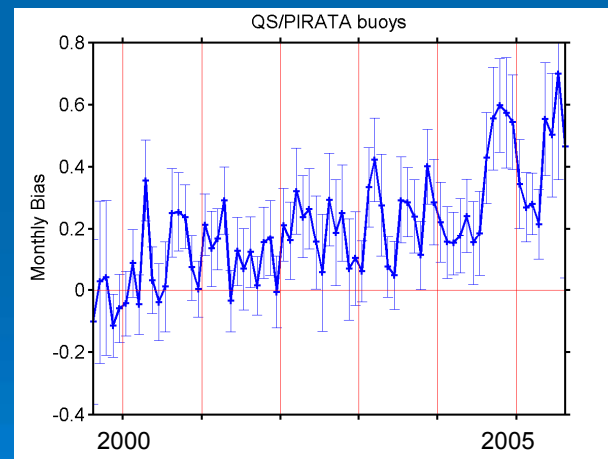
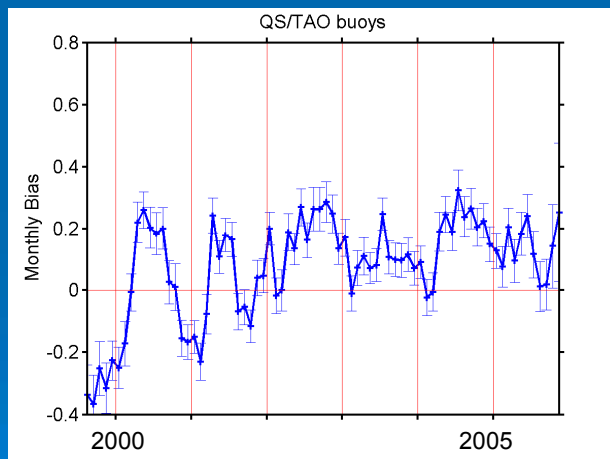
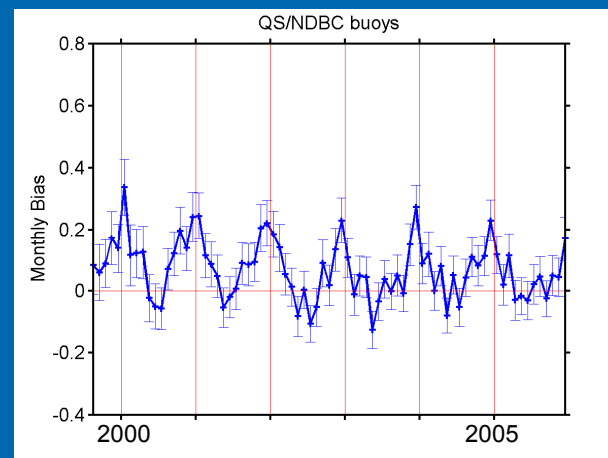
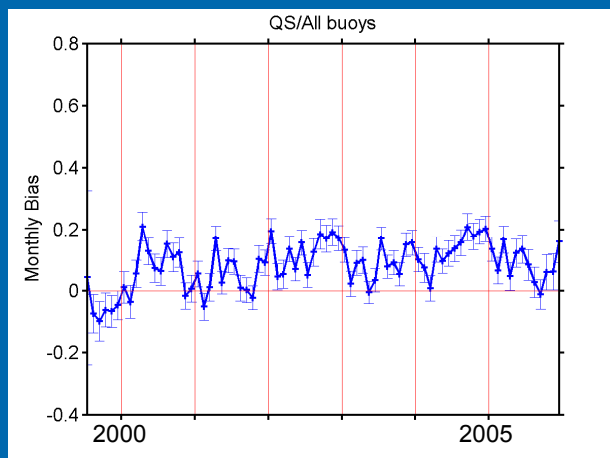


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QuikSCAT temporal variability

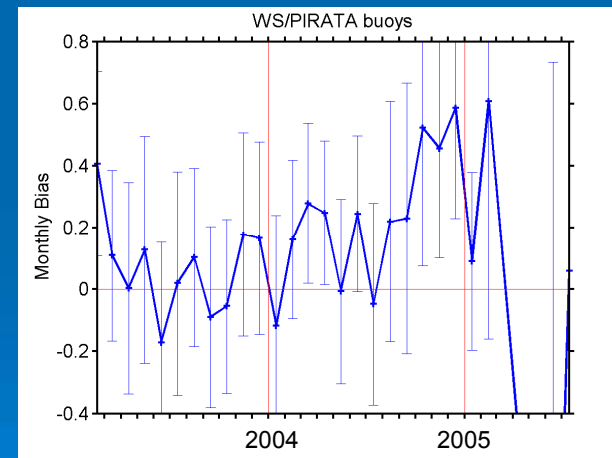
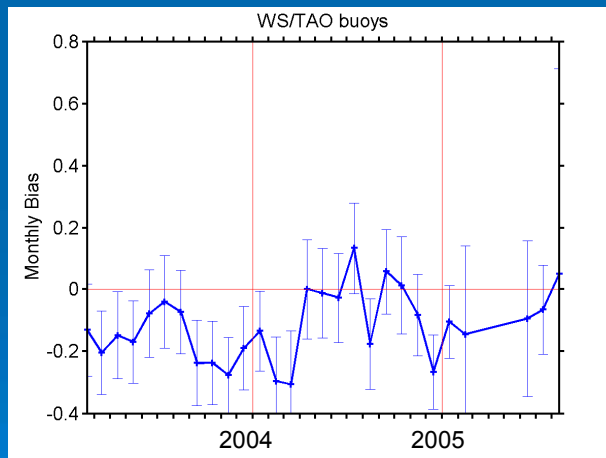
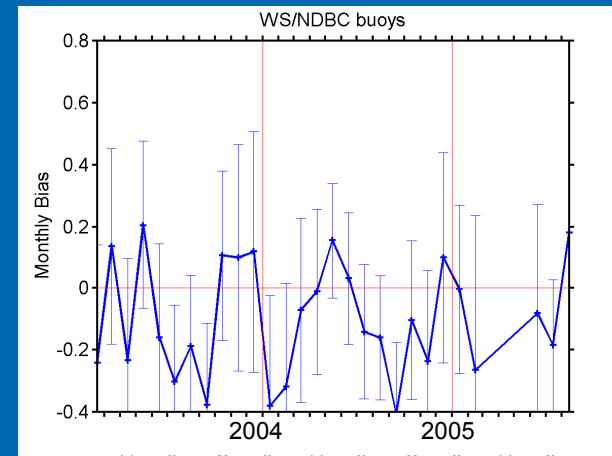
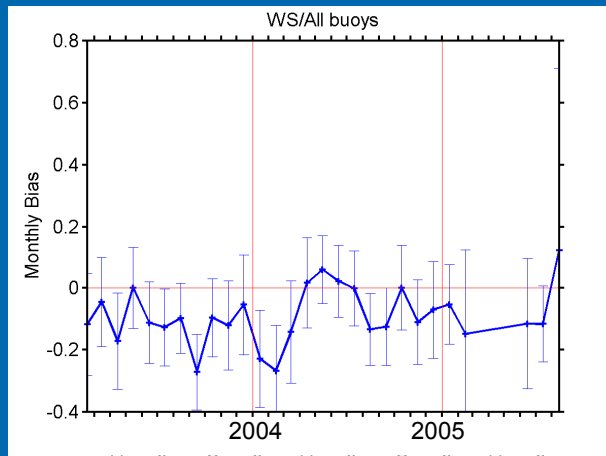


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WindSAT temporal variability



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Summary

Satellite	Count	Speed		Direction	
		Bias (m/s)	RMS	Bias (°)	RMS
QuikSCAT	159670	0.09	1.04	-1.66	24.66
U>3 m/s	145882	0.03	0.96	-1.66	19.42
U>5 m/s	118366	-0.05	0.91	-1.69	15.55
WindSAT	23042	-0.10	2.03	-2.79	42.25
U>3 m/s	20966	-0.25	1.96	-2.92	38.16
U>5 m/s	16948	-0.46	1.97	-3.18	34.27

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Summary

- QuikSCAT
 - Continues to perform well
 - Spatial variability in TAO bias
 - Seasonal variability in speed bias
 - General trend toward smaller direction bias
 - Positive trend in significant wave height
- WindSAT
 - Good overall performance
 - High RMSE
 - Unable to determine spatial or temporal variability in speed or direction
 - Negative trend in wave height

Future work

- Continue collocating all available QuikSCAT, SeaWinds, WINDSAT data and include ASCAT winds when available.
- Determine spatial and temporal variability using wavenumber spectra and Empirical Orthogonal Functions.
- Perform statistical vector wind inter-comparison between each satellite.
- Evaluate the temporal variability of satellite-derived surface winds at three open Ocean Reference Stations and operational buoys.
- Evaluate spatial distribution of bias in satellite vector winds along VOS ship tracks.

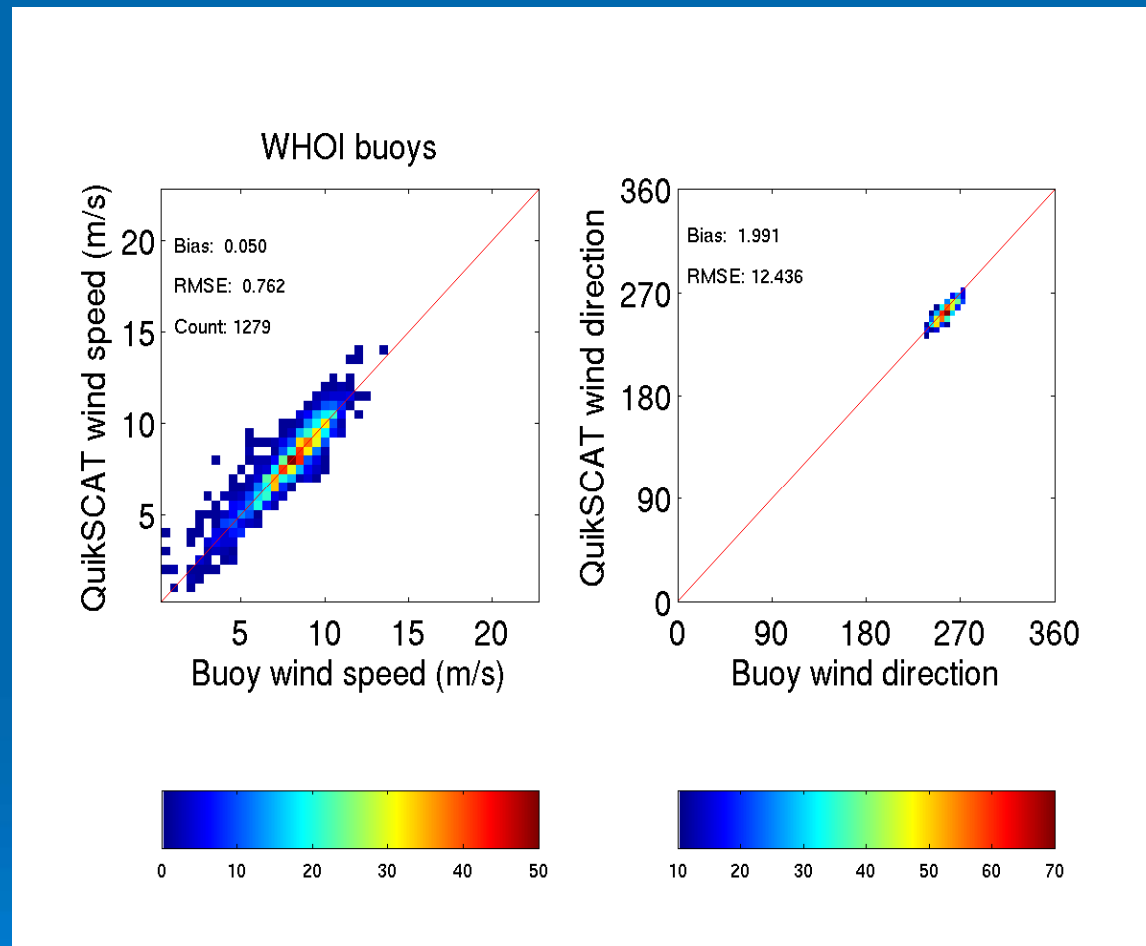
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Ocean Reference Stations



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Questions?

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Buoy groups ($U > 0$ m/s)

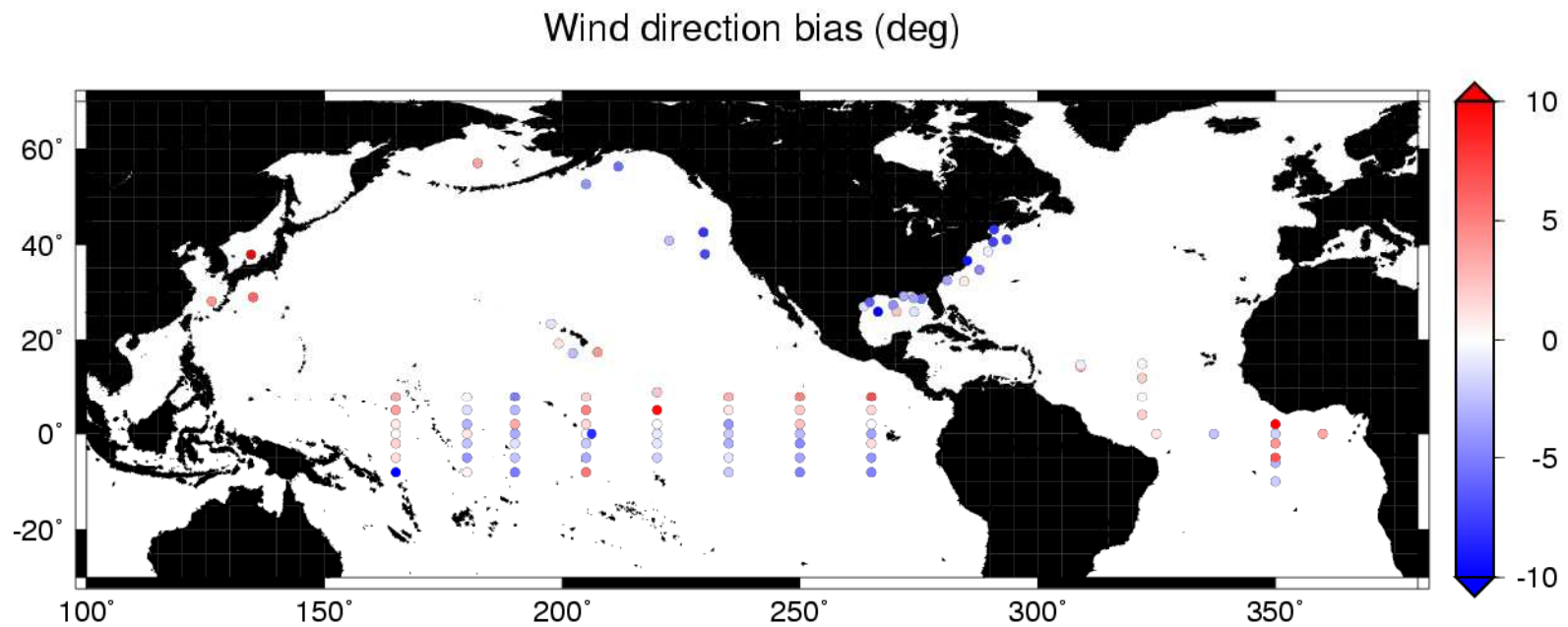
Satellite	Count	Speed		Direction	
		Bias (m/s)	RMS	Bias (°)	RMS
QS/NDBC	63797	0.07	1.02	-3.63	24.68
TAO	79888	0.09	1.06	-0.57	24.96
PIRATA	13176	0.19	0.95	-0.10	22.25
JMA	1552	0.18	1.21	6.58	28.00
WS/NDBC	9576	-0.11	2.61	-7.14	51.80
TAO	11855	-0.13	1.50	0.35	35.00
PIRATA	6937	0.14	1.38	0.01	30.50

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QuikSCAT



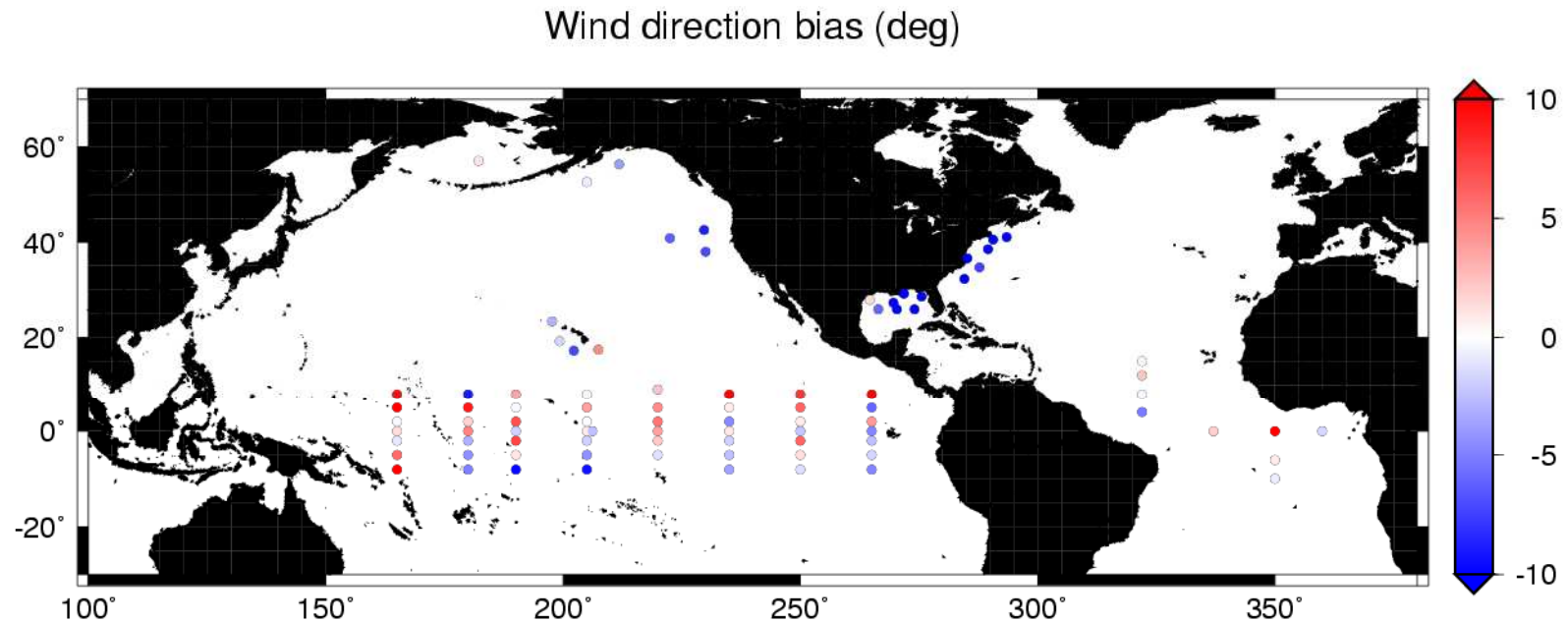
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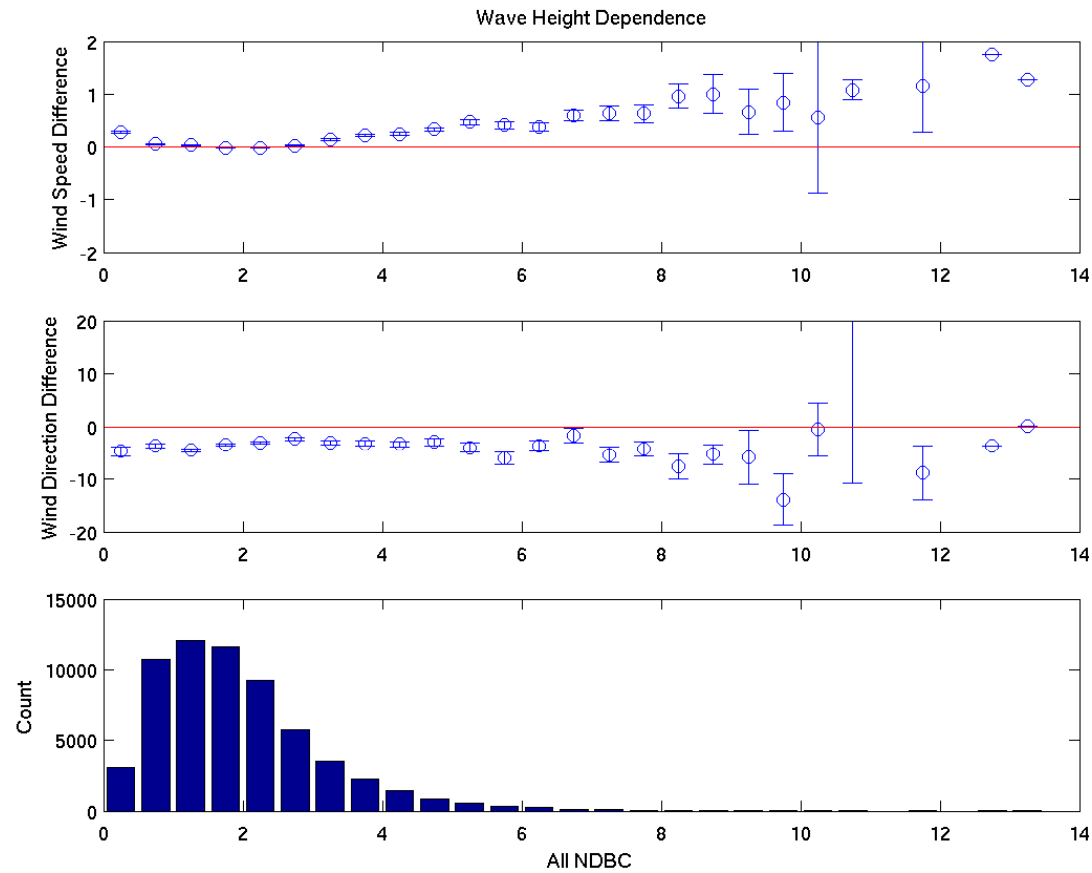
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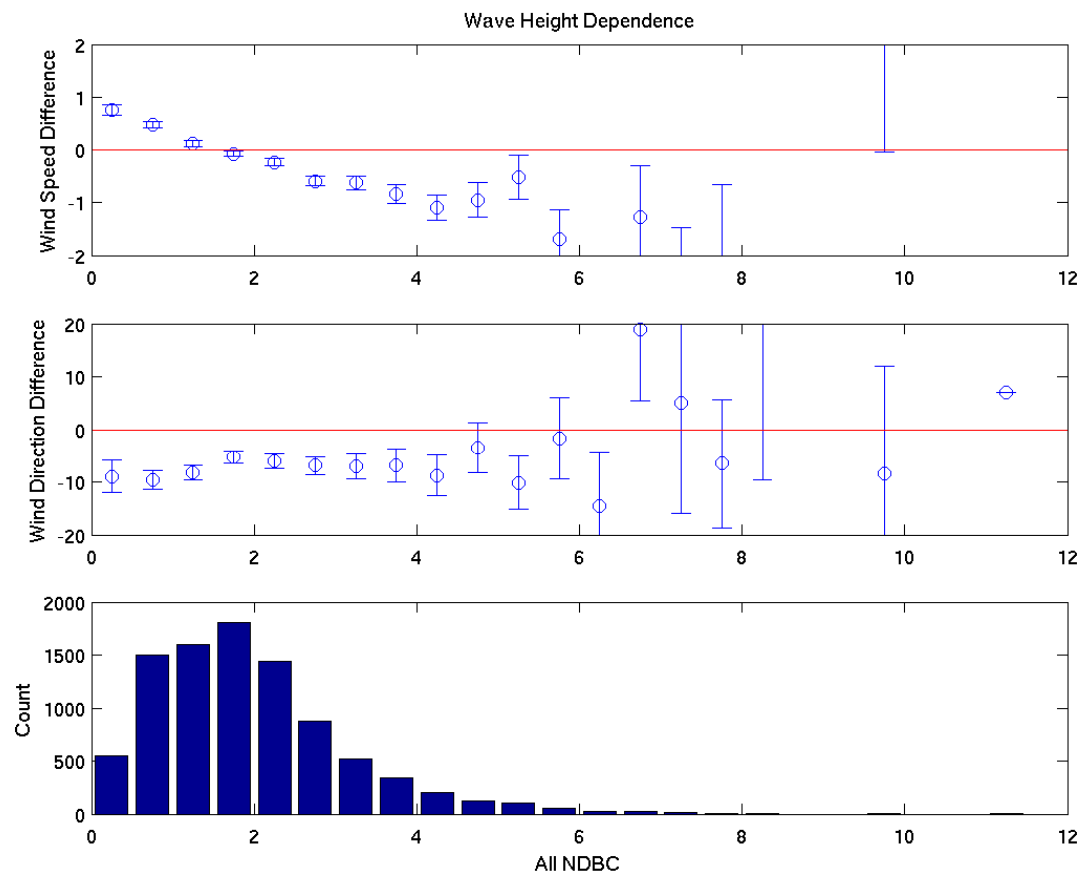
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