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Current and Planned Investigations for the Ocean Vector Wind Science Team

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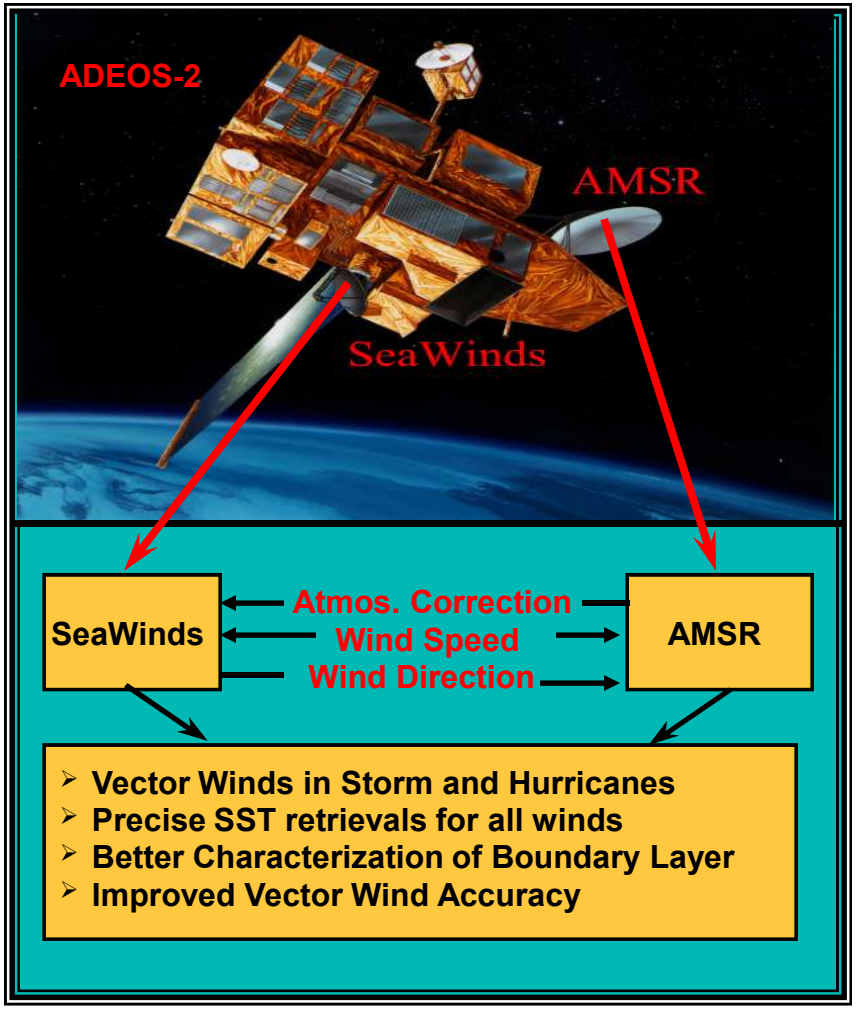
Co.I.: Kyle Hilburn, Deborah Smith, Lucrezia Ricciardulli

1. SeaWinds and AMSR on Midori-2
2. Advances in Retrieval Methodology
3. WindSat and A-Scat
4. Decadal Time Series of Winds

Presented at the OVWST Meeting, Salt Lake City, July 5-7, 2006

Active-Passive Remote Sensing with SeaWinds and AMSR



Wind – Rain Model

$$\sigma_{0,meas} = \tau^2 \left(\sigma_{0,wind} + \Delta\sigma_{0,rain} \right) + \sigma_{0,vbs}$$

surface signal

transmission

volumetric rain backscatter

atmospheric signal

K. A. Hilburn, F. J. Wentz, D. K. Smith, and P. D. Ashcroft
Correcting Scatterometer Data for the Effects of Rain Using Radiometer Data
Journal of Applied Meteorology, March 2006

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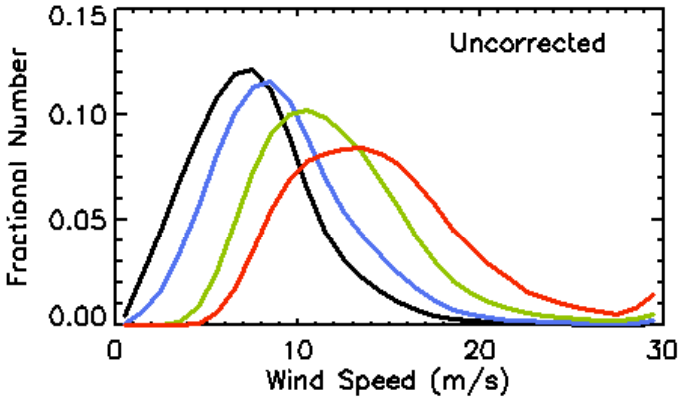
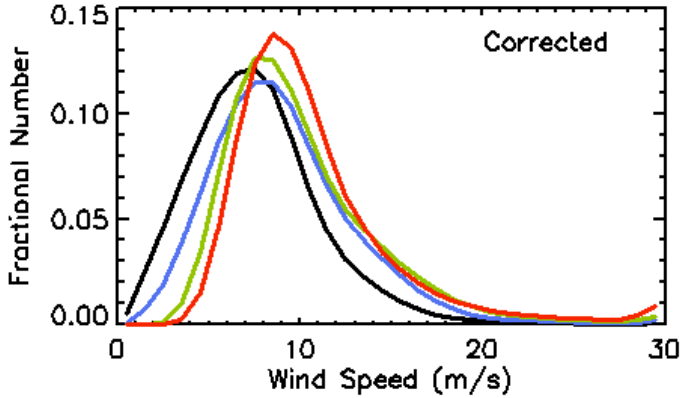
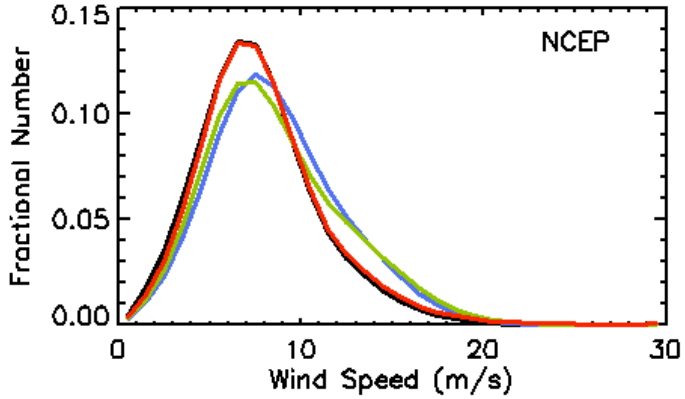
Wind Speed Histograms Improved

NO-RAIN, LIGHT, MODERATE, HEAVY







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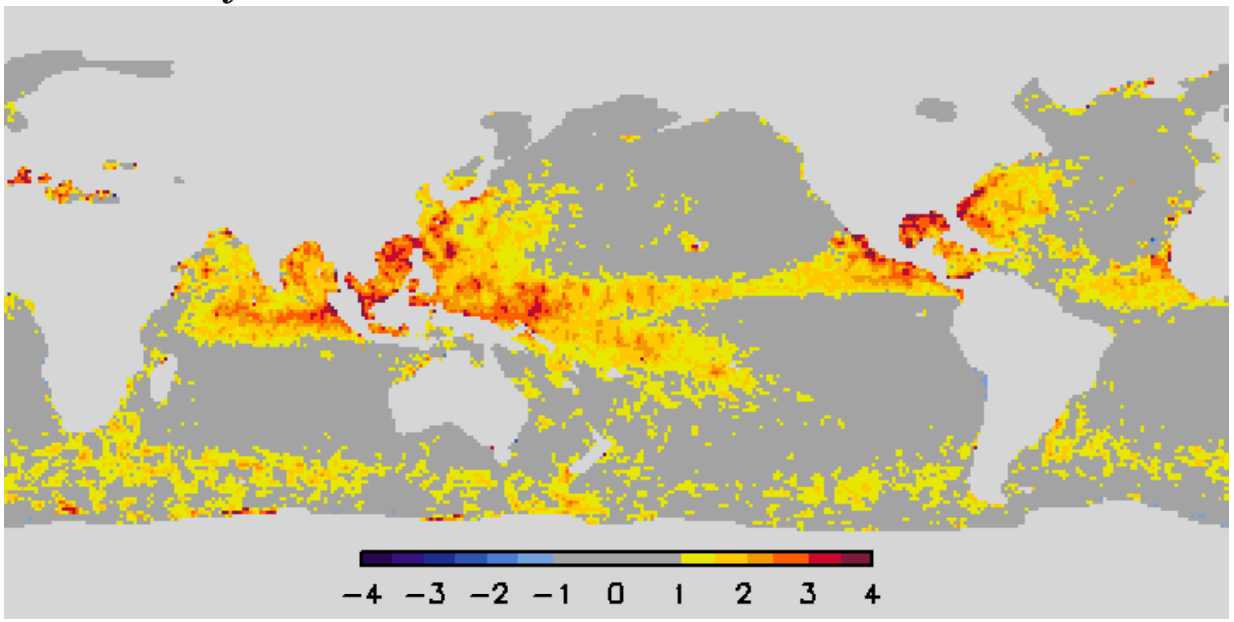
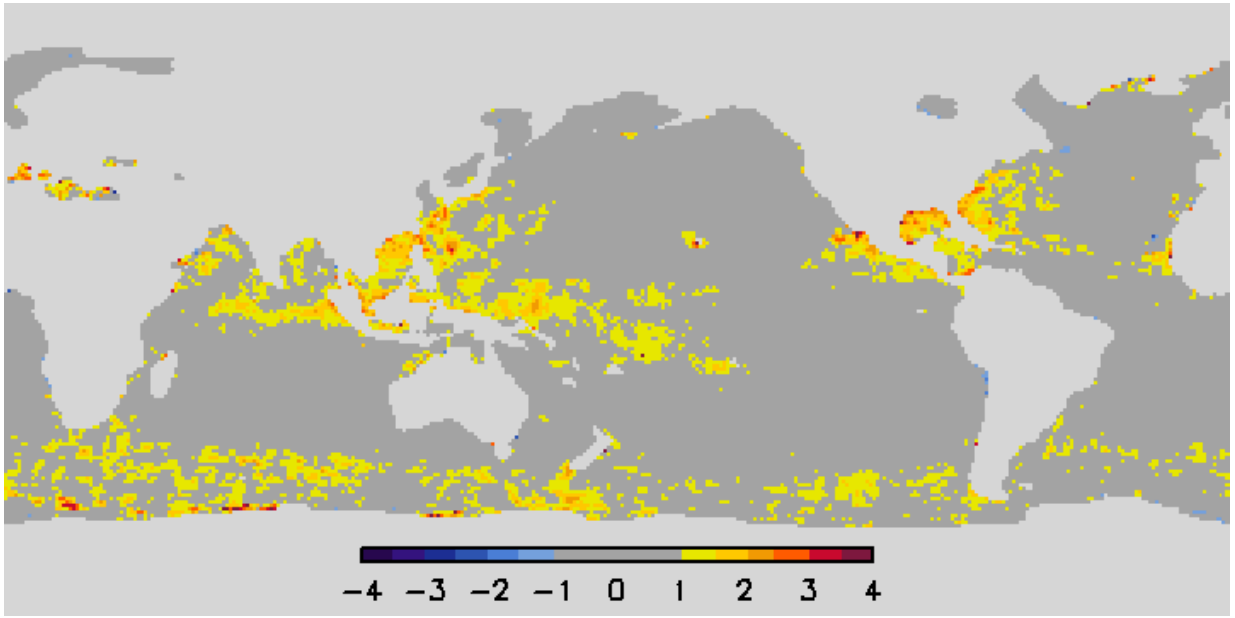


Uncorrected
SeaWinds wind speeds (m/s) minus NCEP in rain



Corrected
SeaWinds wind speeds (m/s) minus NCEP in rain

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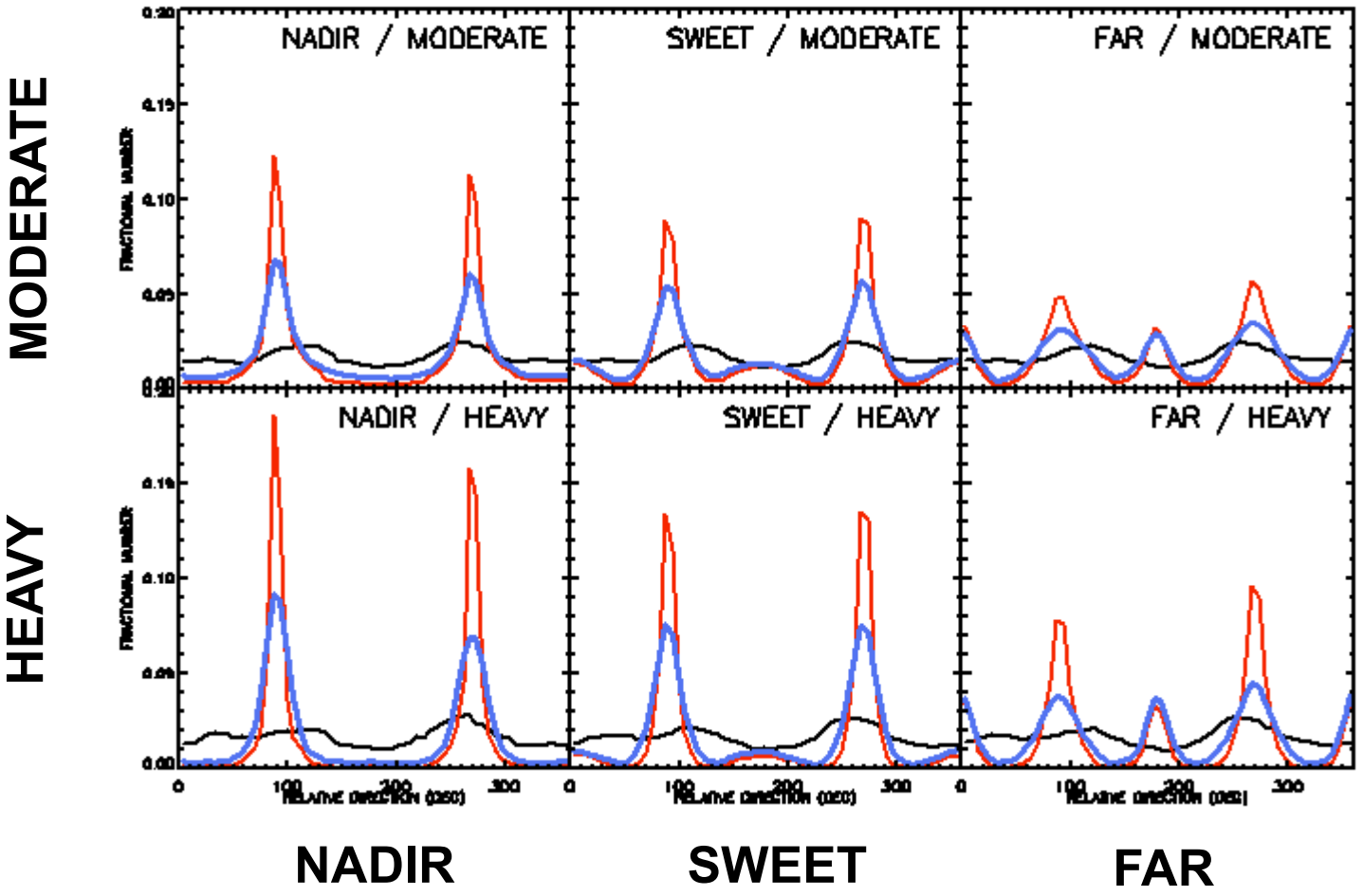
Cross-Track Directions Reduced

NCEP, UNCORRECTED, CORRECTED



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Reprocessing Midori-2 Dataset

- Current Dataset made available last year [Hilburn et al., 2006]
- Improved geolocation, calibration, quality control for AMSR
- AMSR TB data set will be reprocessed and archived at NSIDC
- Much improved rain rate algorithm; Implementation schedule:
  AMSR-E, January 2006
  6 SSMI's July 2006
  TMI Aug 2006
  AMSR Oct 2006
- Redo the AMSR – Seawinds Analysis
- Produce new Midori-2 dataset

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Improvements to Wind Algorithm

- Measurement grouping into WVC
  Earth-fixed grid with weight simulating OI (WindSat heritage)

- Better rain flag coming from Midori-2 Analysis

- Improve geophysical model function
  Fine tune to larger buoy data set
  Less cross track winds
  Slightly lower wind speeds

- Test ambiguity removal methods
  KNMI 2D variational method based on meteorological balance

- Error bars on wind retrievals

- Merge into Decadal Time Series

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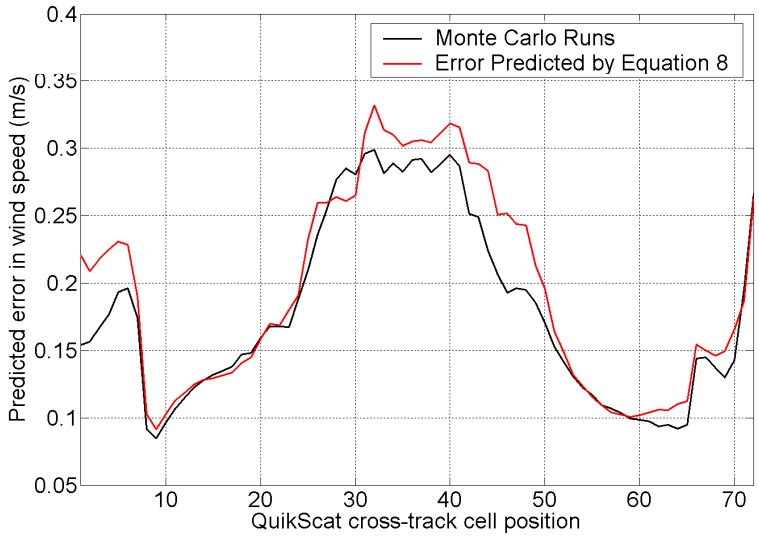
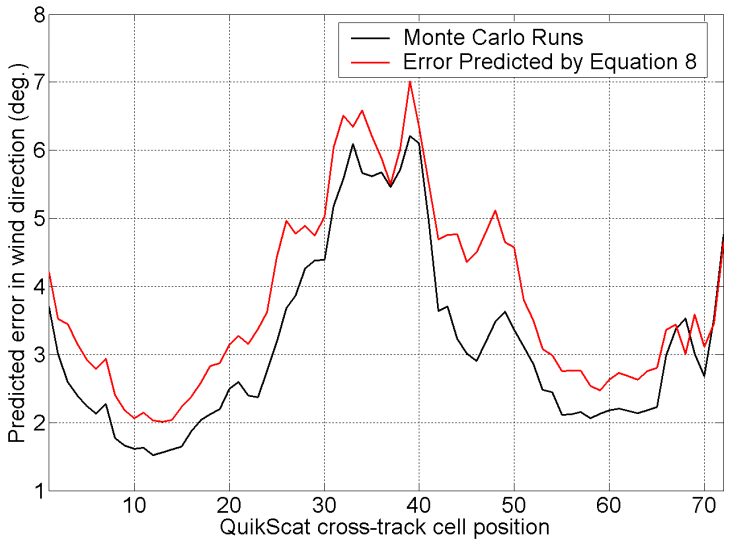
Error Bars

Computed by doing multiple retrievals for same cell

$$\varepsilon_{uncorr}^2 = \sum_{j=1}^{J} \left(\frac{\partial x}{\partial \sigma_{oj}} \right)^2 N_j \varepsilon_j^2$$





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ASCAT on MetOp-A

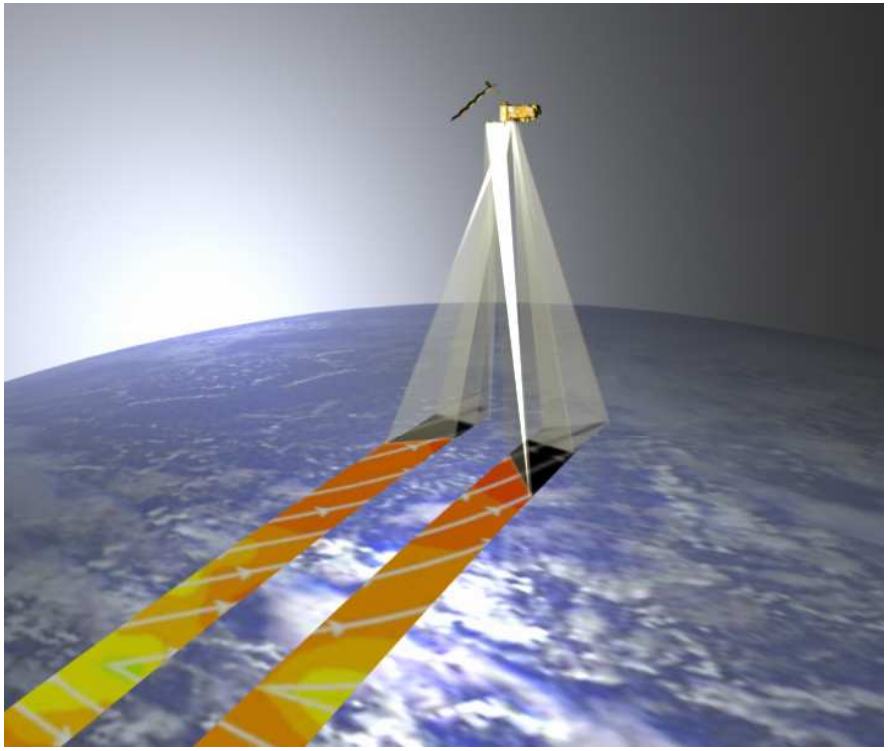
Launch schedule for 17 July 2006

Collaboration with Royal Netherlands Meteorological Institute (KNMI)

Testing the KNMI retrieval algorithm

Assist with the ASCAT validation

Assist with improvements in ASCAT algorithm



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WindSat

- Obtaining WindSat RDR for full resolution
  Rain flagging and correction
- Apply RSS CMIS retrieval algorithm
- Do Comprehensive Validation

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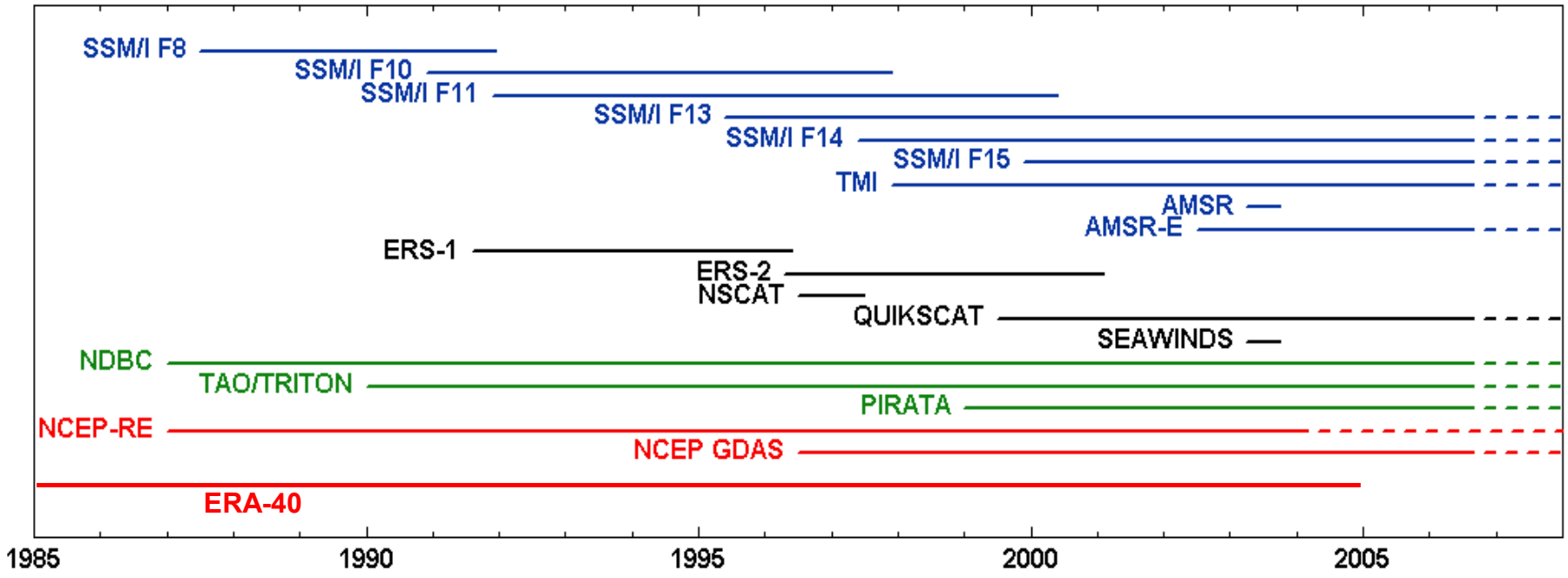
A Decadal Time Series of Ocean Surface Winds

Looking for consistency at the 0.1 m/s/decade level



Last but not least: Histogram Zero-point Analysis

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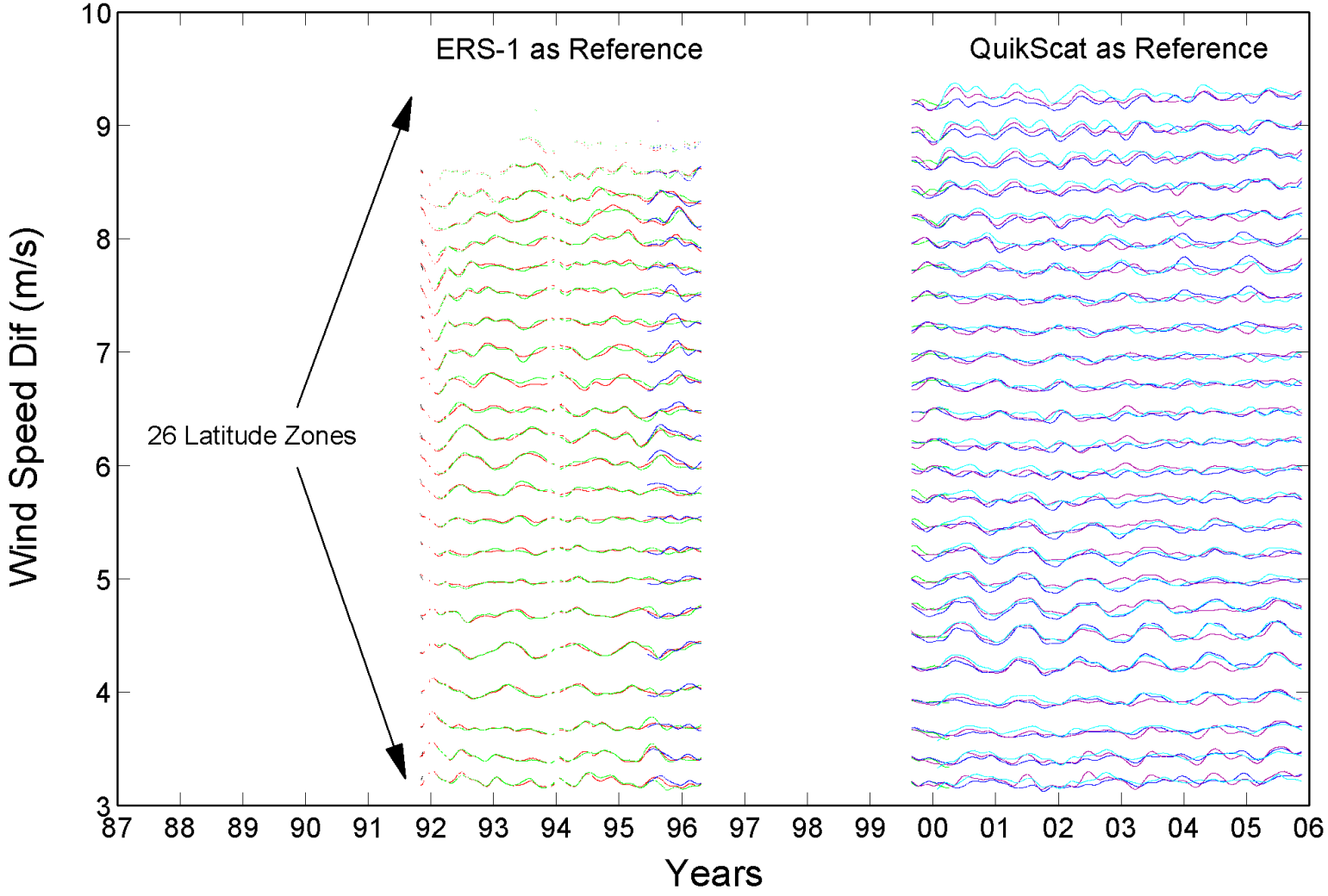
Inter-Satellite Wind Differences



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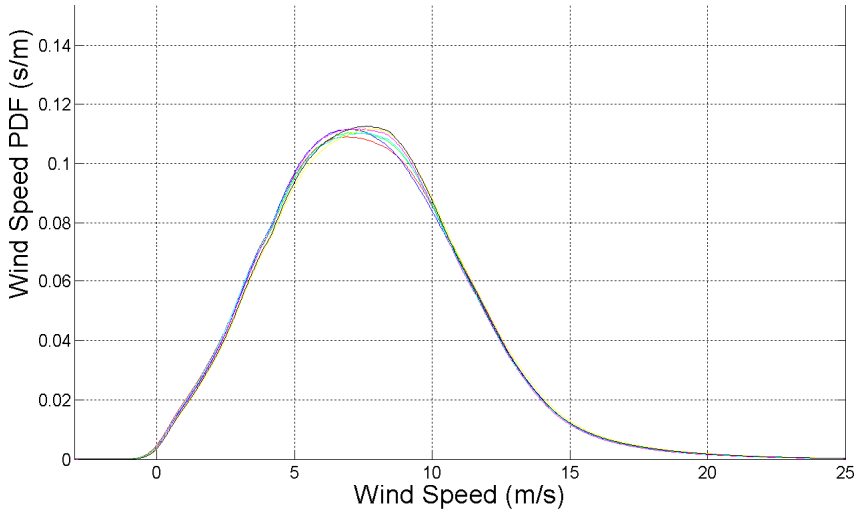
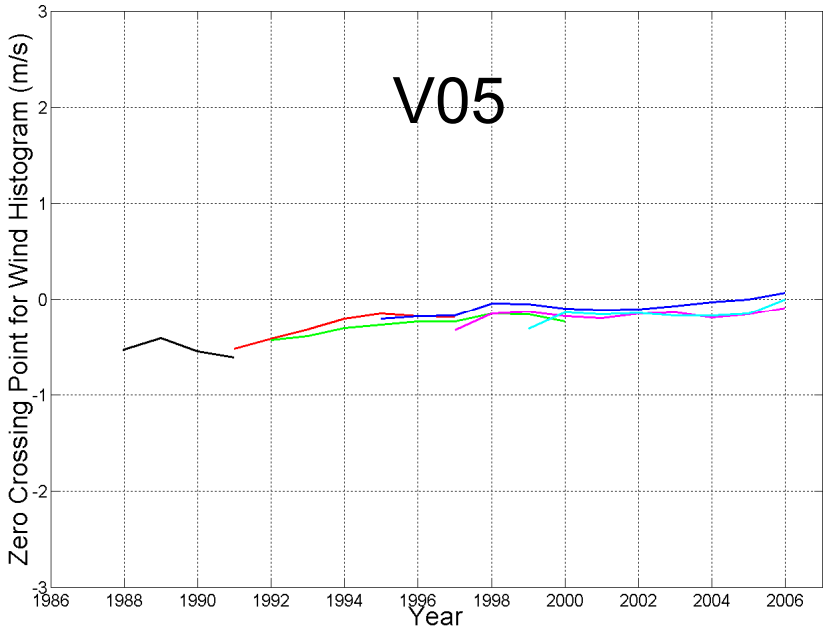
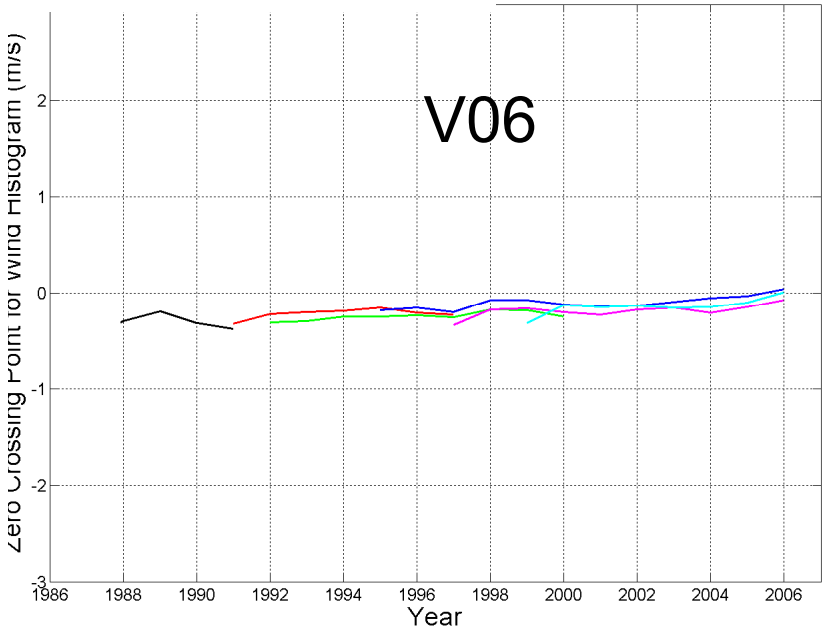
Wind Histograms Zero Point







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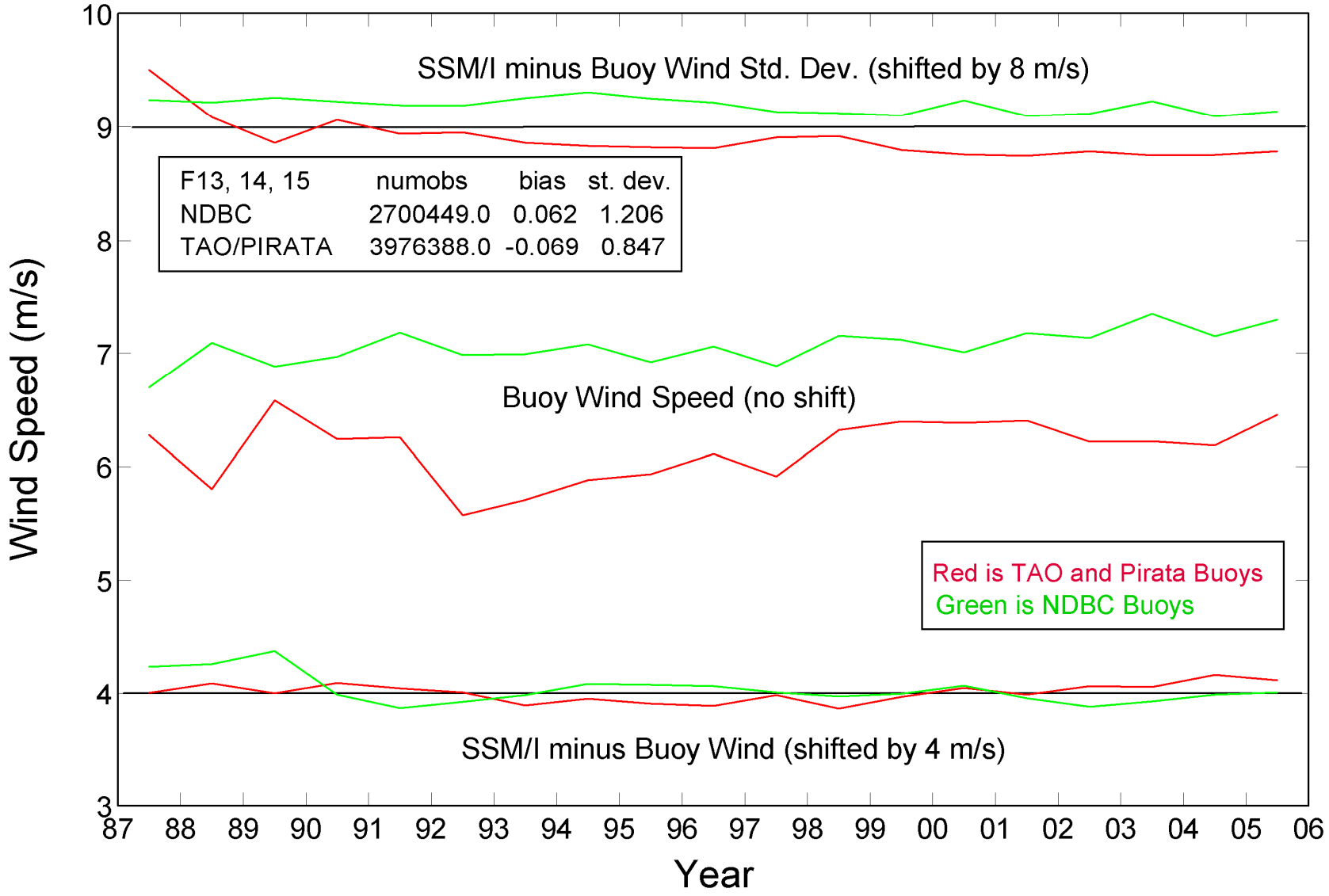
Annual Time Series (18 years)



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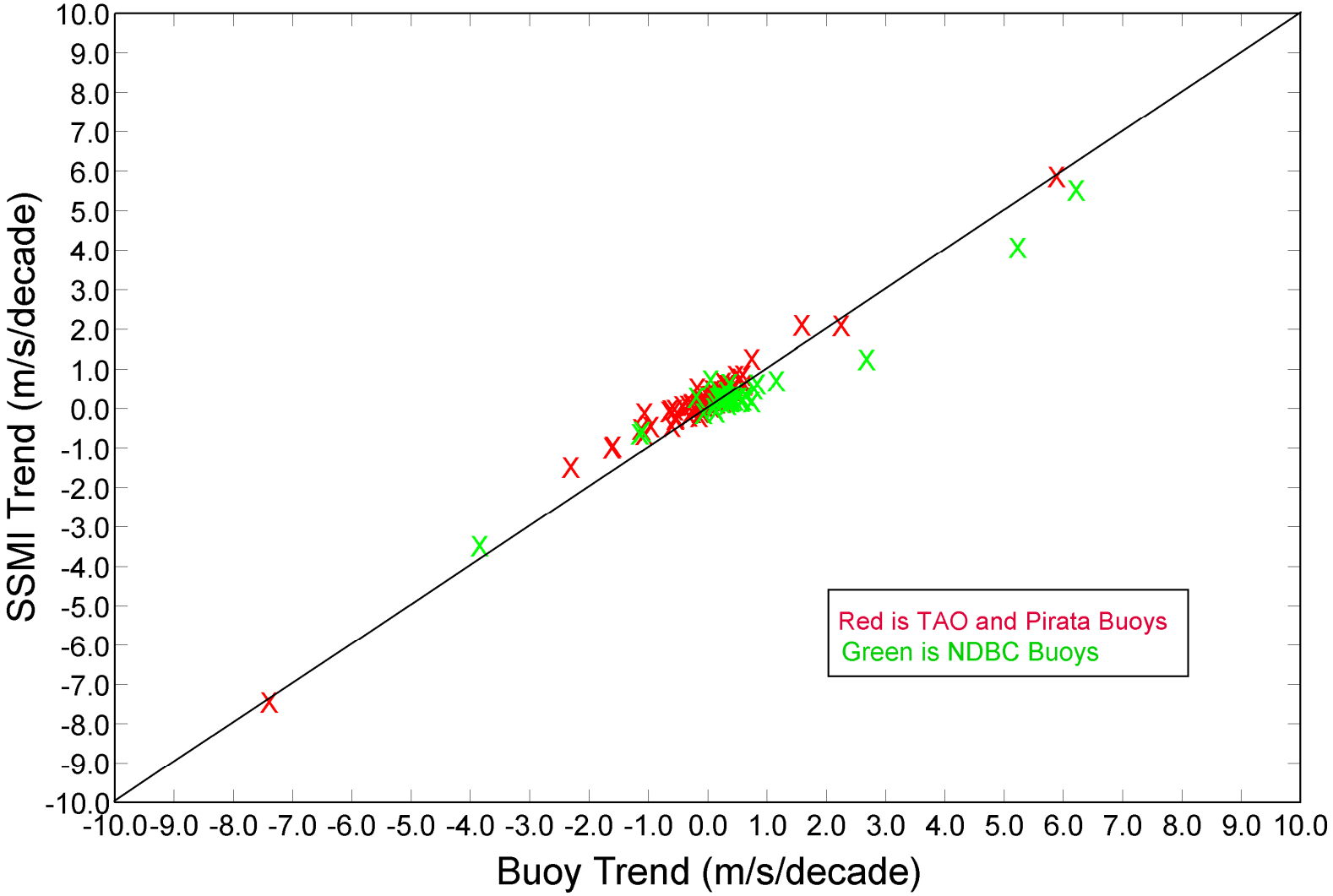
Trend Results for Individual Buoys



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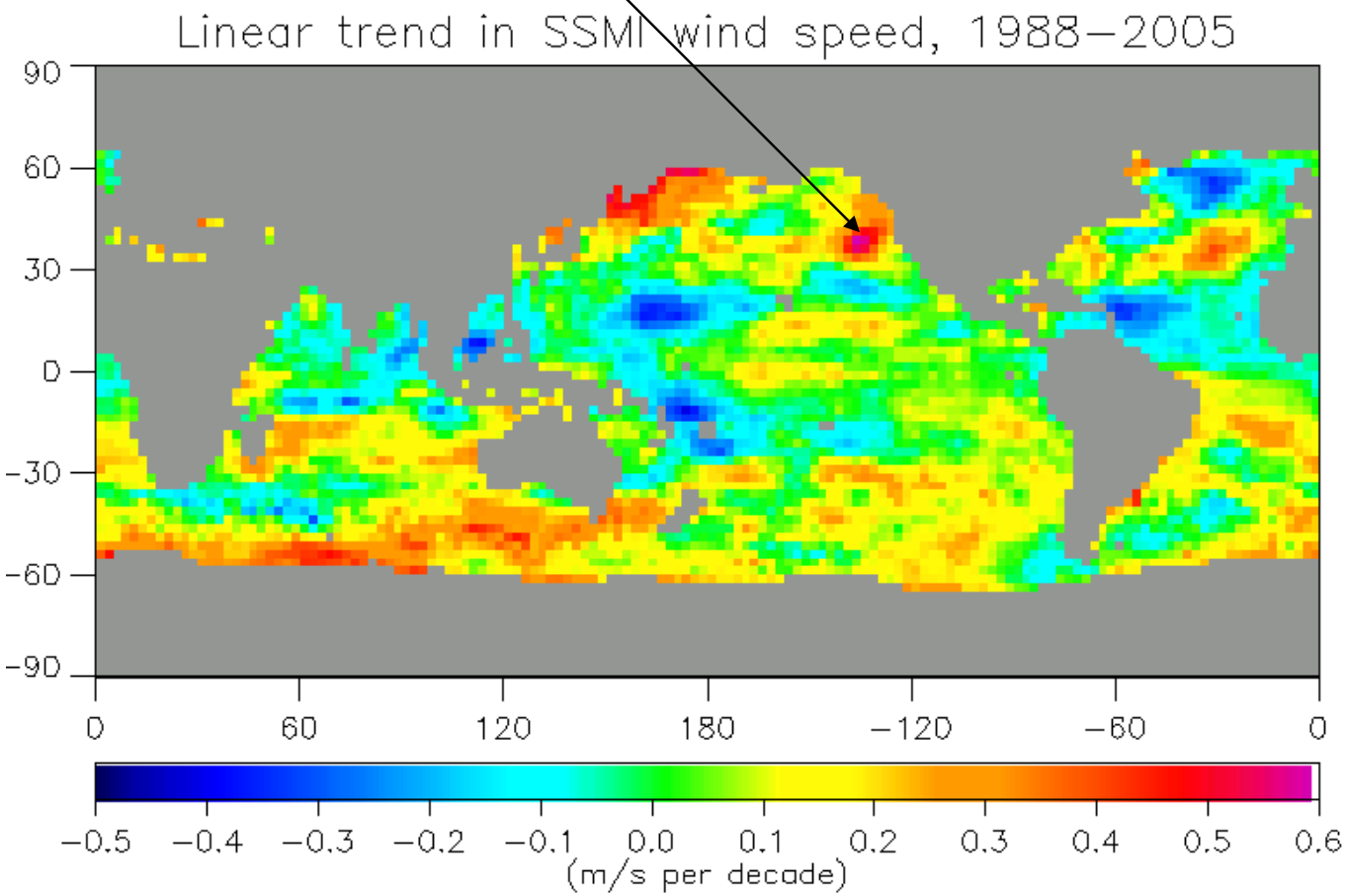
Wind Trends over Last 18 Years

SSMI= 0.59 m/s/decade
NCEP Reanalysis = 0.09 m/s/decade



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Upcoming Activities

- Generate trend maps for NCEP Reanalysis and ERA-40
- Collaborate with Ben Santer's climate modeling group at Lawrence Livermore Labs
- Investigate storm track oscillations
- Time series of active areas
- Compute evaporation maps and tie into other hydrological balance investigations (NEWS)