Data Product Evaluation Team Report

SWS/QSCAT Beta Release Validation
Working Group

OVWST Meeting, Salt Lake City
July 6, 2006

Data Product Validation Team Report
Background

- Meeting was held April 10-11 to review results of validation of the SeaWinds and QuikSCAT Beta releases.
- Presenters included:
  - Mike Freilich, Barry Vanhoff (OSU)
  - Linwood Jones, Khalil Ahmed (UCF)
  - David Long (BYU)
  - Ralph Milliff, Jan Morzel (CoRA)
  - Deborah Smith, Frank Wentz, Kyle Hilburn (RSS)
  - JPLers (S. Dunbar, E. Rodriguez, B. Stiles, S. Veleva)

Beta Release Validation Meeting Objectives

- Present the technical justification for beta release processing choices
- Review the validation results obtained by each validation team
- Identify “significant” (need to be fixed) problems with the beta release
- Identify validation and re-processing activities which remain to be done prior to the release of the data to the OVWST
- Agree upon a format (and assignments) for a data validation report to be presented to the OVWST meeting in July.

Data Product Validation Team Report

Summary of Team Studies

- Freilich/Vanhoff – NDBC buoy comparisons of 25km and 12.5km rain-free and rain-flagged QSCAT
- Smith/Wentz/Hilburn – comparisons between old/new QSCAT, SSM/I, SeaWinds/AMSR corrected data
- Jones/Ahmed – SRad rain rate validation
- Milliff/Morzel – large-scale, long-term averages of wind stress curl, improvements due to better rain flags
- Long – comparisons of SWS and QSCAT storms with wind/rain retrievals; L1B echo-tracking for QSCAT (smoothing/fitting recommended)
- Rodriguez – characterization of error bars vs NWP and buoys

Data Product Validation Team Report

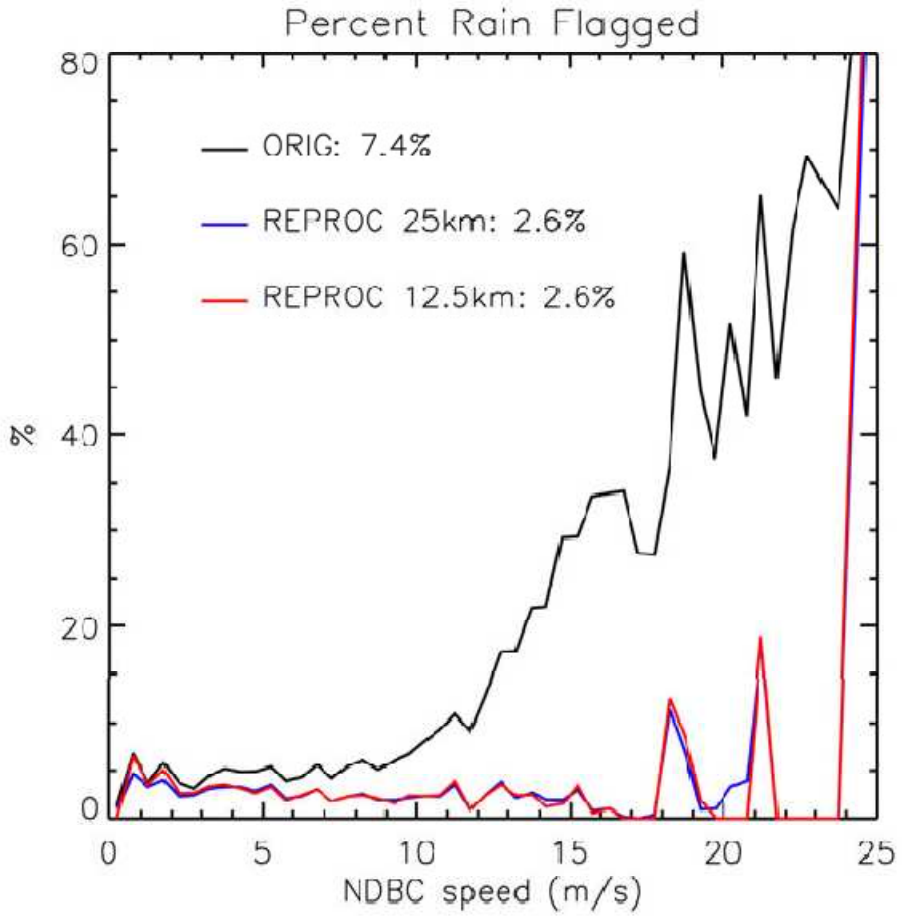
Summary of Validation Results

- Rain-free wind vector quality is substantially unchanged from earlier release (25 km); 12.5 km *directional rms* is ~15% worse than for 25 km
  - 25 km results consistent for buoy, radiometer, NWP model comparisons
- Impact-based rain flagging (IMUDH) improves the quality of the data in several ways:
  - Overflagging of high wind speeds is eliminated;
  - Improves calculation of averaged dynamical quantities (e.g., wind stress curl);
  - Identification of truly rain-impacted data is greatly improved.
- AMSR-corrected SeaWinds data
  - Improved retrieval of tropical cyclonic vorticity
  - Wind speed distributions vs. rain follow expectations from models (shift to higher retrieved speeds greatly reduced)
  - Reduced erroneous cross-track directions due to rain
- SRad rain detection is credible and usable
- Credible wind vector error estimates in products.

IMUDH Improvements

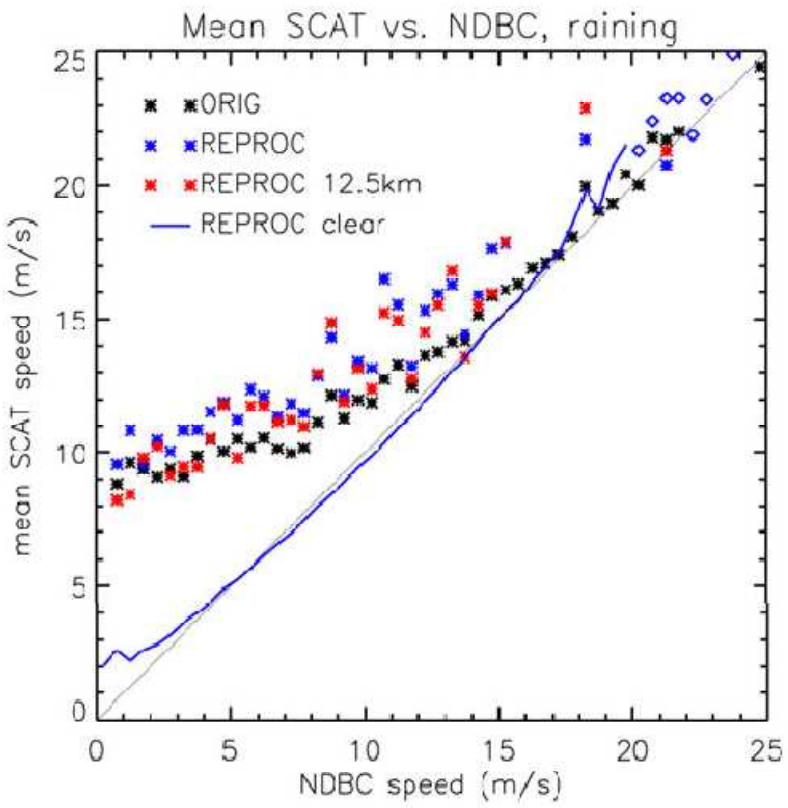
Freilich/Vanhoff Buoy Comparisons

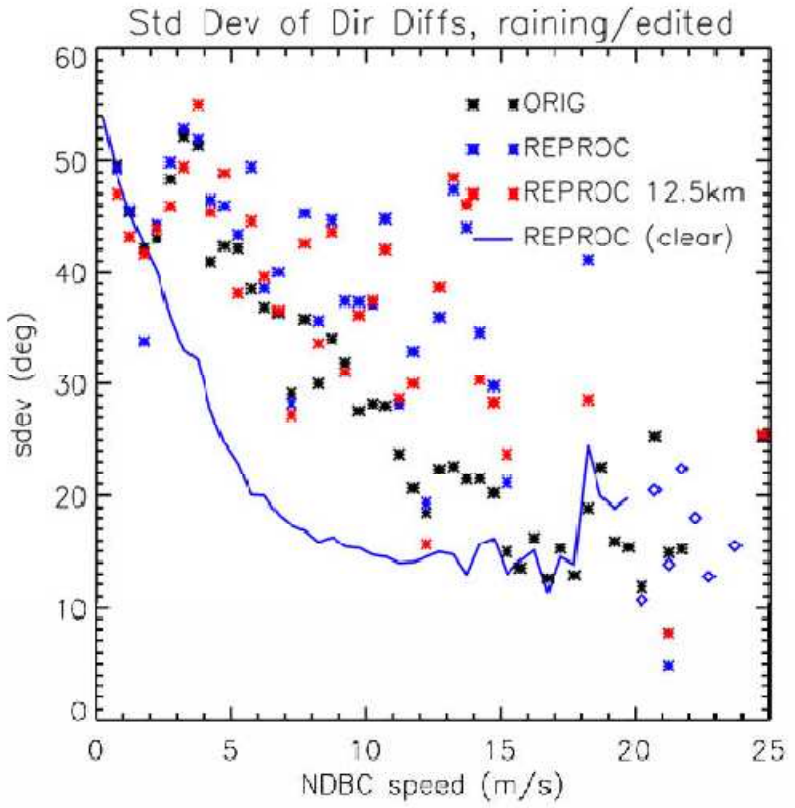
QuikSCAT & Buoy: Rain Fraction vs. Buoy Speed



Freilich/Vanhoff Buoy Comparisons

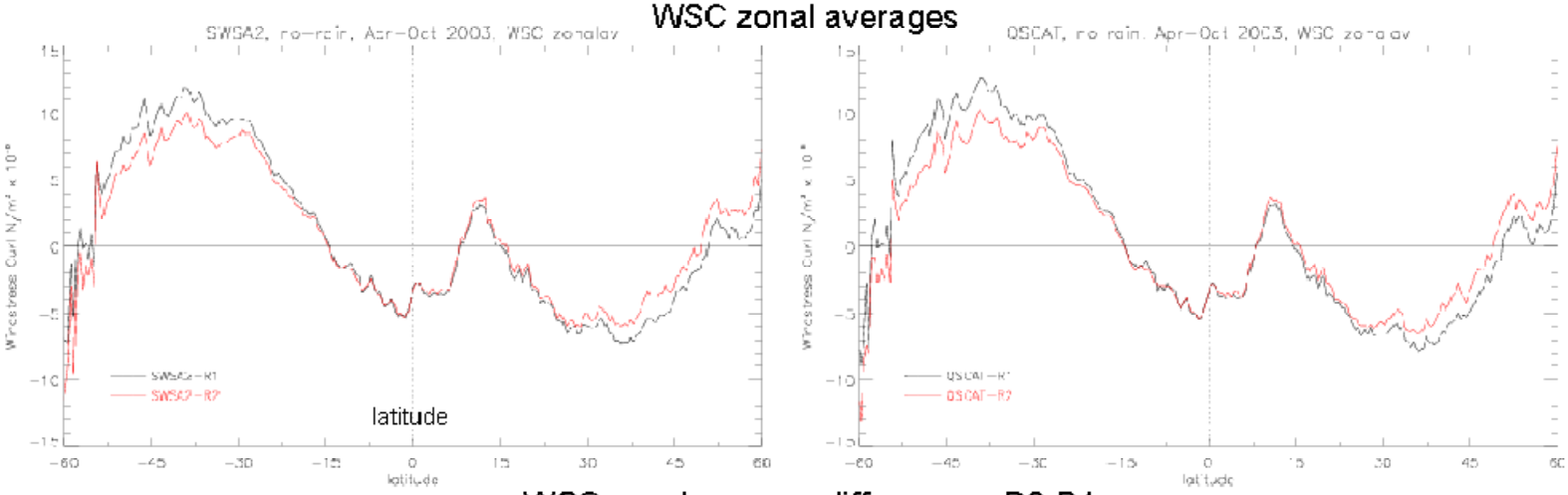
QuikSCAT/Buoy: Rain vs. non-Rain (dir. edit)



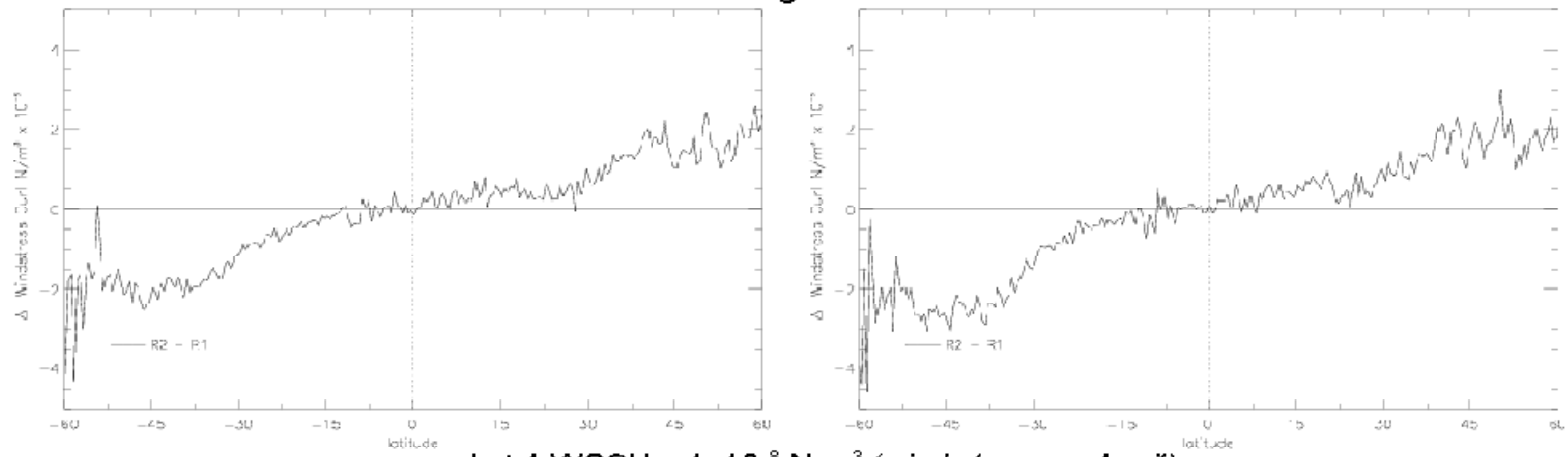


Combined Effects: rainflag improvements and enhanced high-wind speeds

WSC zonal averages



WSC zonal average differences R2-R1



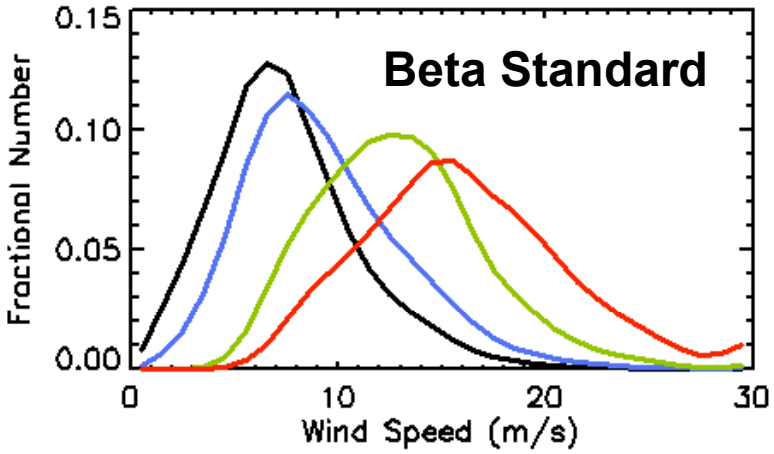
Let 1 WSCU = 1×10^{-8} Nm^{-3} *(wind stress curl unit)*

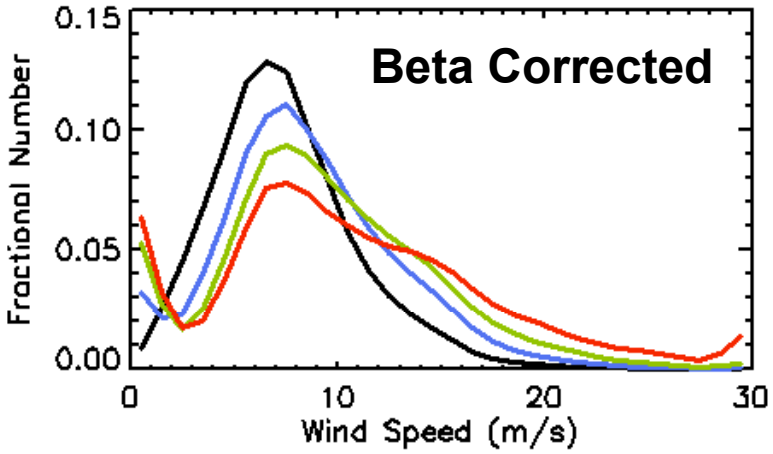
ADEOS-2 QSCAT

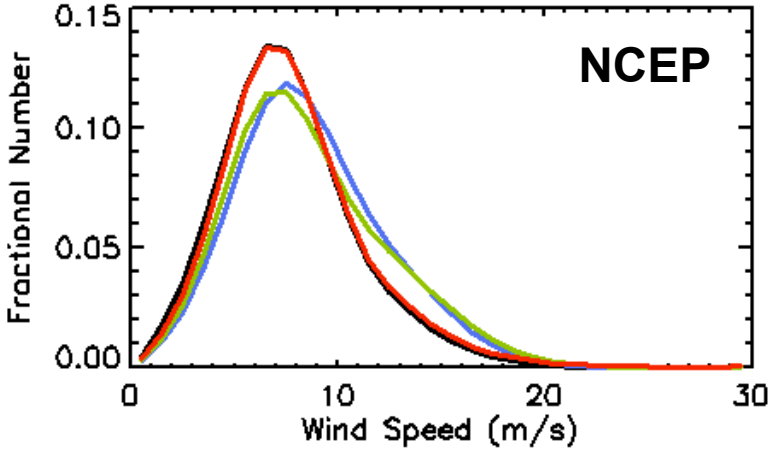
AMSR-Corrected Winds

Remote Sensing Systems
www.remss.com

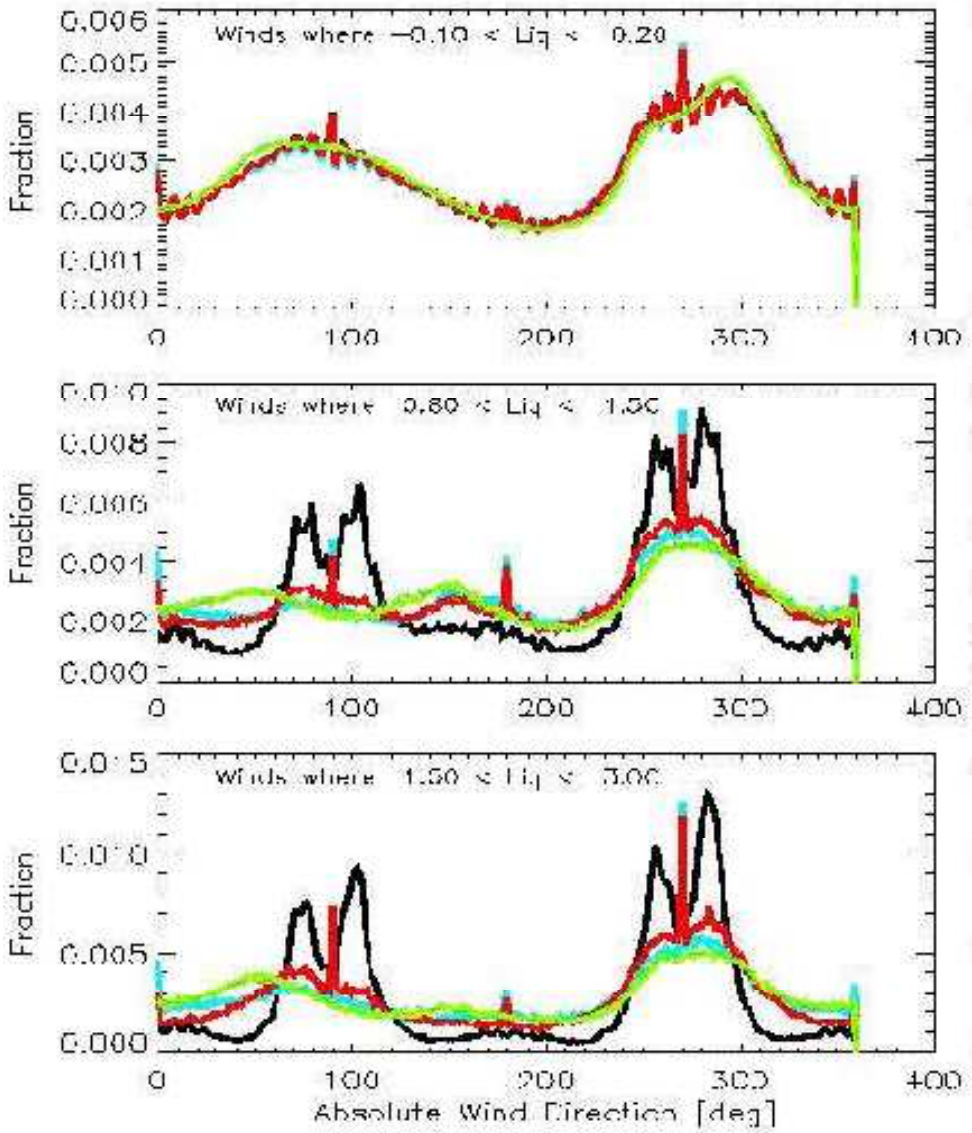
NO-RAIN, LIGHT, MODERATE, HEAVY







Reduced Cross-Track Bias in Corrected Winds



Clear

Light

Heavy

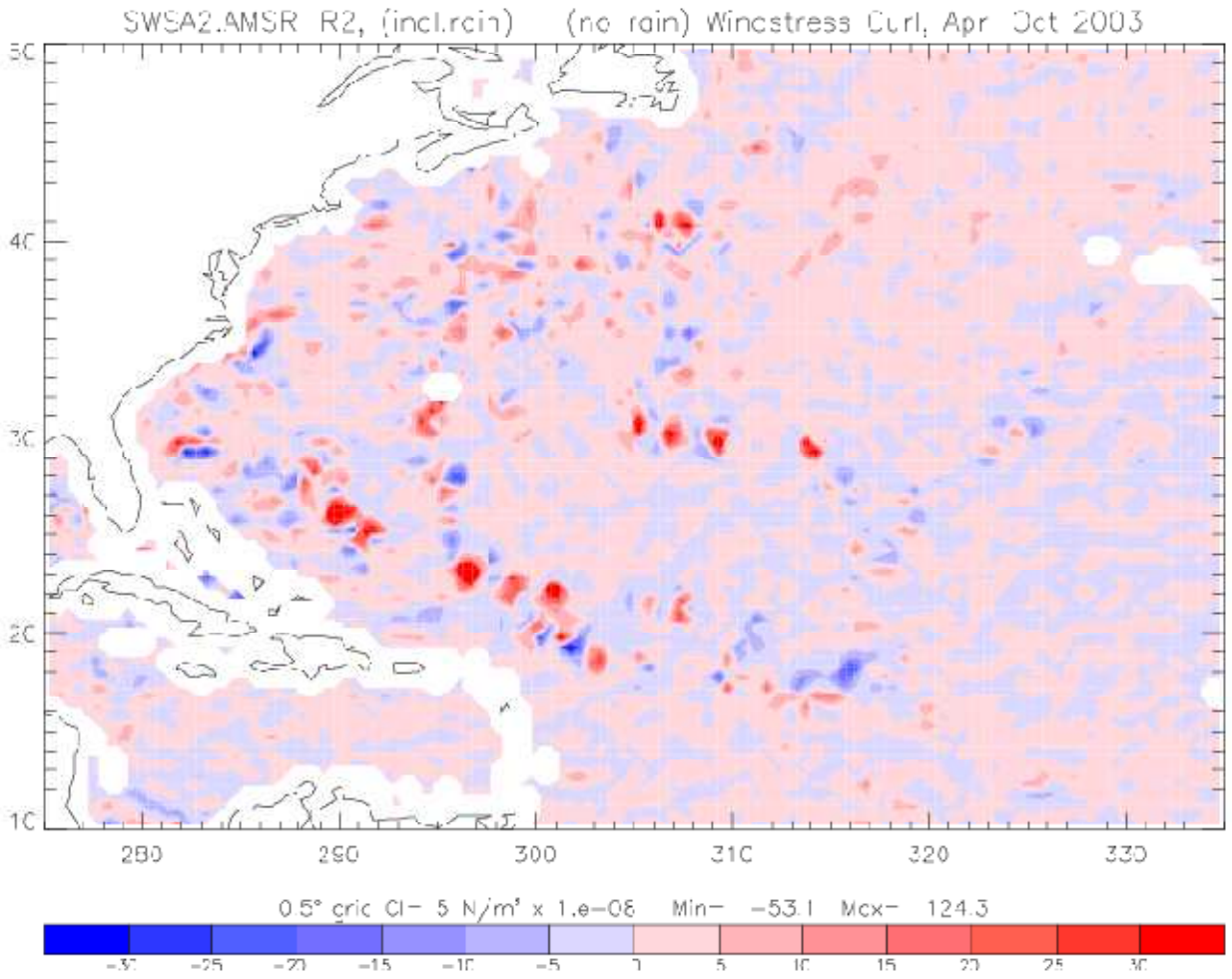
Uncorrected

Physical Correction

Empirical Correction

ECMWF

Emphasizing Rainflag Effects: N. Atlantic AMSR-Corrected – AMSR no rain

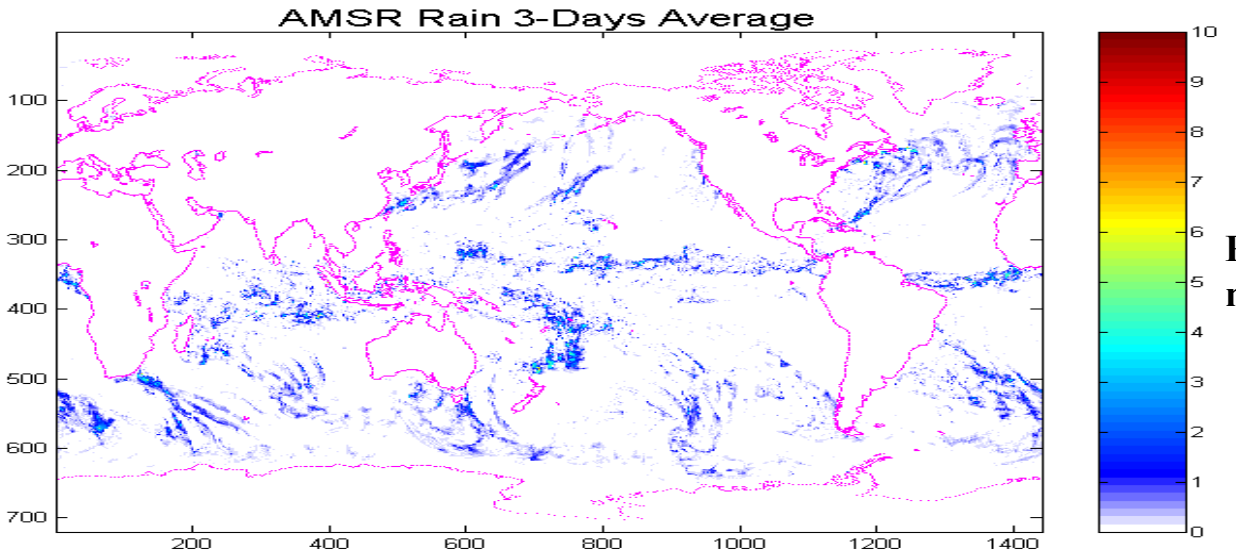


Hurricanes Fabian, Isabel, Juan, Danny .....

SRad Rain Detection

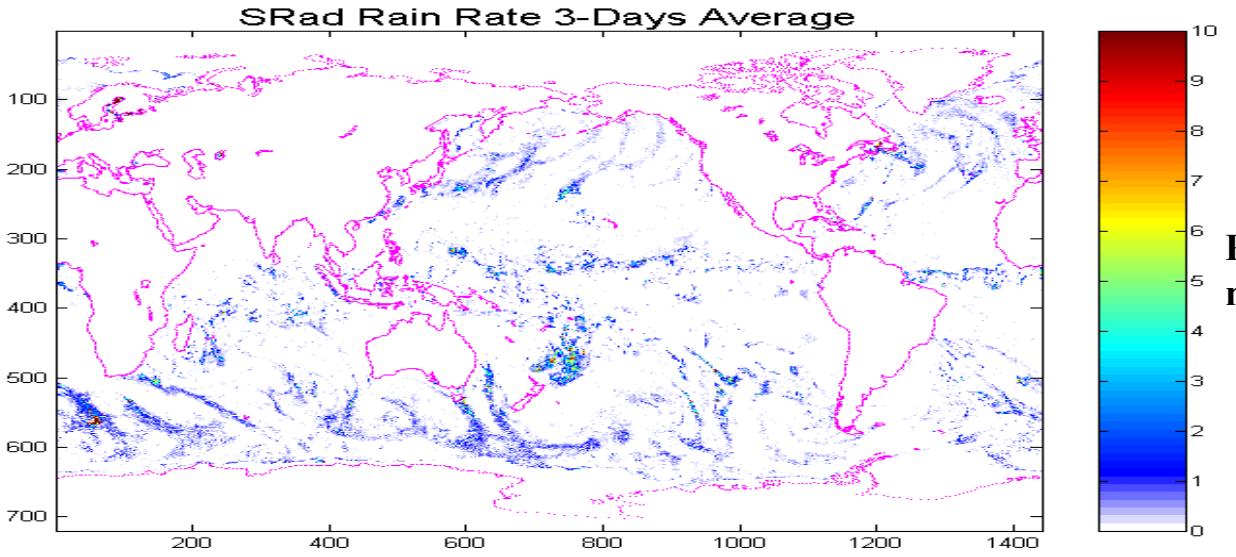
SRad-AMSR 3-Day Avg Rain Rate

AMSR



Rain Rate, mm/hr

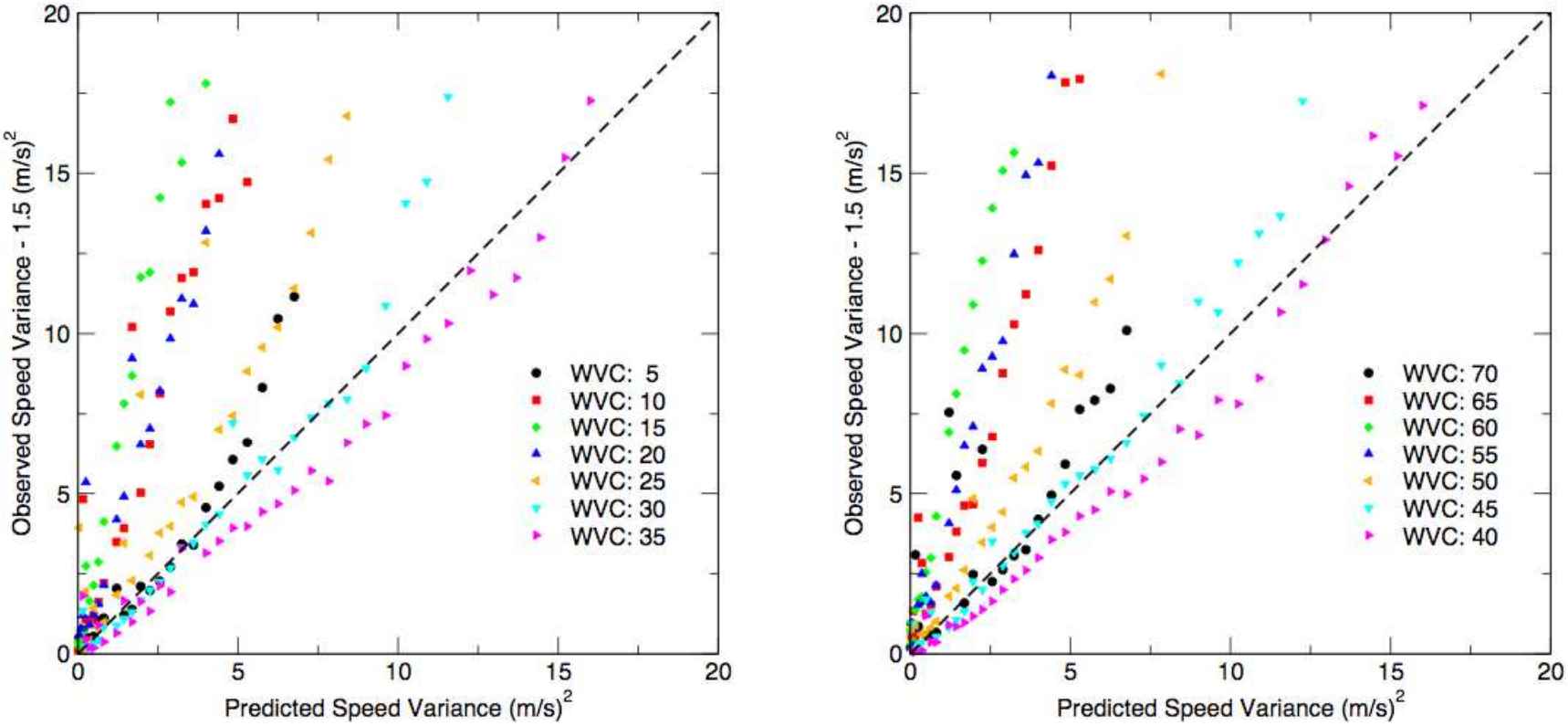
SRad



Rain Rate, mm/hr

Error Bar Validation/Correction

25 km Wind-Speed Error vs WVC



Linear model is appropriate for constant WVC. However, variance is under-predicted for the “sweet spot” WVC’s. Observations are consistent with a constant ECMWF error ~ 1.2 m/s.

A possible explanation: If Kpm where underestimated, the error would show the largest underprediction when Kpc ~ Kpm, or smaller. The effect would be strongest at the sweet spot (to be shown).

Possible Corrections

- Predicted wind speed error is highly correlated with observed error, but the scaling constant depends on WVC
- Two possible solutions:
  - Identify source of discrepancy (Kpm too low?) and re-run estimation [*Kpm has little effect, as it turns out*…]
  - Apply a WVC dependent empirical scaling correction to the estimated speed error to produce an improved speed error. Validate correction validity by using separate training and evaluation data sets. [This is the approach we are adopting for reprocessing.]

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