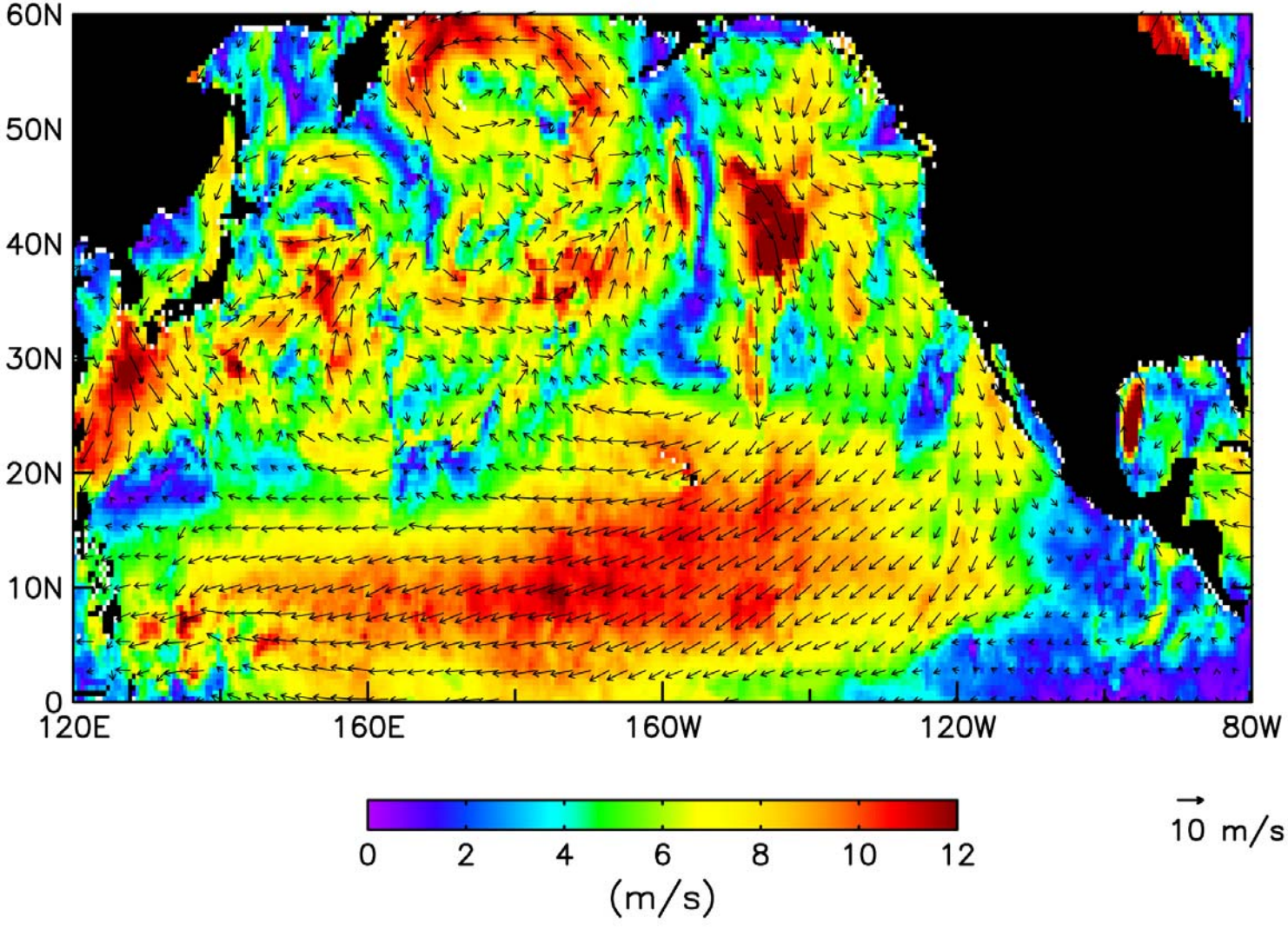
JPL Real-Time QuikSCAT Wind Fields

0.5°x0.5°x12-hr Wind Fields Generated by the Method of Successive Corrections

Vector Wind and Wind Speed April 15, 2000

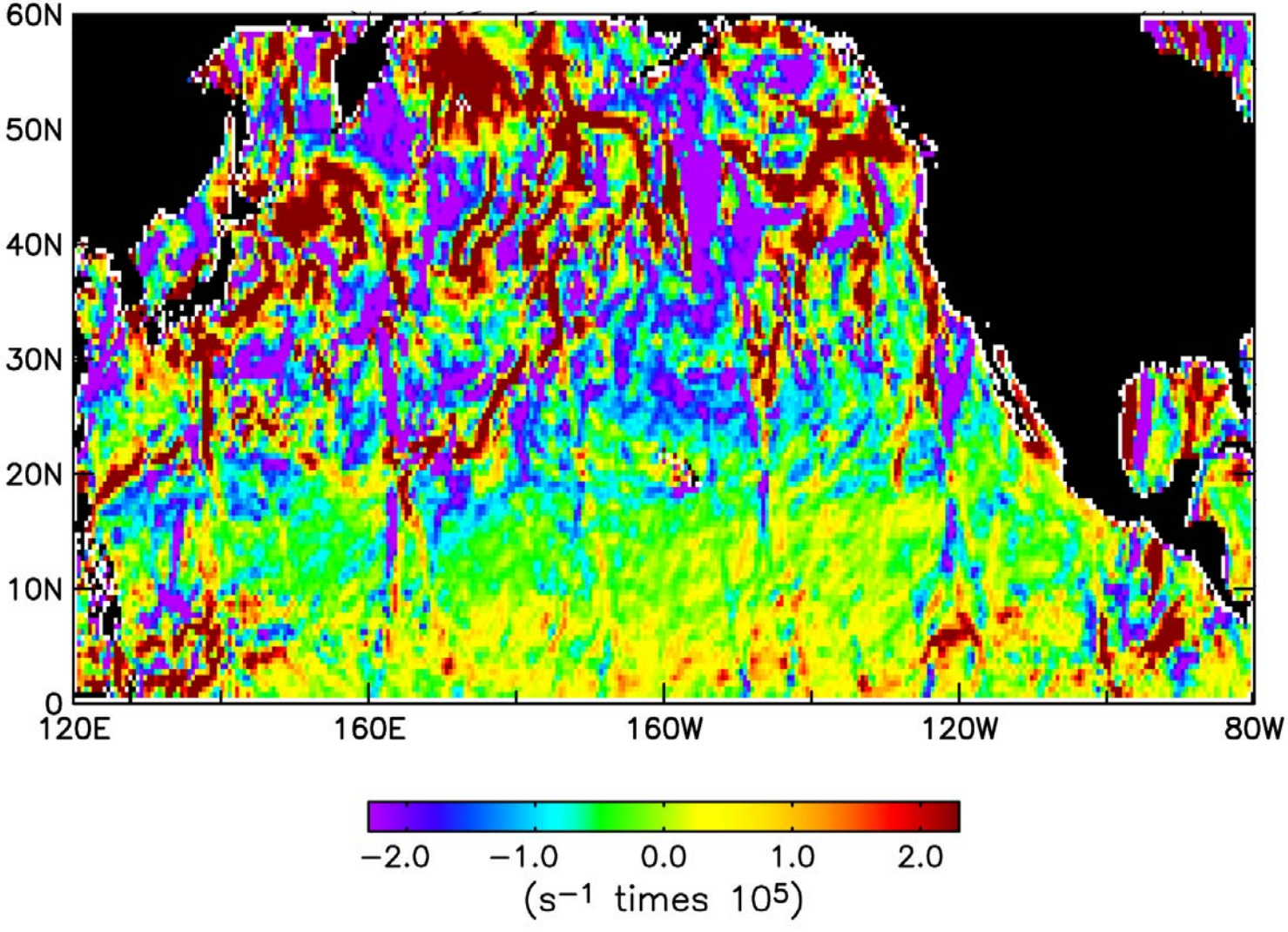


JPL Real-Time QuikSCAT Wind Fields

0.5°x0.5°x12-hr Wind Fields Generated by the Method of Successive Corrections

Wind Vorticity

April 15, 2000

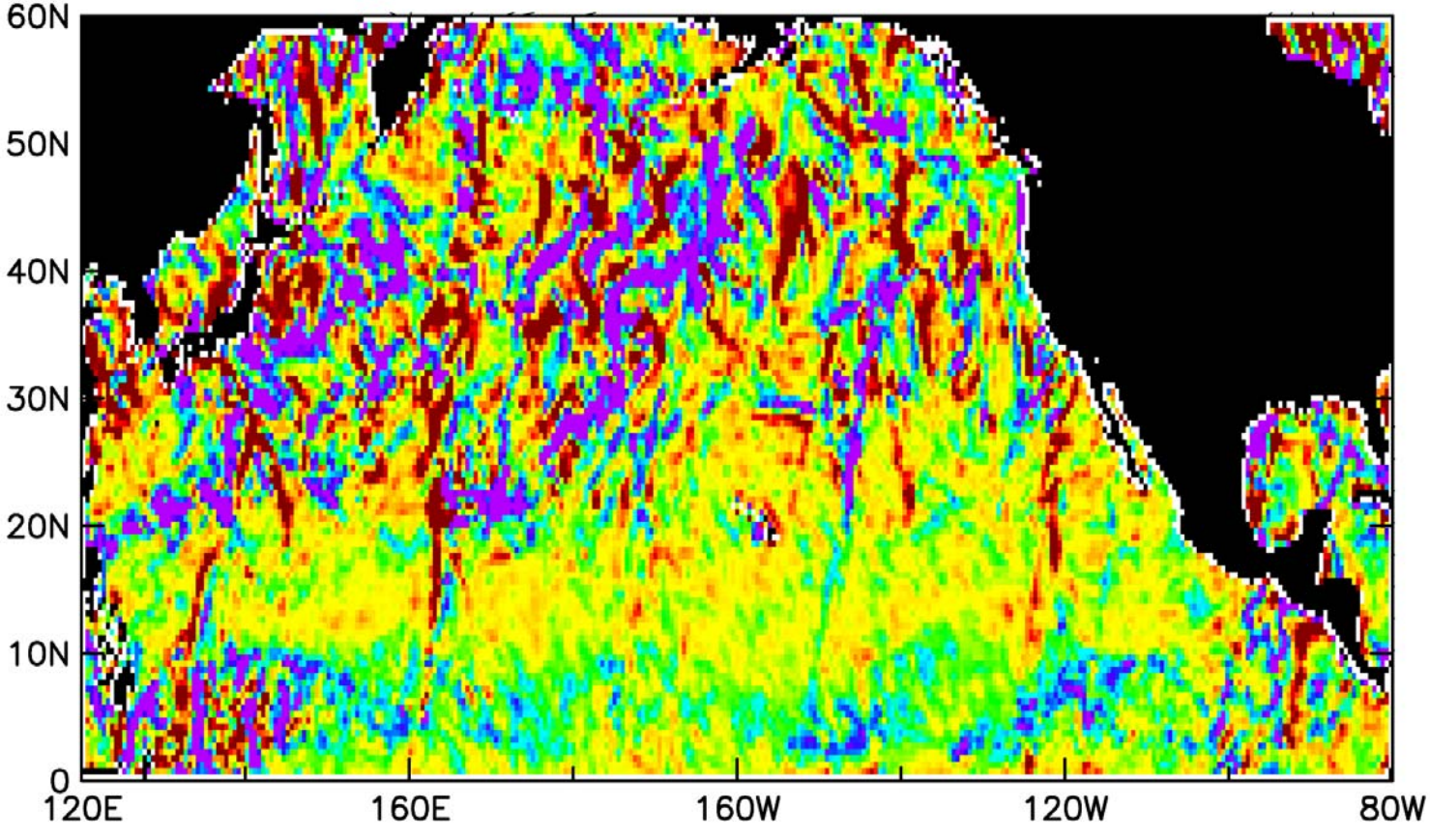


JPL Real-Time QuikSCAT Wind Fields

0.5°x0.5°x12-hr Wind Fields Generated by the Method of Successive Corrections

Wind Divergence

April 15, 2000



Sampling Errors in Wind Fields Constructed from Single and Tandem Scatterometer Datasets

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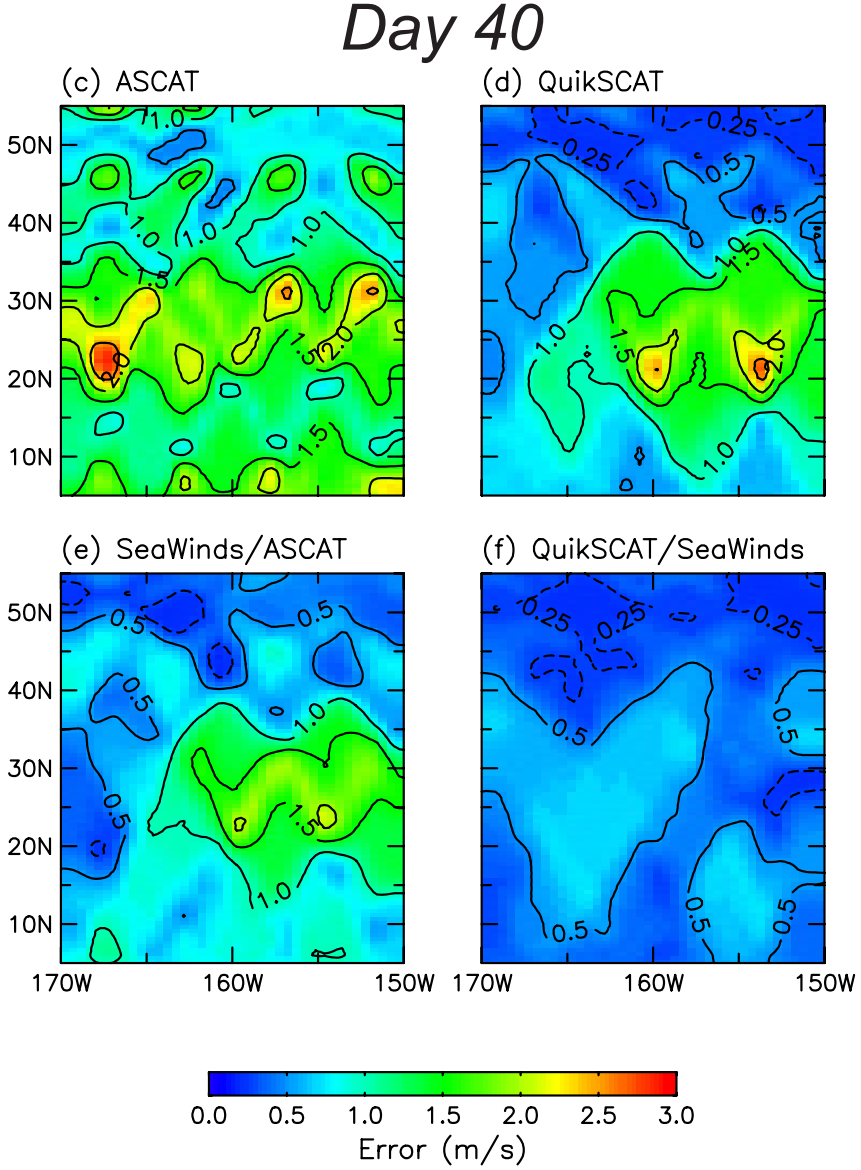
Overriding Principle:

Information cannot be created where information does not exist

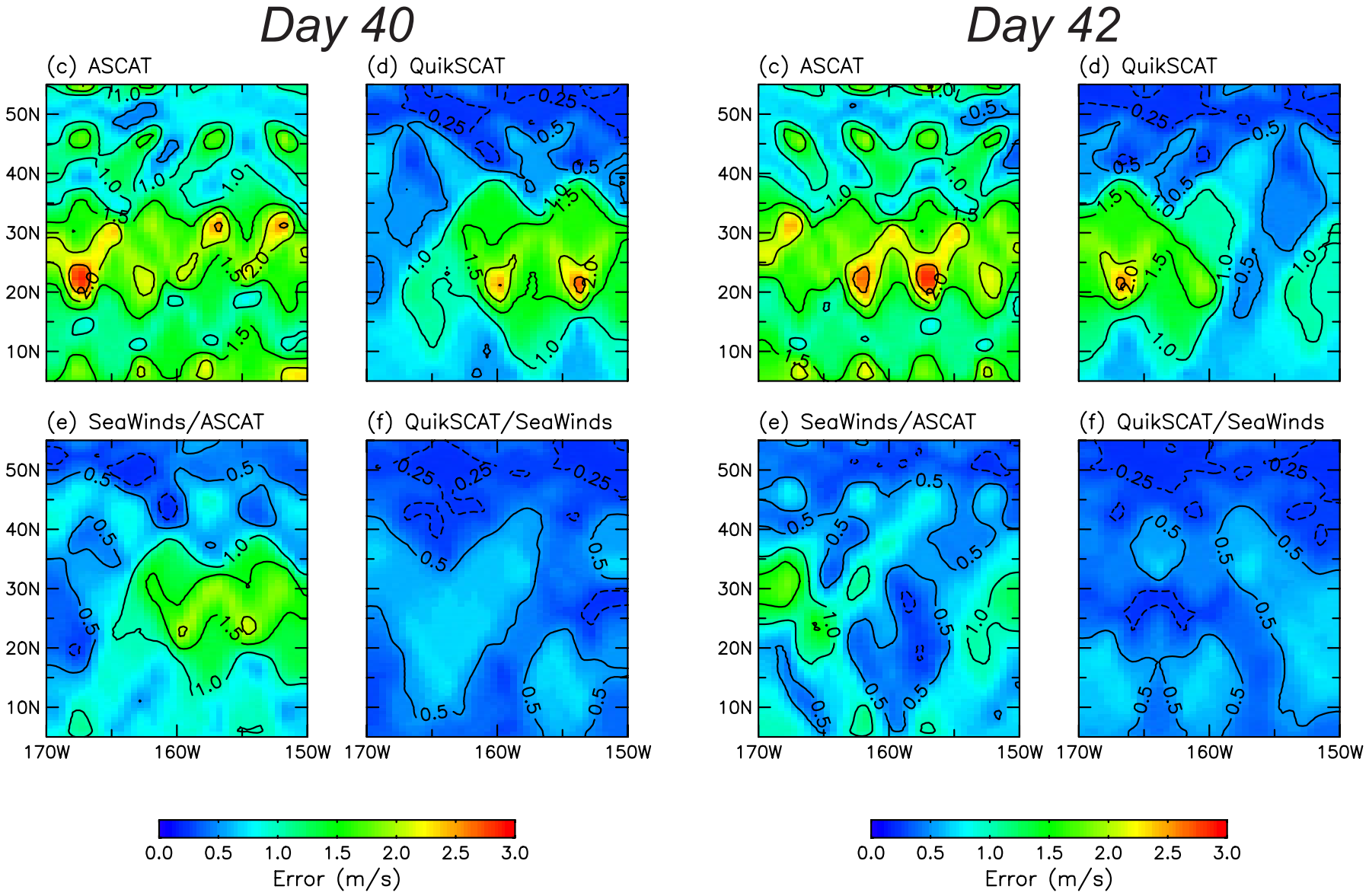
Example Maps of RMS Errors of Meridional Wind Estimates

2º by 2º by 4-day Smoothing



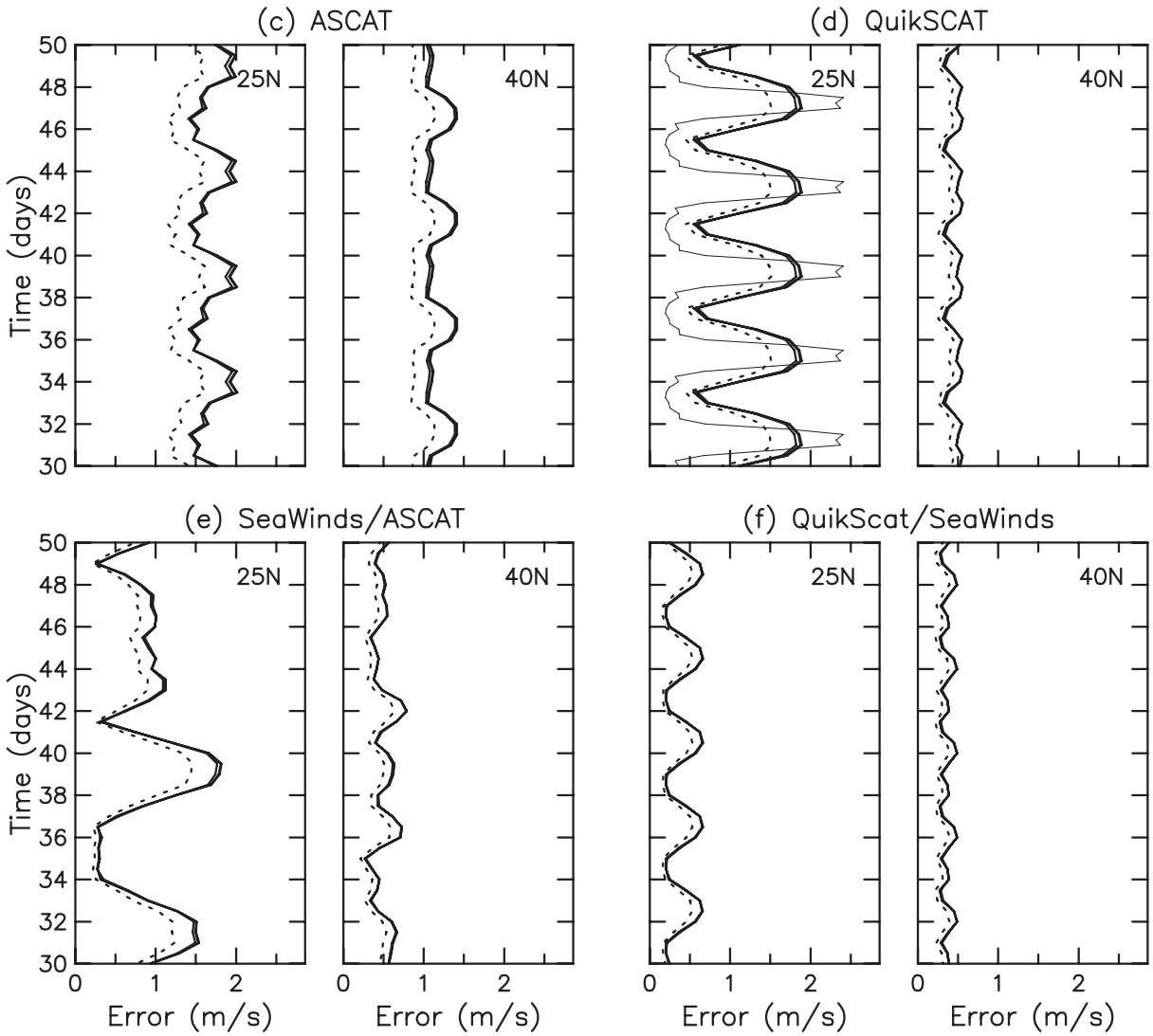
Example Maps of RMS Errors of Meridional Wind Estimates

2º by 2º by 4-day Smoothing



Time Series of RMS Errors of Meridional and Zonal Wind Estimates

2º by 2º by 4-day Smoothing



Solid lines:

Meridional velocity with 3 variants of spatial autocorrelation function and 2º by 2º by 4-day smoothing

Dotted lines:

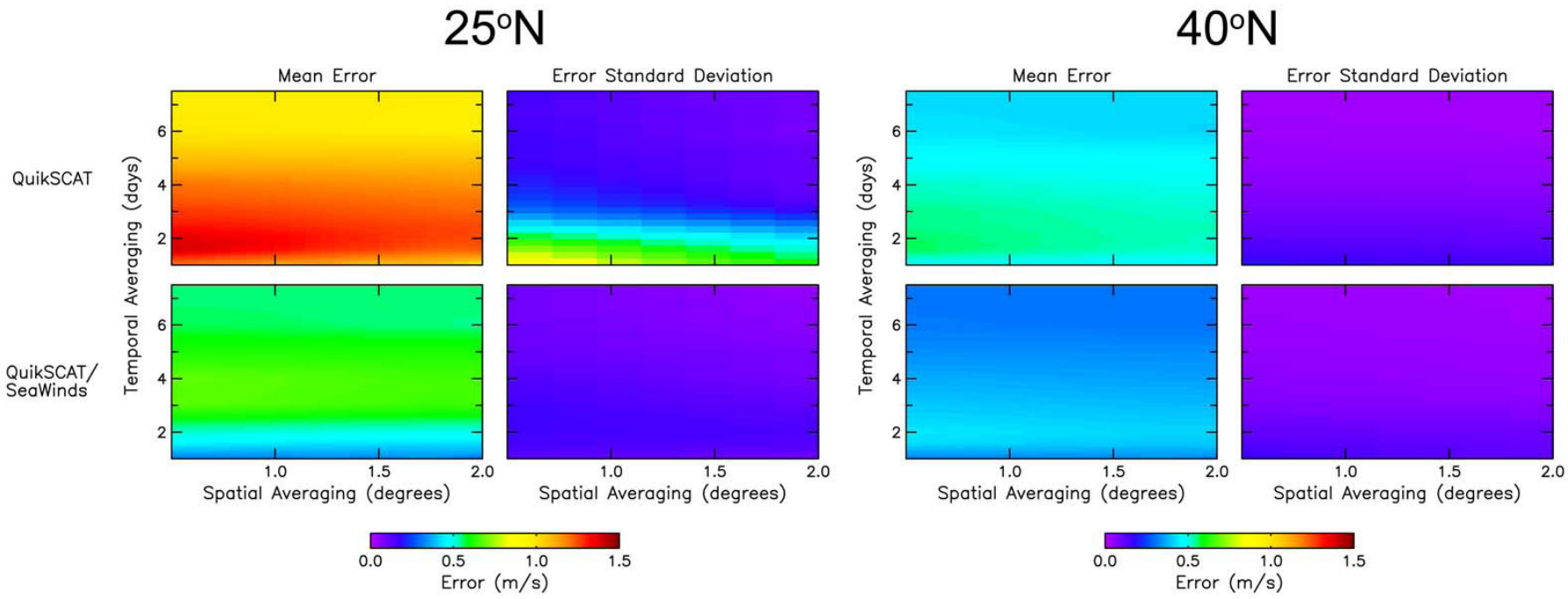
Zonal velocity with 2º by 2º by 4-day smoothing

Thin solid line in panel (d):

Meridional velocity with 2º by 2º by 1.5-day smoothing

Dependencies of Mean and Standard Deviation of Mapping Errors on Spatial and Temporal Smoothing

for QuikSCAT and Tandem QuikSCAT/SeaWinds

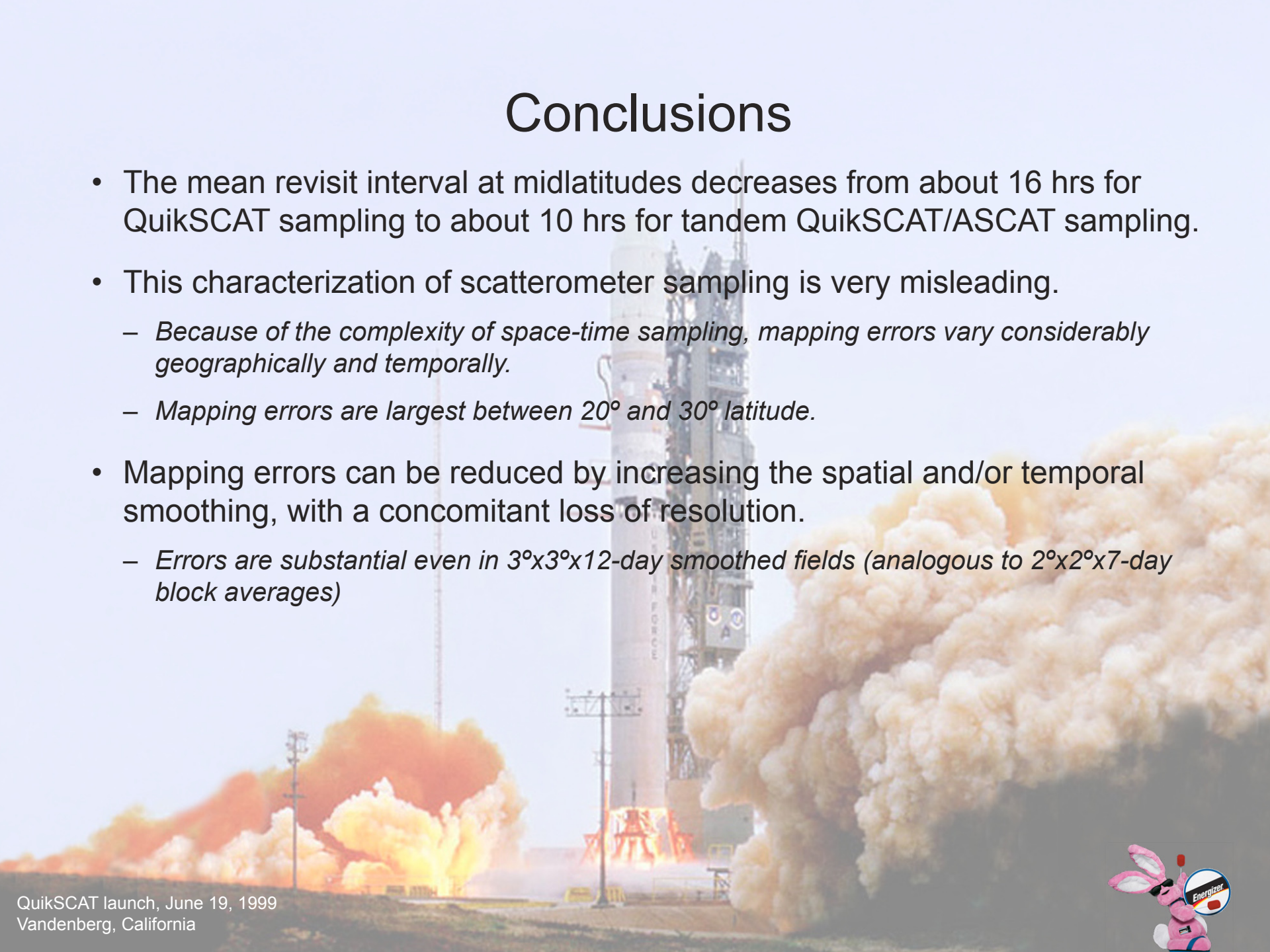


Note that errors are more sensitive to temporal smoothing than to spatial smoothing.

This is an indication that mapping errors are dominated by temporal sampling.

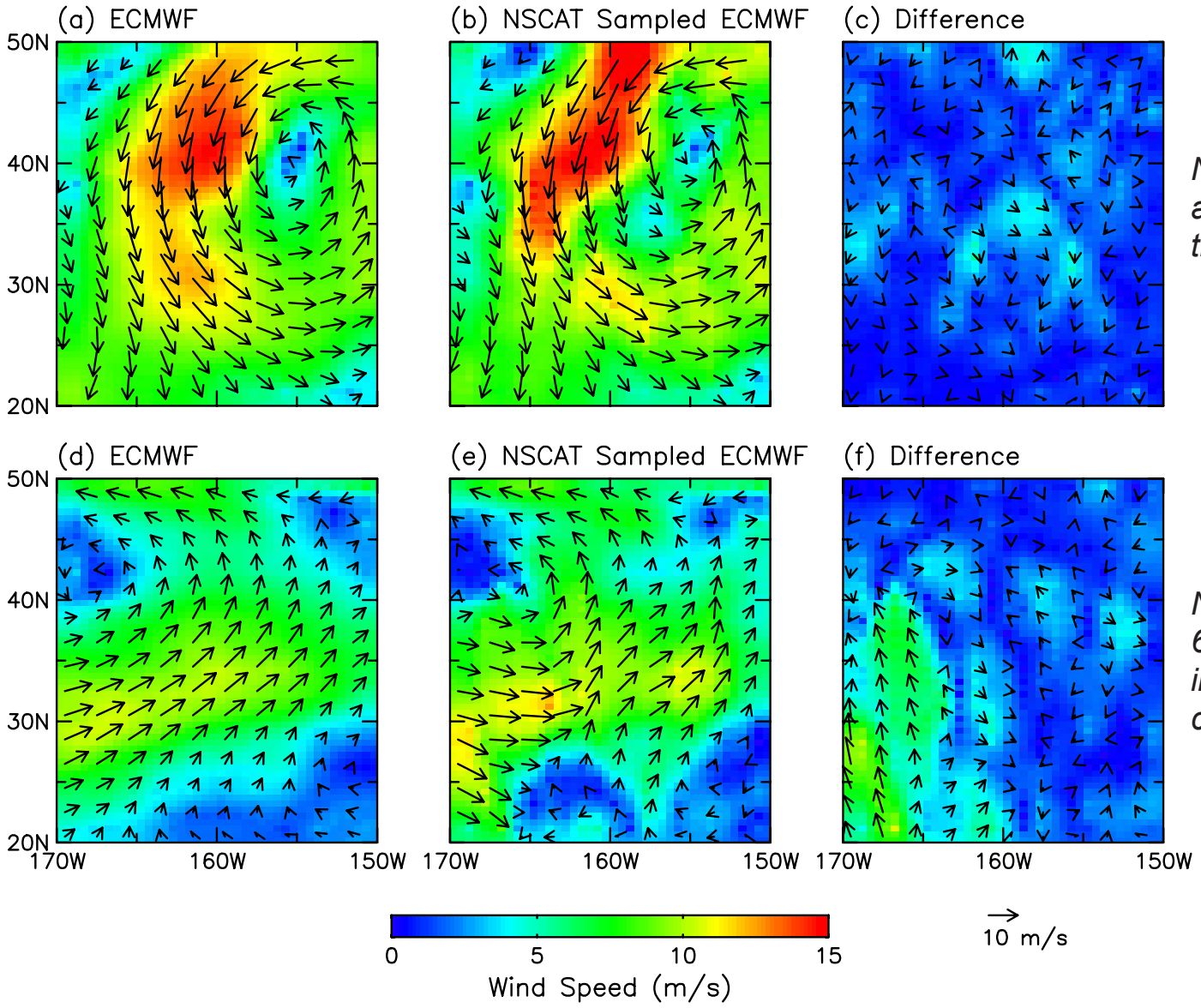
Conclusions

- The mean revisit interval at midlatitudes decreases from about 16 hrs for QuikSCAT sampling to about 10 hrs for tandem QuikSCAT/ASCAT sampling.
- This characterization of scatterometer sampling is very misleading.
  - *Because of the complexity of space-time sampling, mapping errors vary considerably geographically and temporally.*
  - *Mapping errors are largest between 20º and 30º latitude.*
- Mapping errors can be reduced by increasing the spatial and/or temporal smoothing, with a concomitant loss of resolution.
  - *Errors are substantial even in 3ºx3ºx12-day smoothed fields (analogous to 2ºx2ºx7-day block averages)*



QuikSCAT launch, June 19, 1999
Vandenberg, California

Two Examples of NSCAT Sampling Errors
with 2º by 2º by 4-day Smoothing

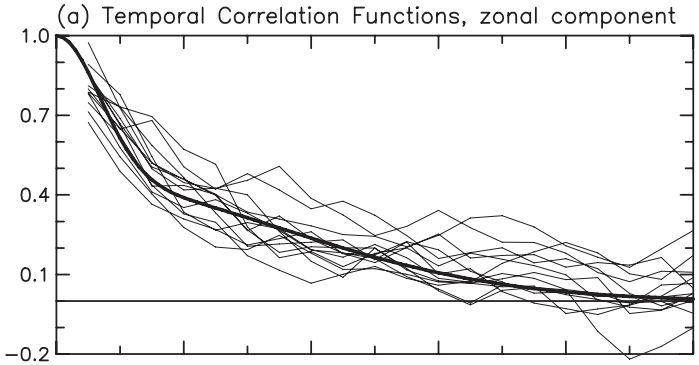


Note patchy areas of more than 4 m/s errors

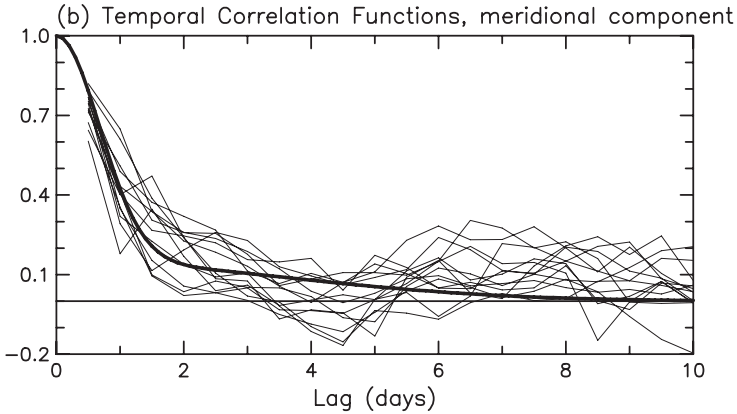
Note the area of 6-10 m/s errors in the southwest corner!

Assumptions for a Statistical Analysis of Sampling Errors

1)

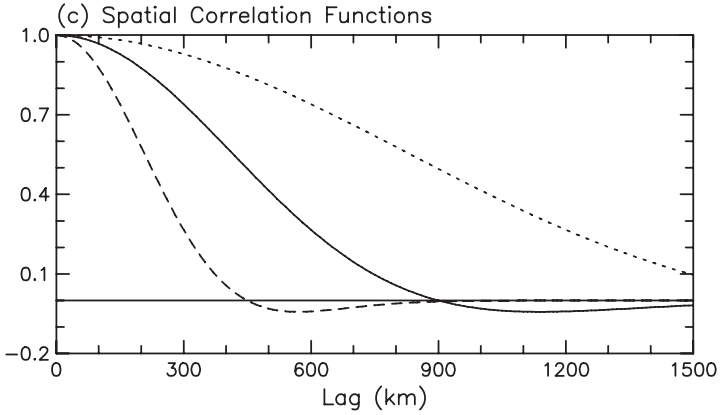


2)



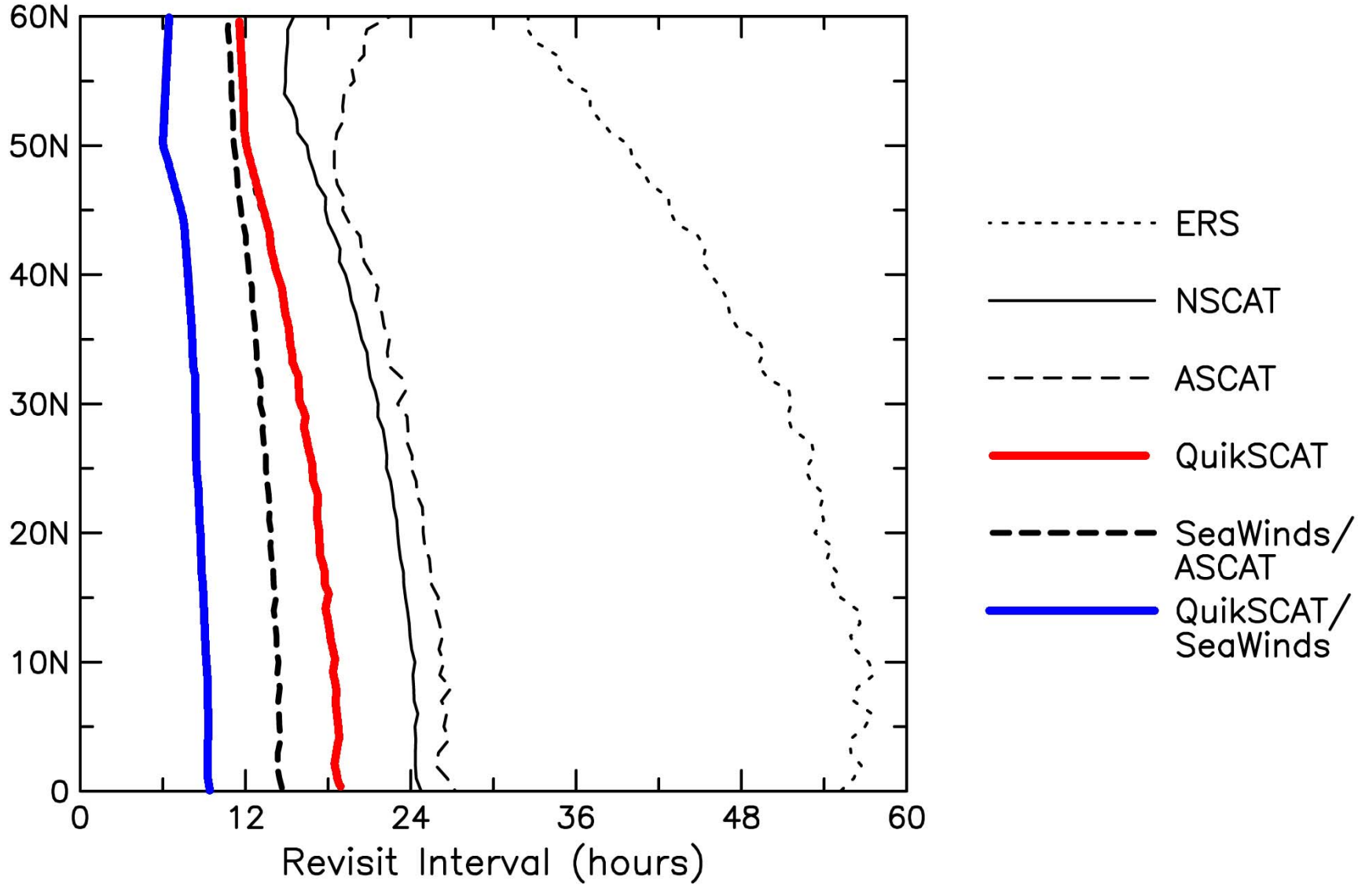
Note the shorter decorrelation time scale for v than for u

3)

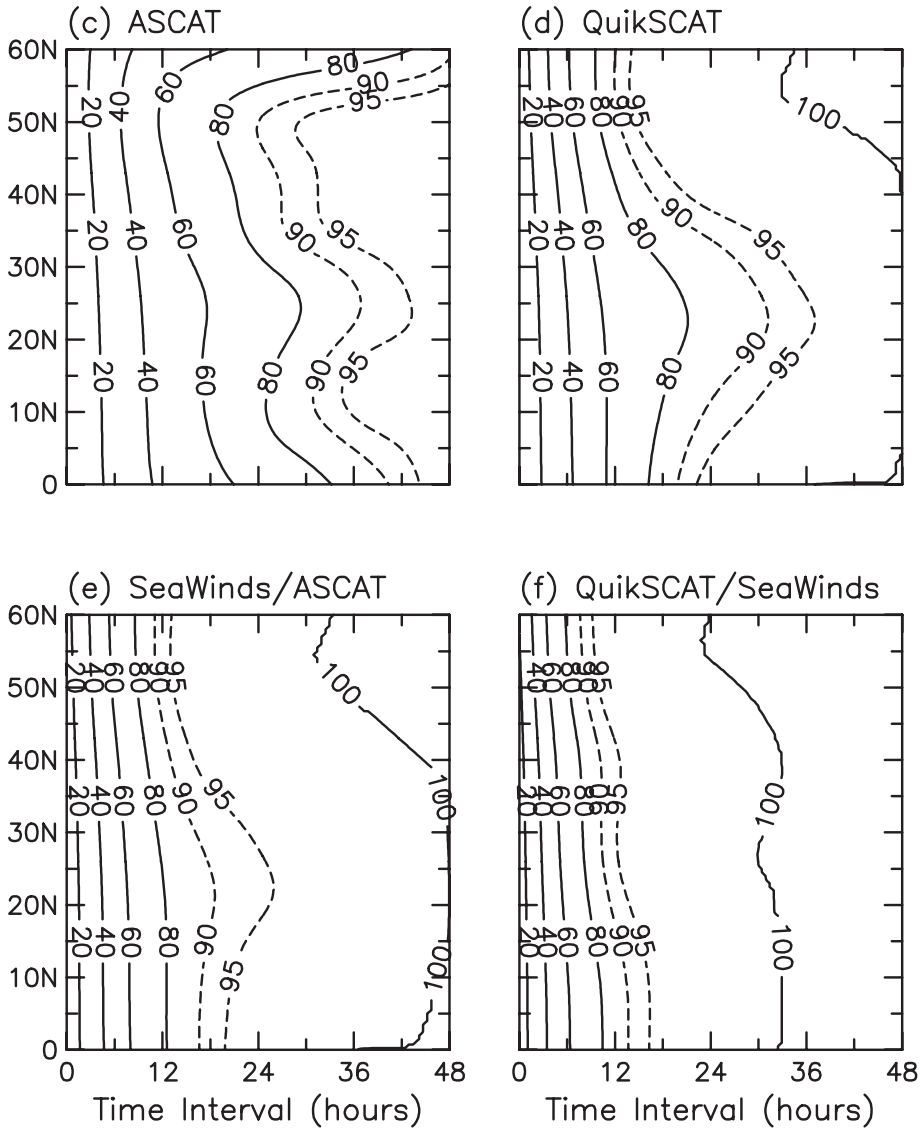


4) Global average standard deviation of 5 m/s for each wind component

Mean Revisit Interval



Percent Sampling Coverage
as a Function of Latitude and Time Interval



Note the "bulge" of relatively poor sampling centered at about 25°N

Time-Longitude Distributions of Measurements Along Selected Latitudes