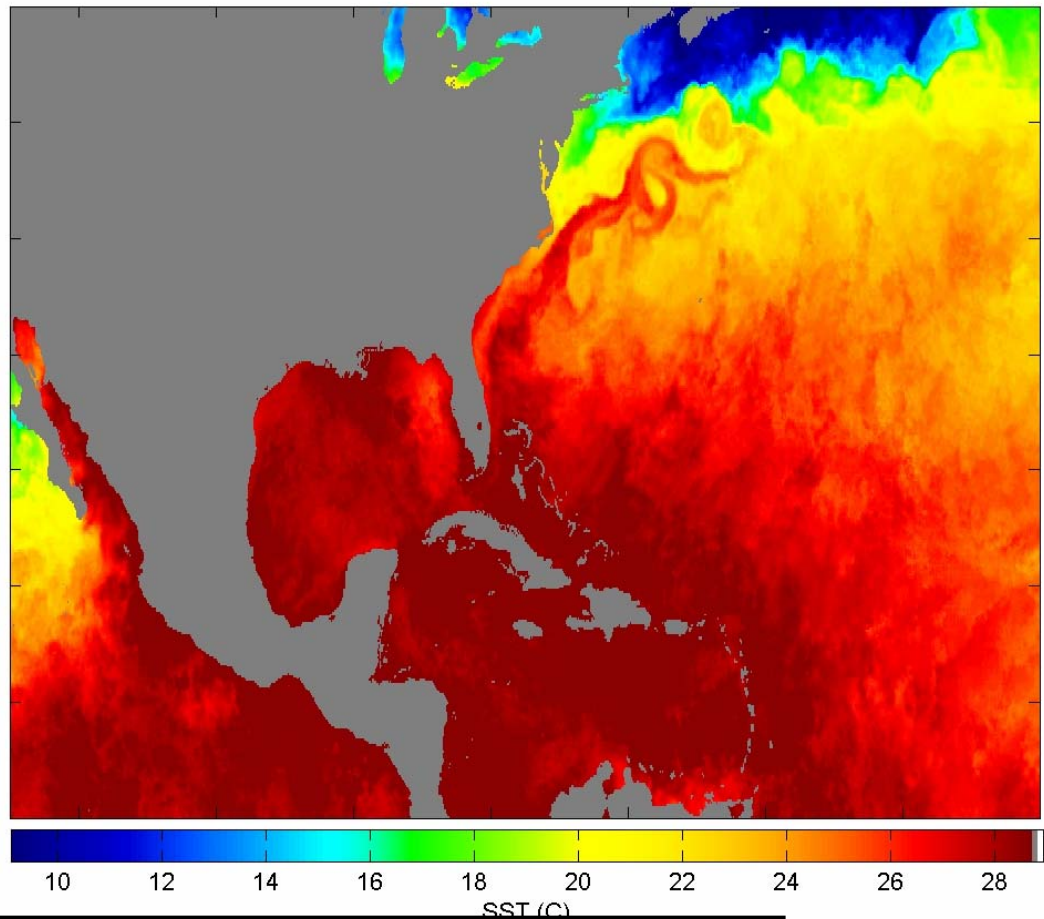
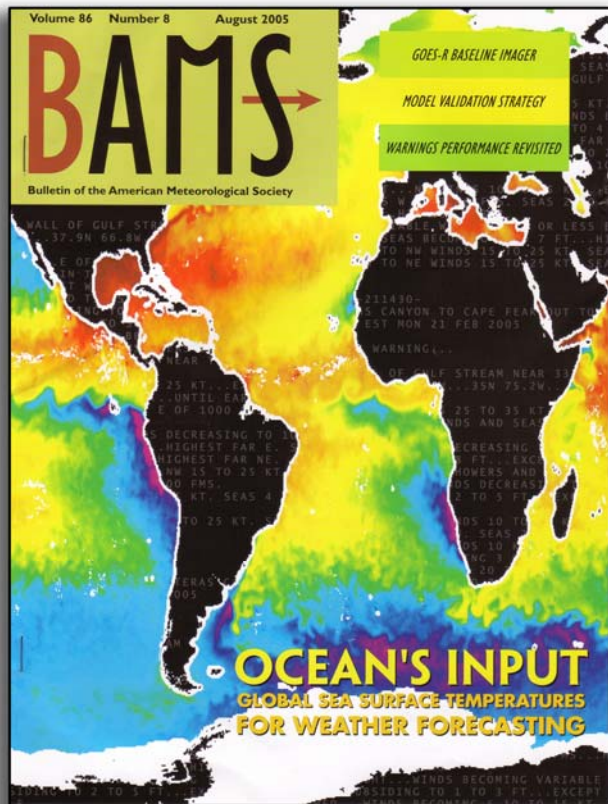




AMSR-E Ocean Products for Climate Research

Frank J. Wentz, Chelle Gentemann, Kyle Hilburn
Remote Sensing Systems
www.remss.com



AMSR-E Team Meeting, La Jolla, CA September 6-8 2006

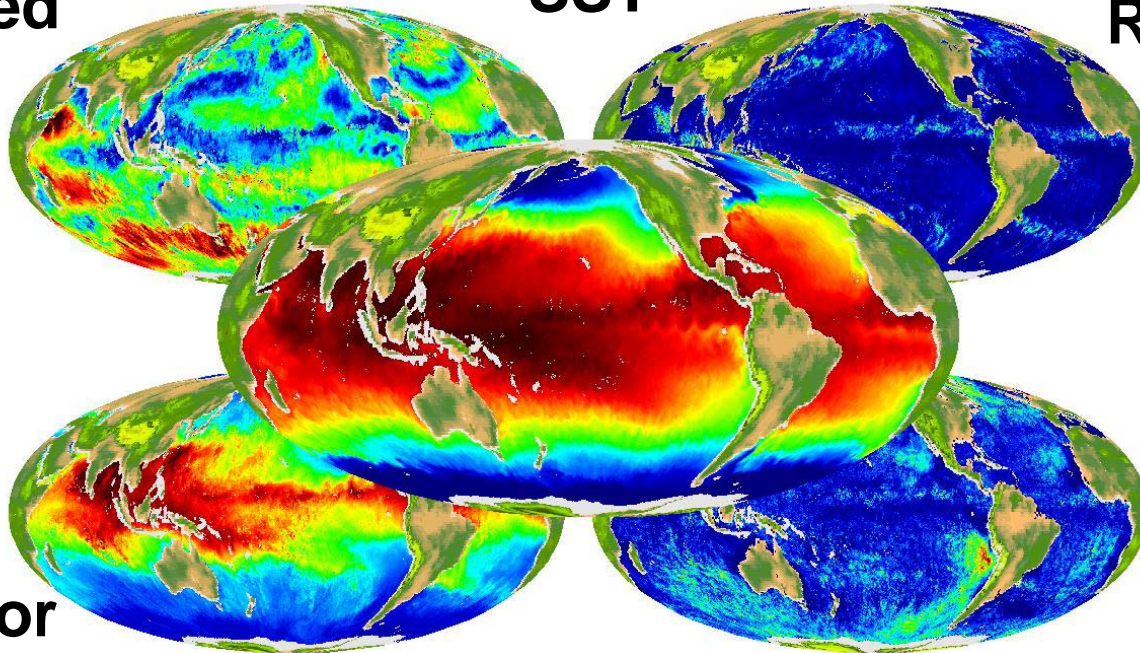


AMSR-E Ocean Products

Wind Speed

SST

Rain Rate

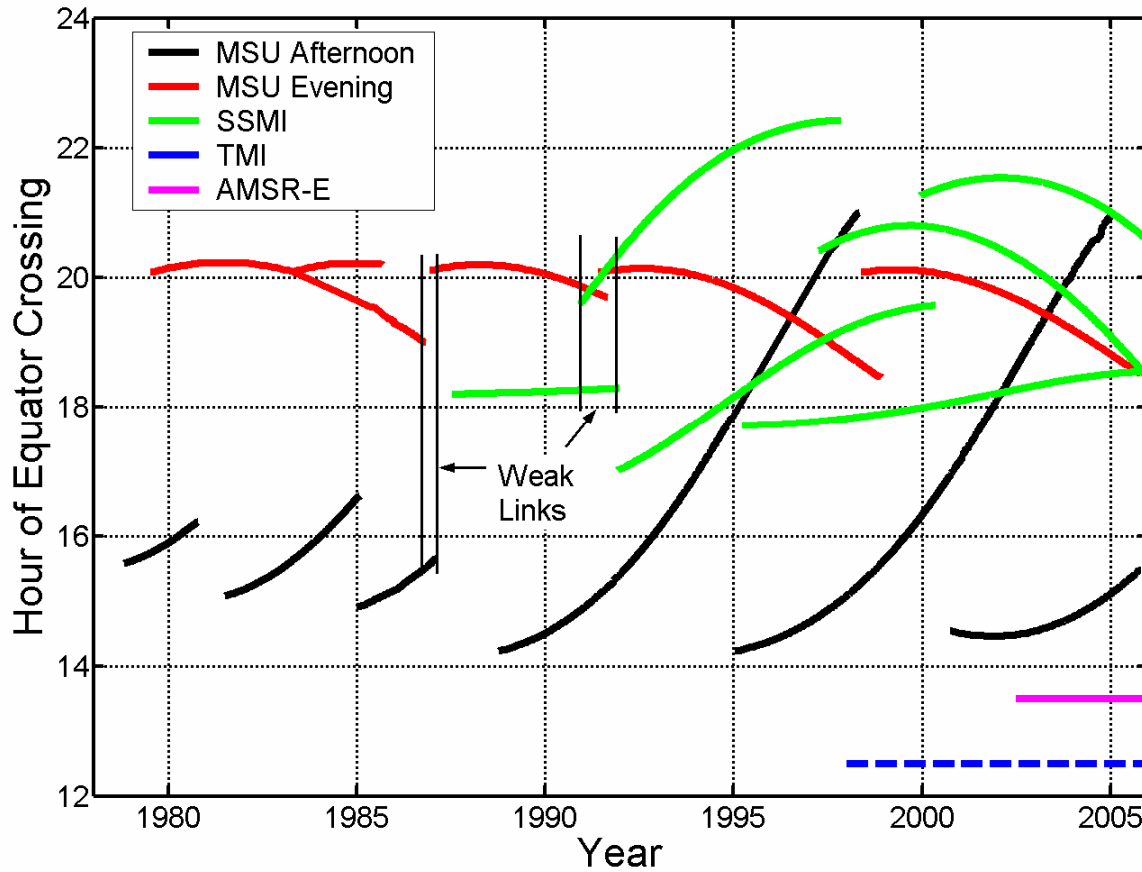


Water Vapor

Cloud

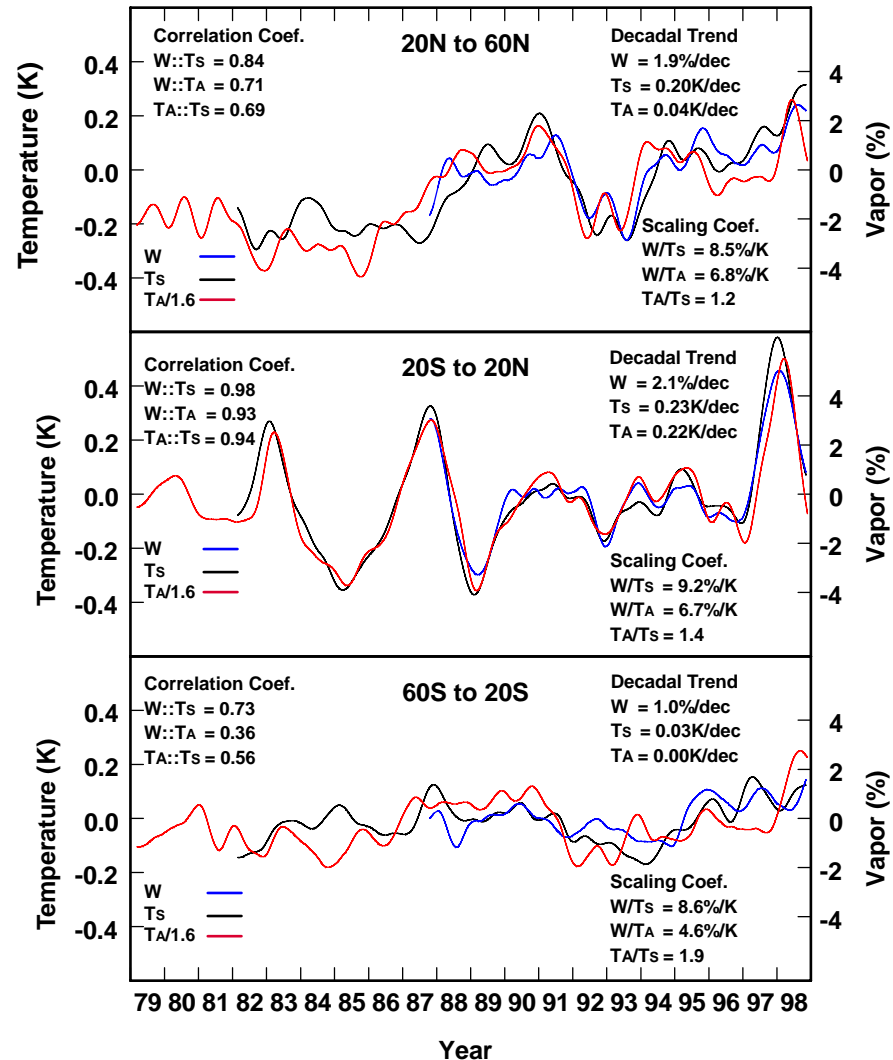


Linking Together Multiple Satellites



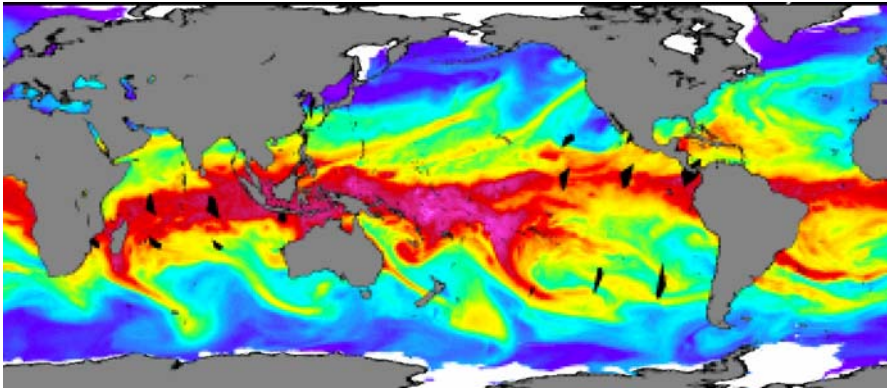
Coupling of Air Temperature, SST, and Vapor

Wentz, F.J., and M. Schabel, Precise climate monitoring using complementary satellite data sets, *Nature*, 403 (6768), 414-416, 2000.

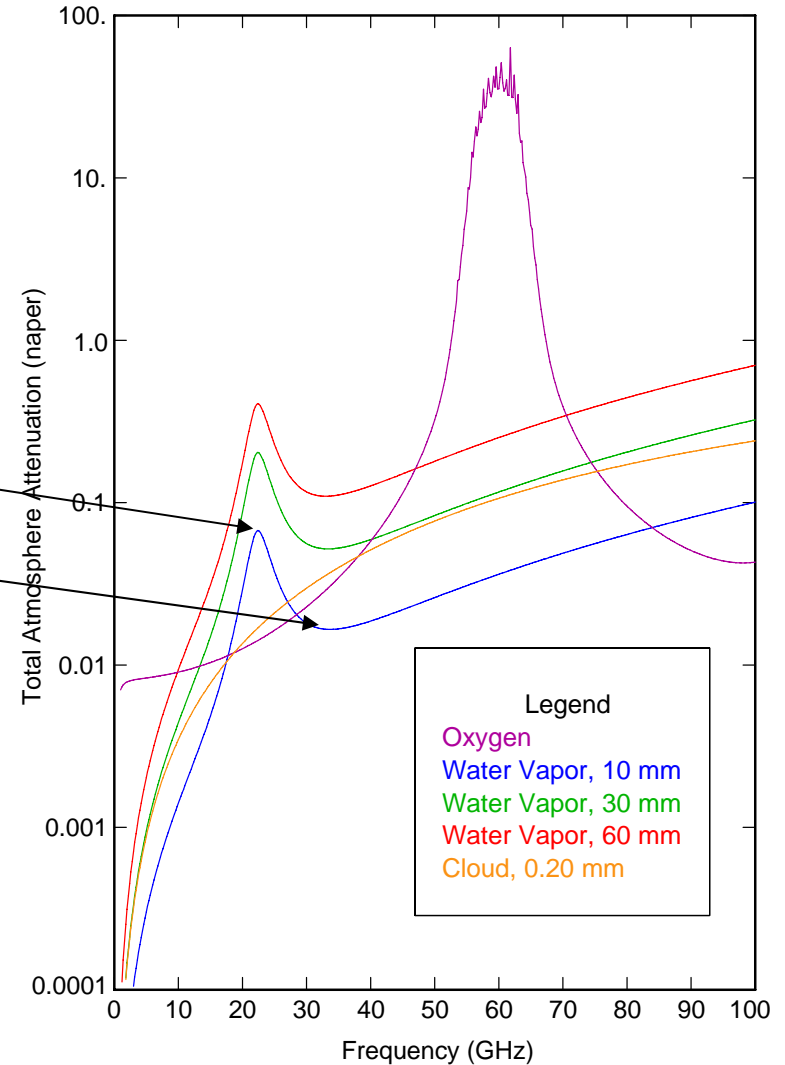




Vapor is Robust Measure of Climate Variability

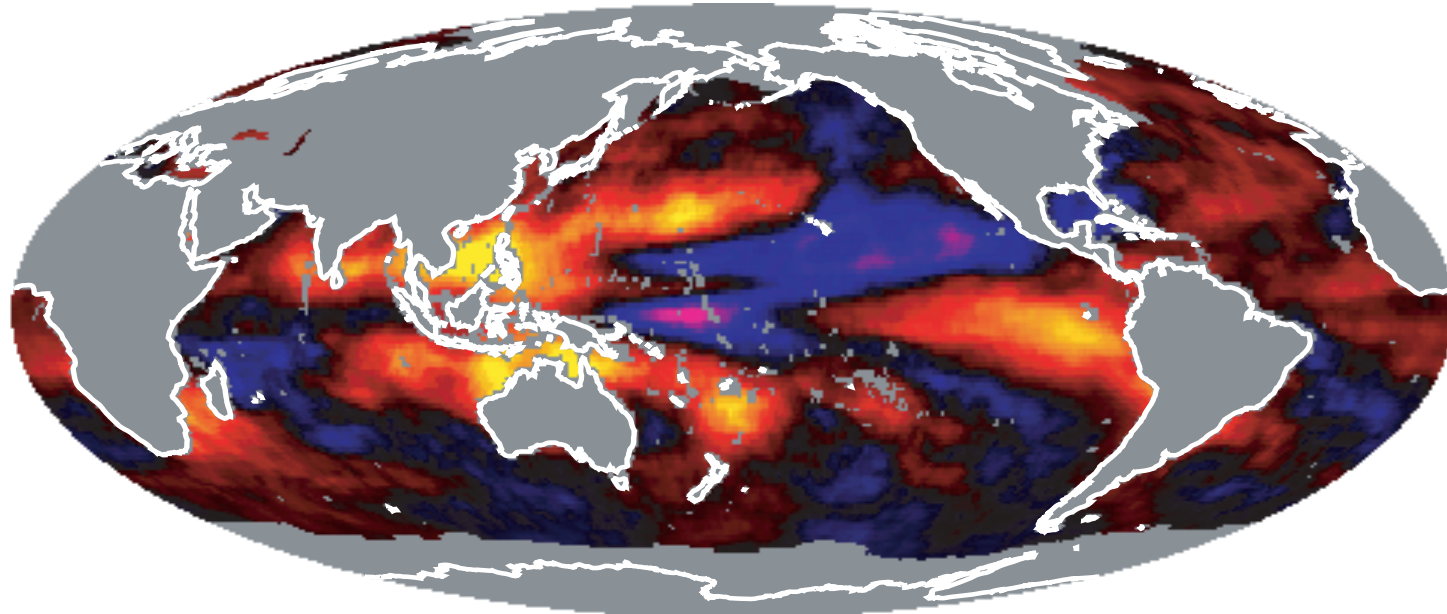


- **A Differential Measurement**
- **SNR 7 times greater than MSU TLT**
- **Climate Variability is both warming and moistening**





Spatial Patterns in Vapor Trends



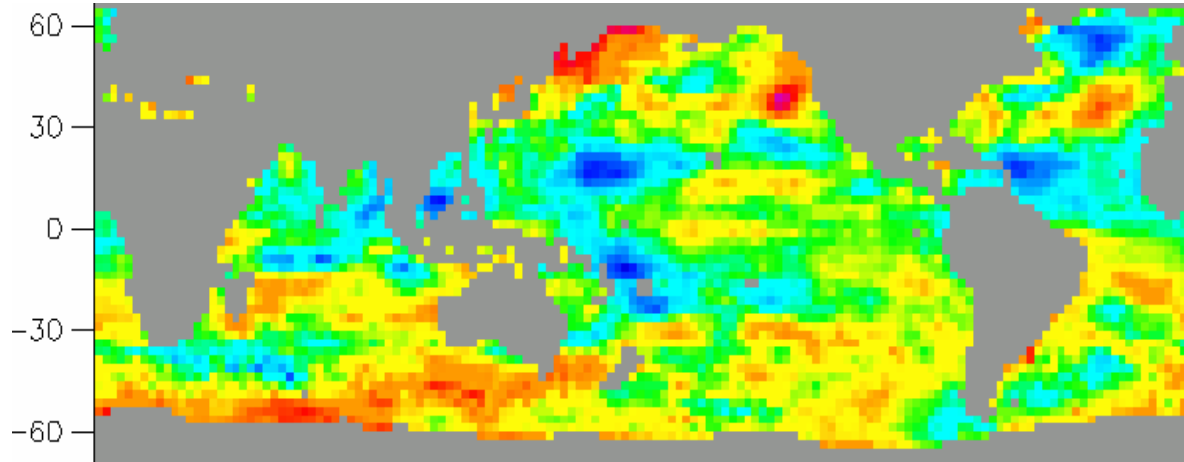
Linear Trend in Water Vapor, 1988-2001 (kg/m^2 per decade)



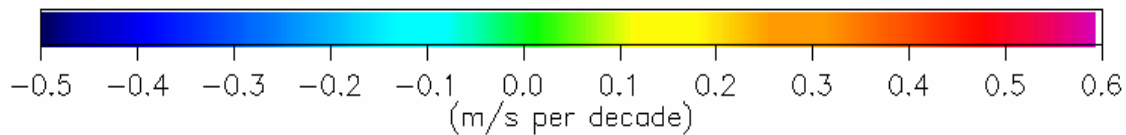
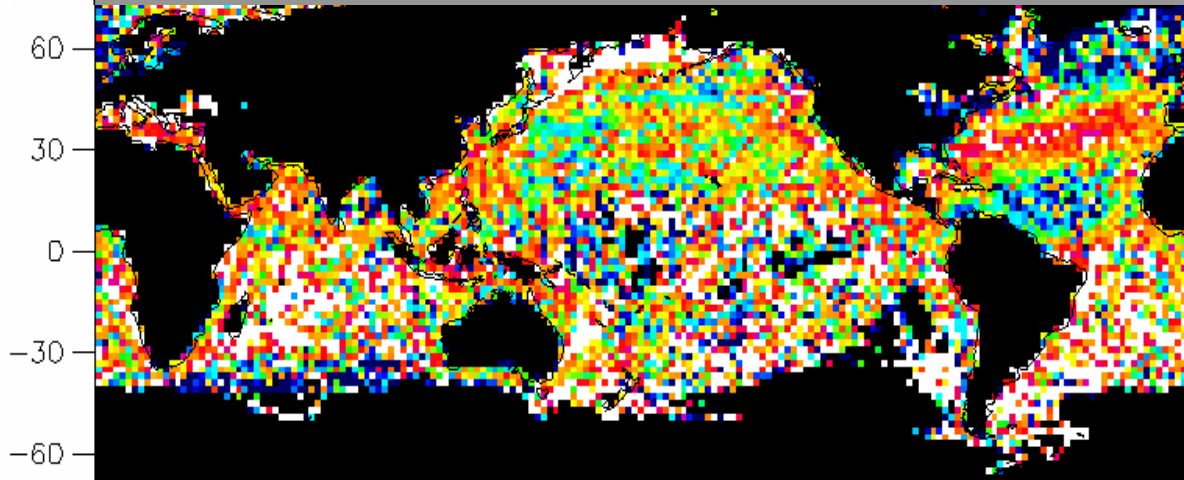


Spatial Patterns in Wind Trends

SSM/I
18-years
1988-2005

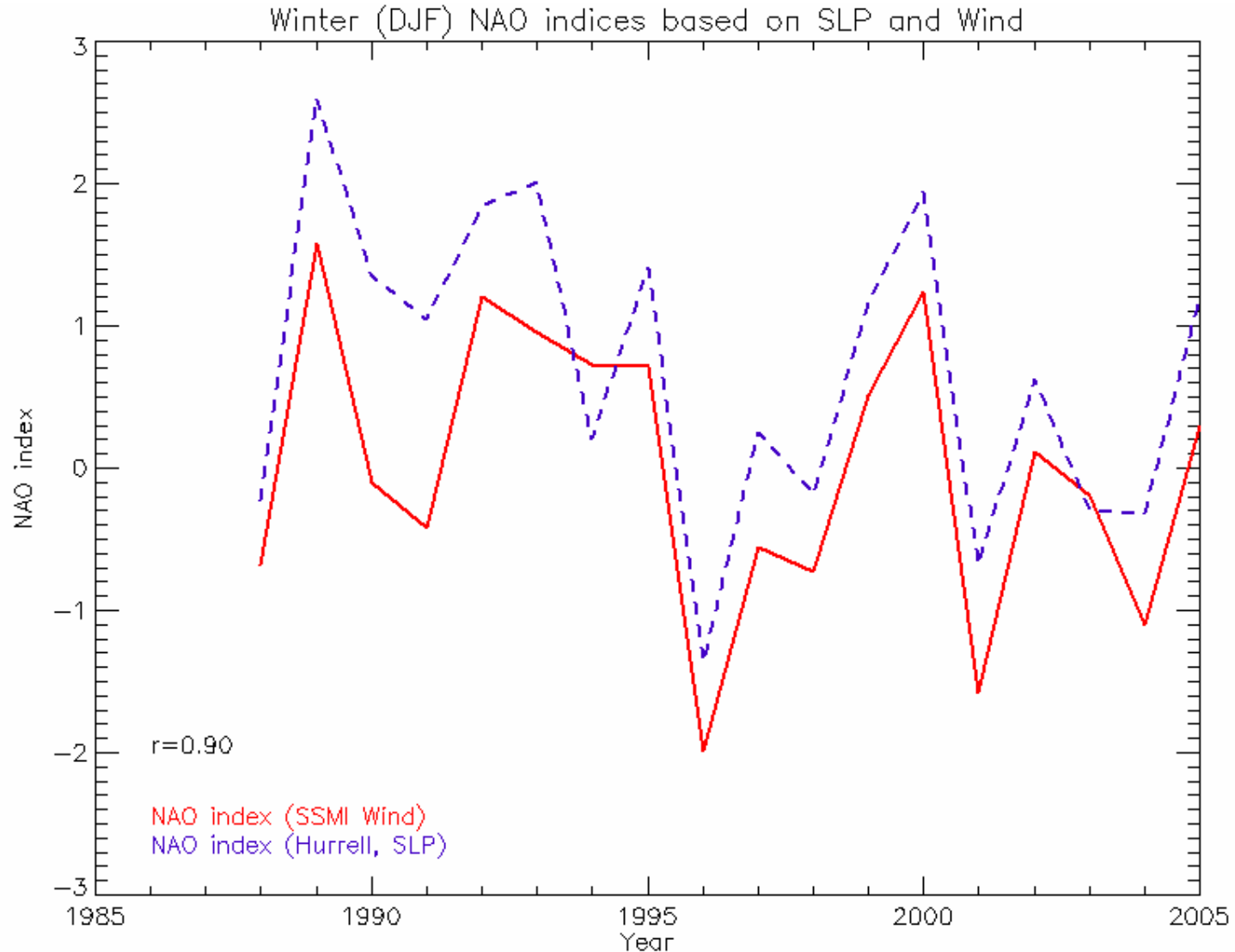


COADS
18-years
1988-2005



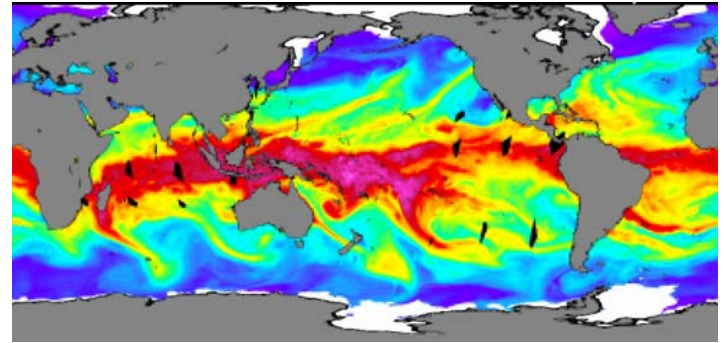
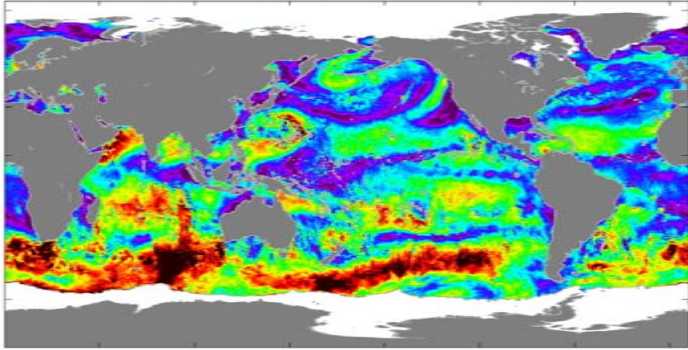


North Atlantic Oscillation from Wind Retrievals





Acceleration of Hydrological Cycle ? Evaporation, Vapor, Clouds, and Rain



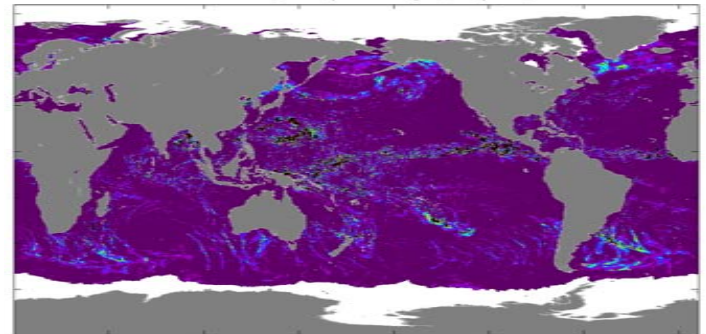
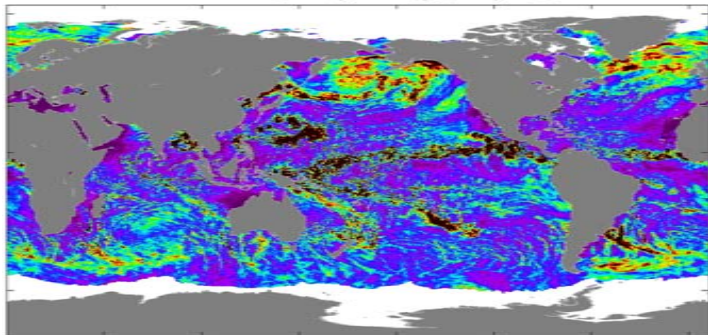
Evaporation (wind)

Vapor

Balancing the Hydrological Cycle

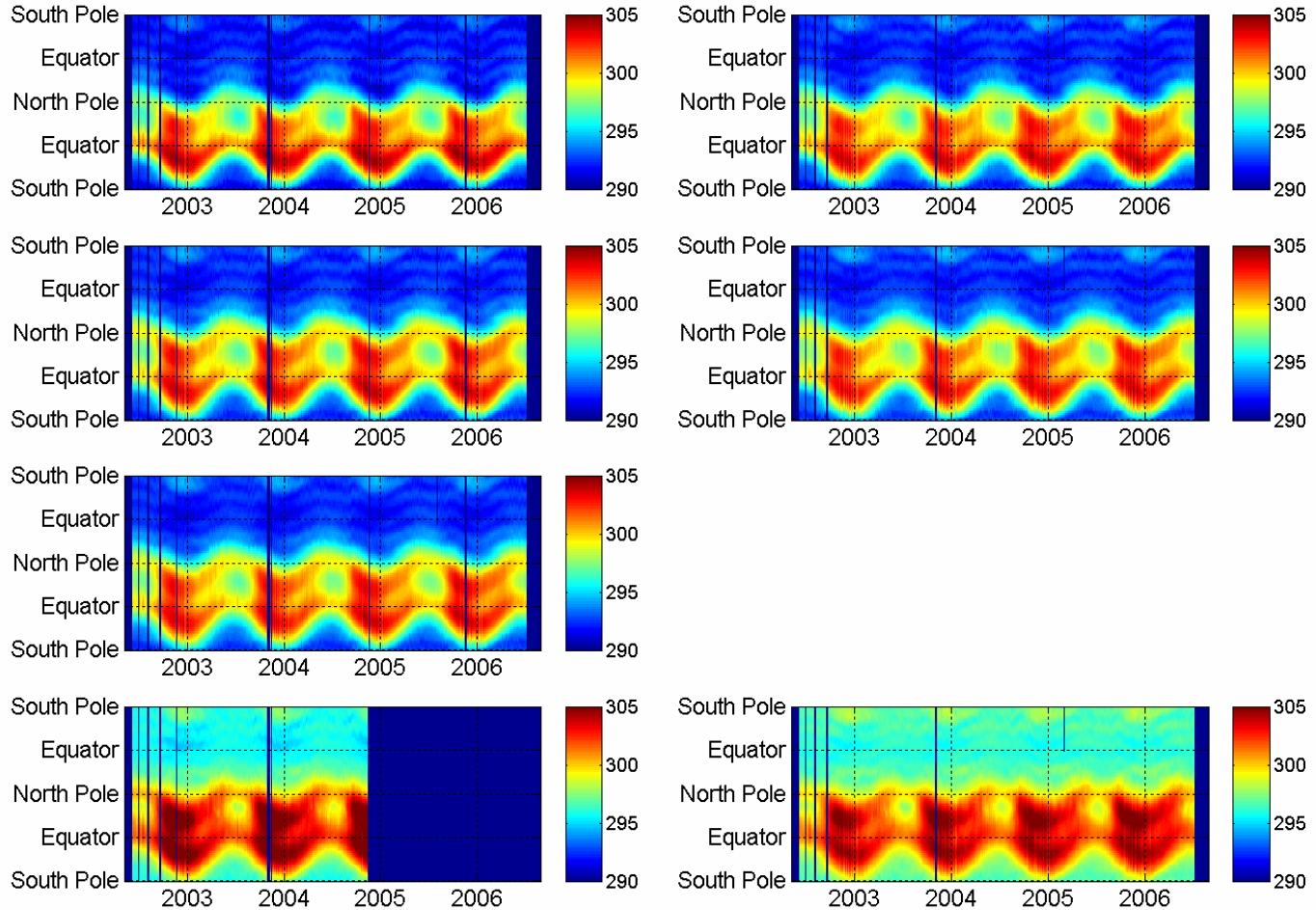
Cloud

Rain





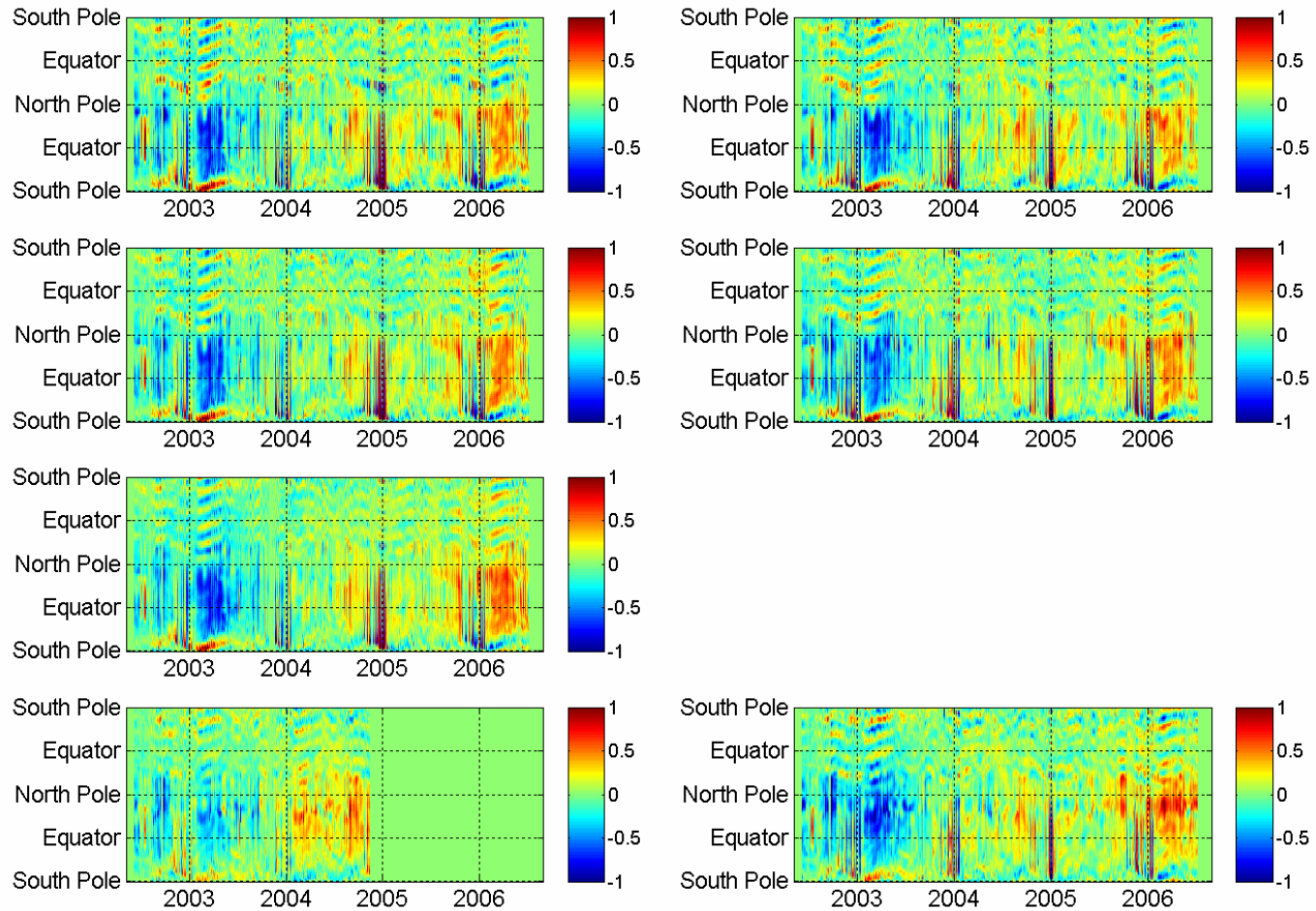
AMSR-E Hot Load Problem



$$T_{eff,j} = a_{0j} + b_{0j} \sin \alpha + c_{0j} \sin 2\alpha + \sum_{k=1}^8 a_{kj} (T_k - 303) + b_{kj} (T_k - 303) \sin \alpha + c_{kj} (T_k - 303) \sin 2\alpha$$

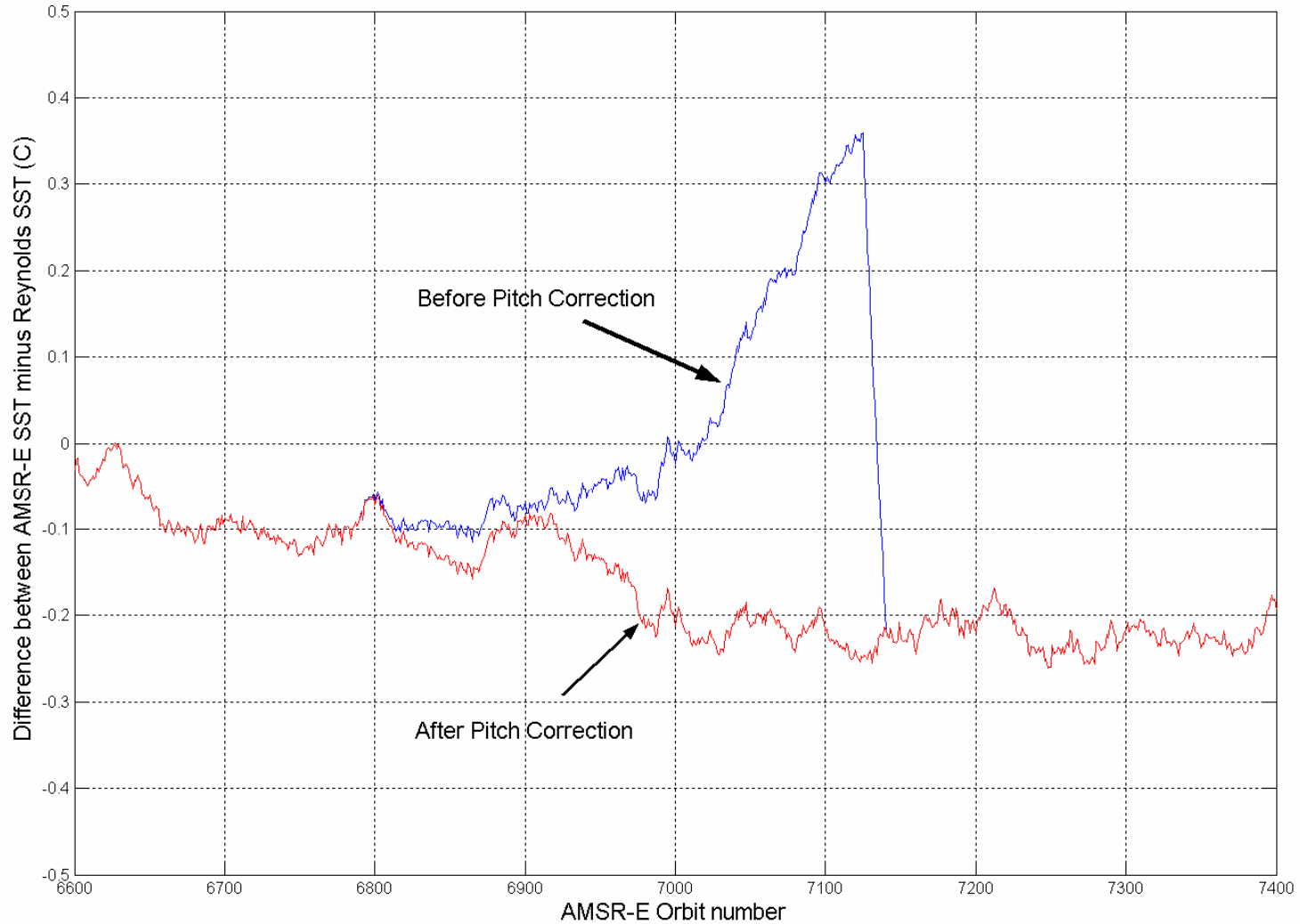


AMSR-E Hot Load Anomaly



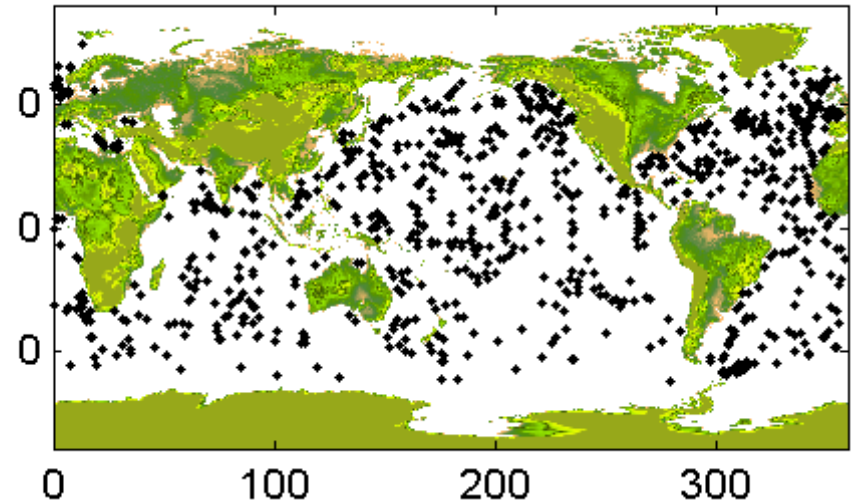
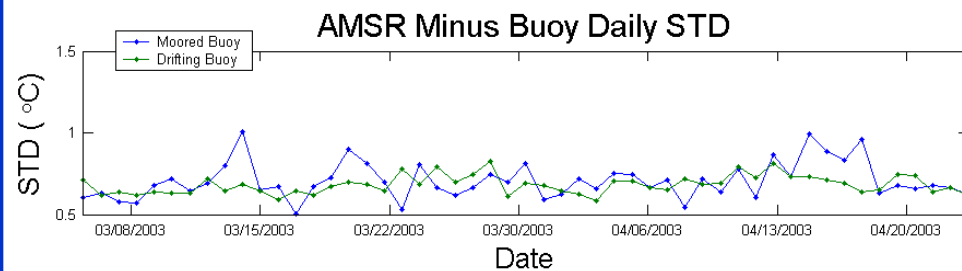
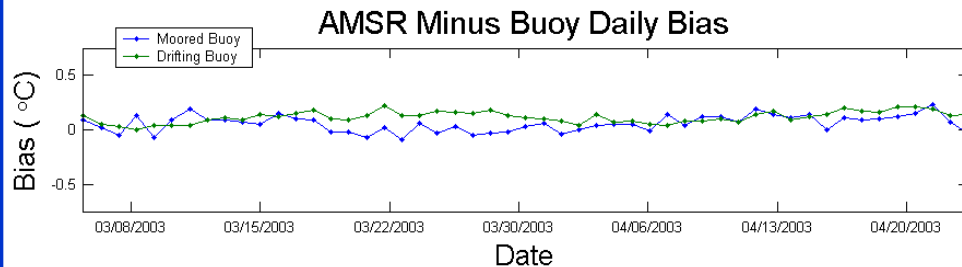


Dependence of AMSR Retrievals on Ancillary Data



Validation, Validation, Validation

- **Daily collocation (within 6 hrs and 25 km) of satellite and FNMOC Near-realtime GTS buoy data set. Observations between 12PM and 4PM, with wind speeds less than 6 m/s are excluded from the dataset.**

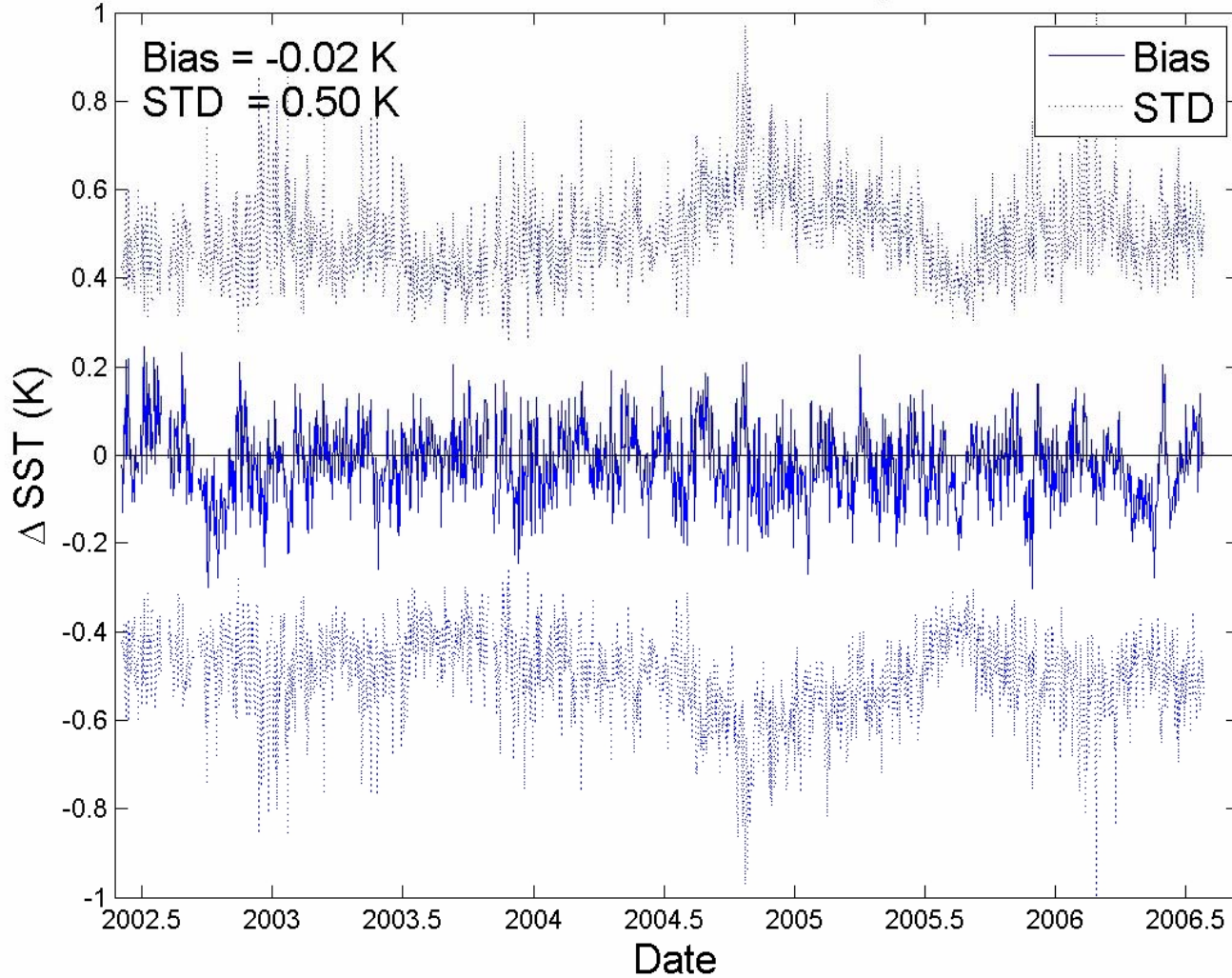




Time Series Validation Using Buoys

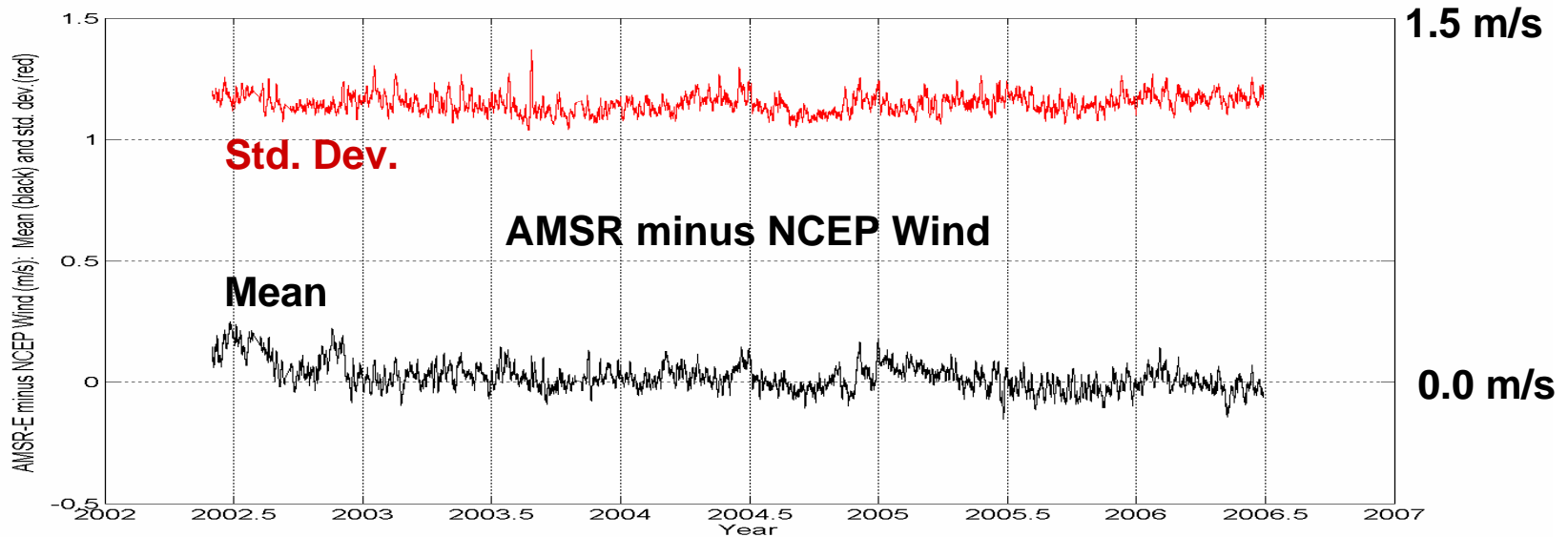
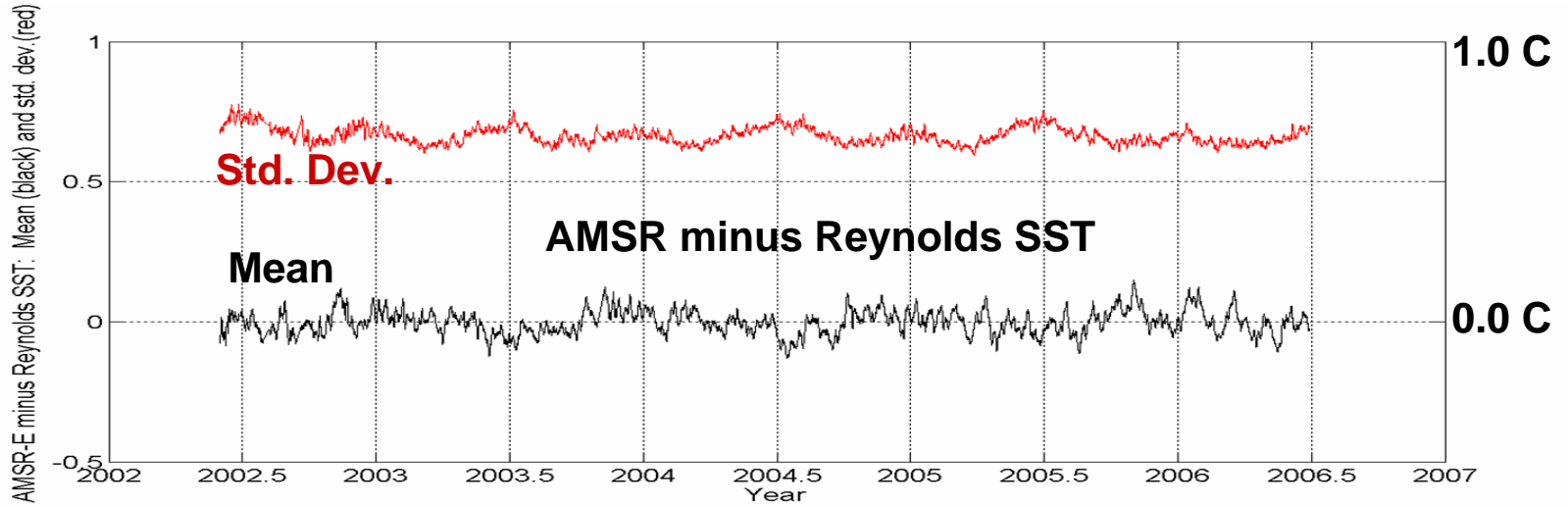


AQUA AMSR-E - Moored Buoy SSTs



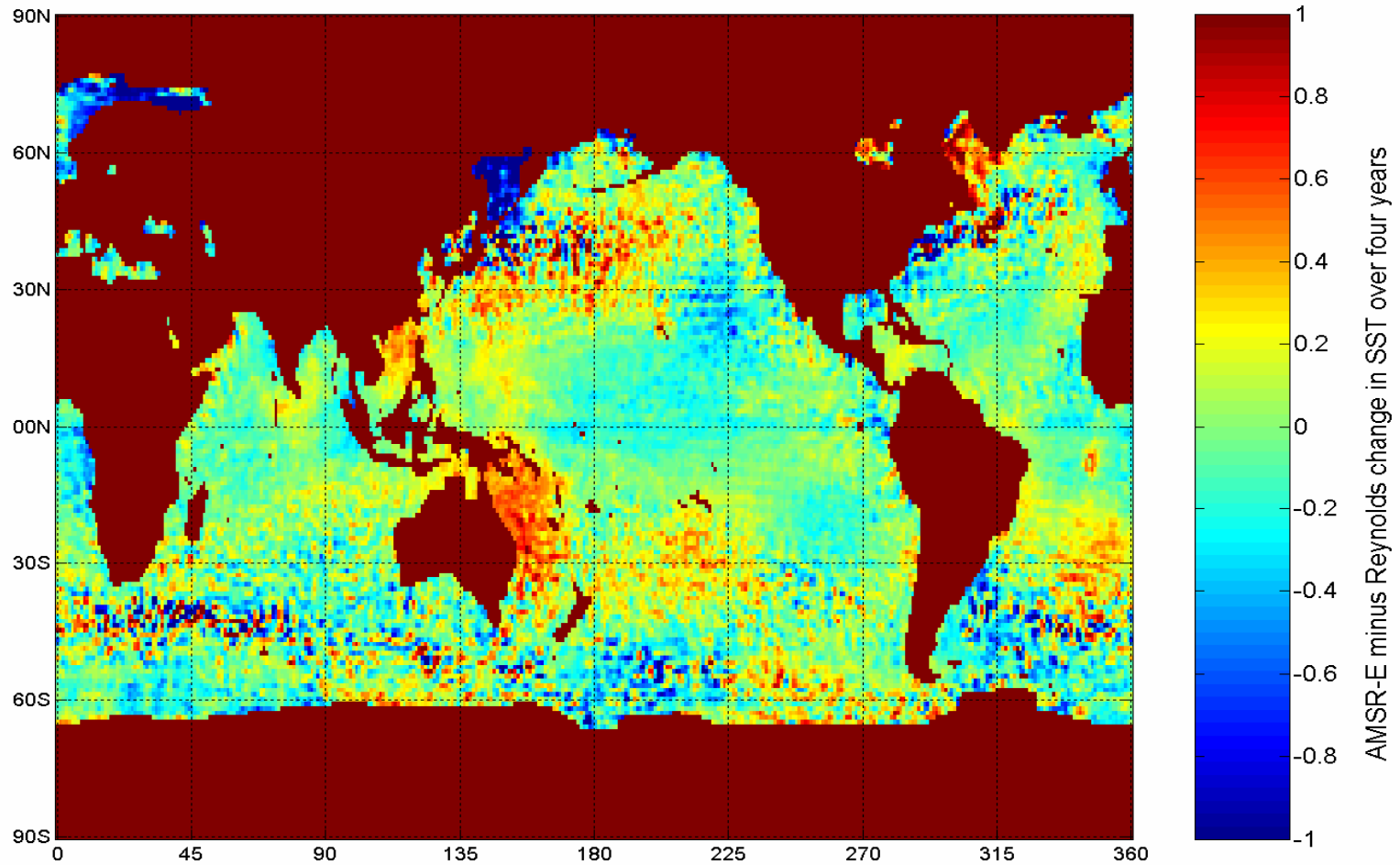


Time Series Validation Using Other Products



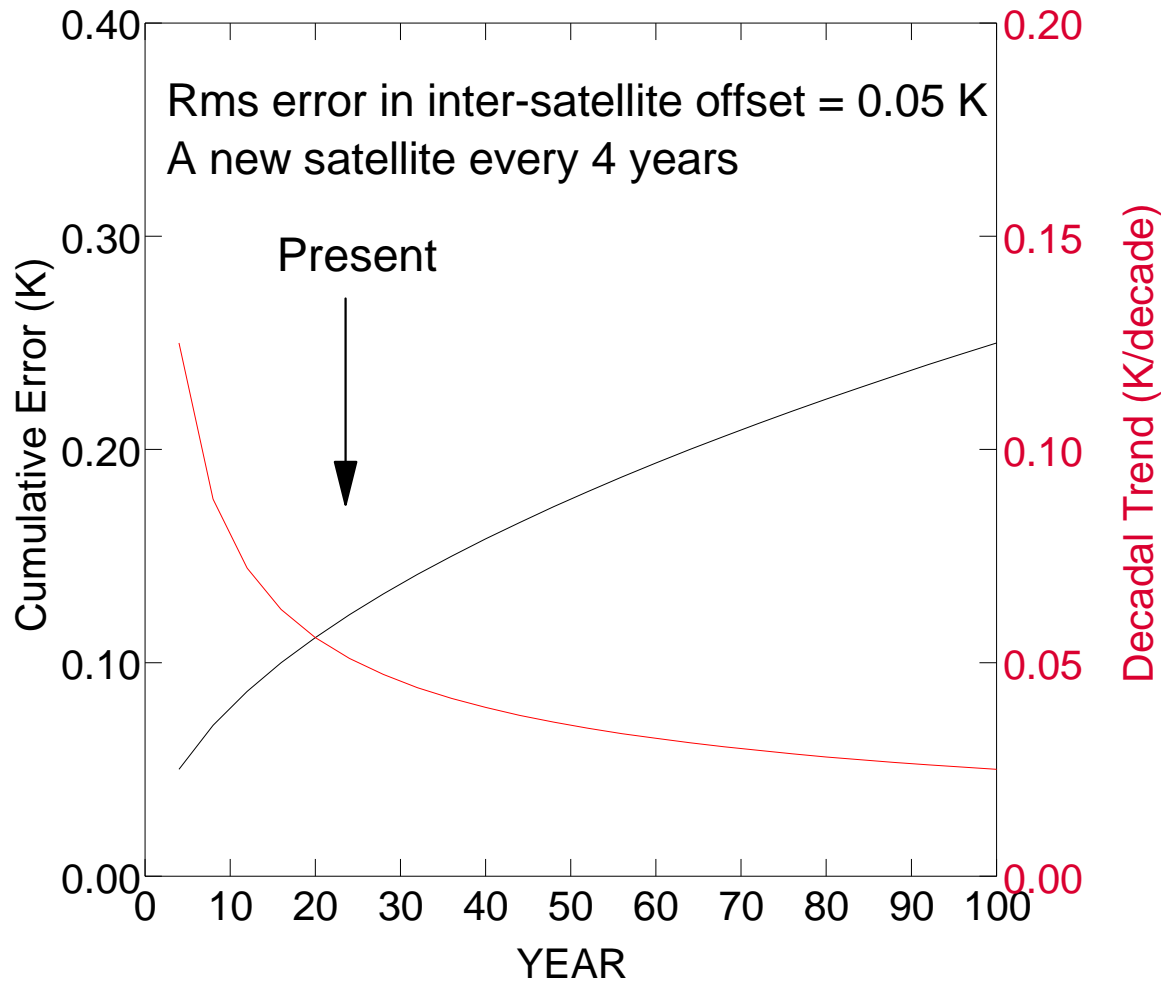


Validation of Regional Trends



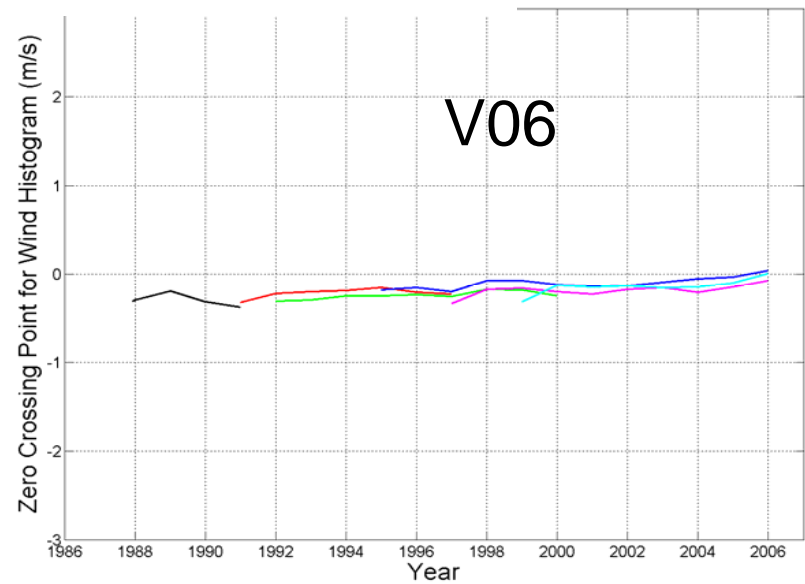
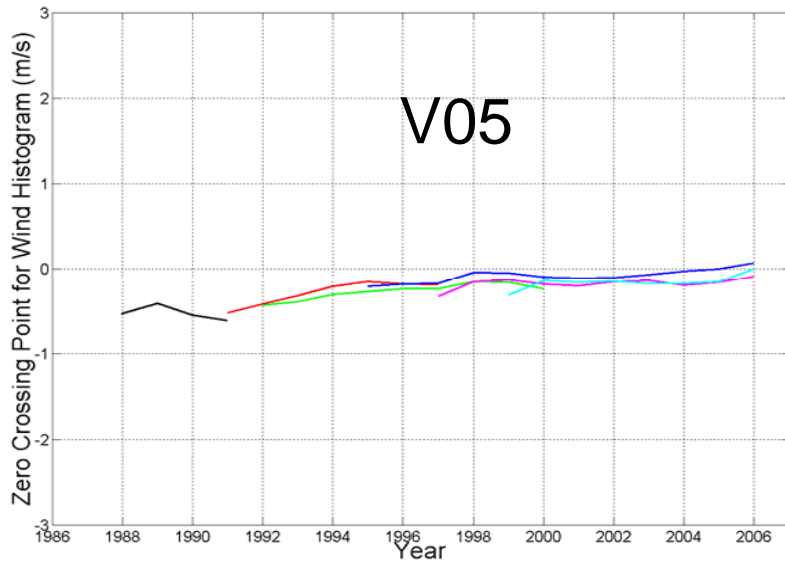
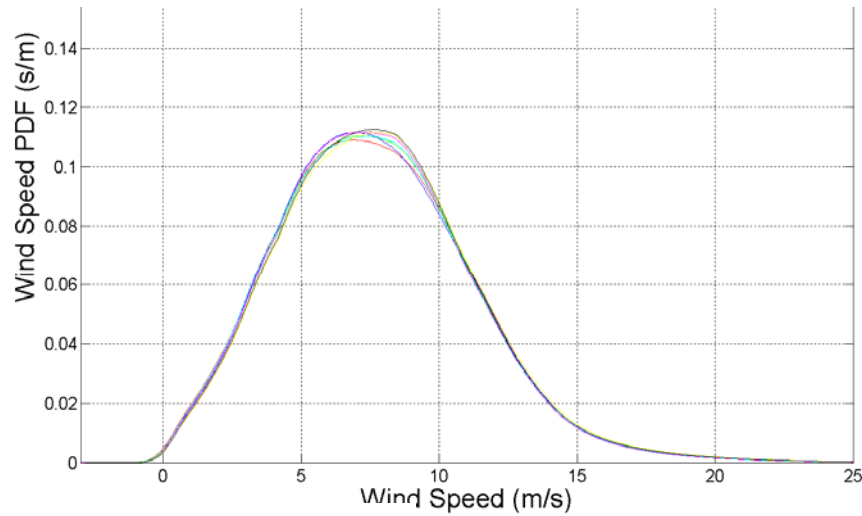


Random Walk Problem



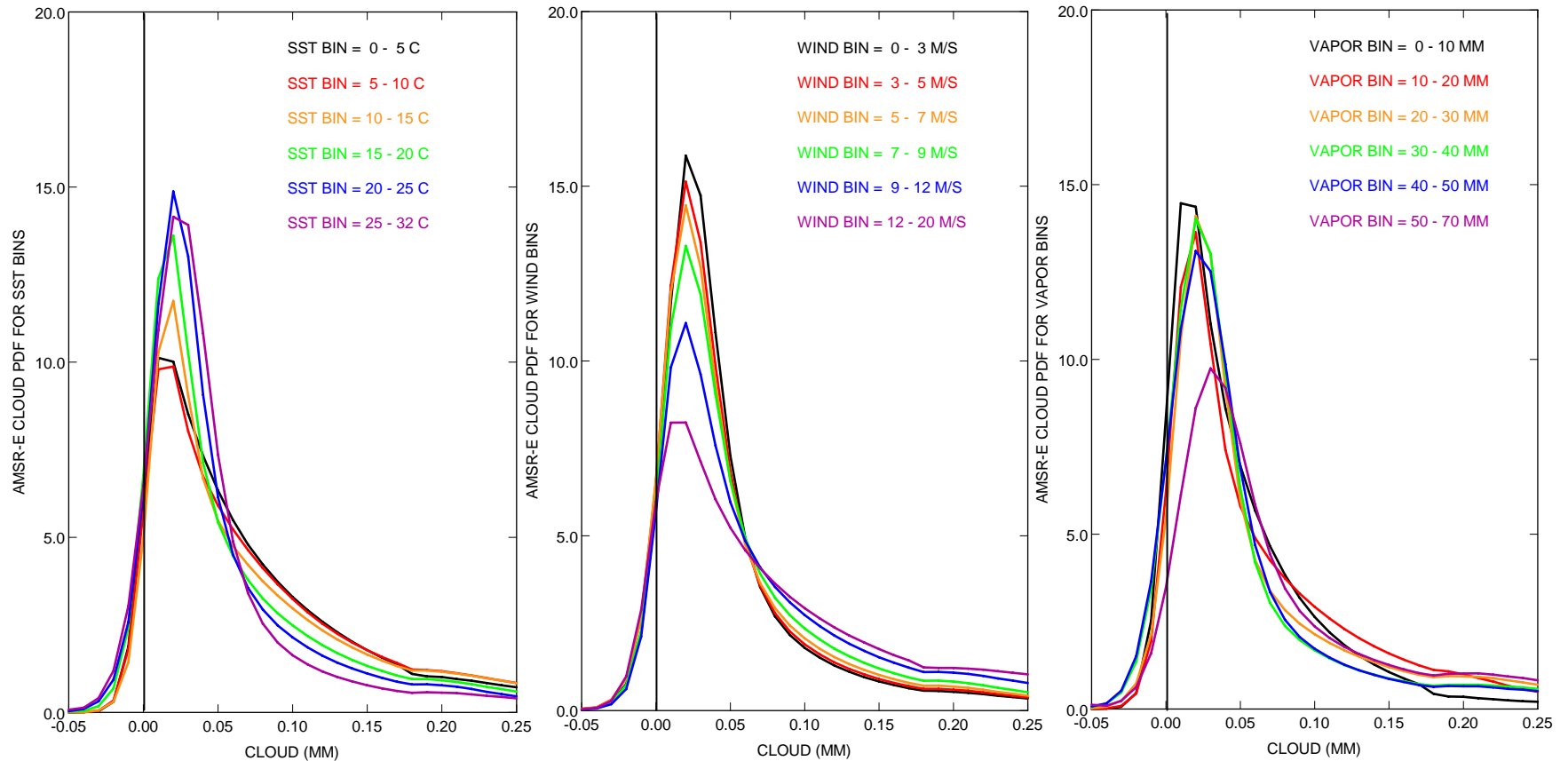


Consistency in Histograms





Intercalibration of Cloud Water



One year of retrievals stratified according to SST, wind, and vapor



Missions



Measurements



Science



DMSPP SSM/I
6 Total, 3 currently operating



TRMM TMI
currently operating



Aqua AMSR-E
currently operating
Let's hope 2011+



QuikScat, SeaWinds, NScat, ERS



MSU, AMSU
13 Total, 3 currently operating