Preliminary Validation of SUOMI-NPP Sounding Products using the NOAA Products Validation System (NPROVS)

Tony Reale and Bomin Sun

AIR Science Team Meeting

Nov. 15, 2012
Greenbelt Md

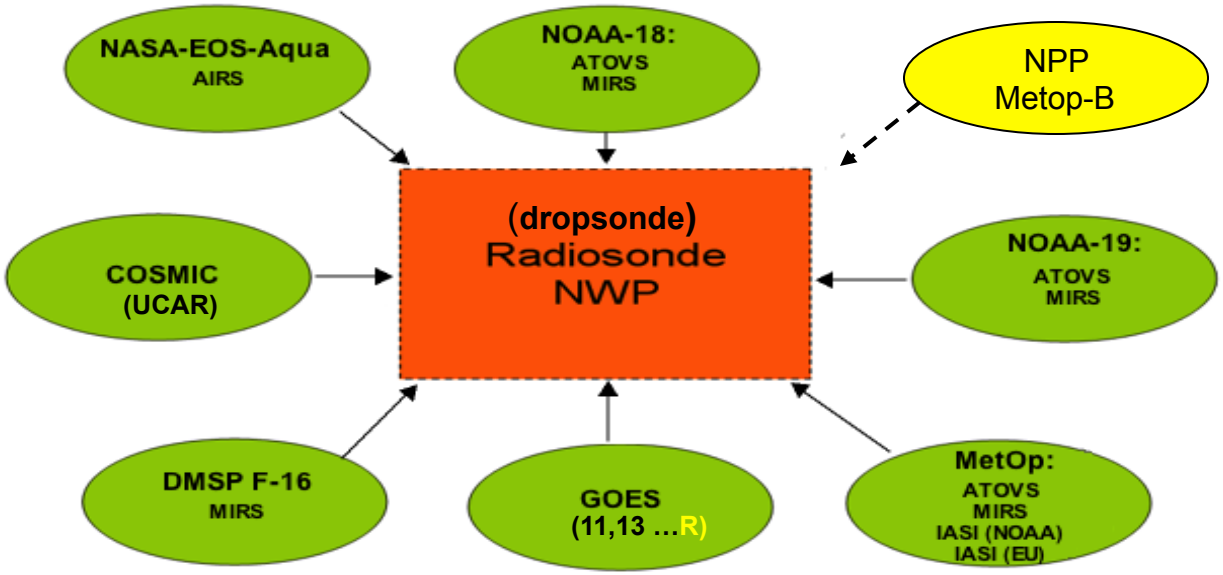
1) Long -Term Monitoring

2) Performance Validation:
CrIMSS
NUCAPS
MiRS

3) Links to “Reference” Observations
GCOS Reference Upper Air Network
(GRUAN)

NOAA Products Validation System (NPROVS)

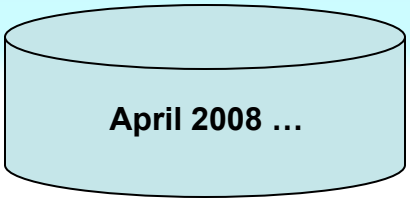
Centralized Radiosonde and Collocation Processing



6-hour

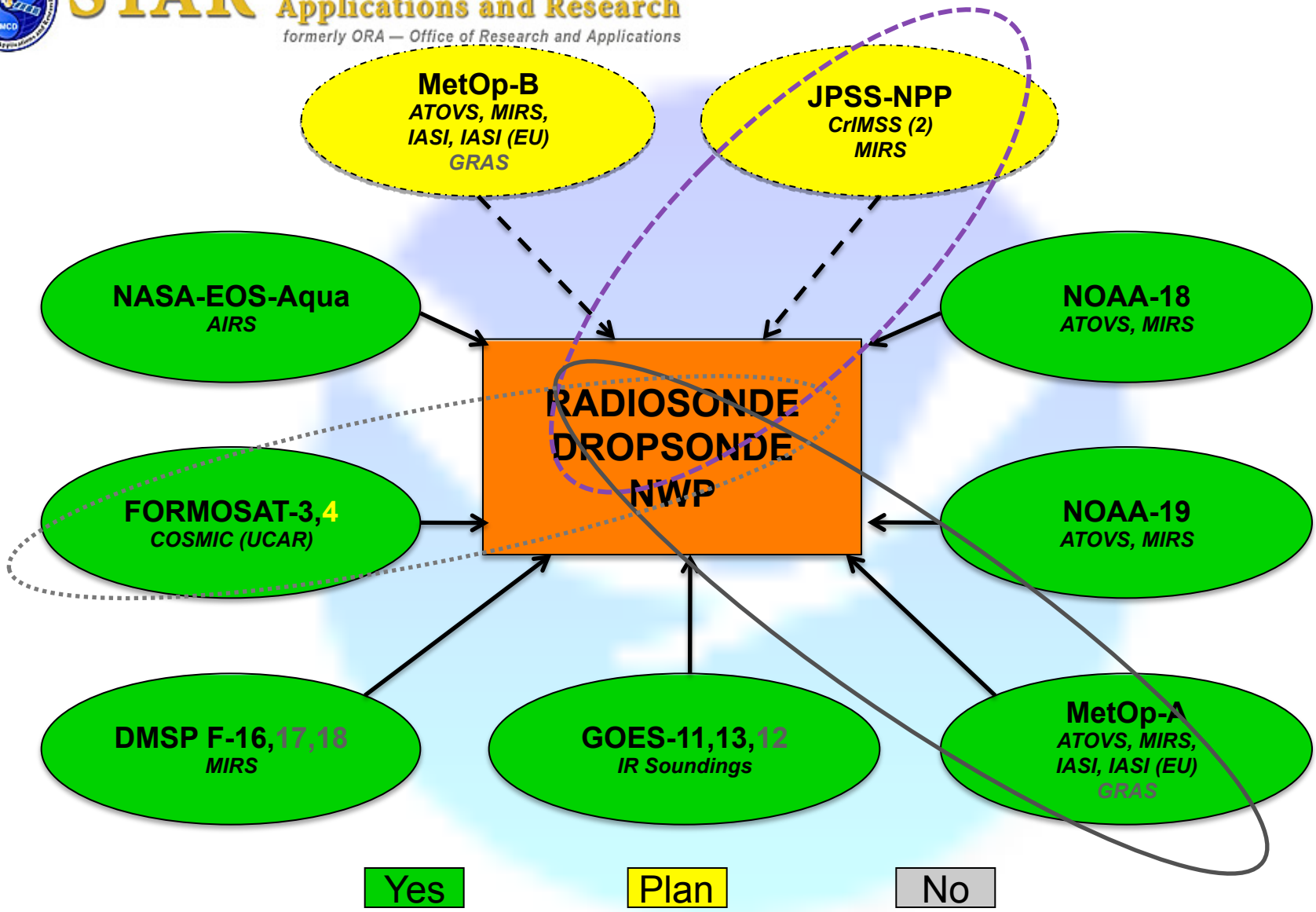
250km

Collocated radiosonde and multiple satellite products dataset



NWP:
- GFS 6-hr
- CFSR
- CFSR (Back)
- *Other*

Single Closest



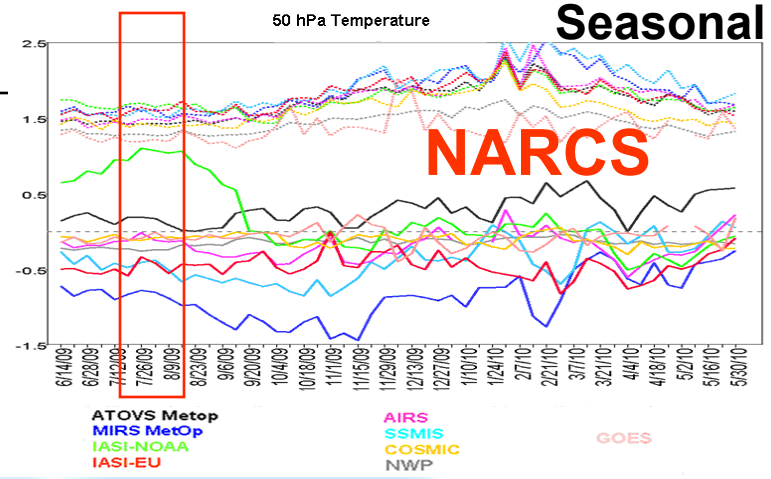
NOAA Products Validation System (NPROVS) Schematic

STAR Center for Satellite Applications and Research
formerly ORA — Office of Research and Applications

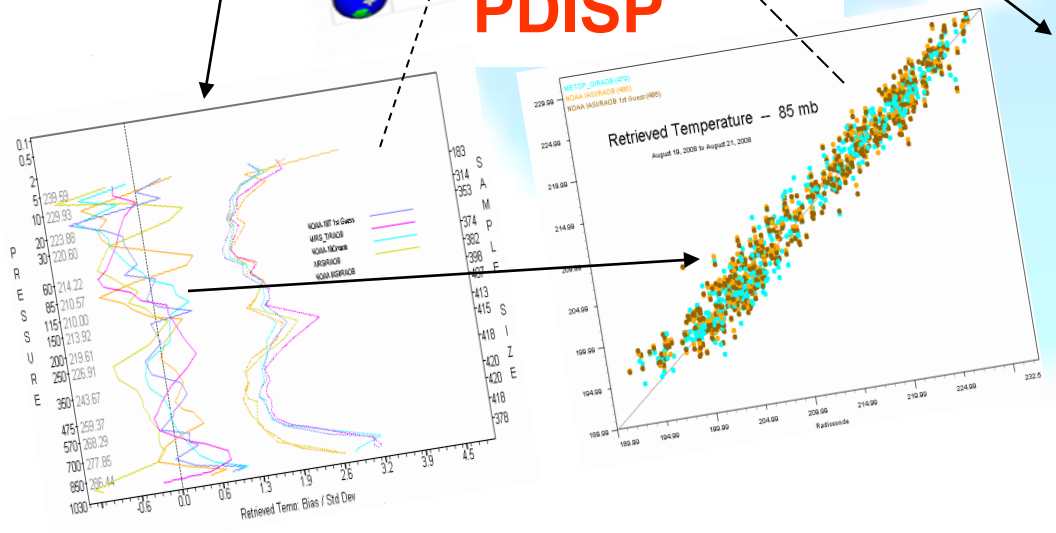
NOAA Products Validation System (NPROVS)
(Analytical Interface)

Weekly

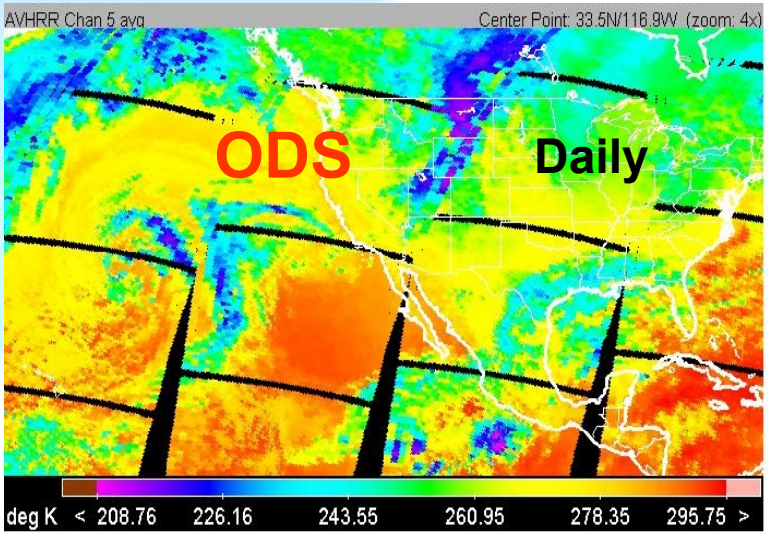
Seasonal



PDISP



ODS Daily



NOAA Products Validation System (NPROVS)

Web Site:

http://www.star.nesdis.noaa.gov/smcd/opdb/poes/NPROVS.php

Monthly Summaries (to 2008):

- **Vertical Profile Statistics**
- **Level Trends (daily)**

Long-term Trends

Down Load User Interface Clients (JAVA) and Datasets

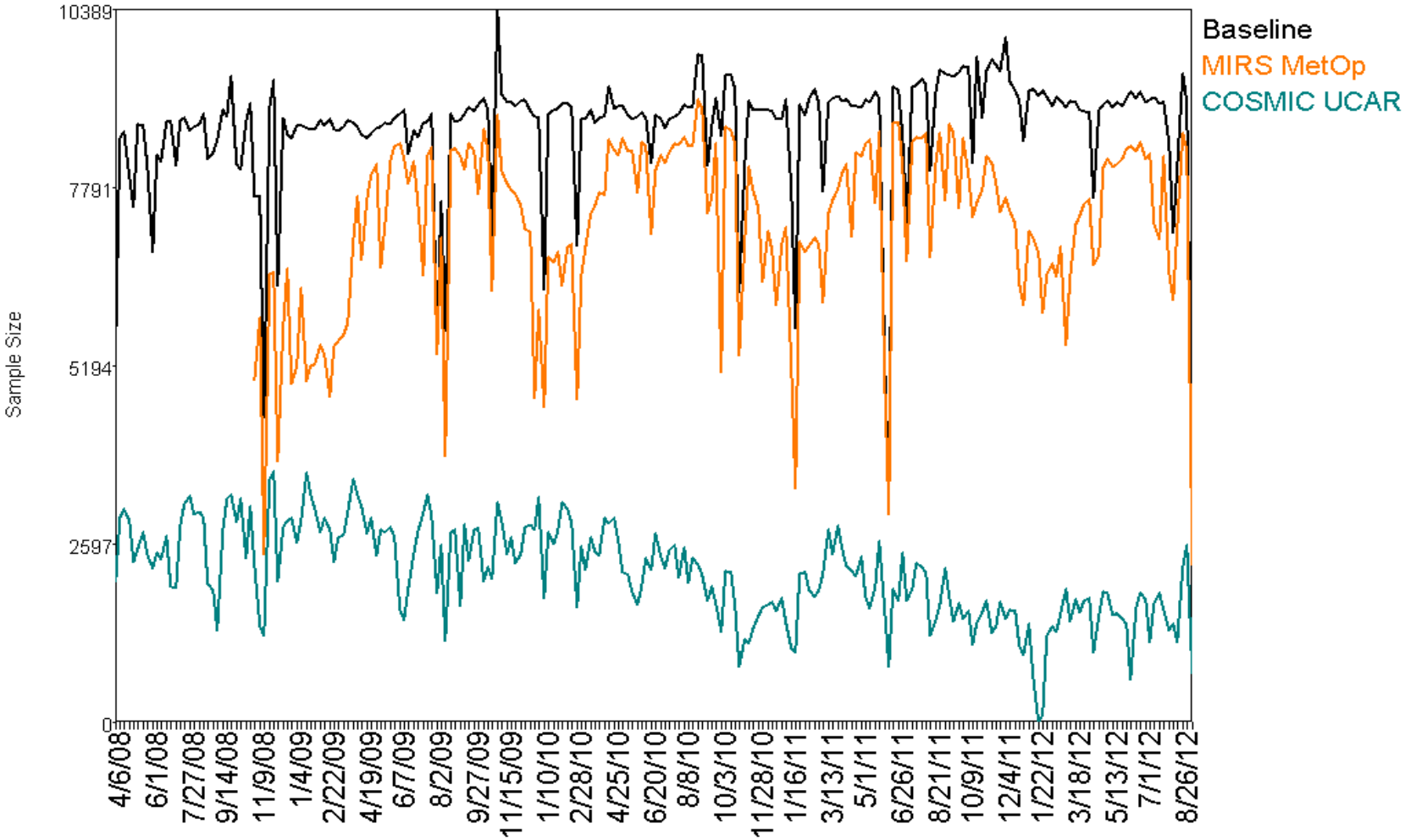
- **PDISP**
- **NARCS**

Publication:

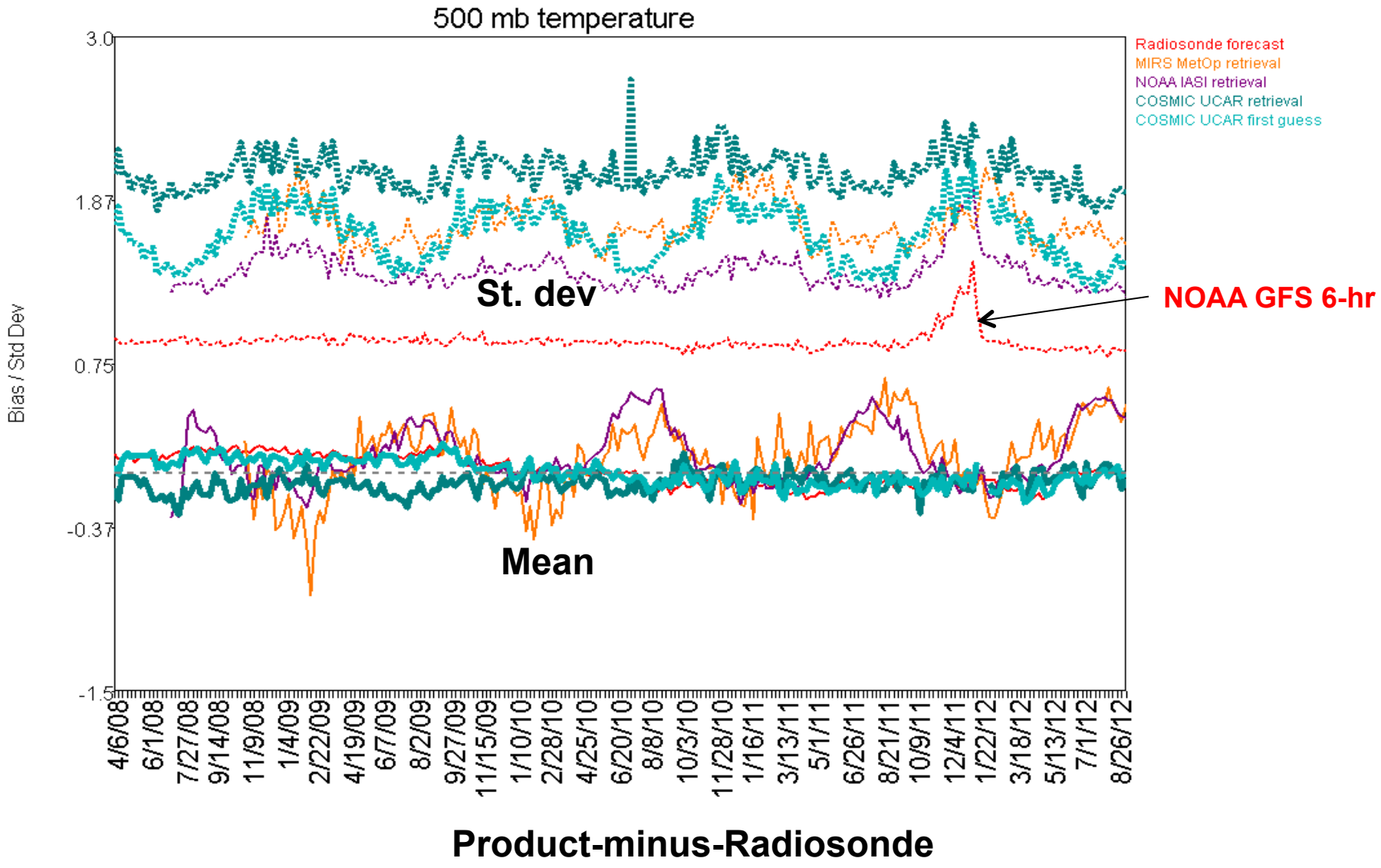
Reale, Sun, Pettey and Tilley, "The NOAA Products Validation System (NPROVS); *IJRS, 2012*

Long-term Monitoring

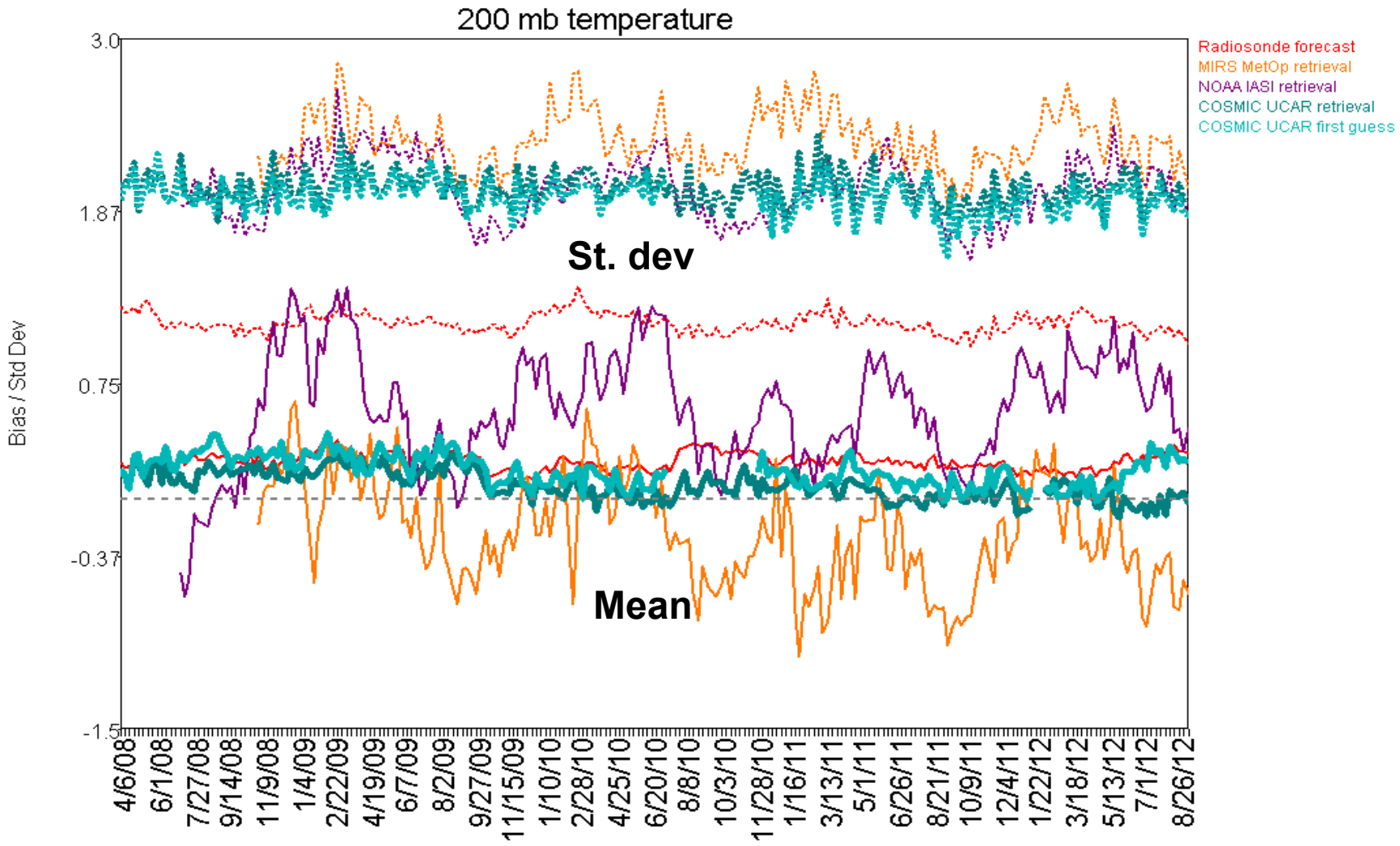
NPROVS ARChive Summary (NARCS)



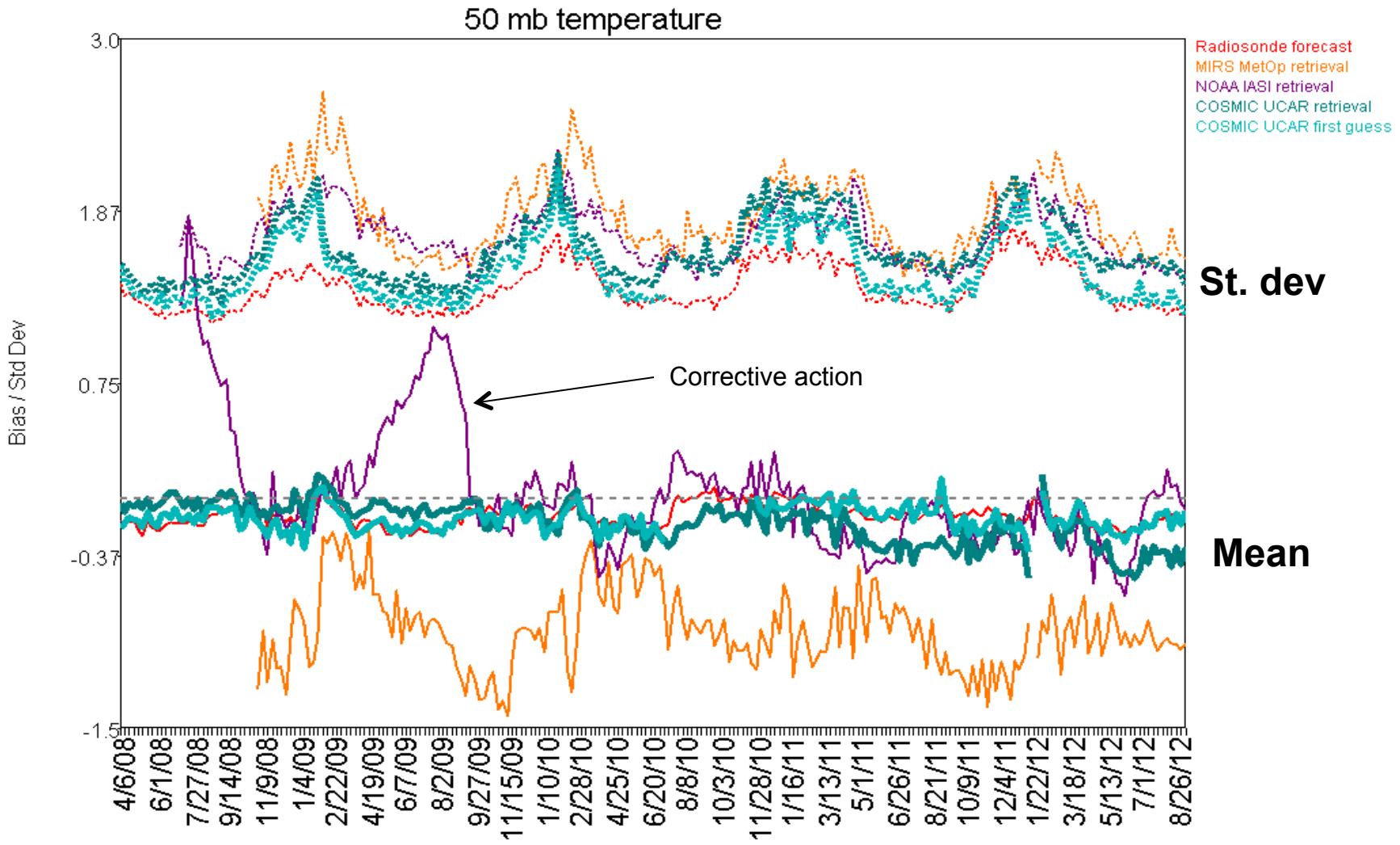
Samples Size



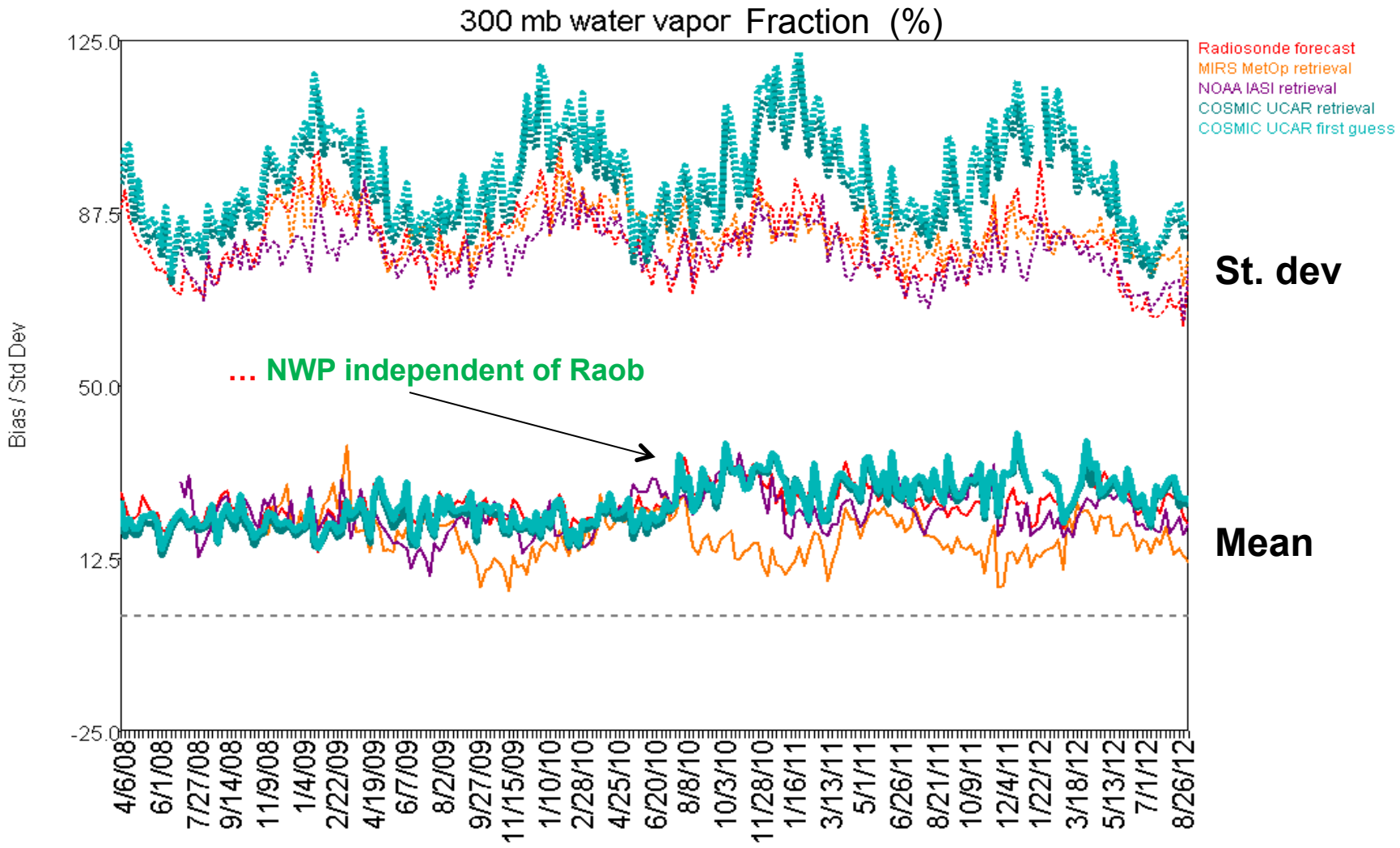
Product-minus-Radiosonde



Product-minus-Radiosonde



Product-minus-Radiosonde



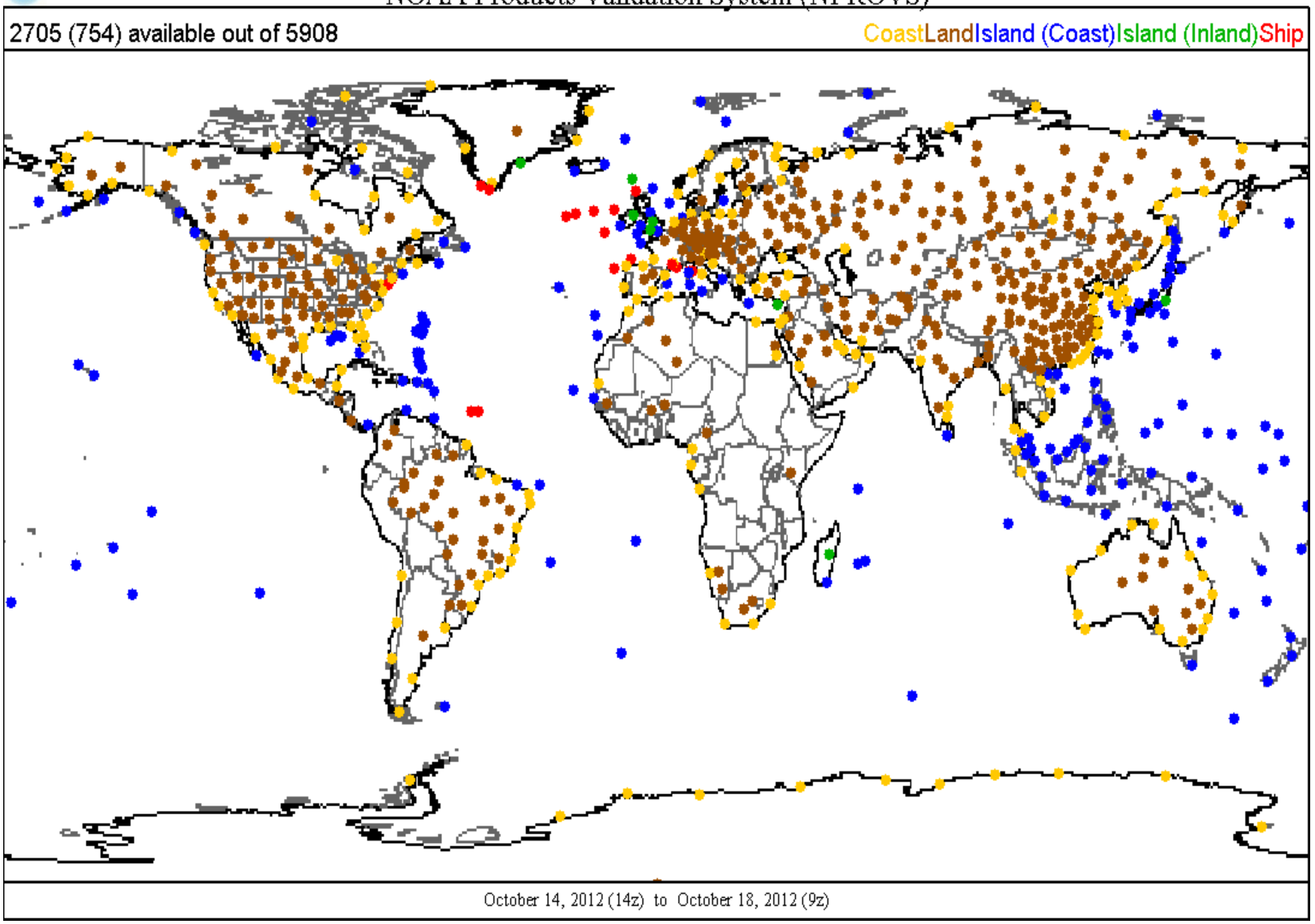
Product-minus-Radiosonde

NPP Validation Example using PDISP

Oct 14-18, 2012

… preliminary demonstration of capability to access / validate projected operational data-streams

NOAA Products Validation System (NPROVS)



2700 Collocations containing Suomi-NPP CrIMSS, NUCAPS and MiRS … 3 days

QC Definitions

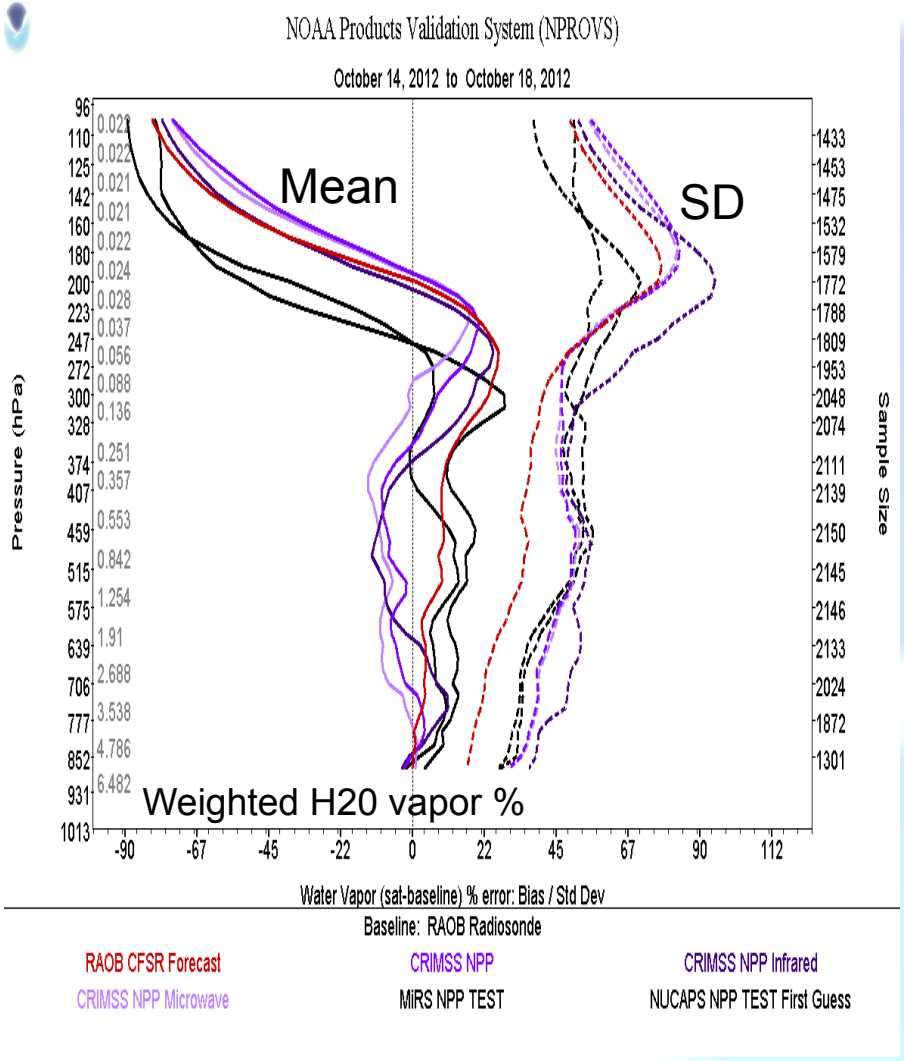
CrIMSS (3):
High (IR + MW) … 15%
Low (MW only) … 65%
Poor (non-converge) … 20%

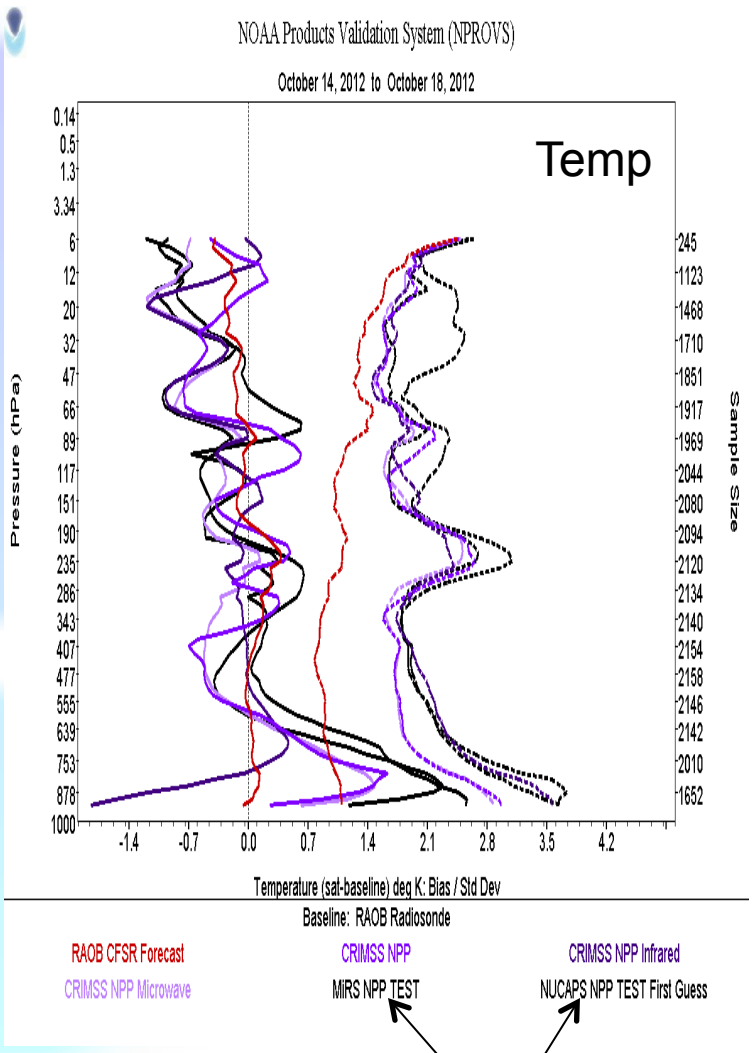
NUCAPS (3):
Pass … 20%
Fail … 80%

MiRS (1):
Pass … 0
Fail … 100
**no land T*

IASI (3):
Pass … 55%
Fail … 45%

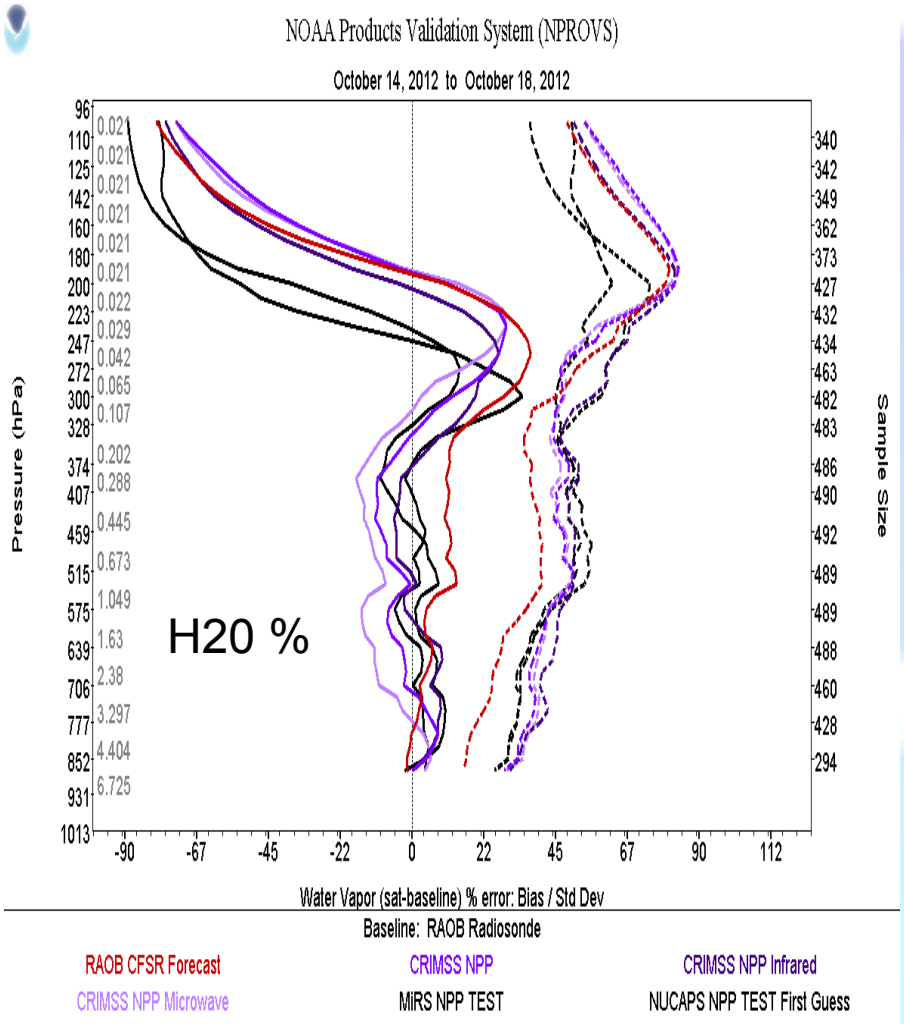
AIRS (3):
Pass … 55%
Fail … 45%

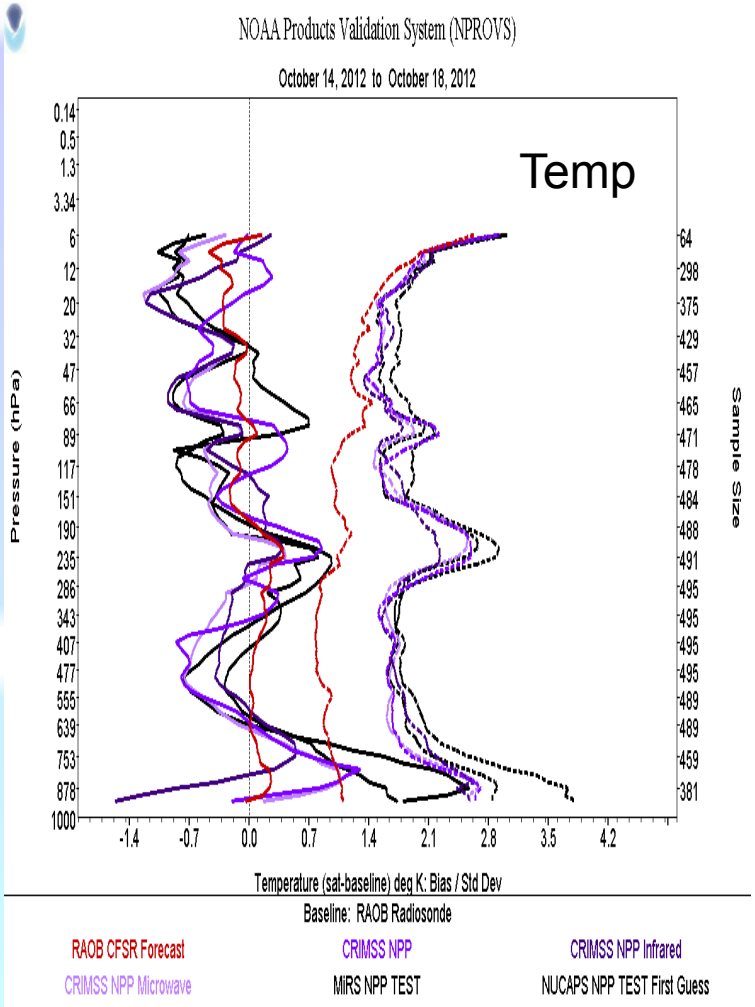




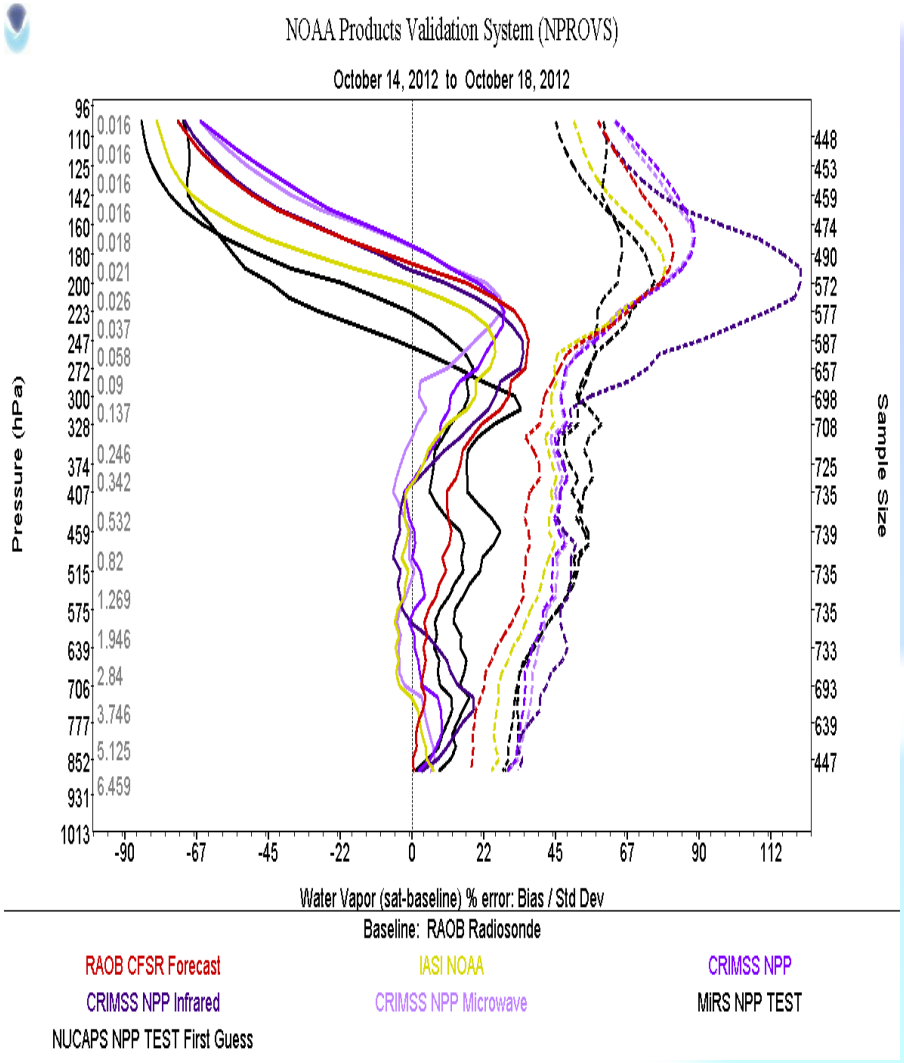
Baseline
CrIMSS QC (remove Poor)
(2100)

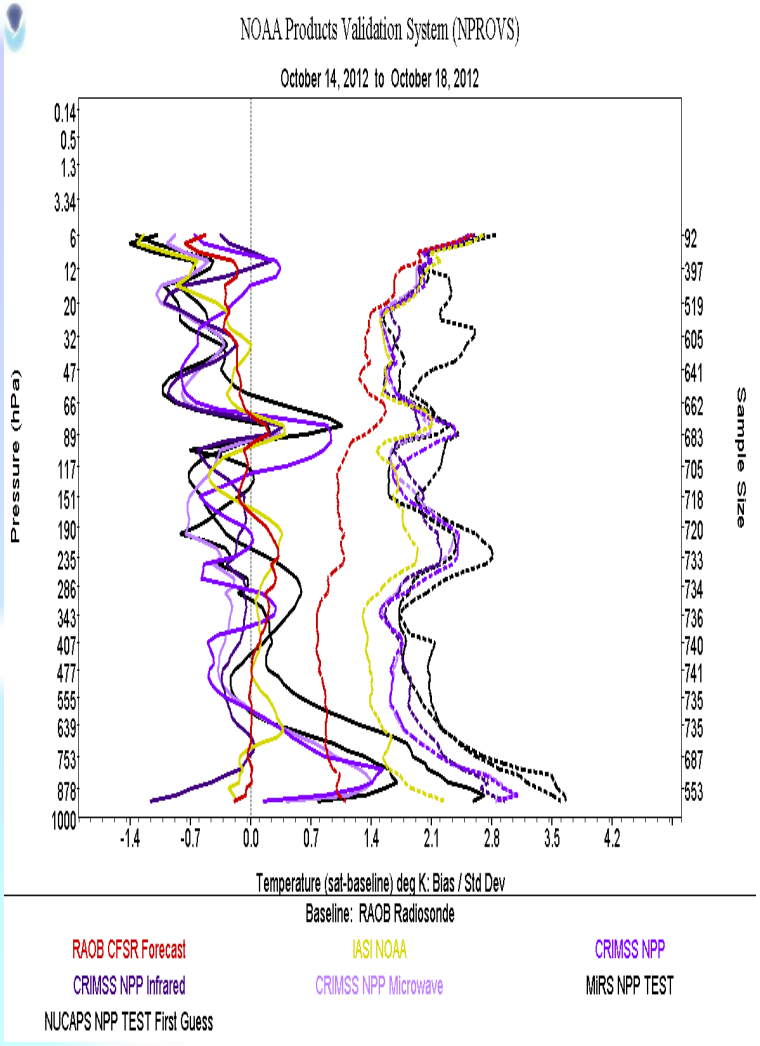
sorry about that



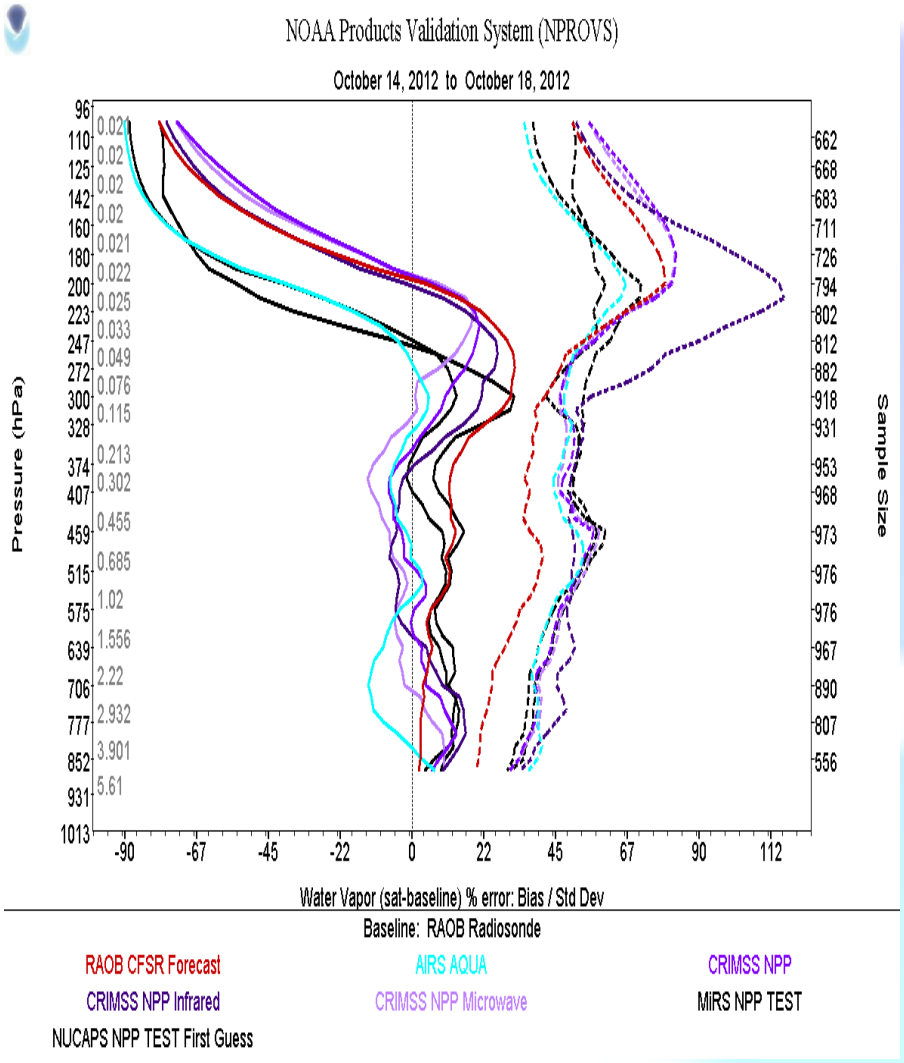


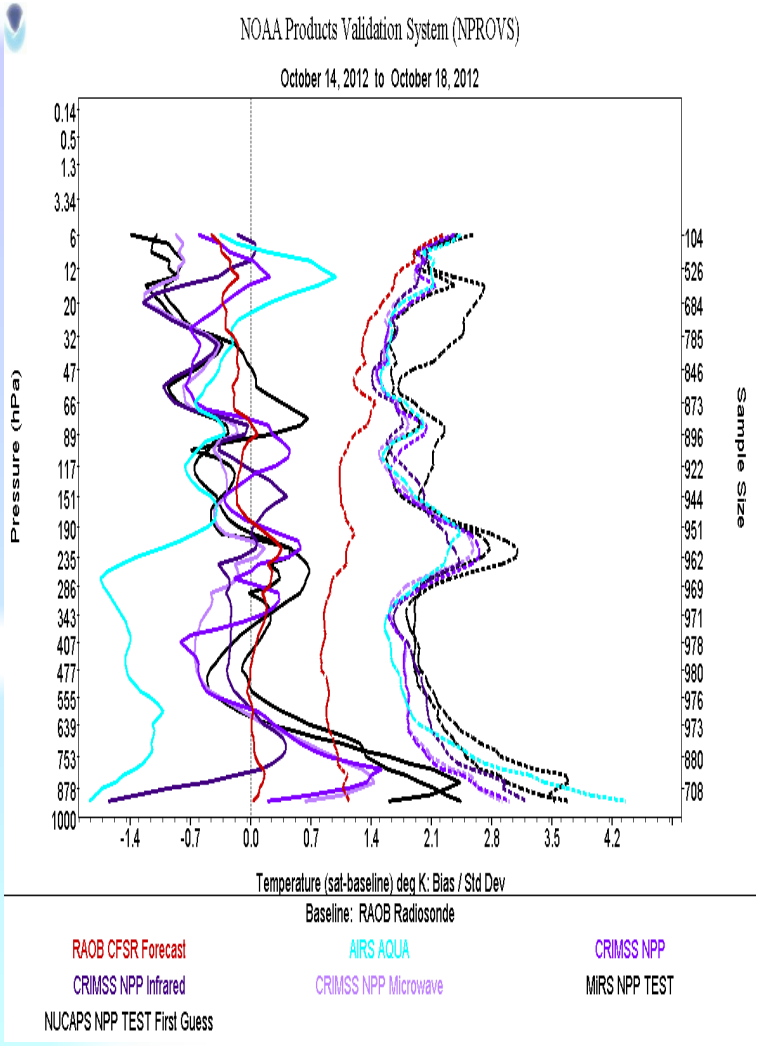
Baseline + NUCAPS QC (pass) (500)



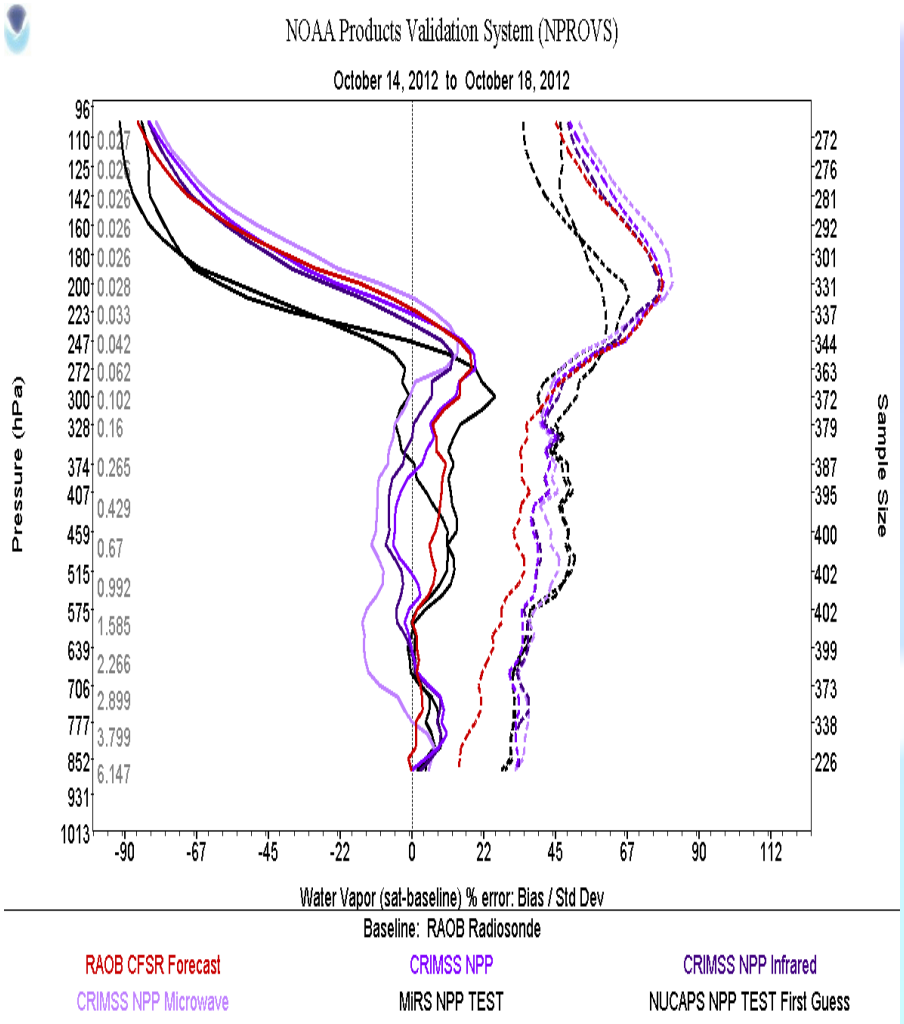


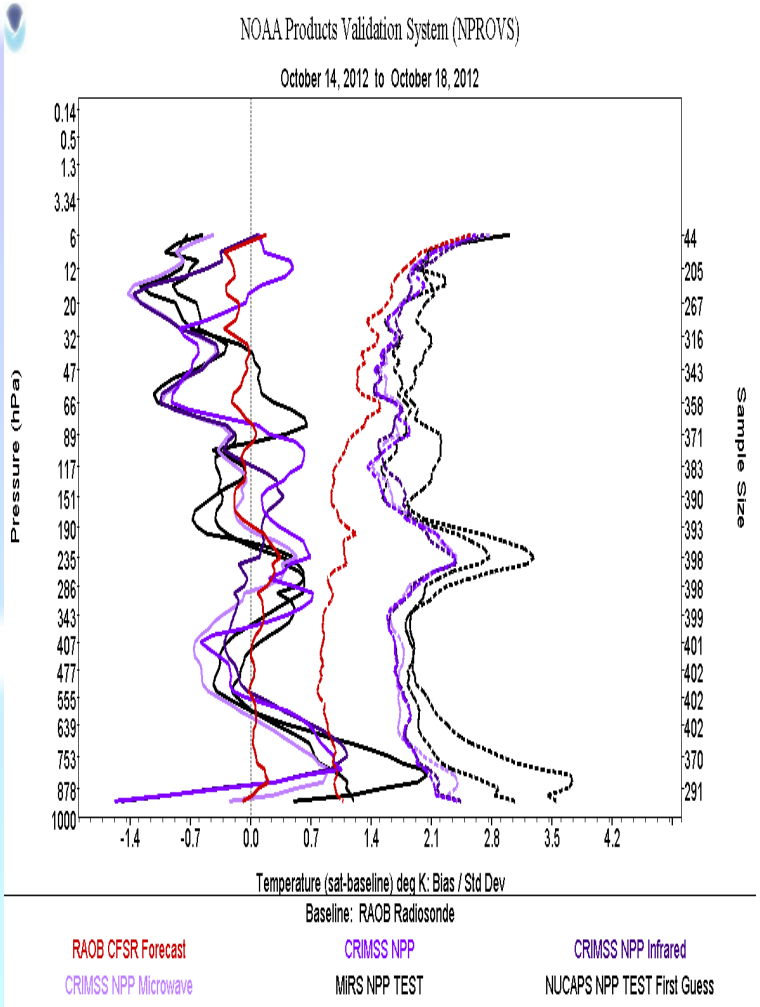
Baseline + IASI QC (pass) (700)



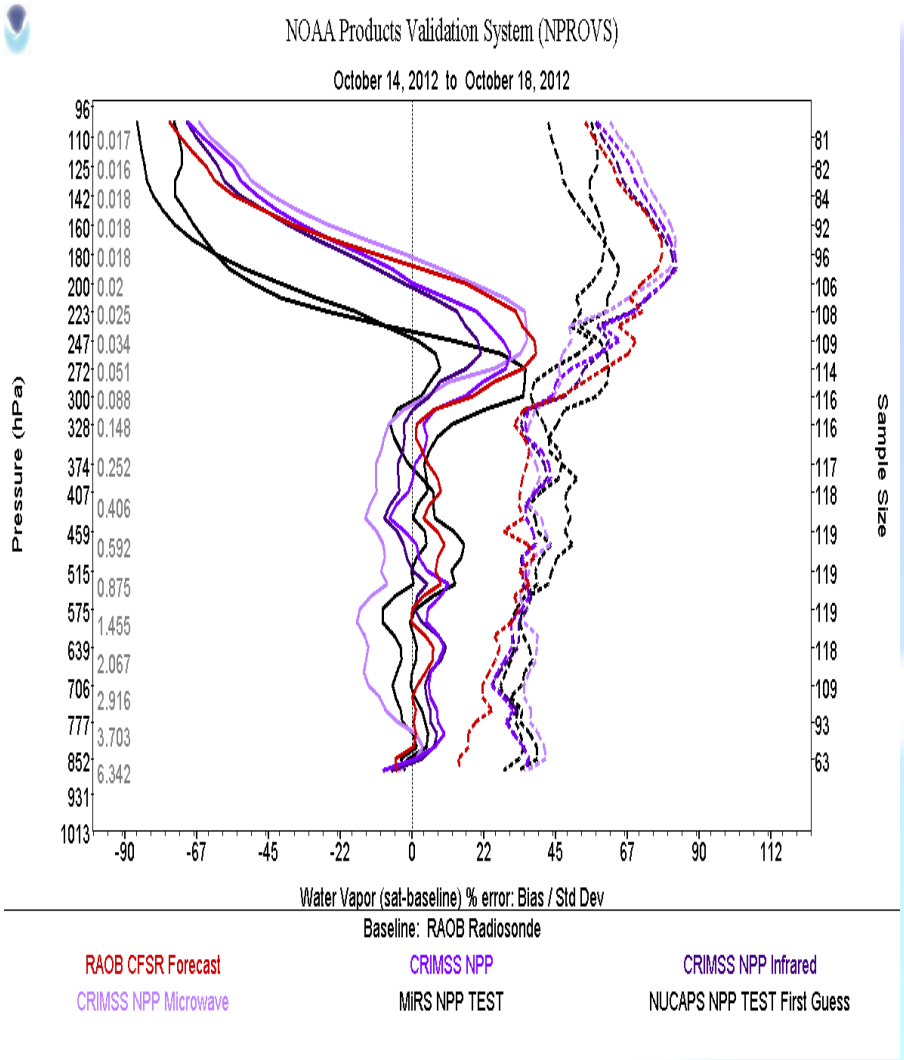


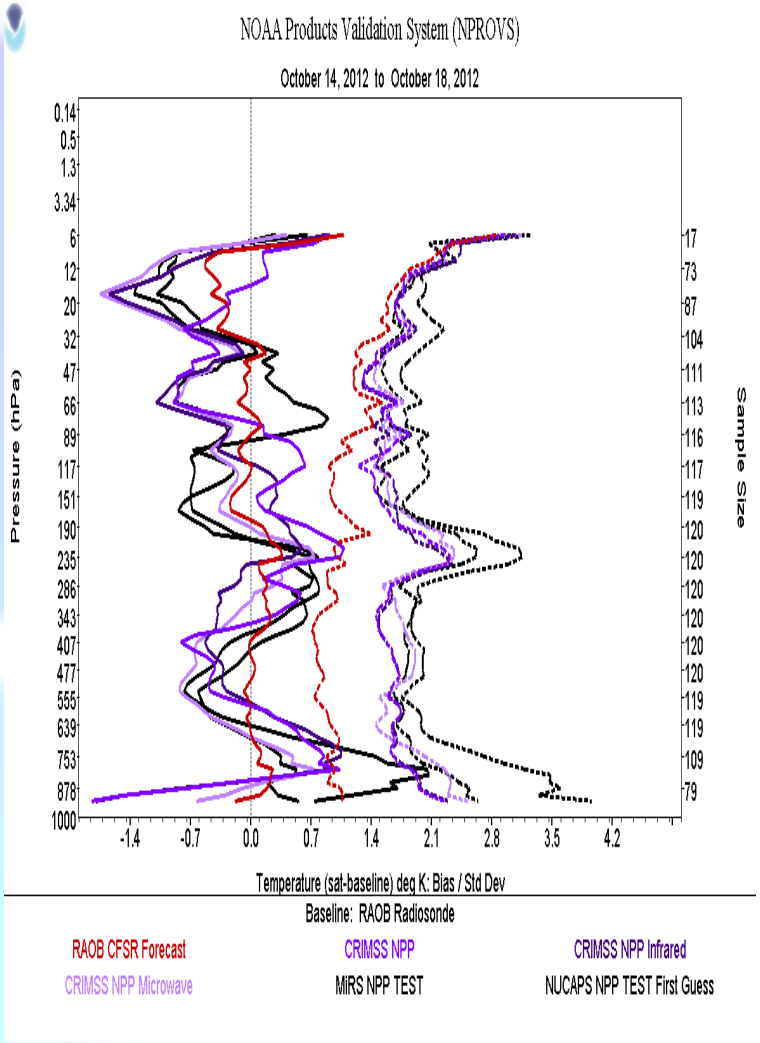
Baseline + AIRS QC (pass) (950)





Baseline + CrIMSS QC (high (IR + MW)) (400)





Baseline + NUCAPS QC (pass) + CrIMSS QC (high (IR + MW)) (100)

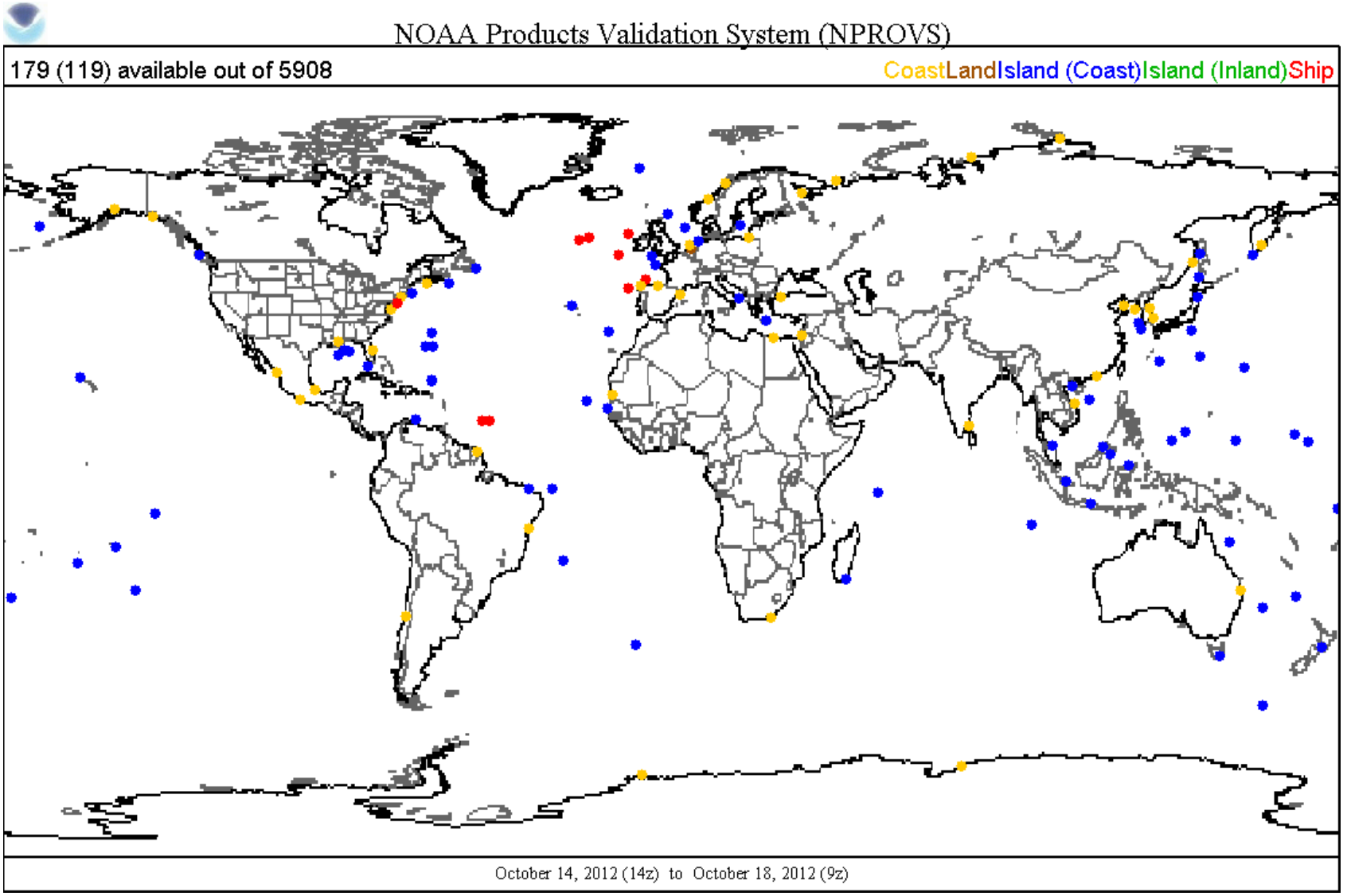
Microwave Only:

CrIMSS (MW only)

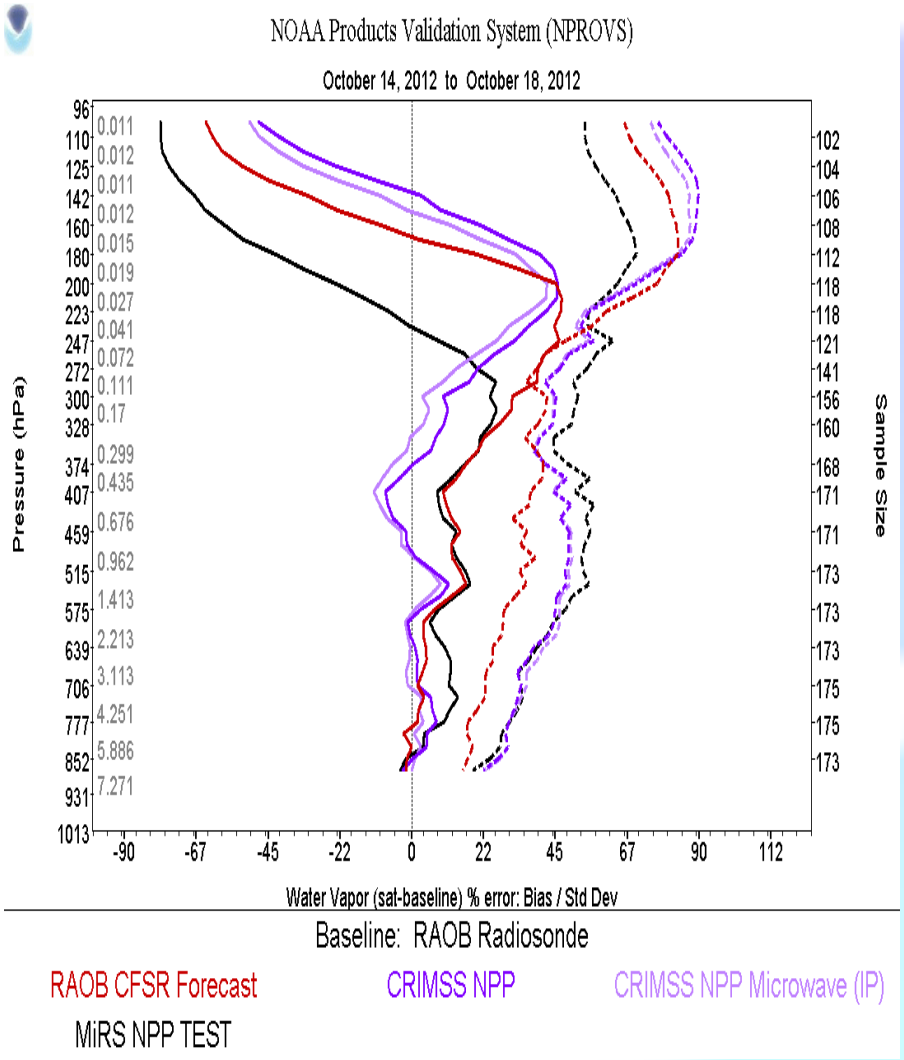
*MiRS

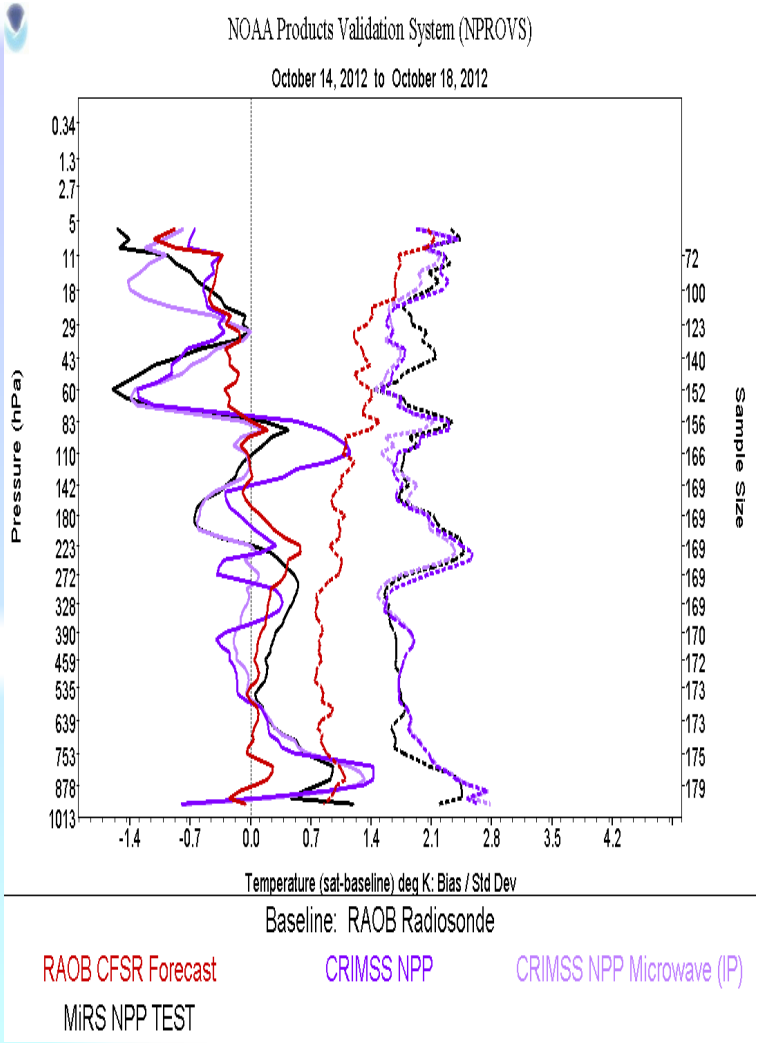
(sea only)*

… should not compare MW to IR



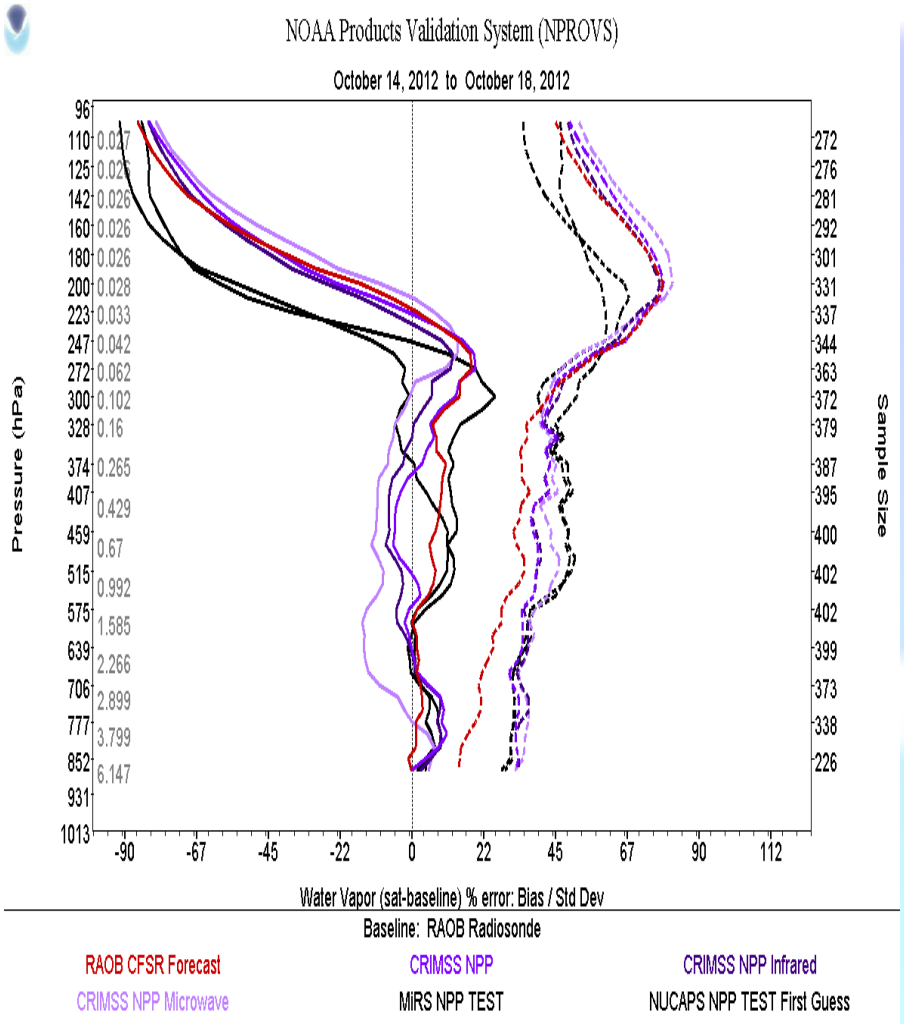
… appropriate validation dataset for MiRS

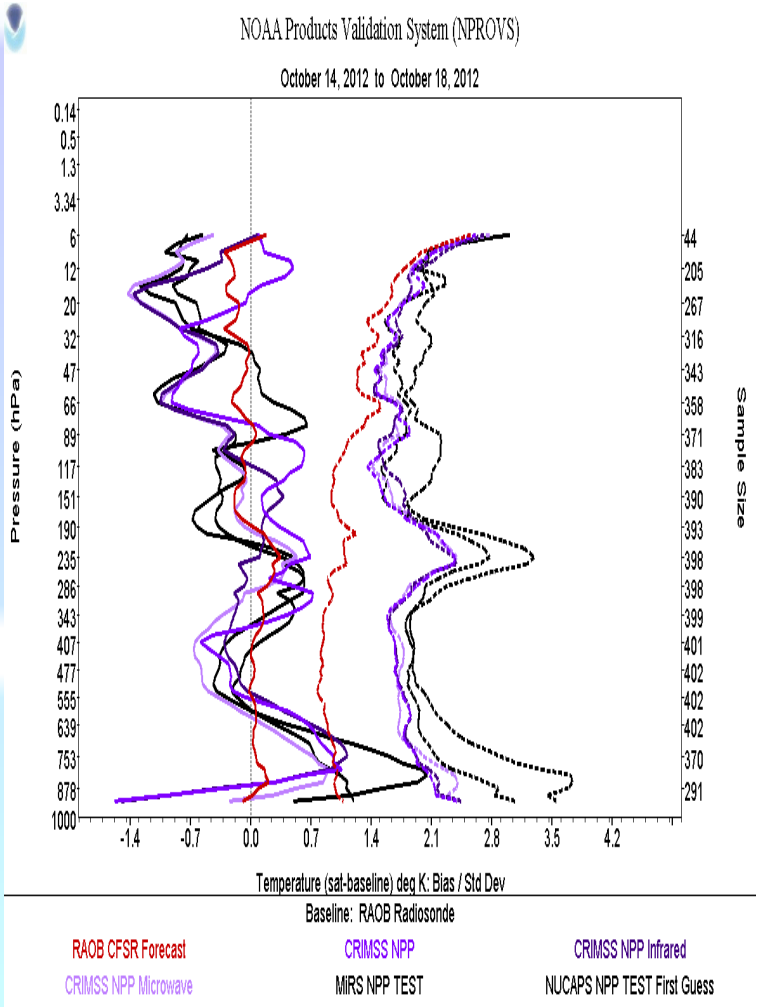




… appropriate validation dataset for MiRS

Baseline + CrIMSS (MW only) + sea only (180)



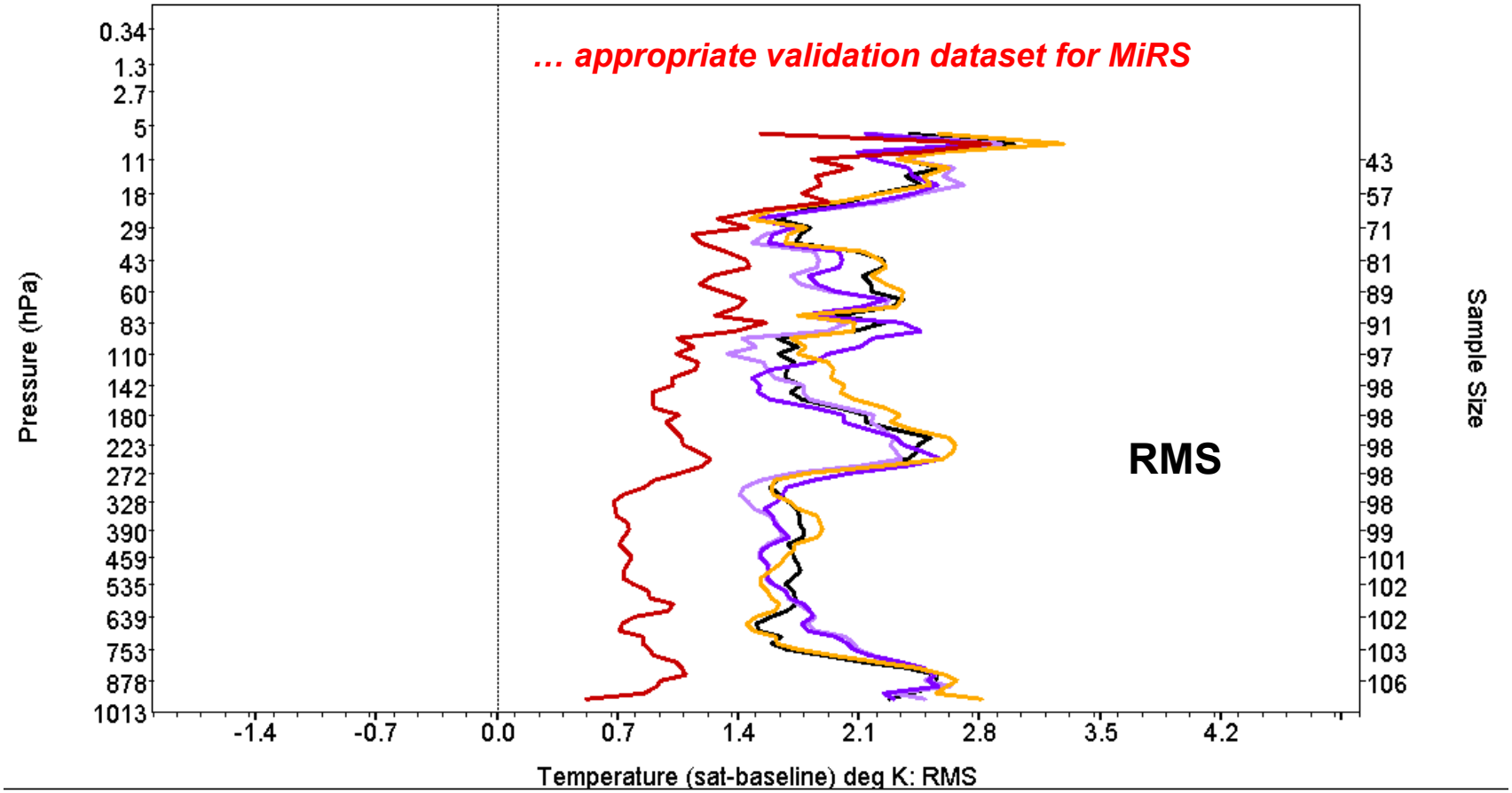


… inappropriate validation dataset for MiRS

Baseline + CrIMSS QC (high (IR + MW)) (400)

NOAA Products Validation System (NPROVS)

October 14, 2012 to October 18, 2012



Baseline: RAOB Radiosonde

RAOB CFSR Forecast

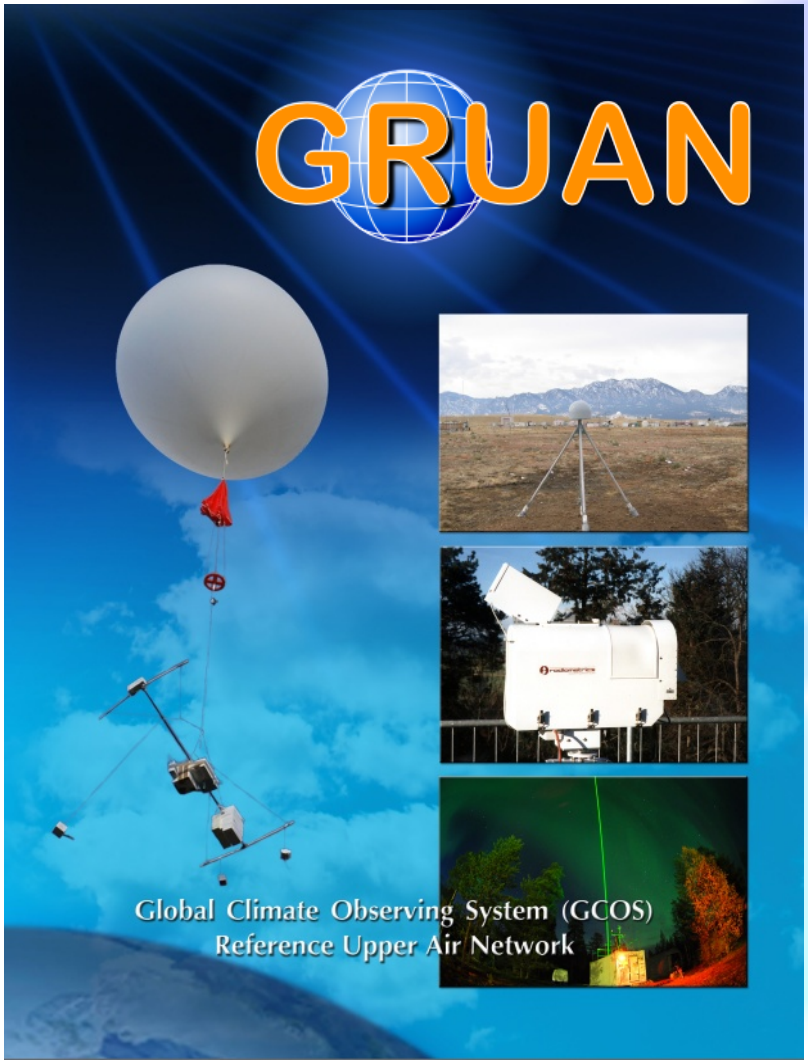
MiRS NOAA-19

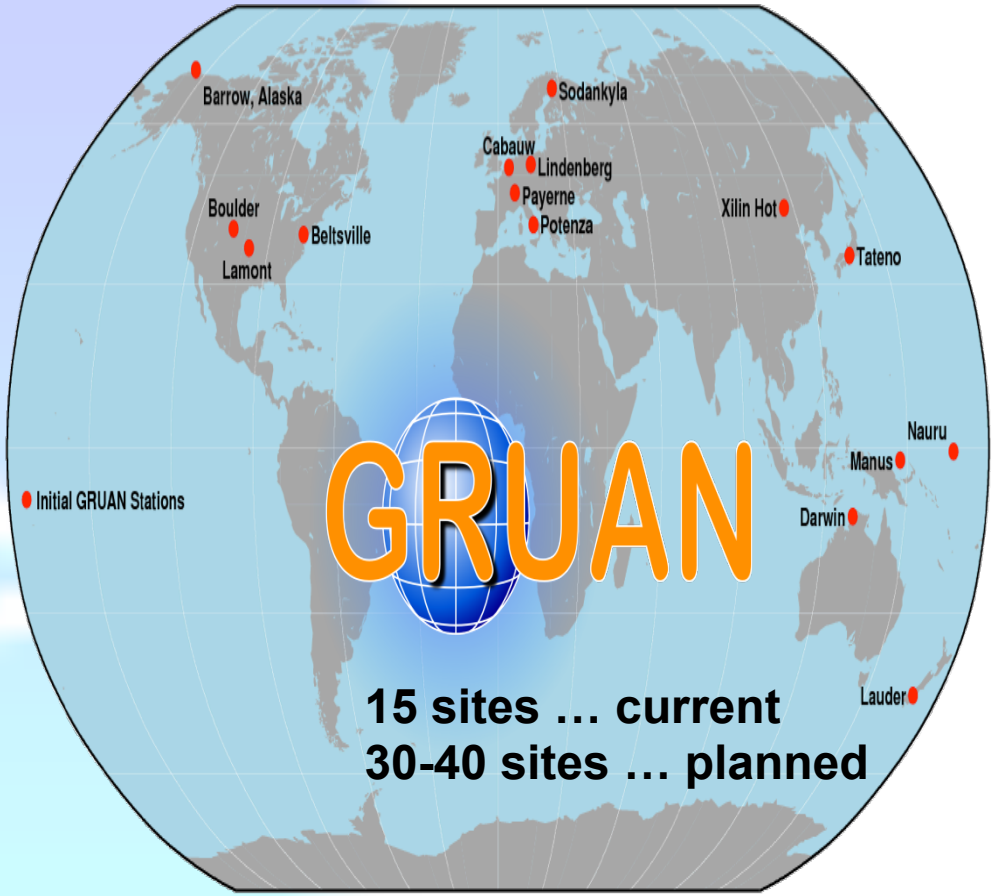
CRIMSS NPP

CRIMSS NPP Microwave (IP)

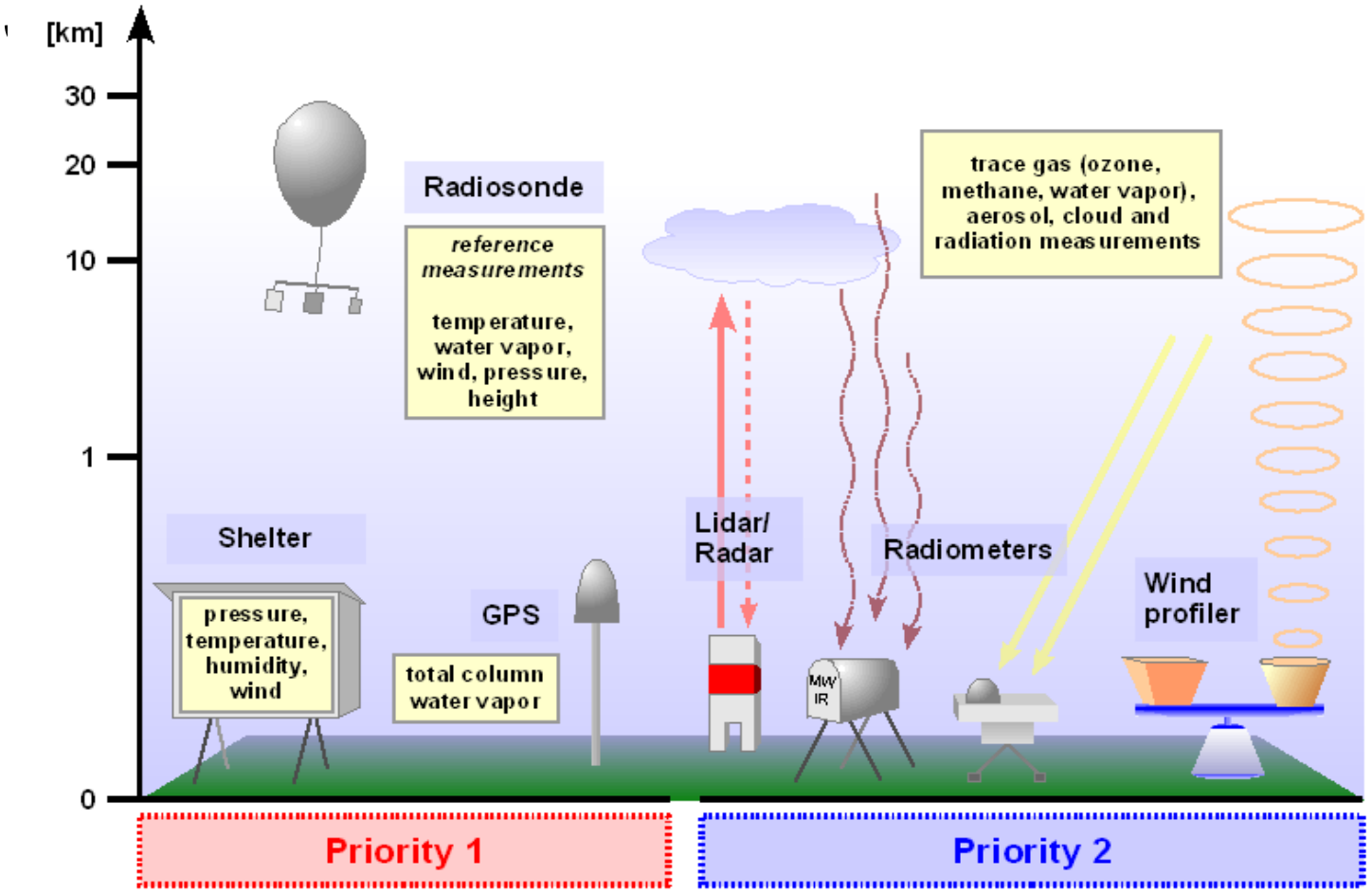
MiRS NPP TEST

http://www.gruan.org





GCOS Reference Upper Air Network (GRUAN)



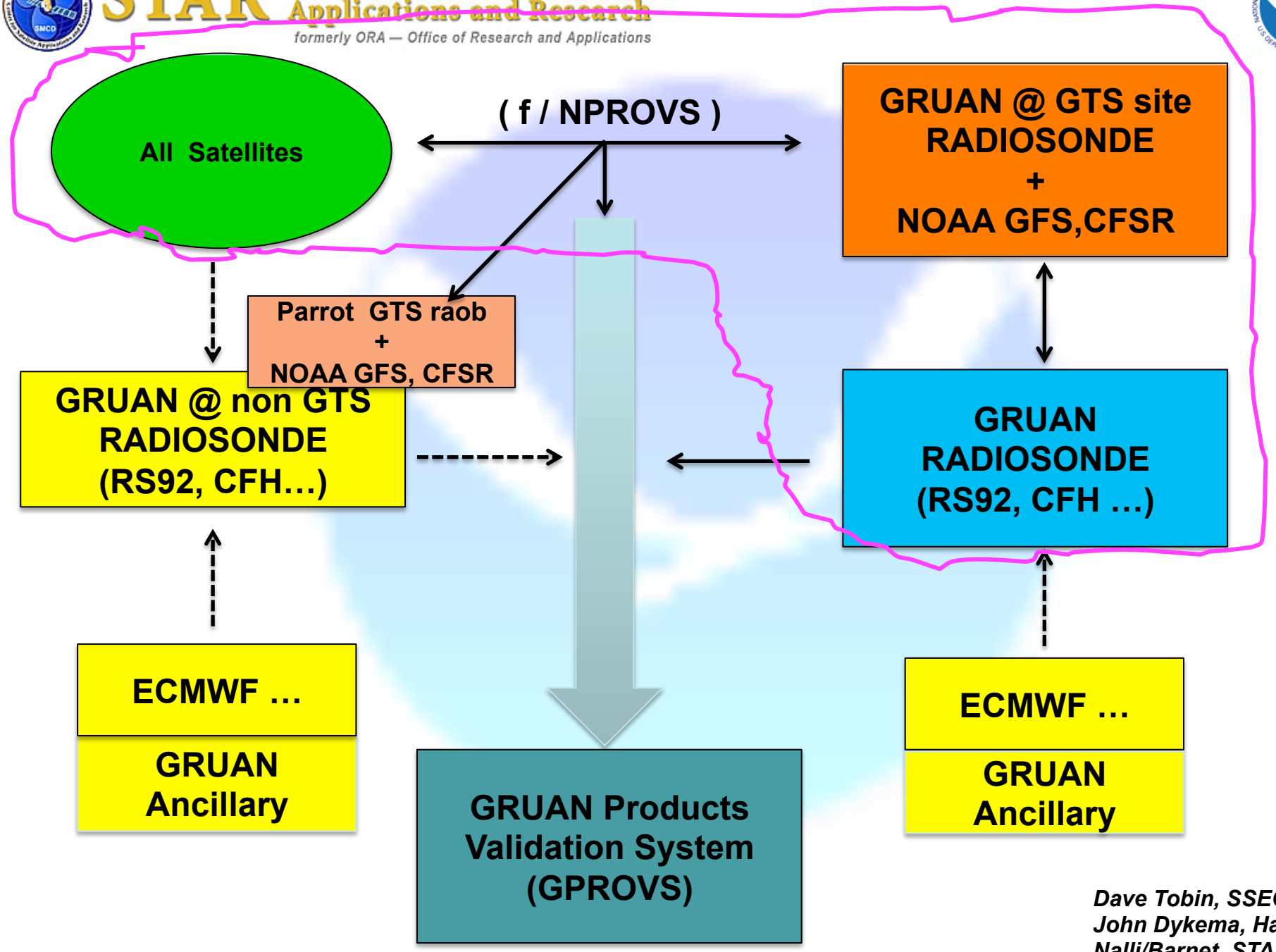
Priority 1: Water vapor, temperature, (pressure and wind)

Establishing Uncertainty

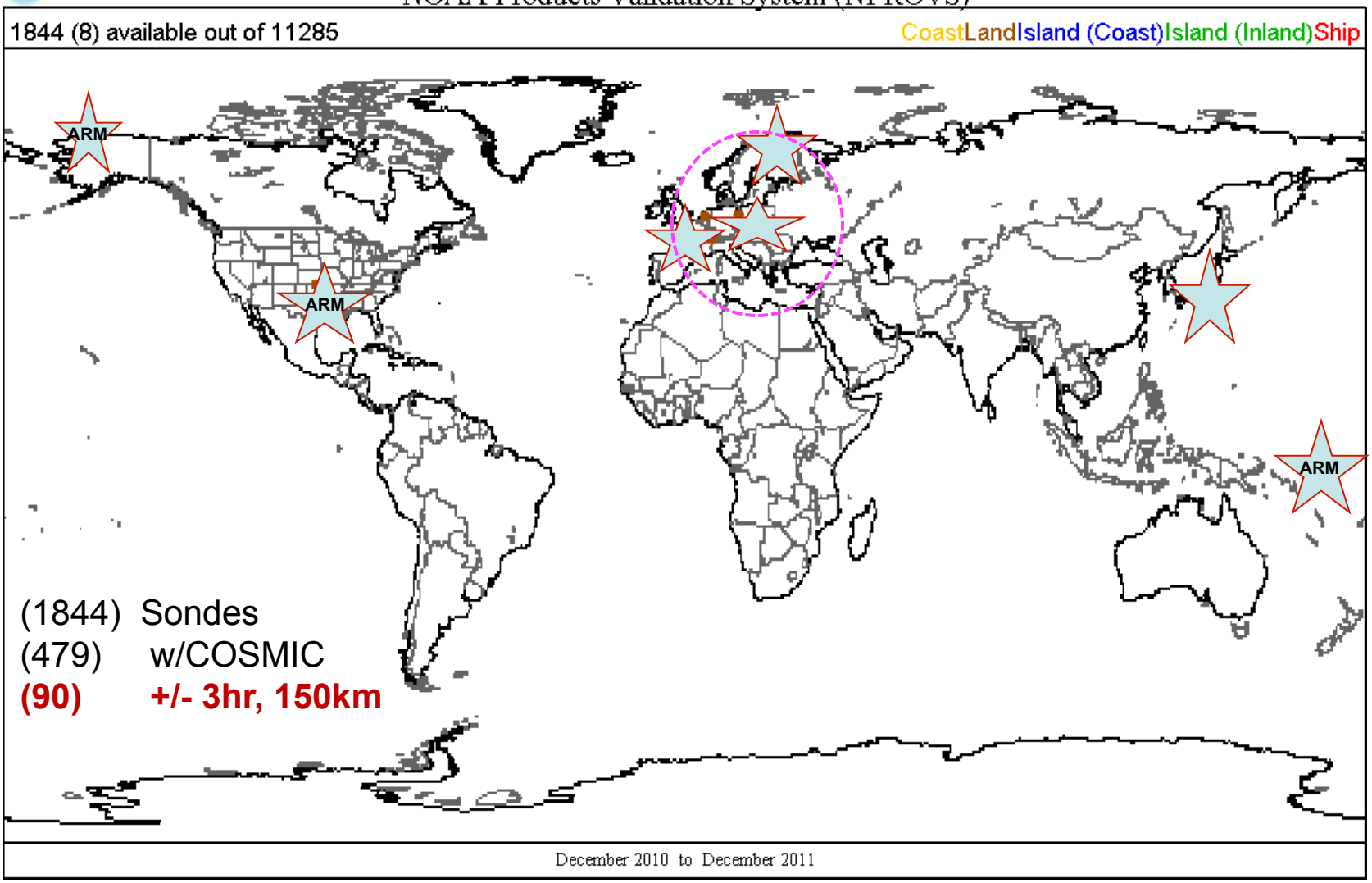
Concept:

- The "true value" of a physical quantity is no longer used
- Error is replaced by uncertainty
- A measurement = a range of values
  - generally expressed by $m \pm u$
  - m is corrected for systematic effects
  - u is (random) uncertainty

Meteorological Observatory Lindenberg – Richard Assmann Observatory (2010)

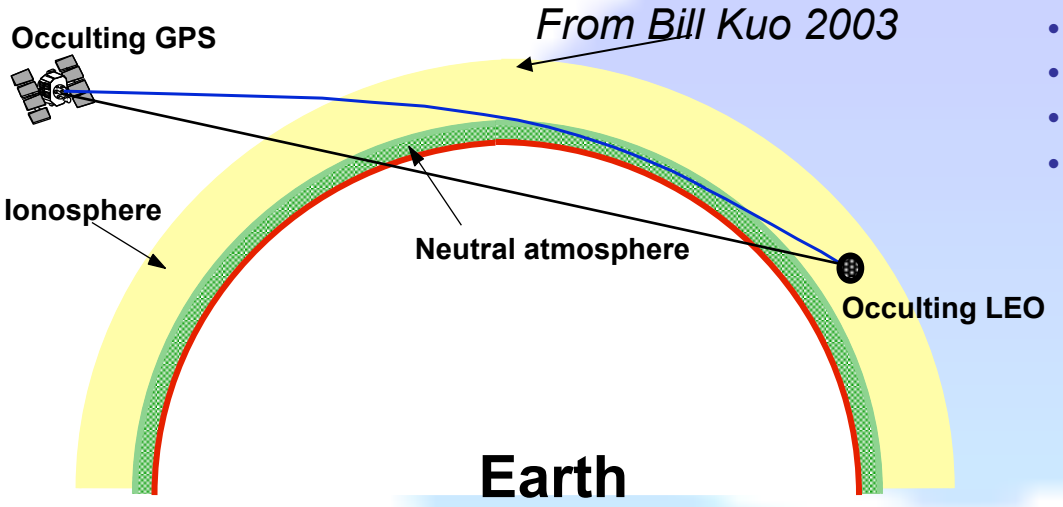


Dave Tobin, SSEC
John Dykema, Harvard
Nalli/Barnet, STAR

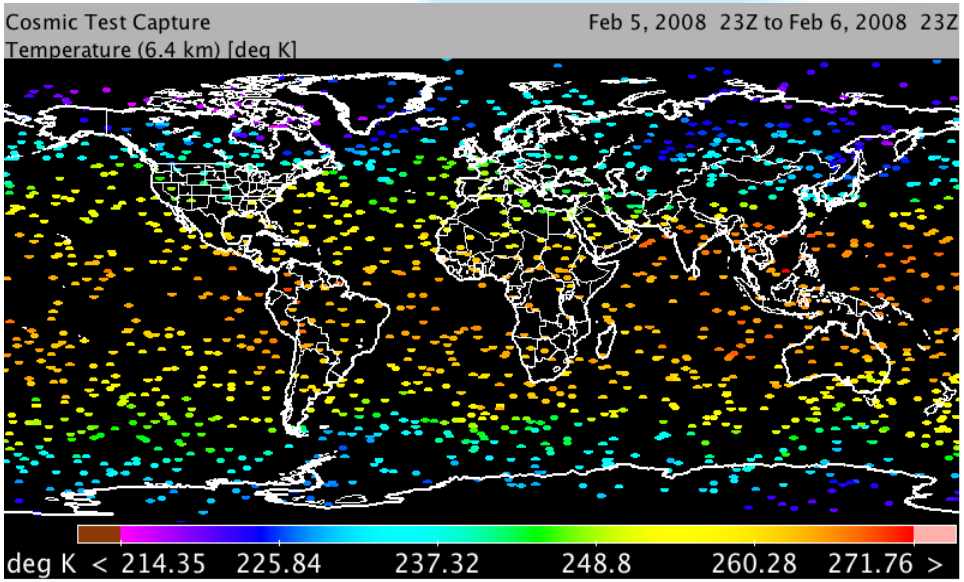


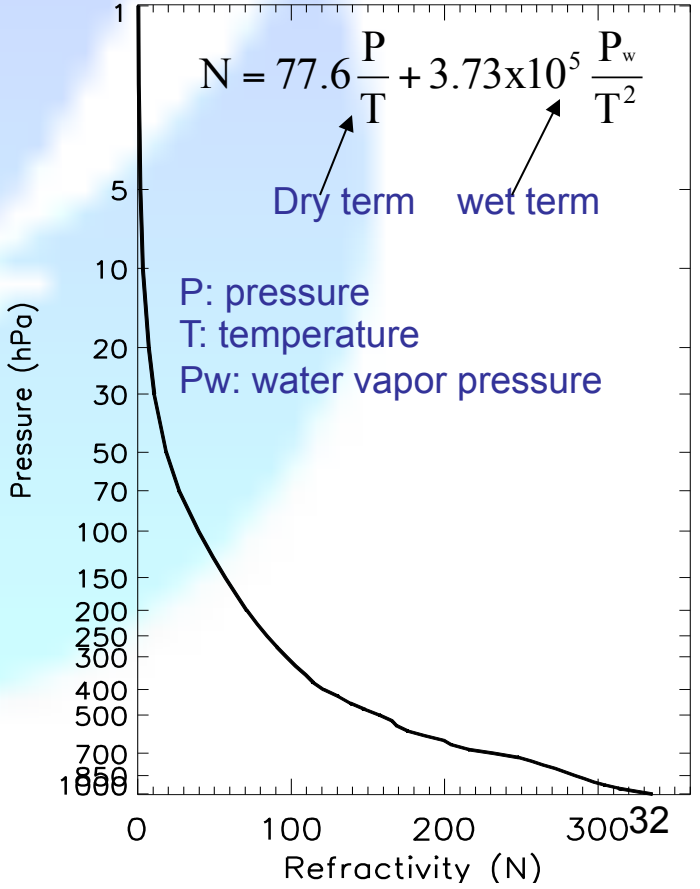
Collocations of COSMIC, GRUAN Sonde and GTS Sonde; 2011

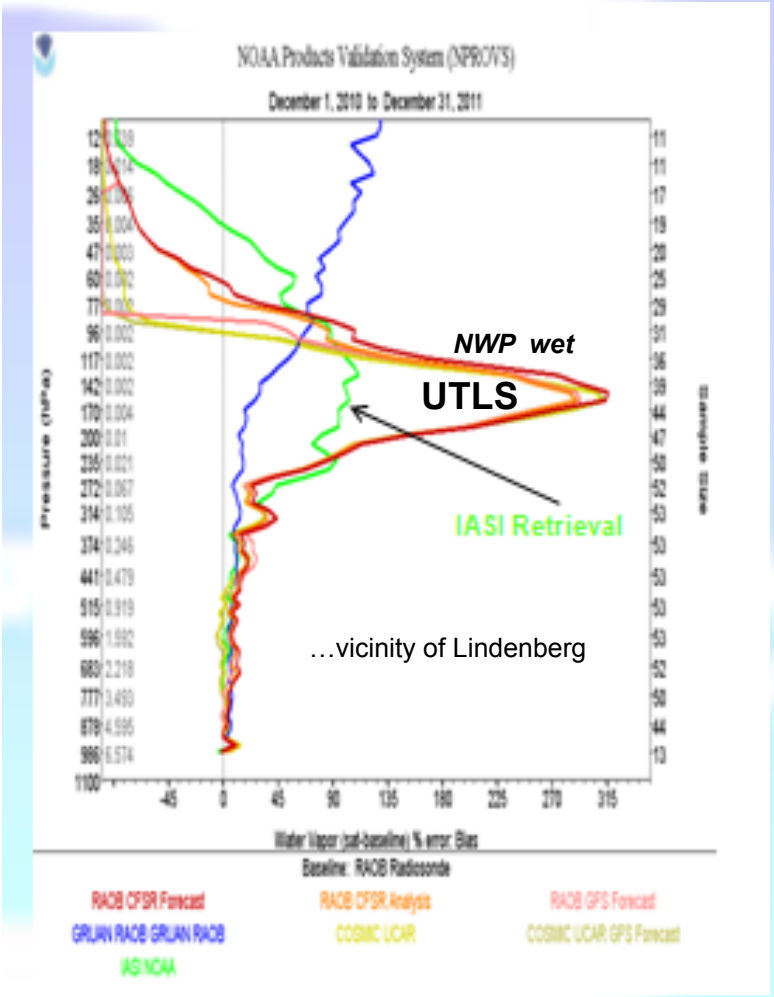
Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC)

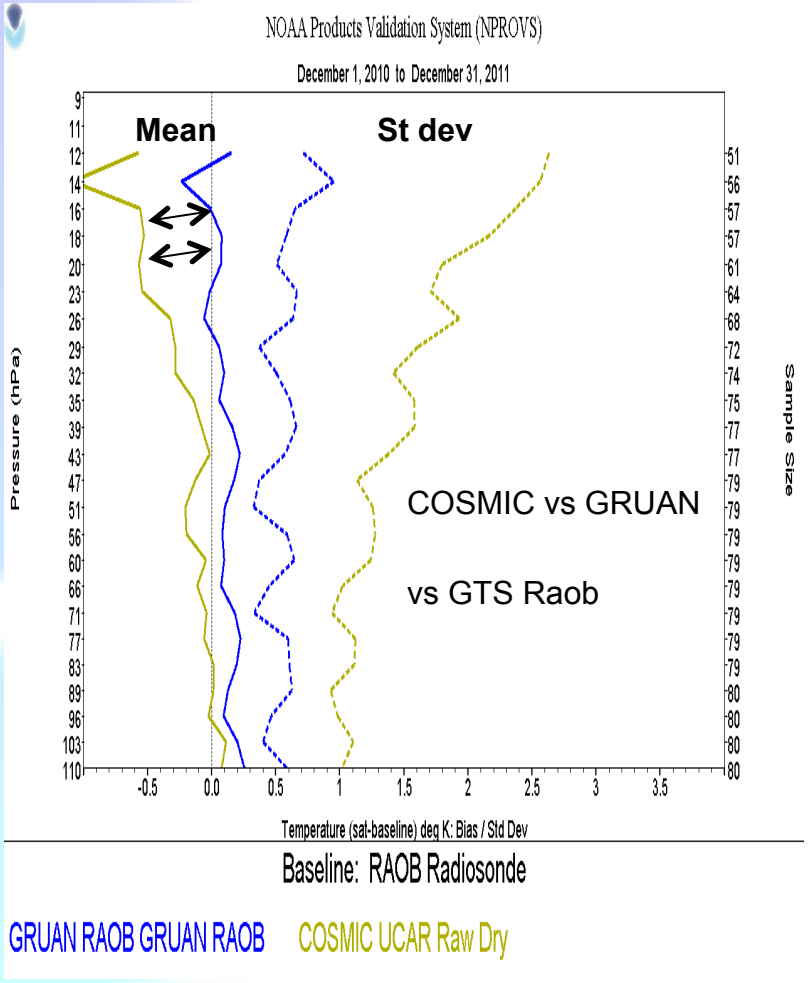


- All-weather sounding capability
- High vertical resolution
- No calibration issues
- Good spatial and temporal distribution



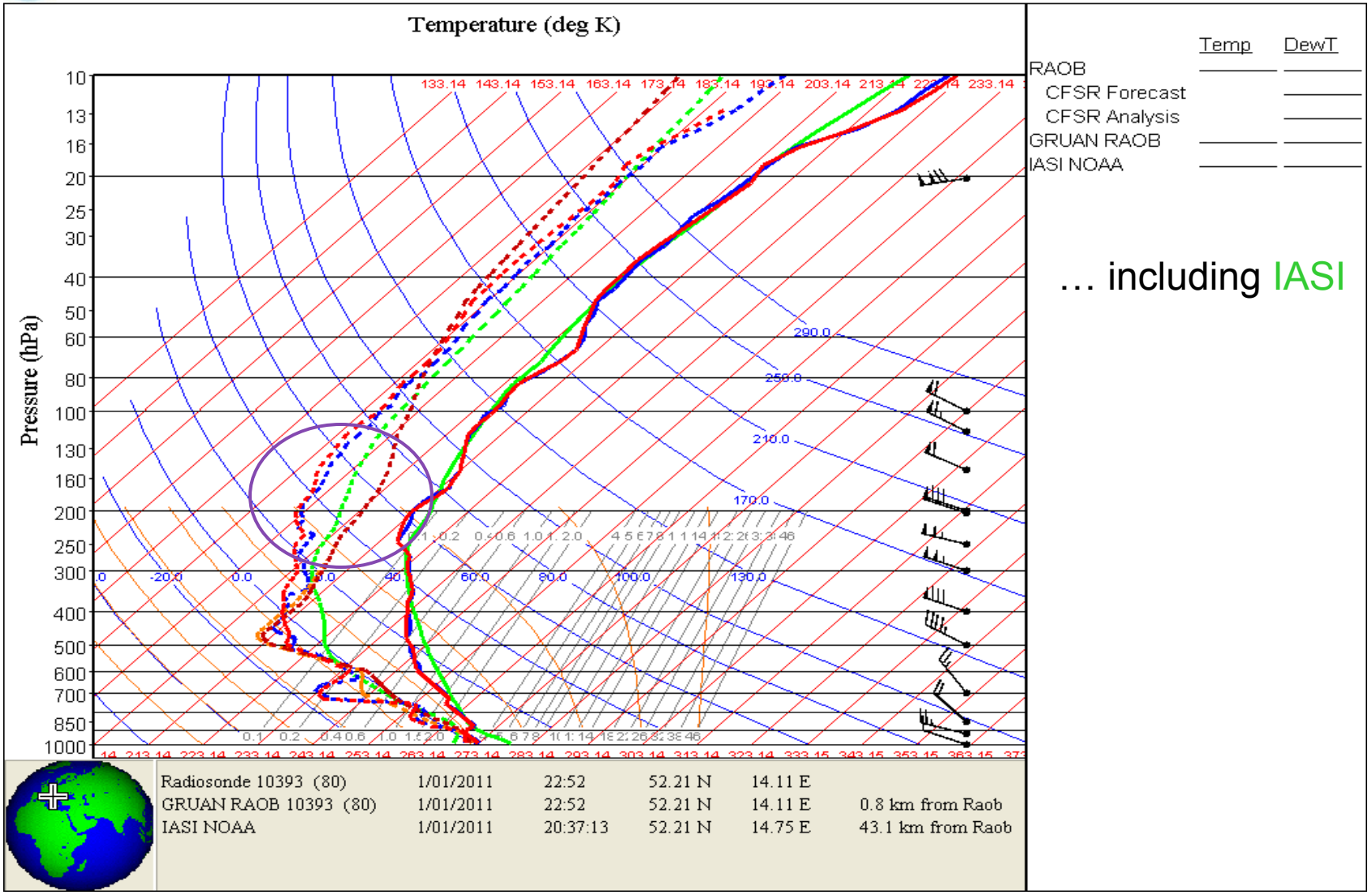






… combining GRUAN, GPSRO, NWP …

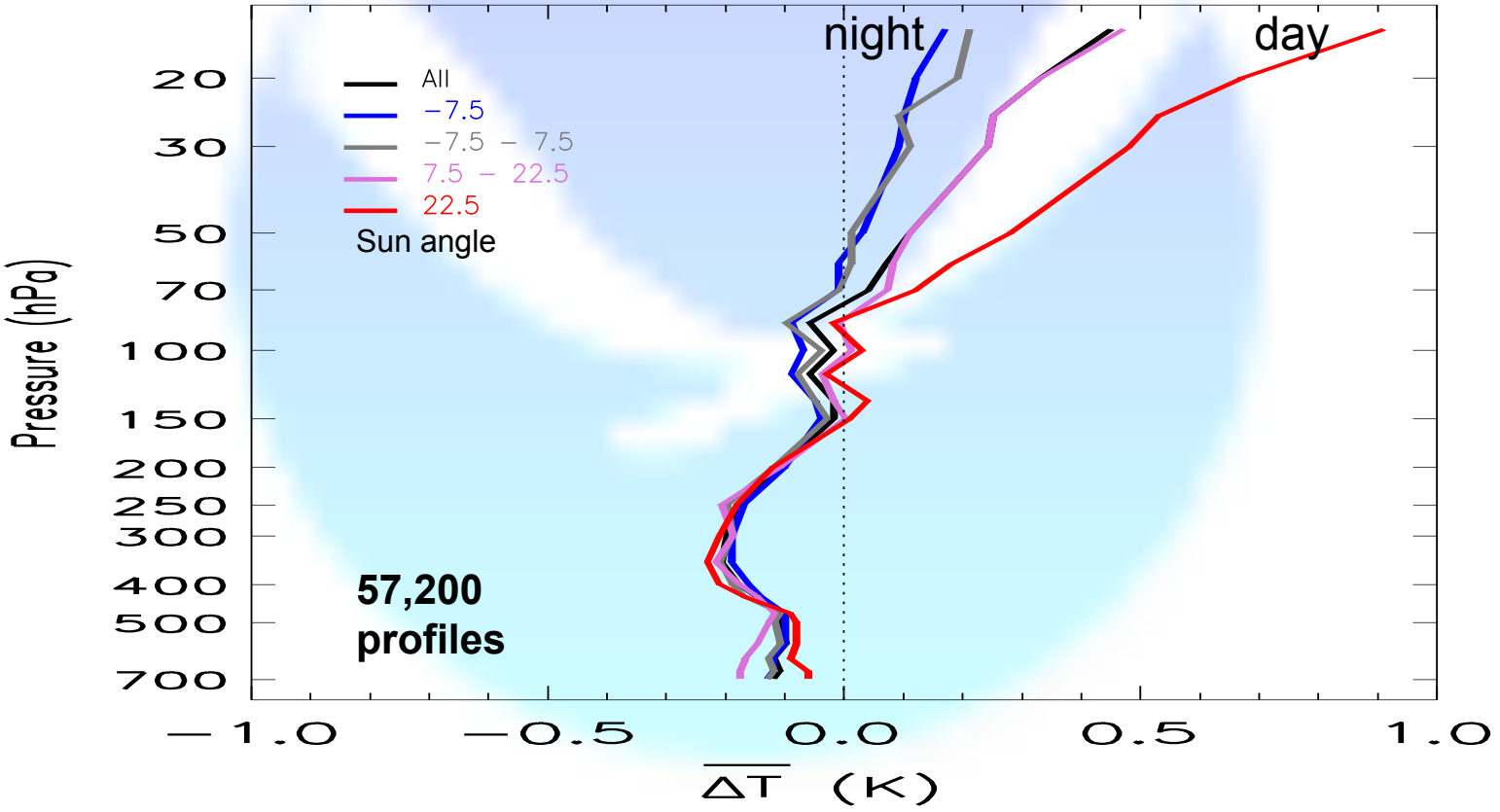
NOAA Products Validation System (NPROVS)



… including IASI

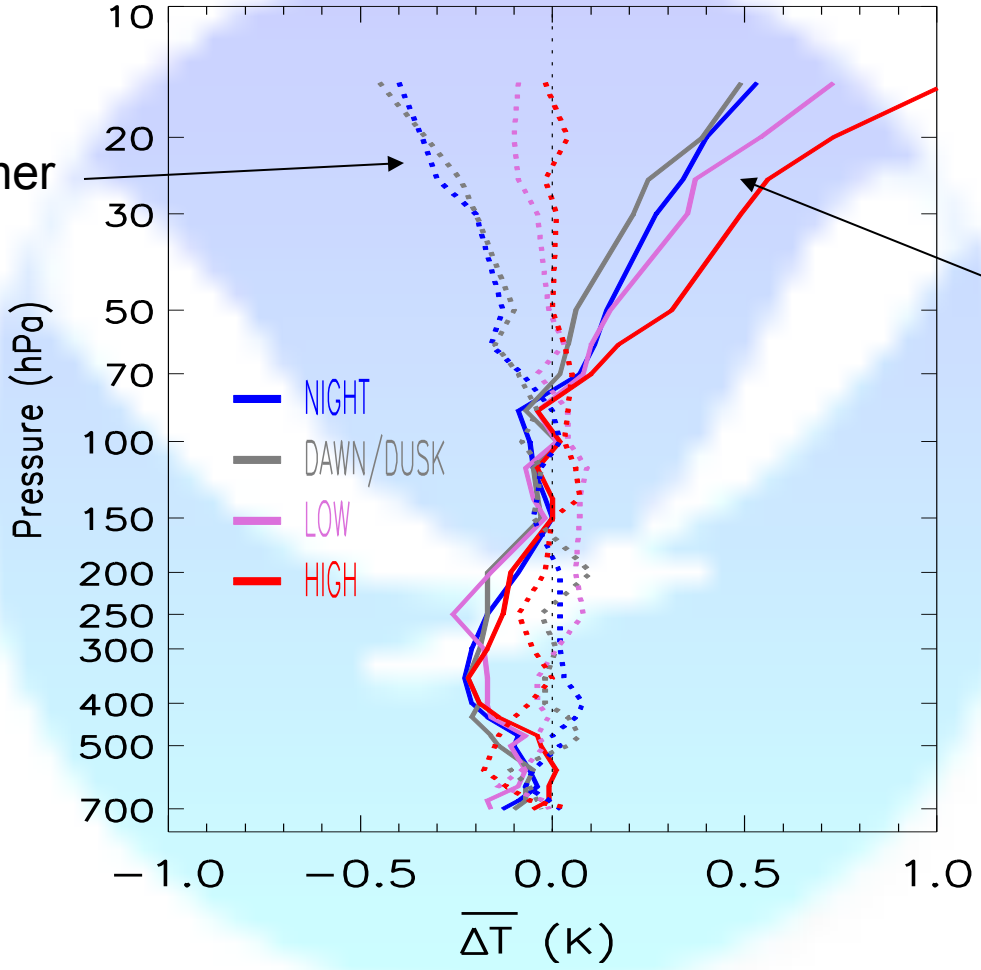
Vaisala RS92

difference from COSMIC T



Raob-minus-COSMIC … *raob warm or COSMIC cold*?

Seasonal Variation in Raob-minus-COSMIC for Vaisala RS92

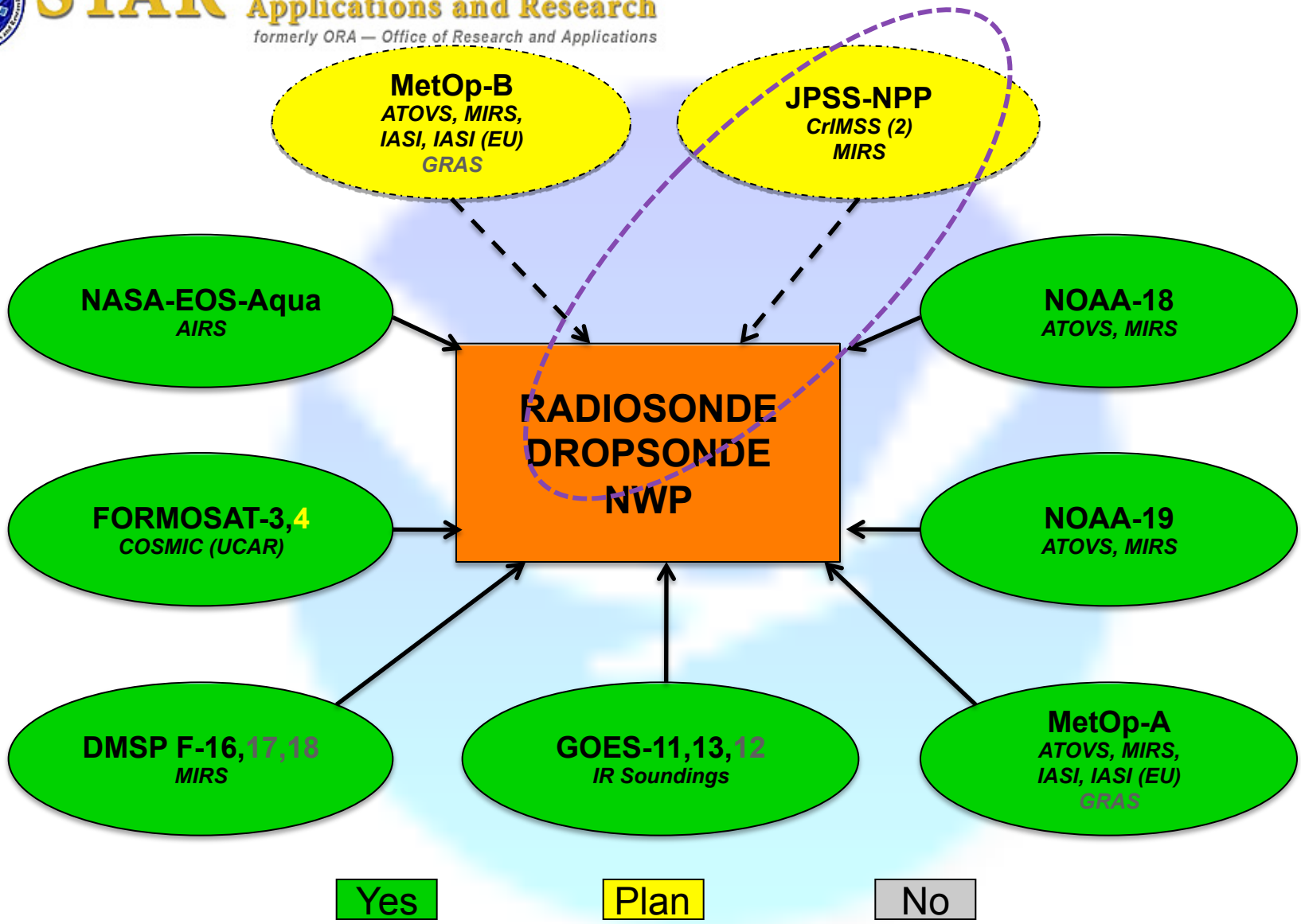


Seasonal variation in bias is bigger at nighttime:
Summer relatively warmer than winter?
GRUAN interest …

Publications

Sun, Reale, Seidel, and Hunt, “Comparing radiosonde and COSMIC atmospheric profile data to quantify differences among radiosonde types and the effects of imperfect collocations on comparison statistics“, *J. Geophys. Res,* 2010.

Sun, Reale, Schredor, Sidel and Bradley, “Towards improved corrections for radiation-induced biases in radiosonde temperature observations“, *J. Geophys. Res,* 2012 (submitted).



NOAA Products Validation System (NPROVS) Schematic

Summary

- NPROVS background
- Examples of long (4 yr) term trends in selected operational sounding products
- Preliminary results for CrIMSS, NUCAPS and MiRS operational data streams sorted by QC designation
- **Examples of *"special"* access/analysis of GRUAN / ARM datasets in context of satellite and ground profile validation … GPROVS**
- **Future target products include re-processed AIRS, COSMIC, (IASI?) and NWP (MERRA, ECMWF …) and GPSRO anchored collocations …**