



Calibration and Validation Activities at NOAA/NESDIS

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CEOS WG on Cal/Val

October 15-17, 2003 Beijing, China



Overview: Scope and Goals; Examples of Methods and Results

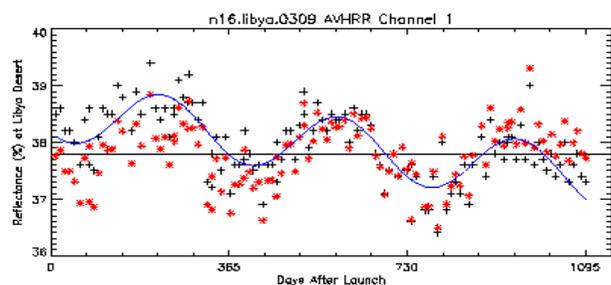
- Assure Functionality of Current/Near-Future Operational Systems
 - » Develop & maintain on-orbit calibration approach, algorithms, & databases
 - » Oversee pre-launch sensor calibration
 - » Perform post-launch checkout, monitoring, and trouble-shooting
- Apply Experience to Design of Future systems
 - » Define future measurement requirements & support development of future systems (NPP, NPOESS, GOES-R, active sensors)
- Assure Required Accuracy, Stability, Inter-comparability
- Serve Community of Data Providers and Users
 - » Elsewhere in NOAA
 - » Other US Government Agencies
 - » Academia and Industry
 - » International partners



Current - POES

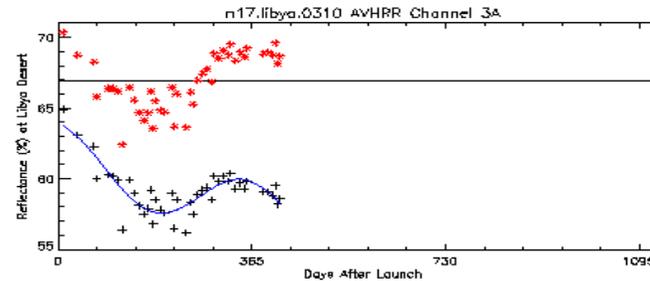
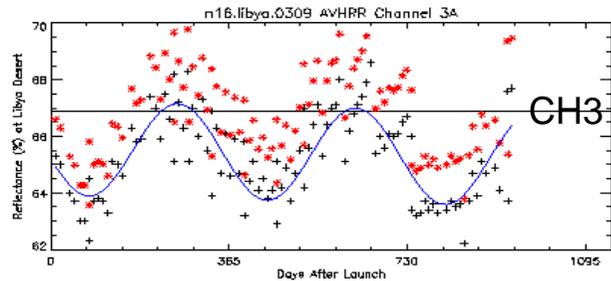
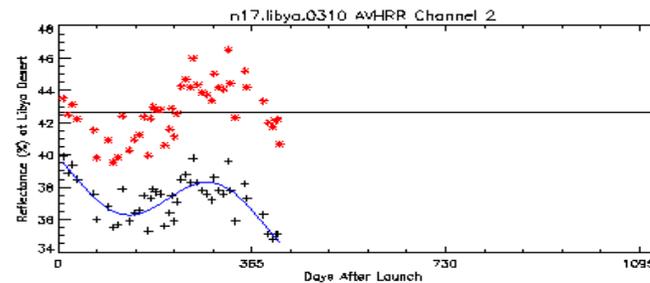
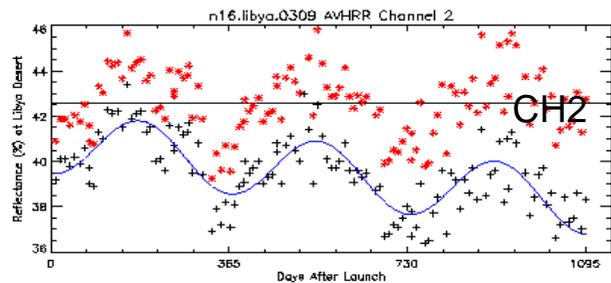
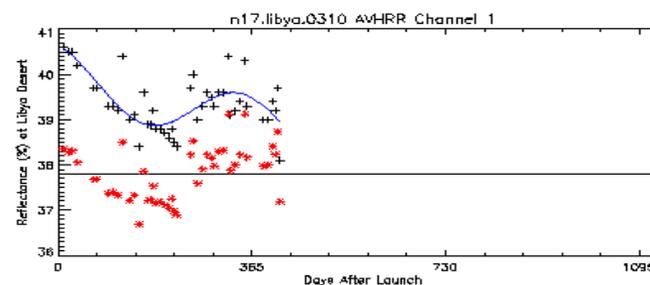
AVHRR Albedo for Libyan Desert

–NOAA 16 AVHRR Albedo



CH1

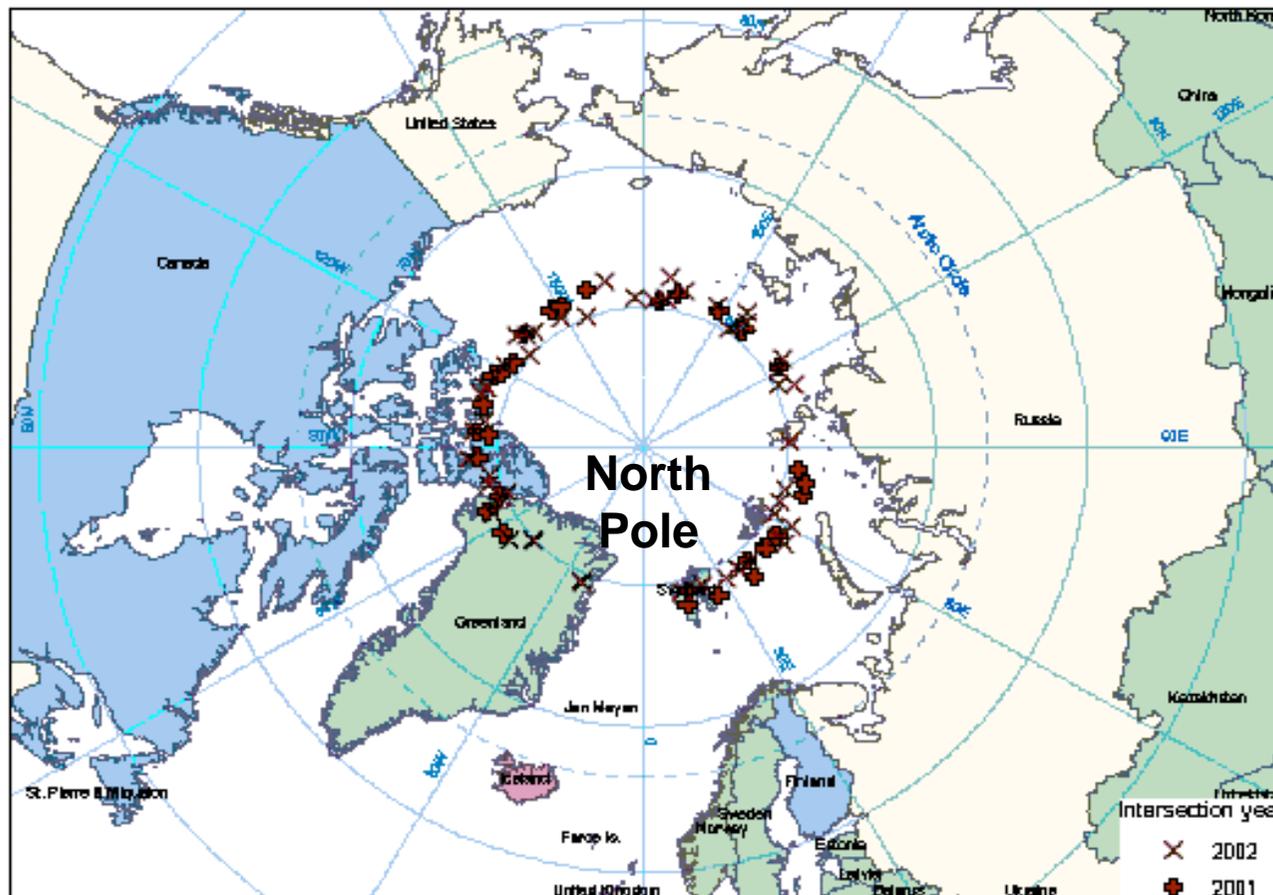
–NOAA 17 AVHRR Albedo



Courtesy Xiangqian (Fred) Wu, 2003



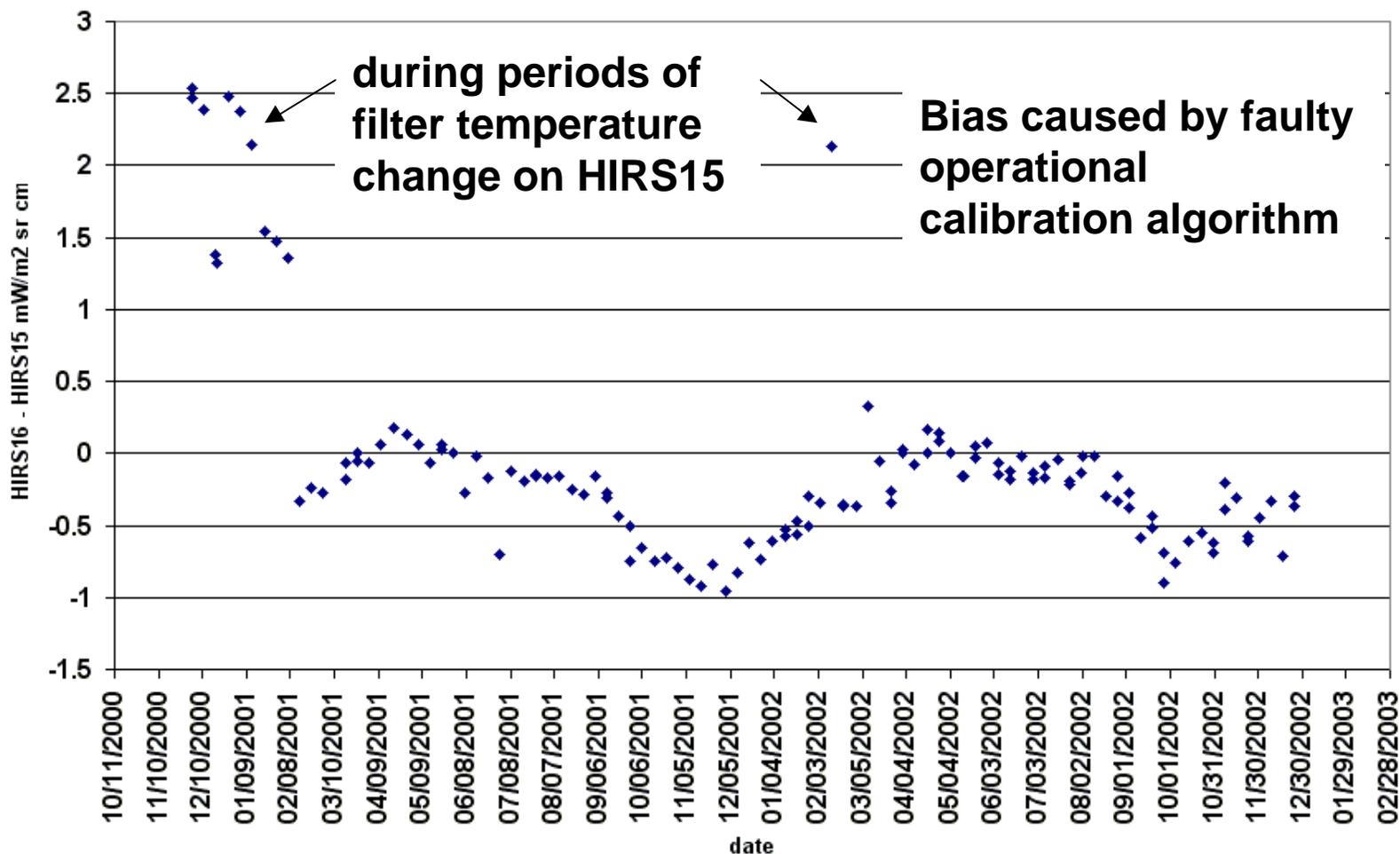
Simultaneous Nadir Overpasses 2001 and 2002 between NOAA-15 & -16 at 80 N



Reference: Cao, C, M. Weinreb, and H. Xu, Predicting Simultaneous Nadir Overpasses among Polar-orbiting Meteorological Satellites for the Inter-satellite Calibration of Radiometers, Journal of Atmospheric and Oceanic Technology, In press.



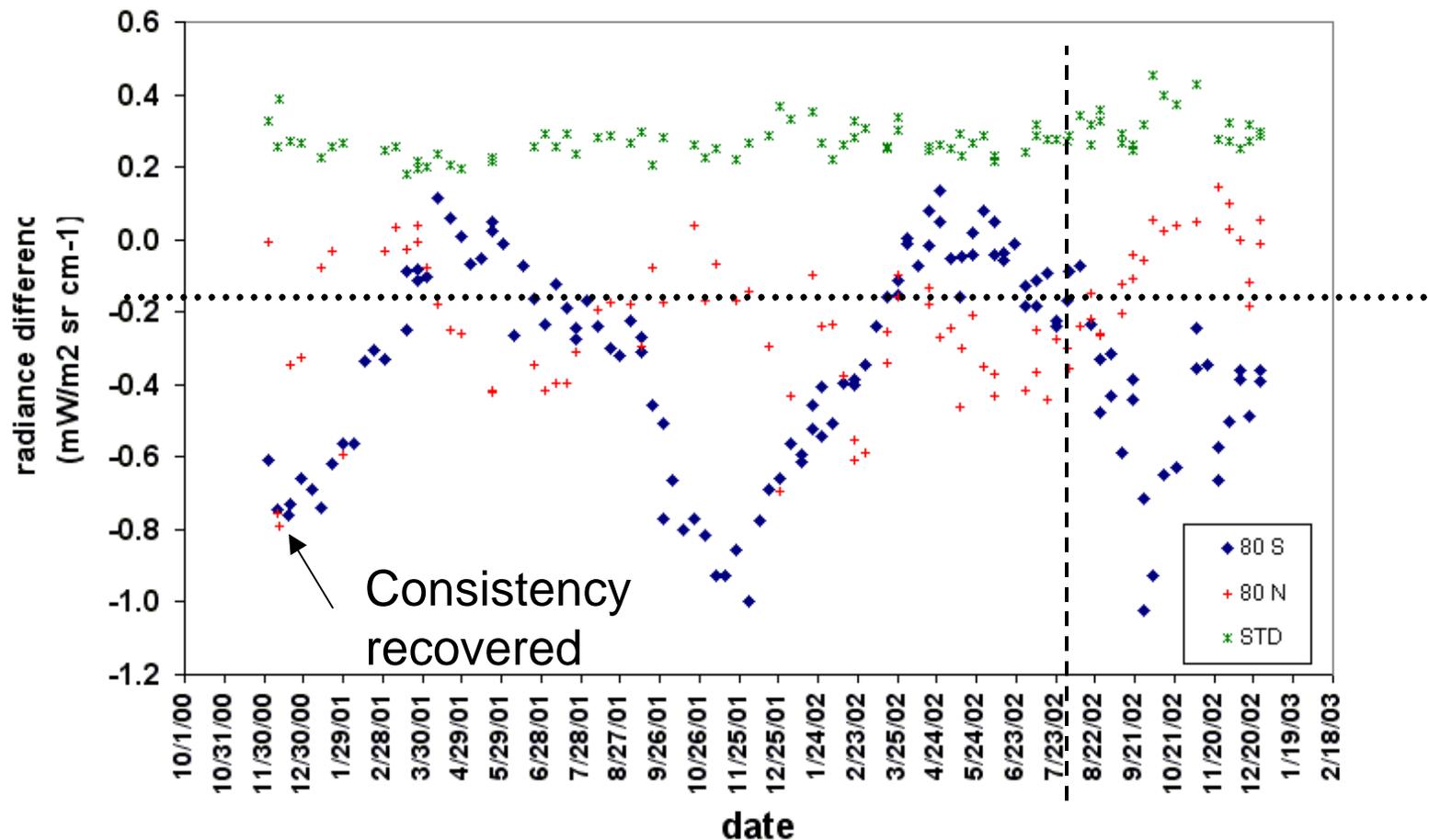
Inter-satellite HIRS Calibration Revealed Radiance Data Inconsistency (Ch 2 differences @ 680cm⁻¹)



Source: Cao, C, and H. Xu, Inter-satellite Calibration of HIRS. Calcon, 2003, Logan, UT



Reprocessing using new Calibration Algorithm Radiance Difference (Channel 2 @ 680 cm⁻¹)

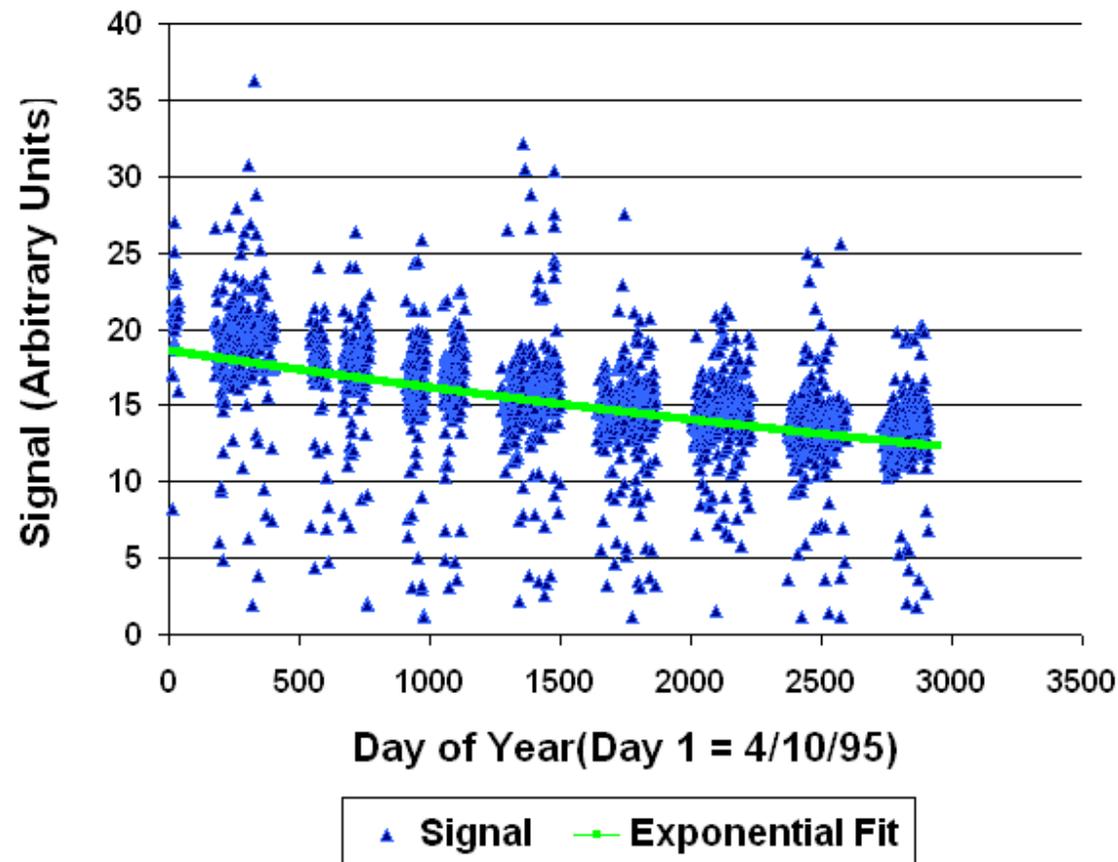


Source: Cao, C, and H. Xu, Inter-satellite Calibration of HIRS. Calcon 2003, Logan, UT



Current Operational Satellite Sensors – GOES 8

GOES-8 Star Beta-Cnc IMAGER Signal
Time Span(4/10/95 - 6/17/2003)

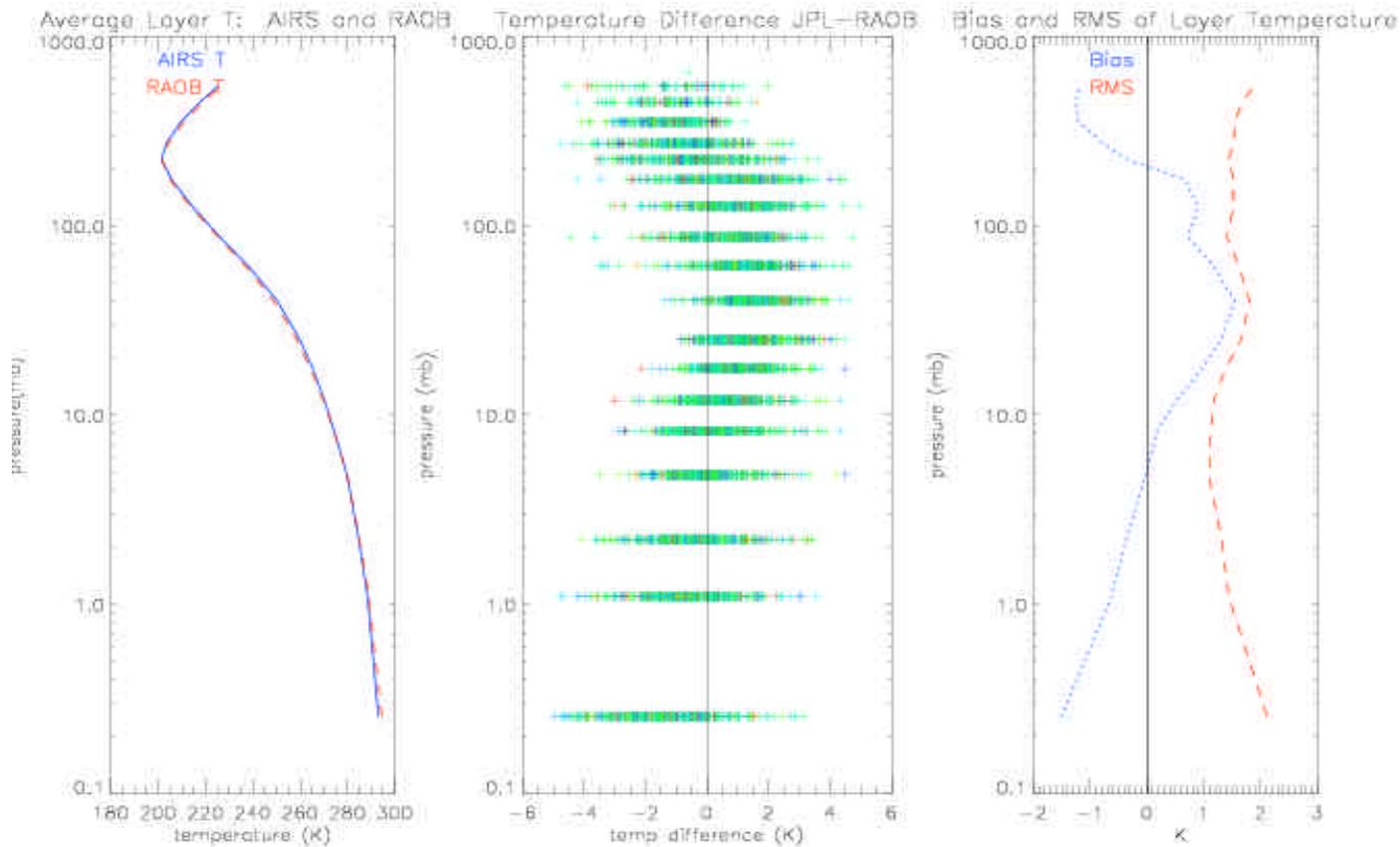


–M. Weinreb



Near Future – Validation of AQUA/AIRS Temp. Differences (AIRS - RS80 Radiosonde)

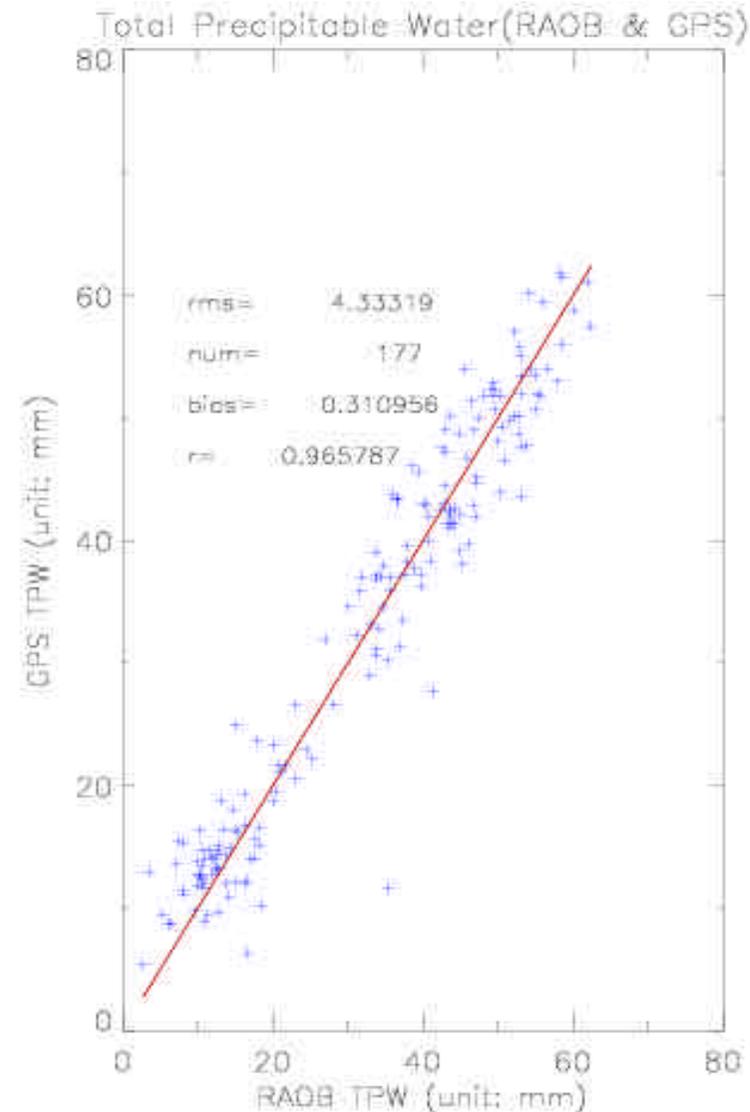
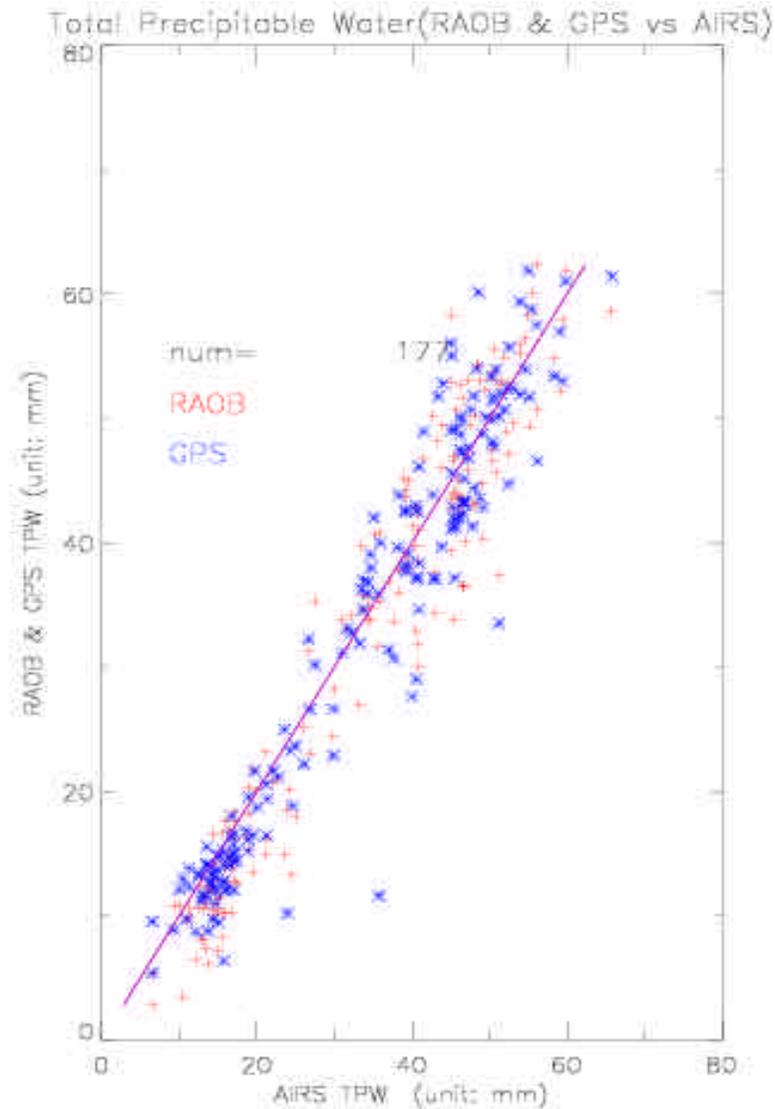
LAT (YLOG) RAOB Type 61 (RS80)



–Jiang and McMillin

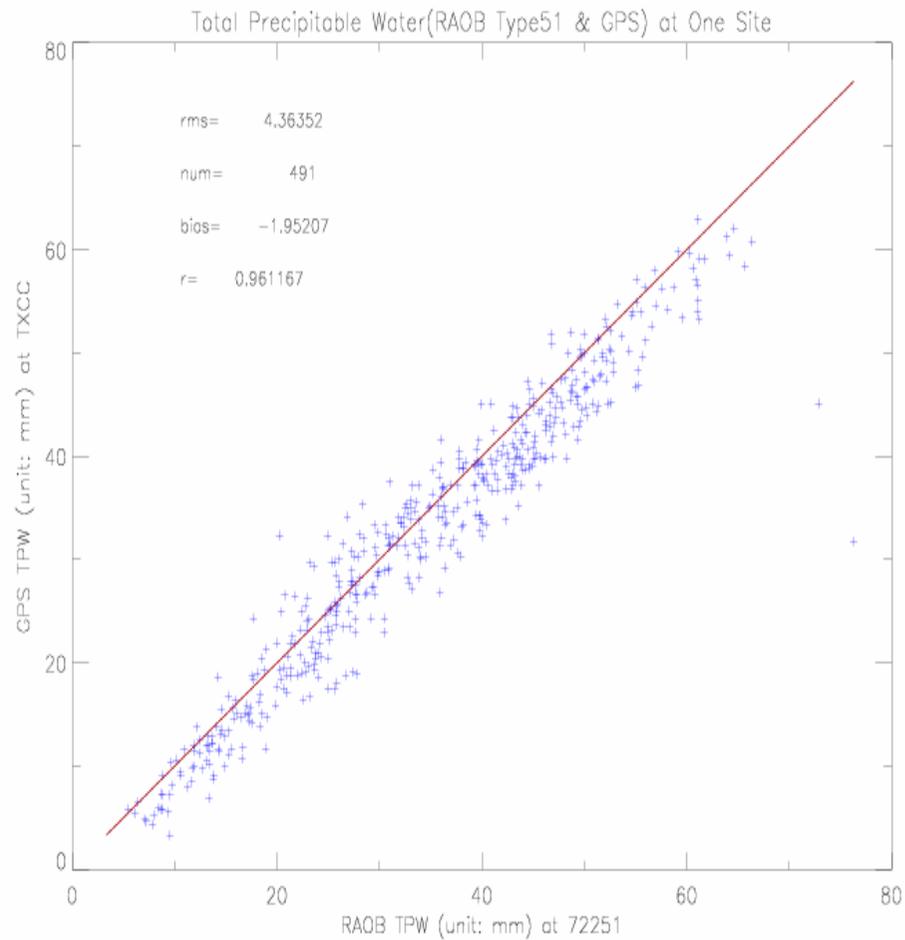
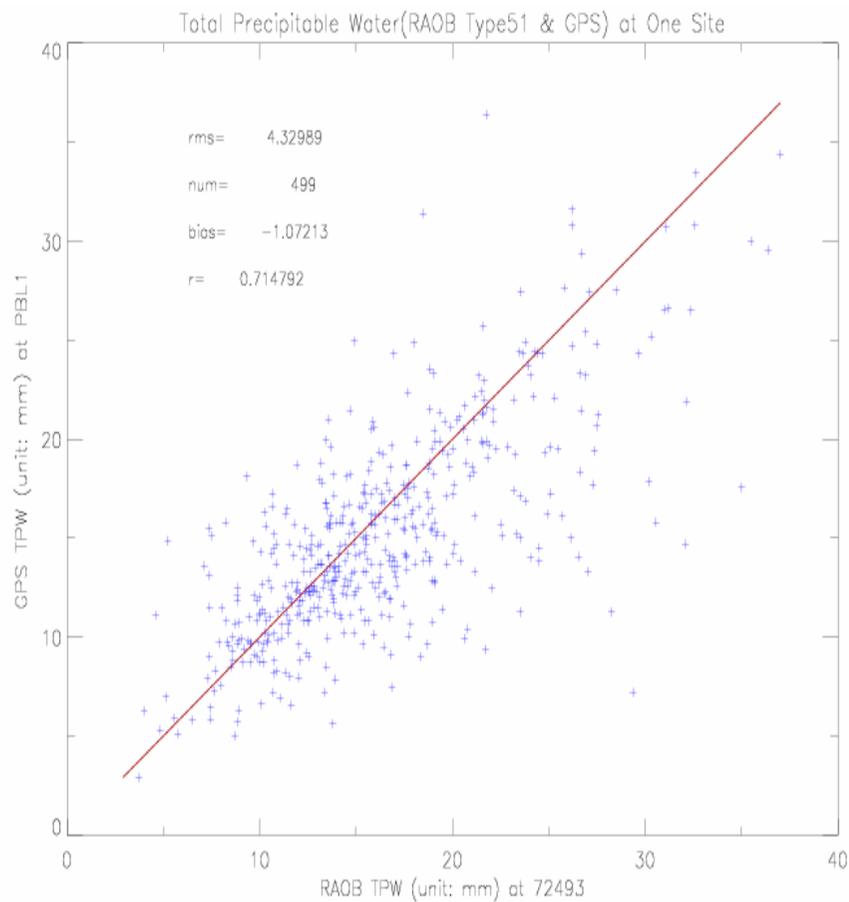


Near Future Operational: AQUA/AIRS IPWV Validation





RAOB Type 51





NPP Cal/Val

- NPP = NPOESS Preparatory Project (IPO/NASA)
- NPP carries VIIRS, CrIS, ATMS, and OMPS
- Purpose
 - » Risk-reduction for NPOESS
 - » EOS-NPOESS bridge for data for Global Change Research
- A joint cal/val plan was developed by IPO and NASA
 - » IPO: cal/val for operational products (RDRs, SDRs, EDRs)
 - » NASA: cal for science applications, trending of sensor performance, validation of level-1 data and CDRs
 - » SSPR Contractor: development of cal/val activities adopting NPP cal/val guidelines



NPOESS Cal/Val

**NPOESS concept--“Shared System Performance Responsibility”
(contractor and government teams)**

- **Cal/Val planning is joint activity between SSPR contractor & gov’t**
 - » **NPOESS Cal/Val WS held in VA, June 2003**
- **IPO soliciting internal government studies for cal/val**
- **Sensor calibration to be based on NIST standards**
- **SSPR contractor has prime role in pre-launch cal, verification, & characterization, with gov’t oversight**
- **Gov’t has ultimate responsibility for executing post-launch validation, with contractor participation**
 - » **Gov’t maintains key correlative data**

**NPOESS = National Polar-orbiting Operational Environmental Satellite System
(NOAA/DOD/NASA) managed by Integrated Program office (IPO)**



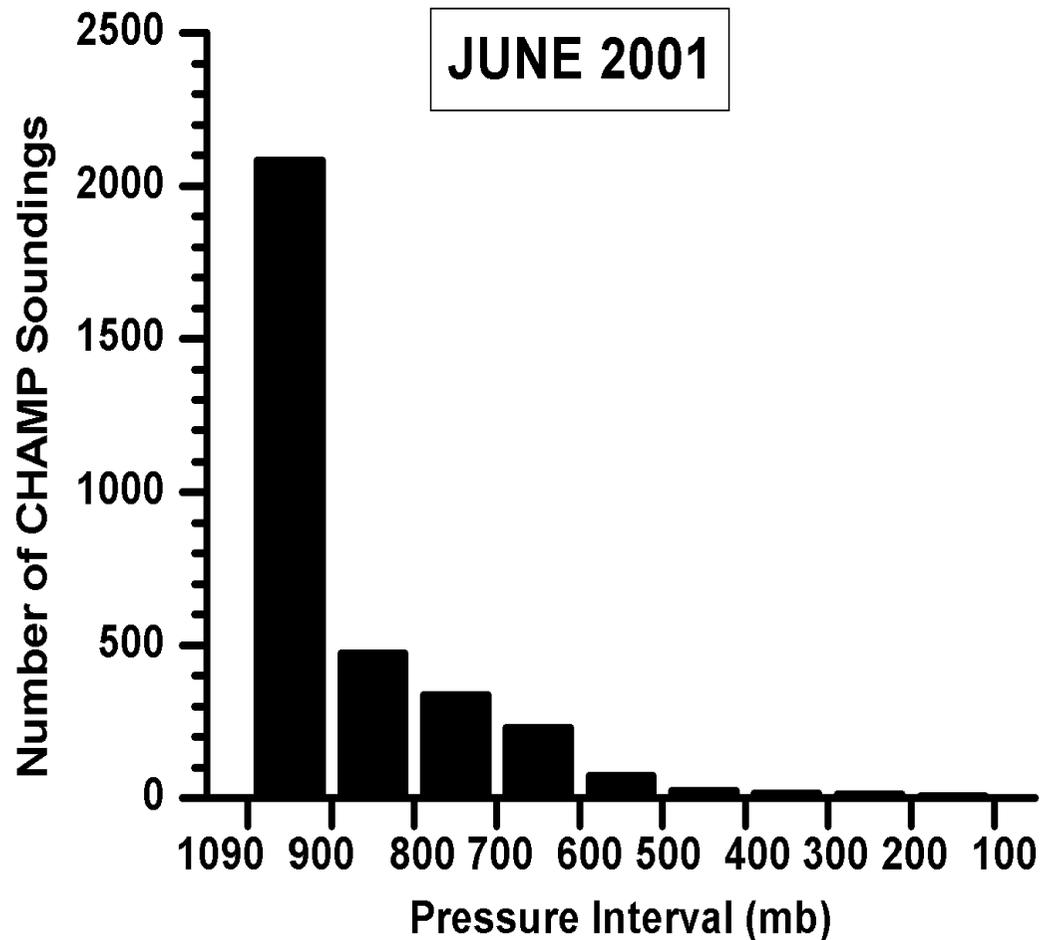
Status of the Unified NESDIS System for Monitoring Instrument Radiometric Performance

User-friendly (web-based) system with high level info, documentation, meta-data, eng & radiometric data archived – undertaken at NRC recommendation

- Tom Kleespies has assumed leadership
- Survey of current capabilities & generation of system requirements document - near completion (1 month) by Aerospace Corporation
- Formulation of alternative architectures to begin in FY04 (funding secured)
- Design and construction of system (FY04-FY05)



Future Operational: GPS/RO Vertical Coverage Verification



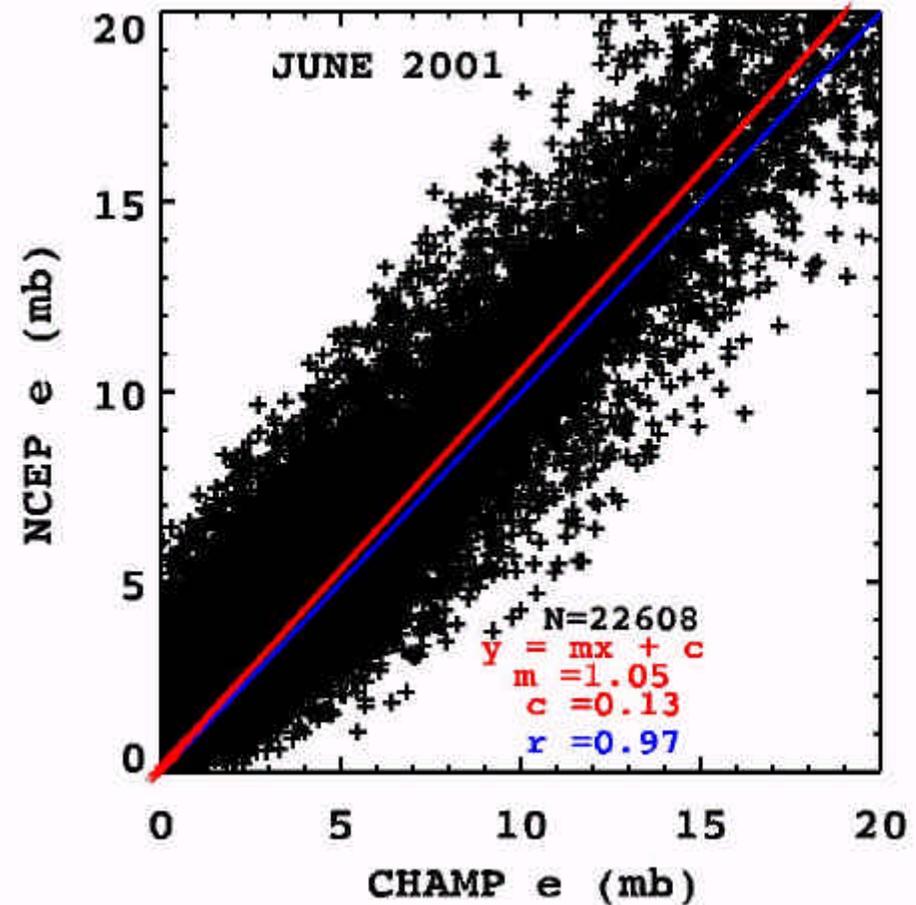
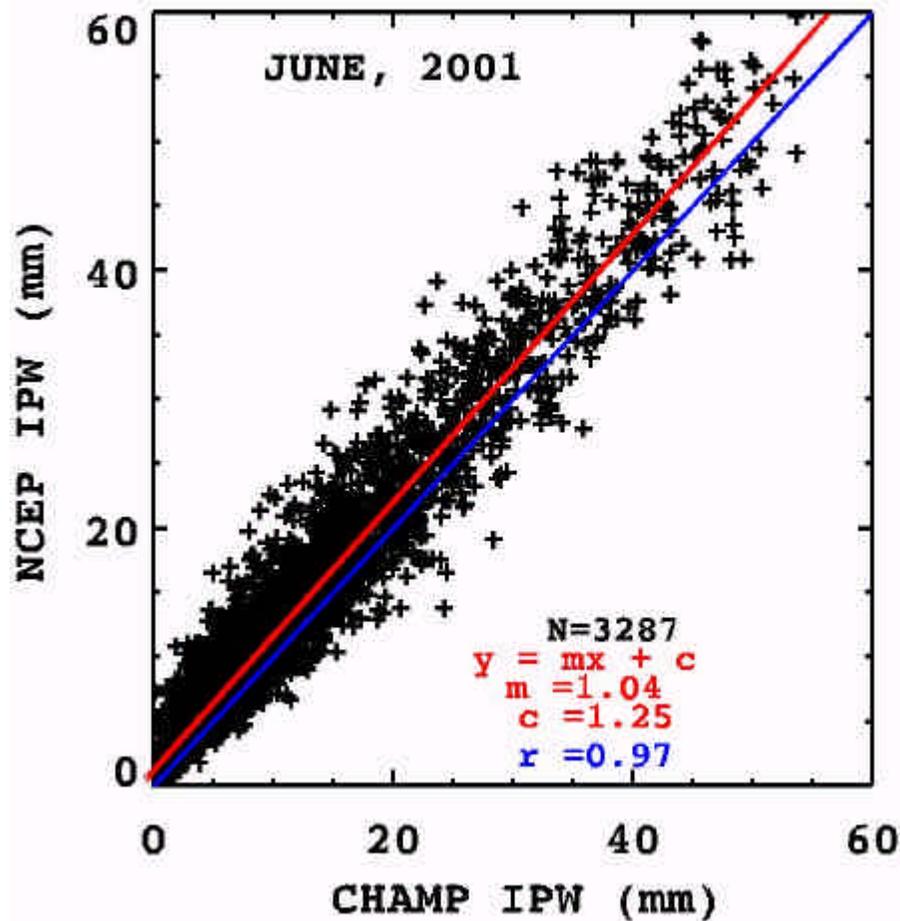
CHAMP Data courtesy
NASA/JPL

Alternate Sources
UCAR/CDAAC and GFZ
Potsdam

Statistics prepared by Rama
Varma Raja, IMSG for NOAA



Future Sensors: Preliminary CHAMP Moisture Check



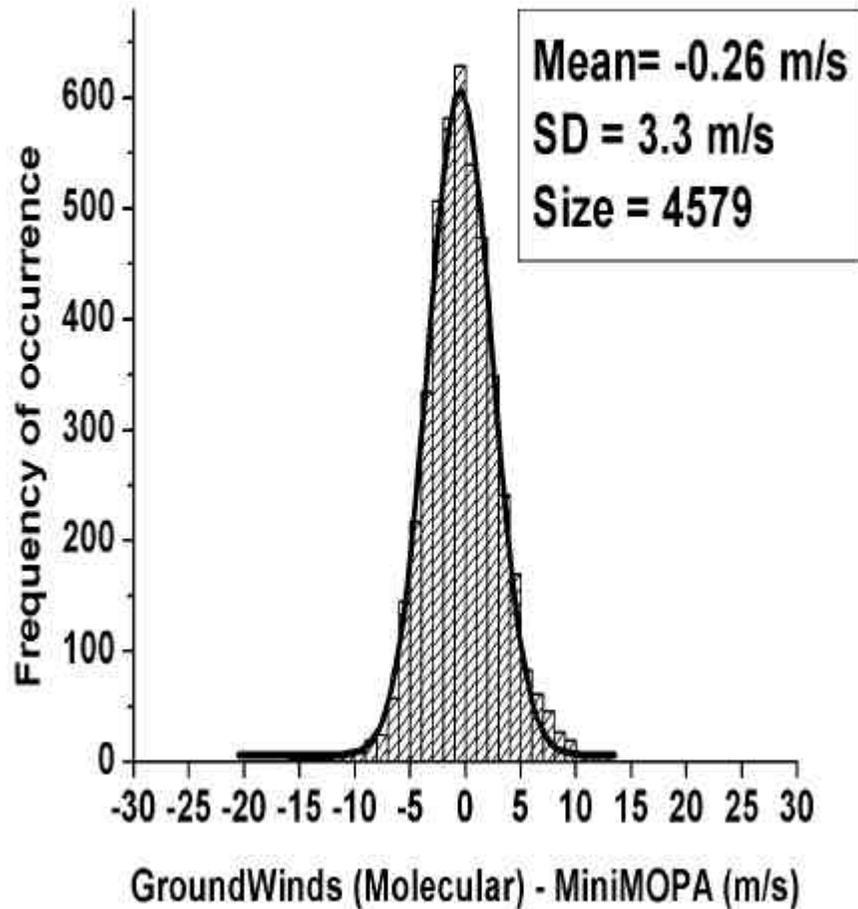


Future Satellite Sensors - Doppler Wind Lidar

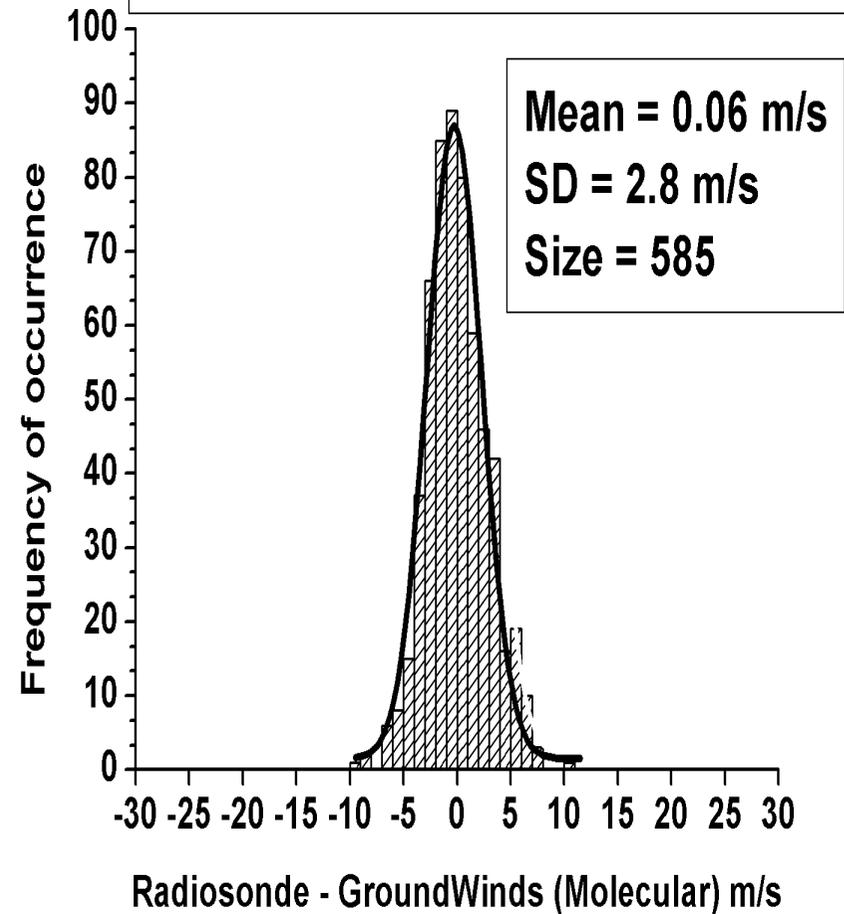


- Highest Unmet Data Requirement for NWP
- Technologically Challenging
- Demonstration Space Instrument (ESA's ADM) expected in 2007
- Ground-based Instruments for technology development, assessment (left)

09/28/00, 0.25 km to 5km, 2046-0425 UT, 1min data



09/28/00 2046 - 0425 UT 0.5 to 5 km



Histograms of the differences between corresponding pairs of (left) 1-minute line-of-sight projected horizontal (LOSH) Doppler velocities for the GroundWinds and mini-MOPA DWLs, and (b) GroundWinds (10-min averaged) LOSH and the component of the height-averaged radiosonde horizontal wind along the DWL azimuth



An Eye to the Future

- Communicate more comprehensively between WGCV and NOAA/NESDIS/ORAs*
 - » SAR and Scatterometry
 - » OC
 - » Microwave sounders
 - » Atmospheric Chemistry
 - » Aerosols
 - » Land and Surface Products
- Explore METOP/NPOESS c/v consistency

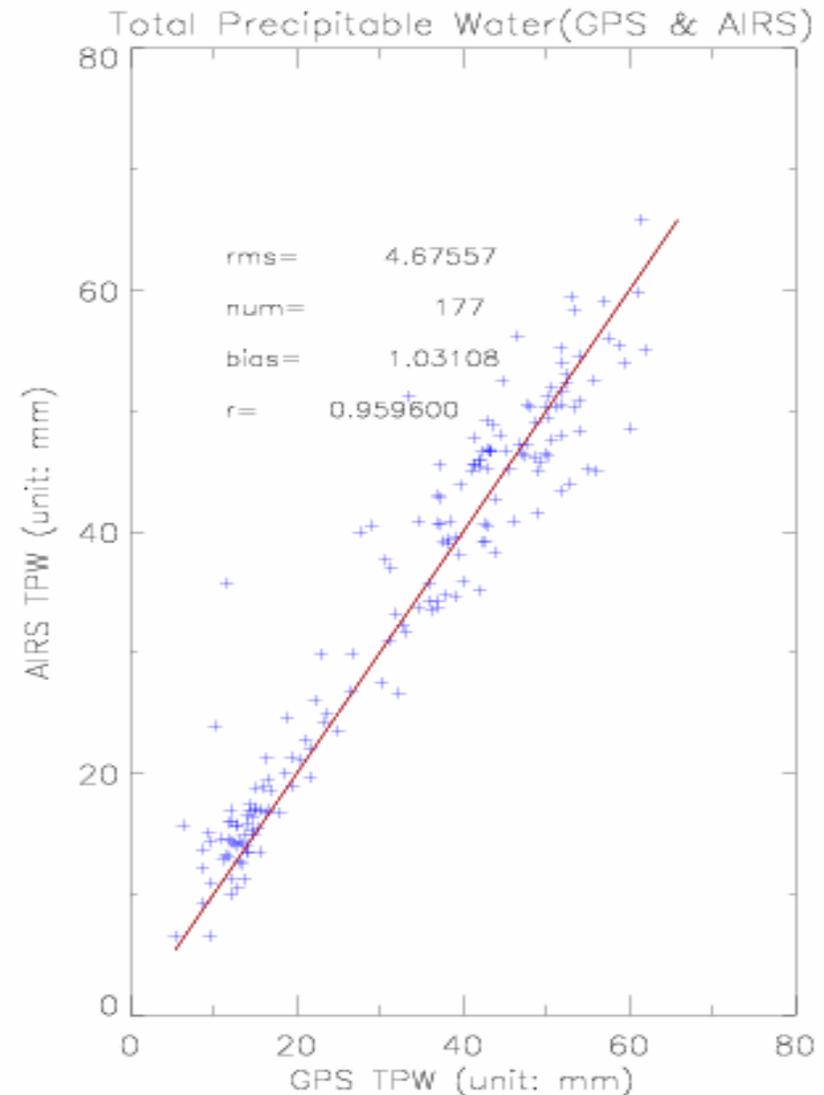
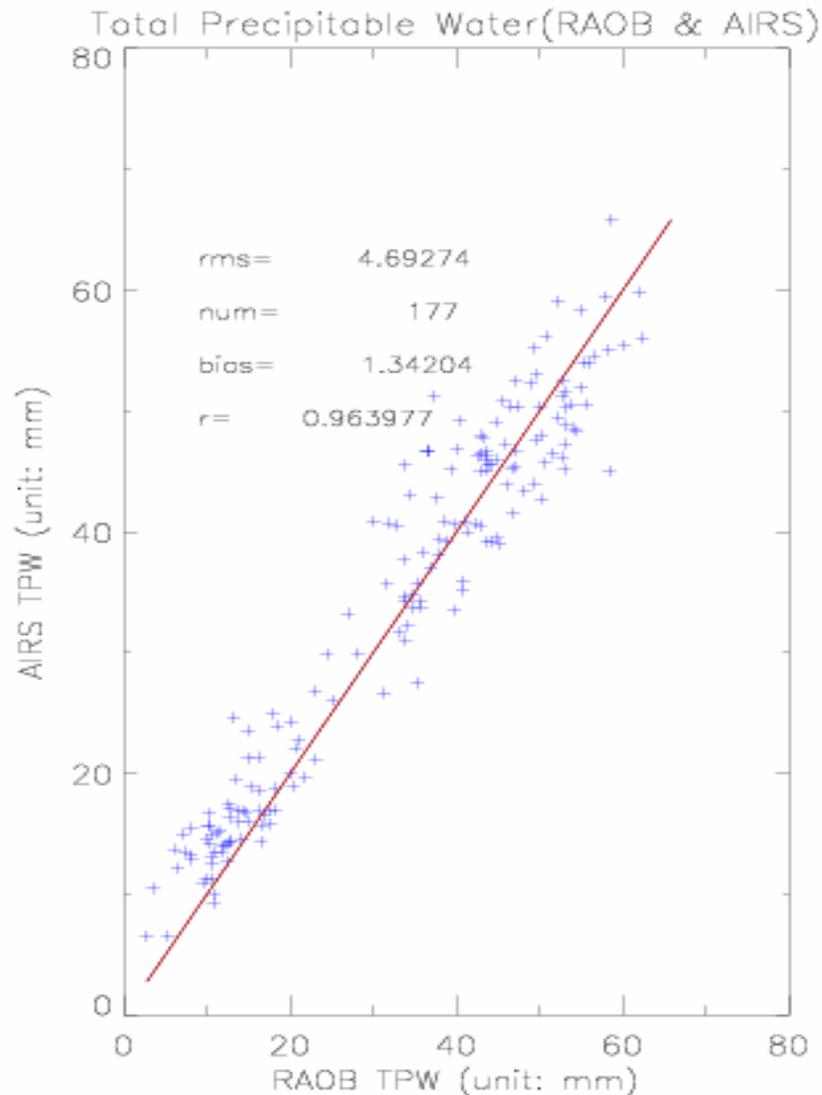
* Office of Research and Applications, soon to become the Center for Satellite Applications and Research, (STAR)



Extras Follow



Near Future Operational: AQUA/AIRS IPWV Validation





RAOB Type 52

