

GPM Intersatellite Calibration ("X-CAL") Status

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GPM Intersatellite Working Group (aka X-CAL)

Make Radiances from Constellation Radiometers Physically Consistent
Differences of Frequencies/Incidence Angles

Clean Up Other Problems (Pre-Screening)

Variety of Methods To Generate Two Point Recalibrations
Unified set of Deltas

$$T_{b_{\text{new}}} = A * T_{b_{\text{old}}} + B$$

Could Be More Complex Where Necessary.
Sometimes Simpler

Currently Have Consensus Calibration based on Windsat and TMI
Use TMI as Transfer Standard. (CC_1.1) (75% Windsat—25% TMI)
Published in Proceedings of IGARSS 2011

Models

No model is absolute truth. (Love/Hate Relationship)

Atmosphere: Rosenkranz

Ocean Surface: Elsaesser

Use Double Differences to Minimize Sensitivity to Model Choices

However: Some Algorithms (*i.e.* TAMU, CSU) Tune to Models to Some Degree

If we use Goodness-of-Fit Metrics to Evaluate How Well We're Doing

TMI CC_1.1 Works Better Than Uncorrected Windsat

WS CC_1.1 Works **WORSE** Than Uncorrected Windsat

We're Wrestling with Tuning Issue

Have made Progress on Understanding

From Steve Bilanow's Presentation at March 2011 X-CAL meeting TMI Pointing Uncertainty Effects

- “Prelaunch measure of TMI 10 V and 10H boresight alignment offsets from a 49 degree scan cone were reported at 0.555 and 0.185 degrees respectively. “

Memorandum from Jim Shiue, 12/11/97”

When you do the trigonometry, this translates to *increases* of the Earth Incidence Angle for the two 10.7 GHz channels of 0.649° and 0.216°. (OK, a few too many significant figures)

Is it real? *(Yes)*

Does it matter? *(Some and it Depends)*

Recalibration Will Paper Over this Sort of Problem to Some Degree

See Wilheit poster for details

TMI CC_1.2

We have CC_1.1 to work with now, can take necessary time for CC_1.2

More Rigorous/Defensible

Error Model-Based Weights for Unified Deltas

More Consistent Data Handling

Include 10 GHz Angle Issue

Investigate Use of Other Radiative Transfer Models
(*e.g.* CRTM)

Investigate updated Windsat Data Version

Other Imaging Radiometers

AMSR-E

Have a working set of Deltas relative to TMI CC_1.1
Offset only @ 89 GHz
23H incomplete

SSM/I (F13, 14 &15)(Beta Product from CSU)

Prescreening shows Many Wild Points
Refined Geolocation/Incidence Angles
Beta Intercalibration Referenced to F13
Moving Target

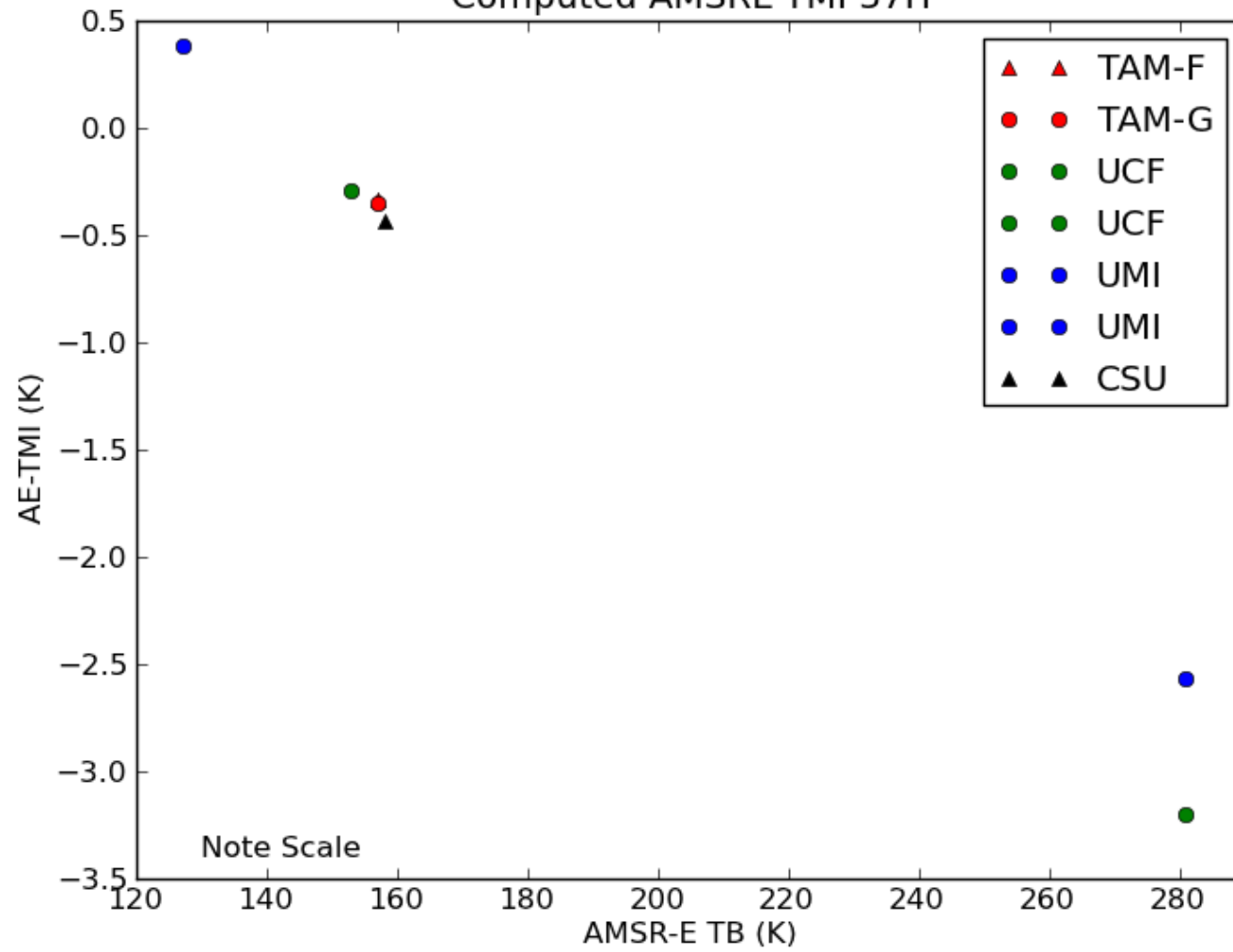
SSMIS

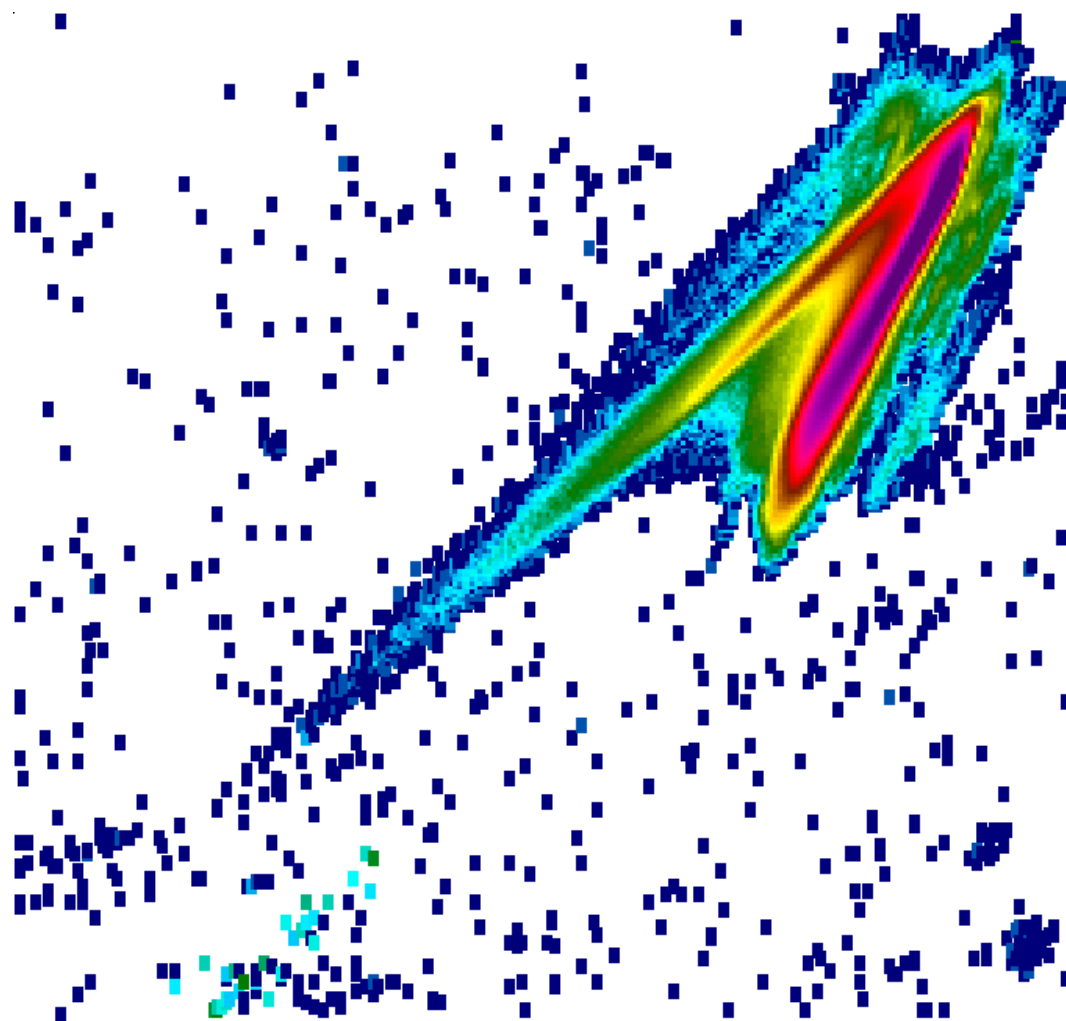
Awaiting FCDR from CSU

Future

Anxiously awaiting data from Megha-Tropiques, GCOM-W, NPP
(FY & Aquarius ?)

Computed AMSRE-TMI 37H





SSM/I F13 July 2005
Ocean only Flag = 5
Lat 40S to 40N
Horiz Axis 85V
50 to 300K
Vert Axis 85H
50 to 300K
Color = # of Samples
1(blue) 100K(purple)



Water Vapor Sounders

Peter Bauer supplied data set from ECMWF Interim Analysis
Observations, Corrections, Computed Tbs from Analysis and Forecast
Intercomparisons of Operational Water Vapor Sounders Looked Quite
Consistent
NOAA 15 was a mess.

Jim Wang Used DOE/ARM Data for Forward Calculations
Bulk Comparisons Differed from ECMWF
NOAA 15 Not So Bad

Detailed Comparisons showed Observations weren't the Same
Different Data Versions

Versions May be More than a Nuisance Issue.

Water Vapor Sounders Continued

Megha-Tropiques has a water vapor sounder and low inclination orbit
(a lot like GPM-Core)

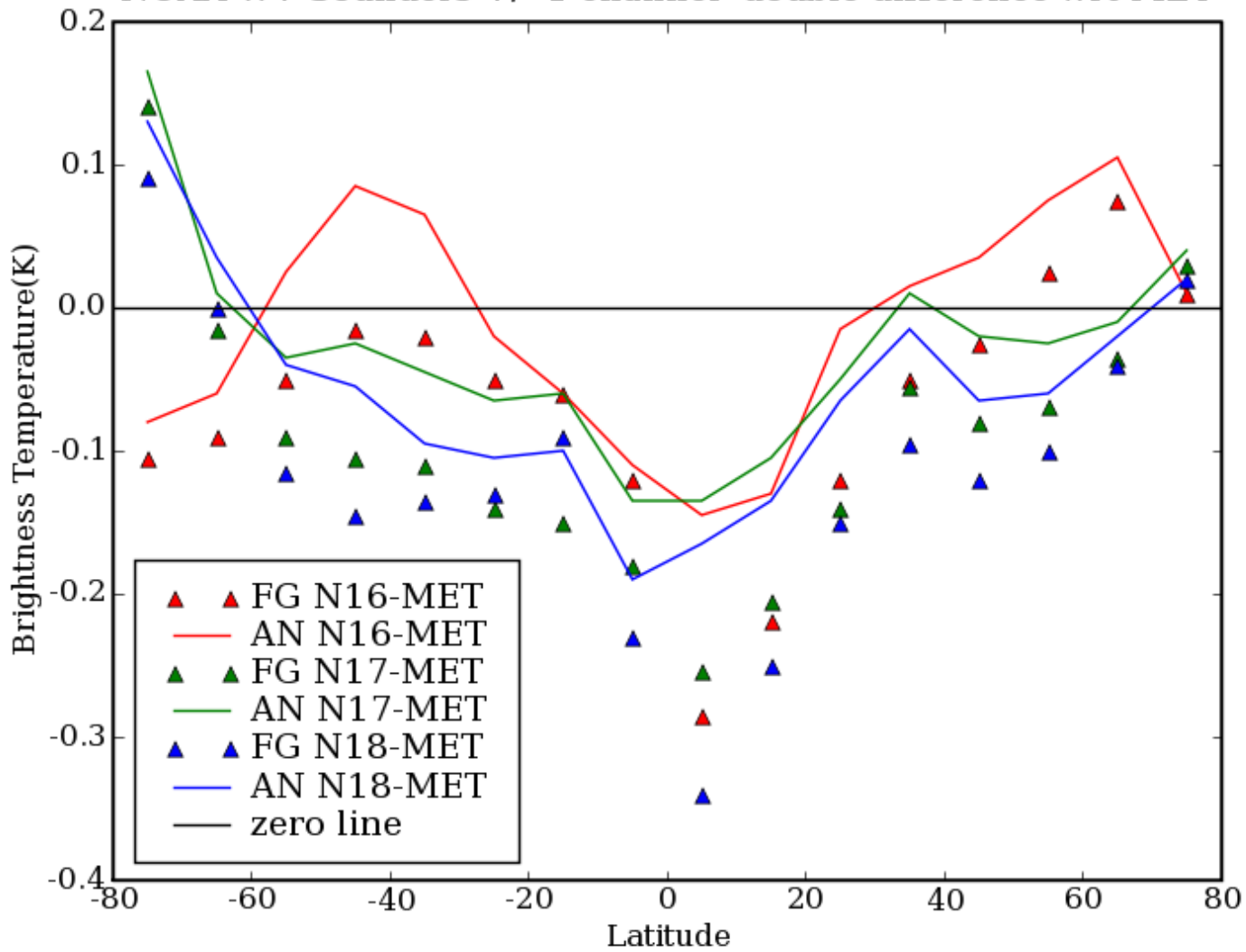
We have methods in hand:

- High Quality Ground truth (ARM Sites)
- Forecast Analysis Based

Will also use results from 4DVAR where we can.

New Idea from Yesterday: GPS Occultation

NOAA WV Sounders +/- 1 channel double difference wrt MET



X-CAL /GSICS Cooperation (Presented at GSICS Workshop, Olso, Sept. 2011)

X-CAL Will Share Data, Models, Documentation, Results

Level 1-C Recalibrated Product Publically Available

Earlier Steps may have Externally Applied Restrictions

Will Answer Reasonable Level of Questions

Will Assist in Data Transfer (*e.g.* Take a Hard Drive to a Meeting)

We each can reduce our efforts in any area where it appears the other's effort will serve our purposes.

GSICS seemed agreeable

Spare Slides

Consensus Calibration

Warm End Variance TMI a little more than twice as large as WS (K**2)

Cold End Variance TMI a little more than three times as large as WS

Keep the numbers simple and round

Windsat Gets 3 times the weight of TMI (i.e. 75%WS/25%TMI)

Consensus Calibration 1.1

75% of Unified Deltas

TMI_CC_1.1

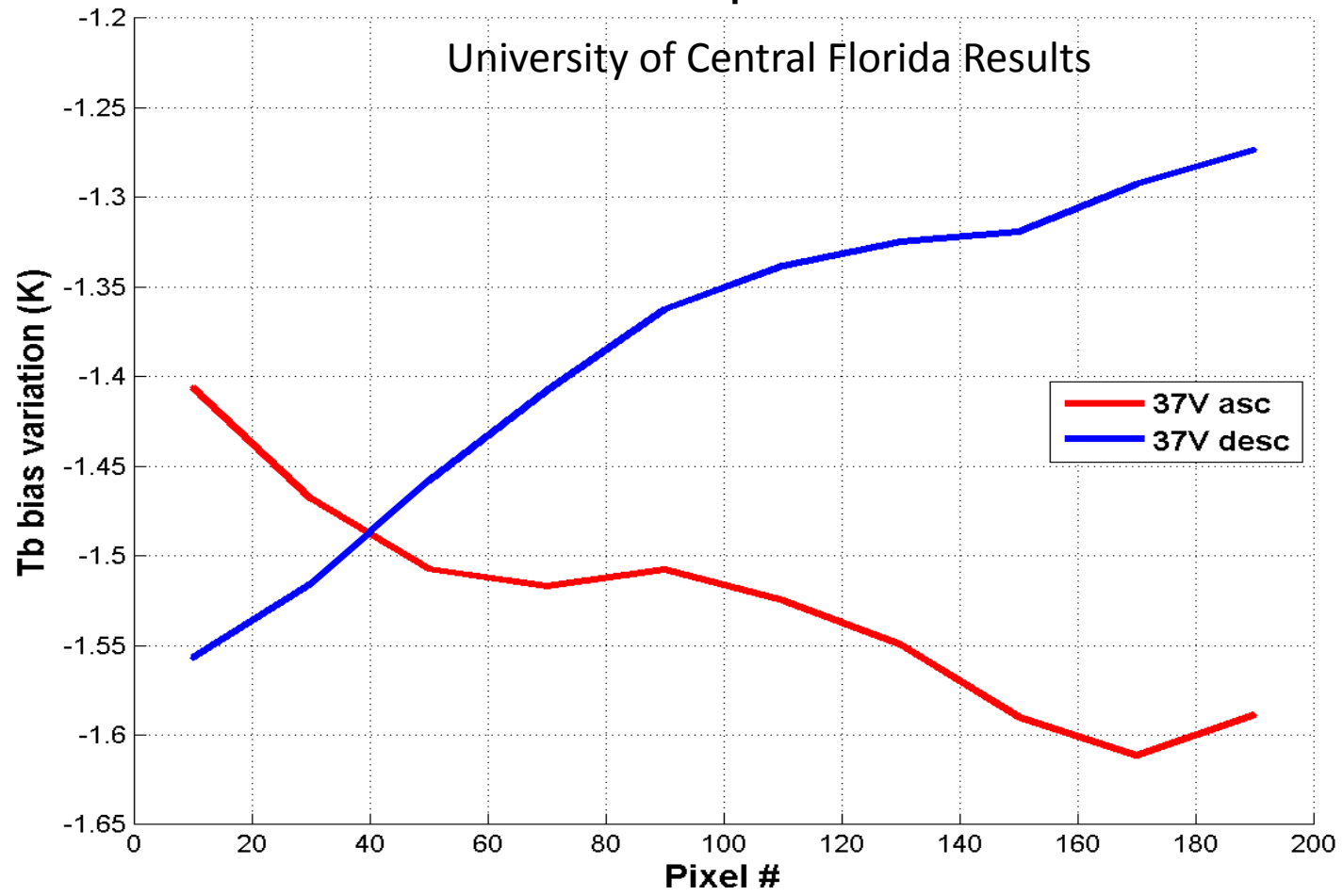
	10V	10H	19V	19H	21V	37V	37H
	0.23K	-1.25	-0.46	-2.40	-1.42	-2.43	-1.81
@	163K	85	188	109	200	206	135
	-0.57K	-0.69	-0.90	-1.07	-2.53	-2.38	2.37
@	281K	280	285	284	284	281	281

Negative #'s indicate TMI cold relative to Windsat

Published in proceedings of IGARSS 2100

AMSRE Scan-dependent biases

University of Central Florida Results



SSM/I F14 July 2005
Ocean only Flag = 5
Lat 40S to 40N
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