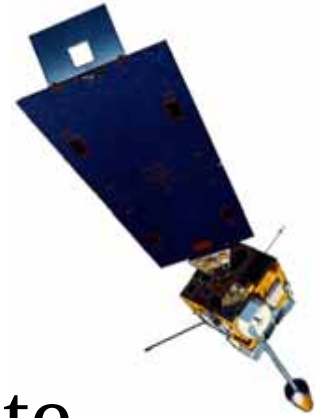
National Environmental Satellite, Data, and Information Service



NOAA Calibration/Validation Update

Presented by Changyong Cao
NOAA/NESDIS/STAR

With contributions from Mitch Goldberg, Fuzhong Weng,
Bob Iacovazzi, Likun Wang, and Ping Jing

Presented at the WGCV29, Avignon, France
Sept. 30 – Oct. 3, 2008

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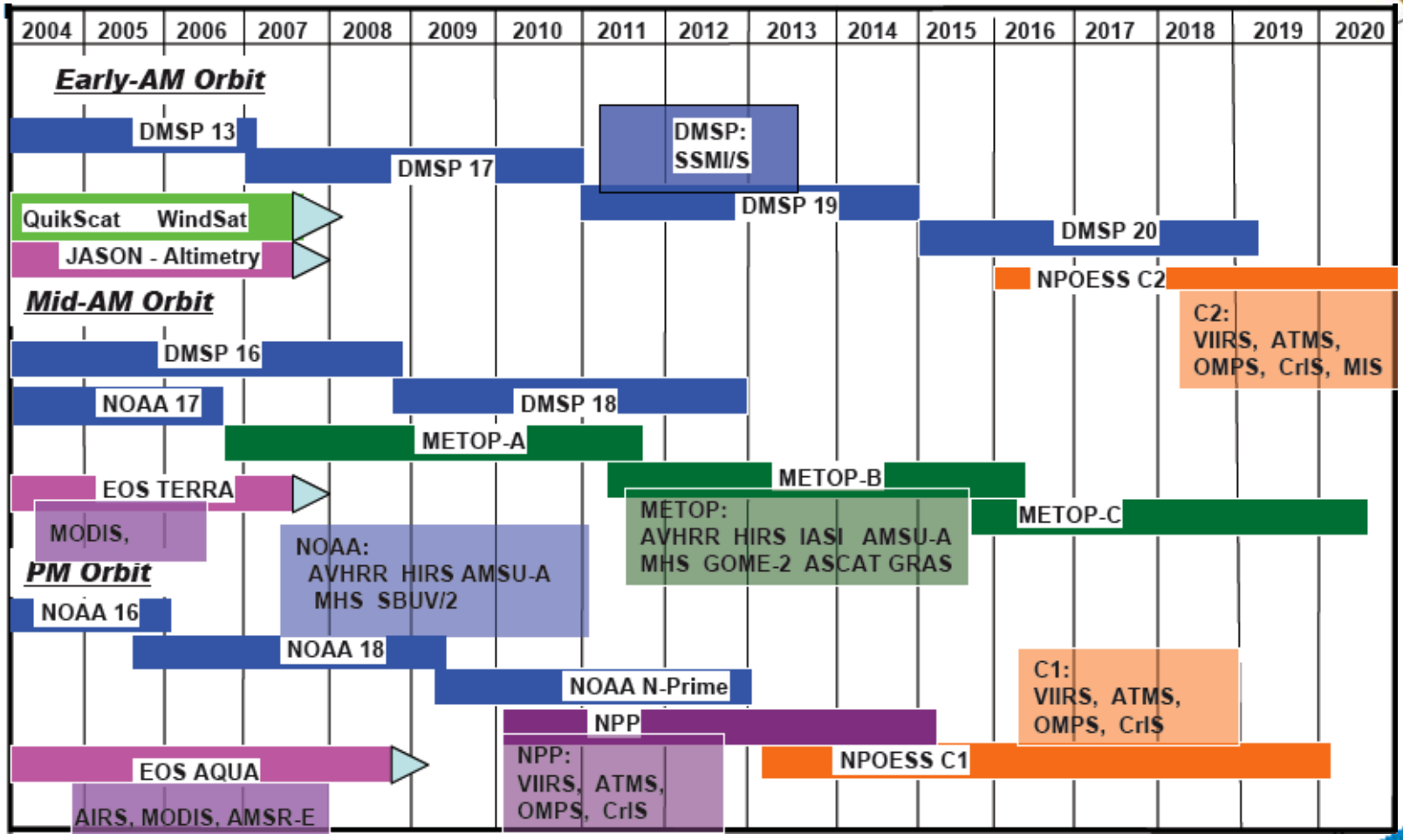
Polar-orbiting Satellites



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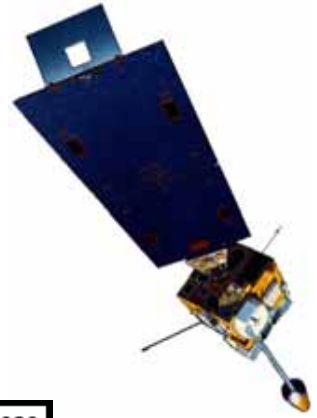
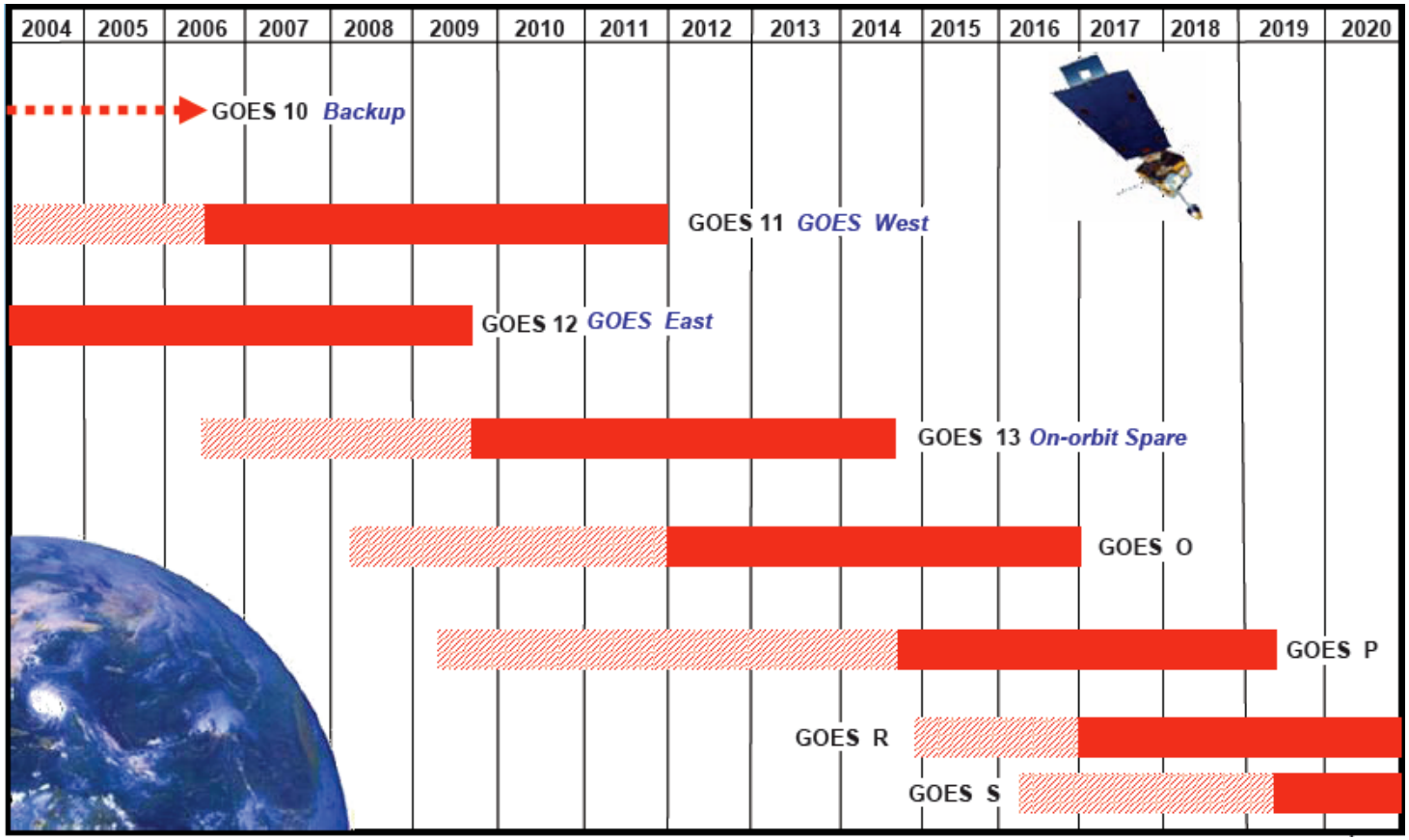


Geostationary Satellites



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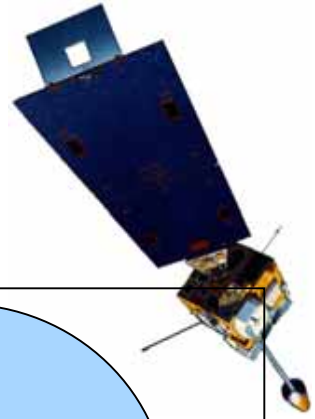
NOAA Cal/Val Programs



GOES

POES

Common themes:

- Operational calibration support
- Data quality assurance
- Calibration for climate
- Cal/val sites
- R2O (NASA)
- SI traceability (NIST)

GOES-R (GPO)

NPOESS (tri-agency IPO)

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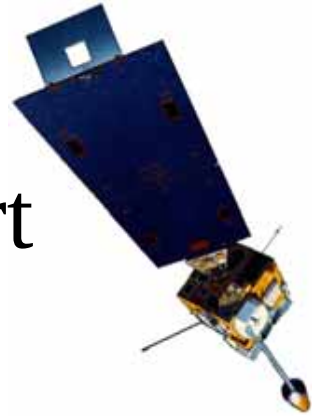

NOAA-N' Launch Readiness Support

- PM orbit (MetOP in AM orbit)
- Instruments: AVHRR/AMSU/HIRS/MHS/SBUV
- Launch readiness review in Sept. 08
  - Prelaunch thermal vacuum data analysis
  - Calibration parameter input datasets
  - Spectral response functions
- Will be launched Feb. 2009

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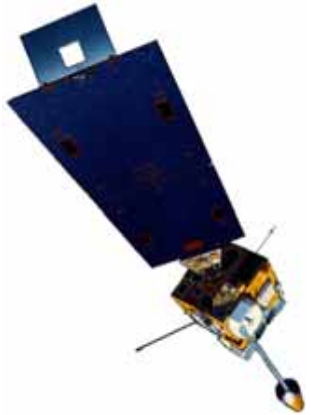
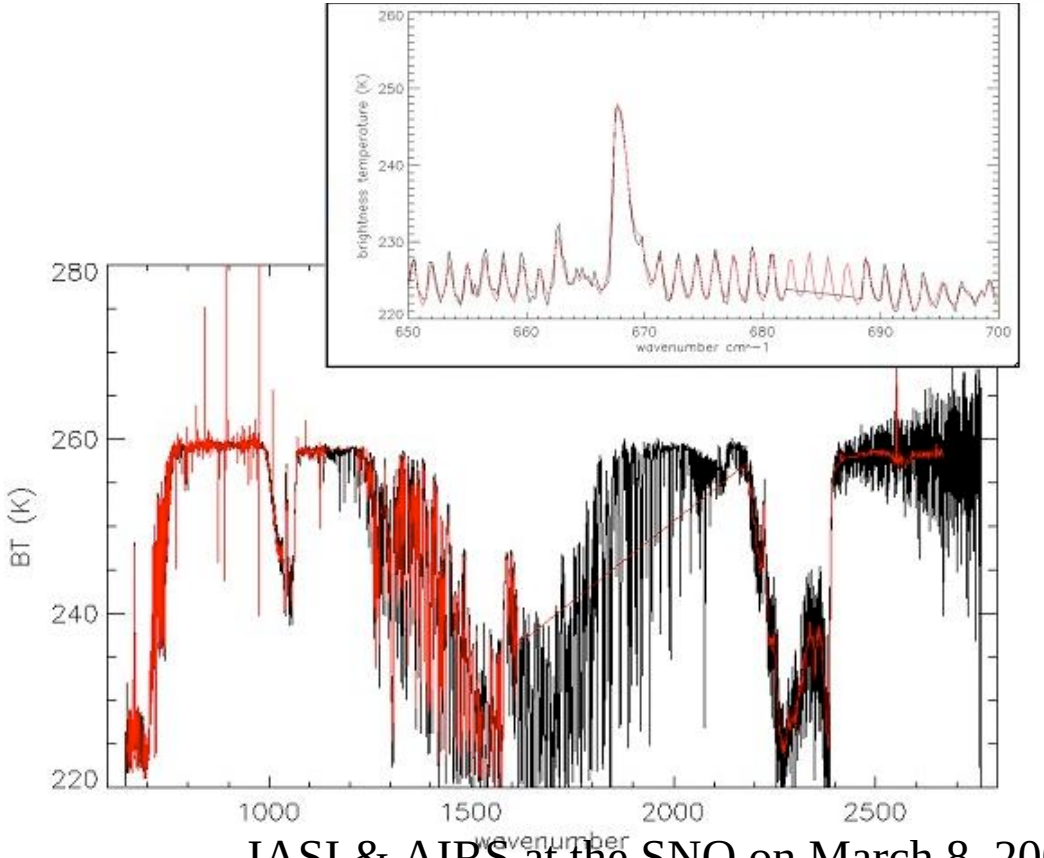


IASI as on-orbit radiometric/spectral reference standard

- Excellent agreement between IASI and AIRS (at the SNOs) provide the basis for using IASI as a reference standard;
- Same conclusion reached in several studies (Bluemstein, Tobin, Straw, etc.).



IASI & AIRS at the SNO on March 8, 2007

IASI can be used as a reference standard

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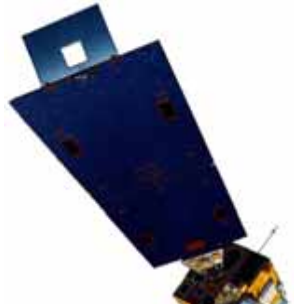
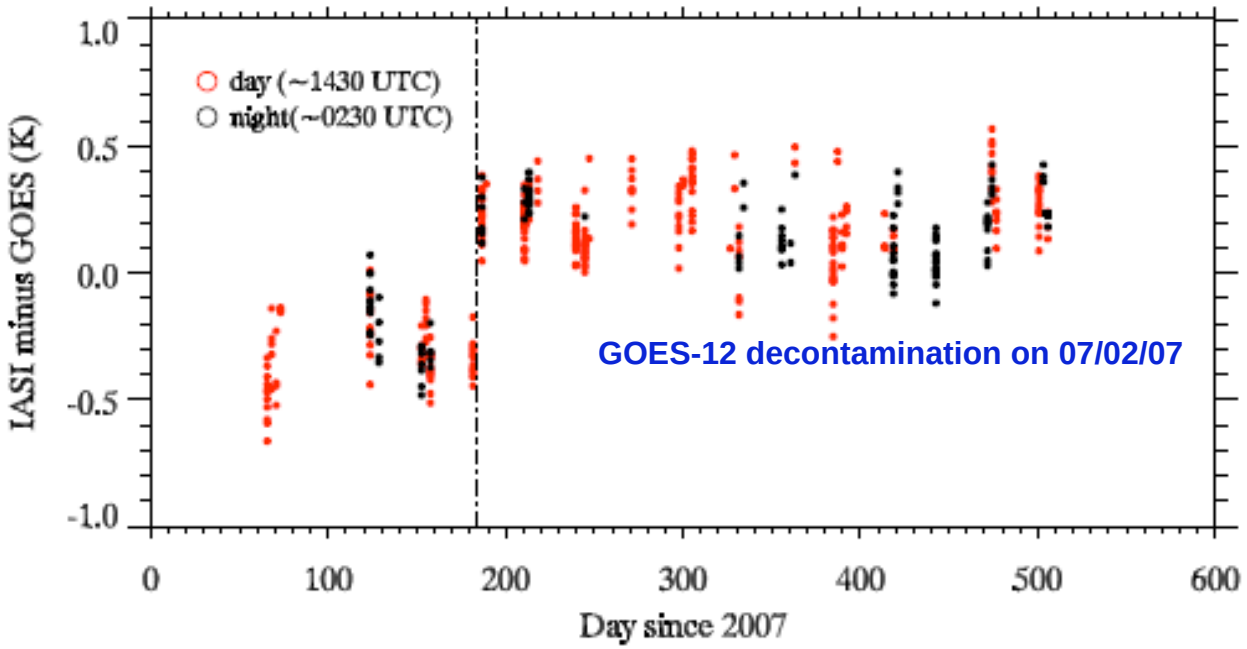
IASI successfully detects the changes after GOES-12 decontamination



- Inter-calibration of GOES-12 imager water vapor channel (Ch 3) is carried out using the IASI hyperspectral radiance measurements by selecting one year of the simultaneous nadir observations with homogeneous scenes.

- IASI successfully detected the changes after the GOES-12 decontamination on July 2 2007. The BT difference between IASI and GOES-12 for water vapor channel is roughly the same order of magnitude but opposite in sign before and after decontamination.



The time series of BT difference between IASI and GOES-12 imager for water vapor channel. The black dots indicate the nighttime data while the red ones are for daytime observations. The line indicates the date of July 2 2007 when the GOES-12 decontamination was performed.

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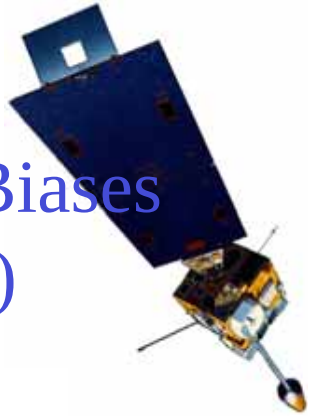
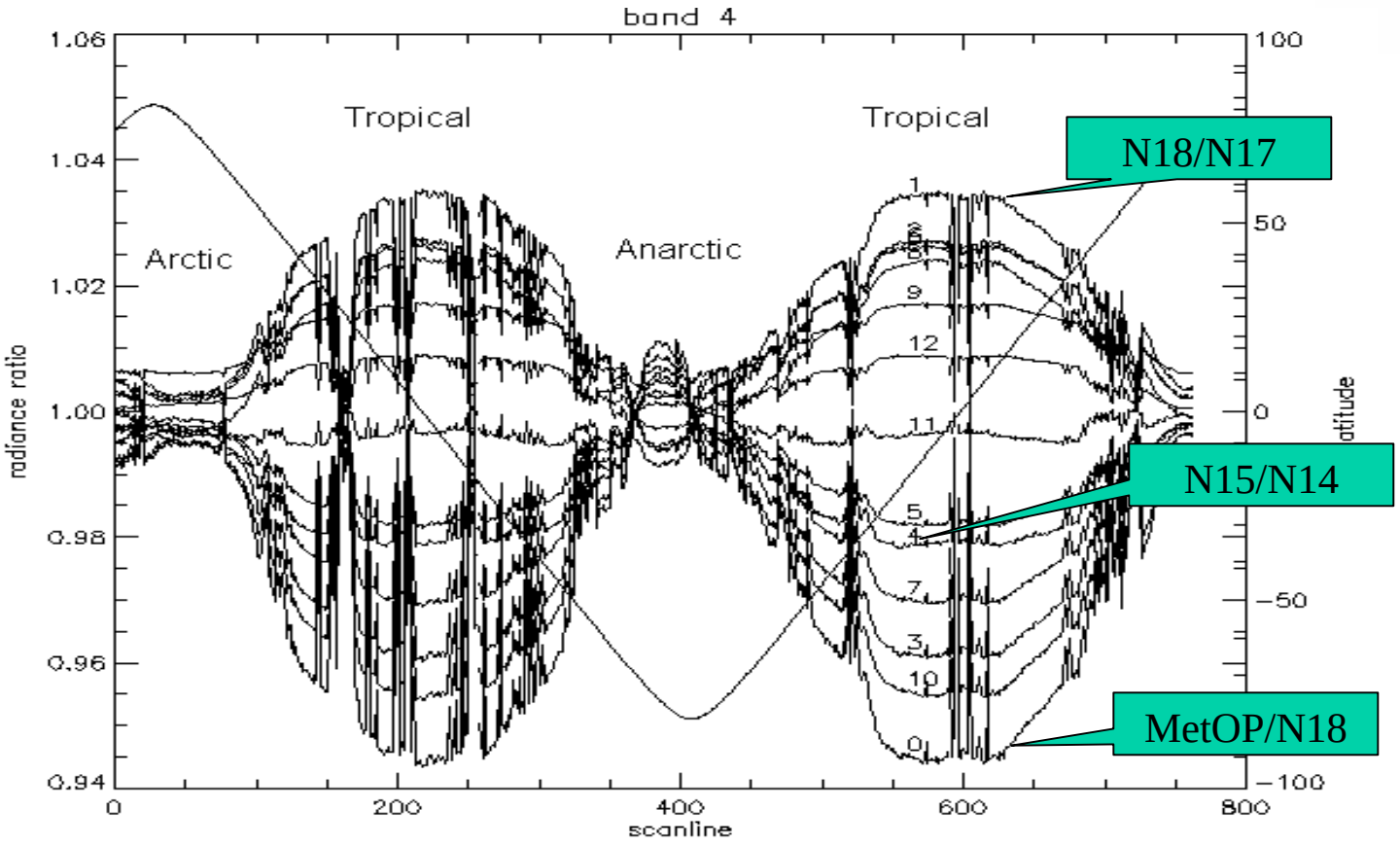


Effect of Spectral Differences on Intersatellite Biases
HIRS Band 4 at 703 cm^{-1} (peak at 250 hPa)



The bell curves can be used as a guide to study intersatellite biases for all historical instruments

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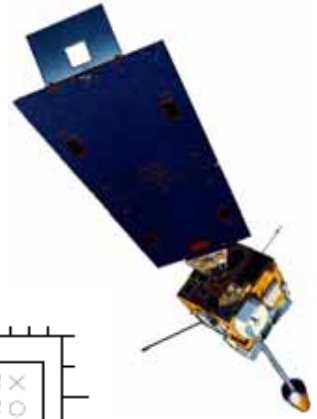
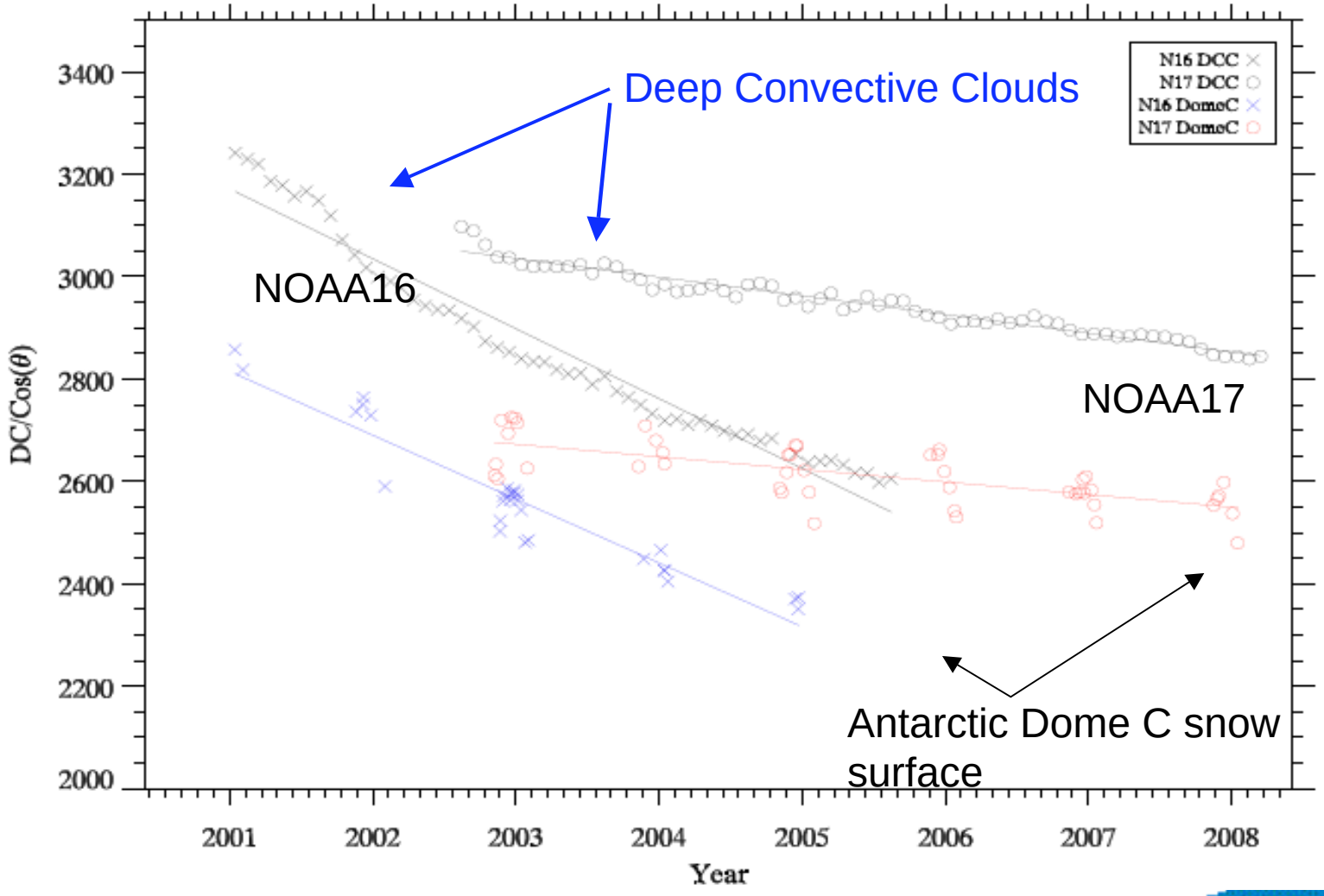
HIRS visible channel (ch20)





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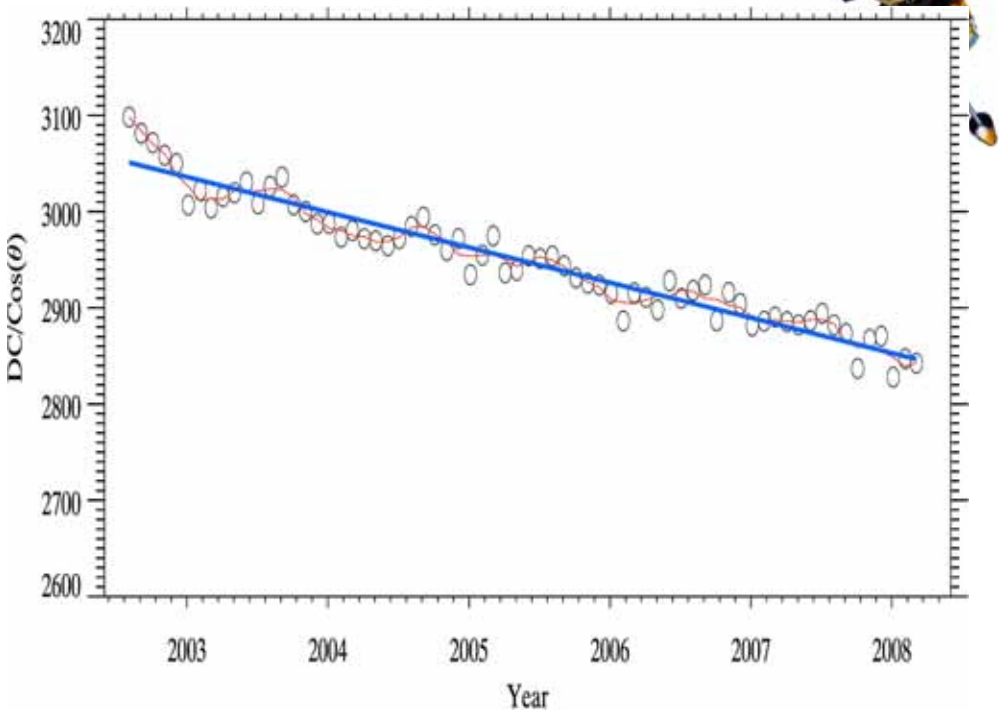
HIRS Visible Channel Calibration using Deep Convection Cloud (DCC)

- Deep Convective Clouds (DDC) are cumulonimbus clouds (<205K at +/-30 Lat).
  - very cold and with stable reflectance.
- The STAR cal/val team is adding the new capability of DCC calibration based on previous studies by NASA Langley and others.
- Pilot study done for HIRS visible channel on NOAA-17 using DCC.
- Results clearly show instrument degradation over a 6 year period, with small uncertainties.
- Among the advantages, DCC does not require atmospheric radiative transfer calculations as other Earth based target do.
  - Further evaluation is needed for climate quality stability using this method.



Time series of the normalized mode value derived from the DCC pixels' statistical distribution function for NOAA17/HIRS channel 20 (DC=Delta Count).

Significance: Refining climate quality calibration techniques to meet the instrument stability requirement is critical for global change studies

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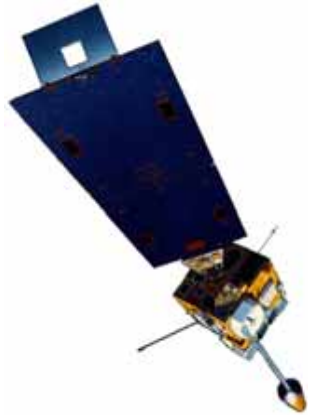
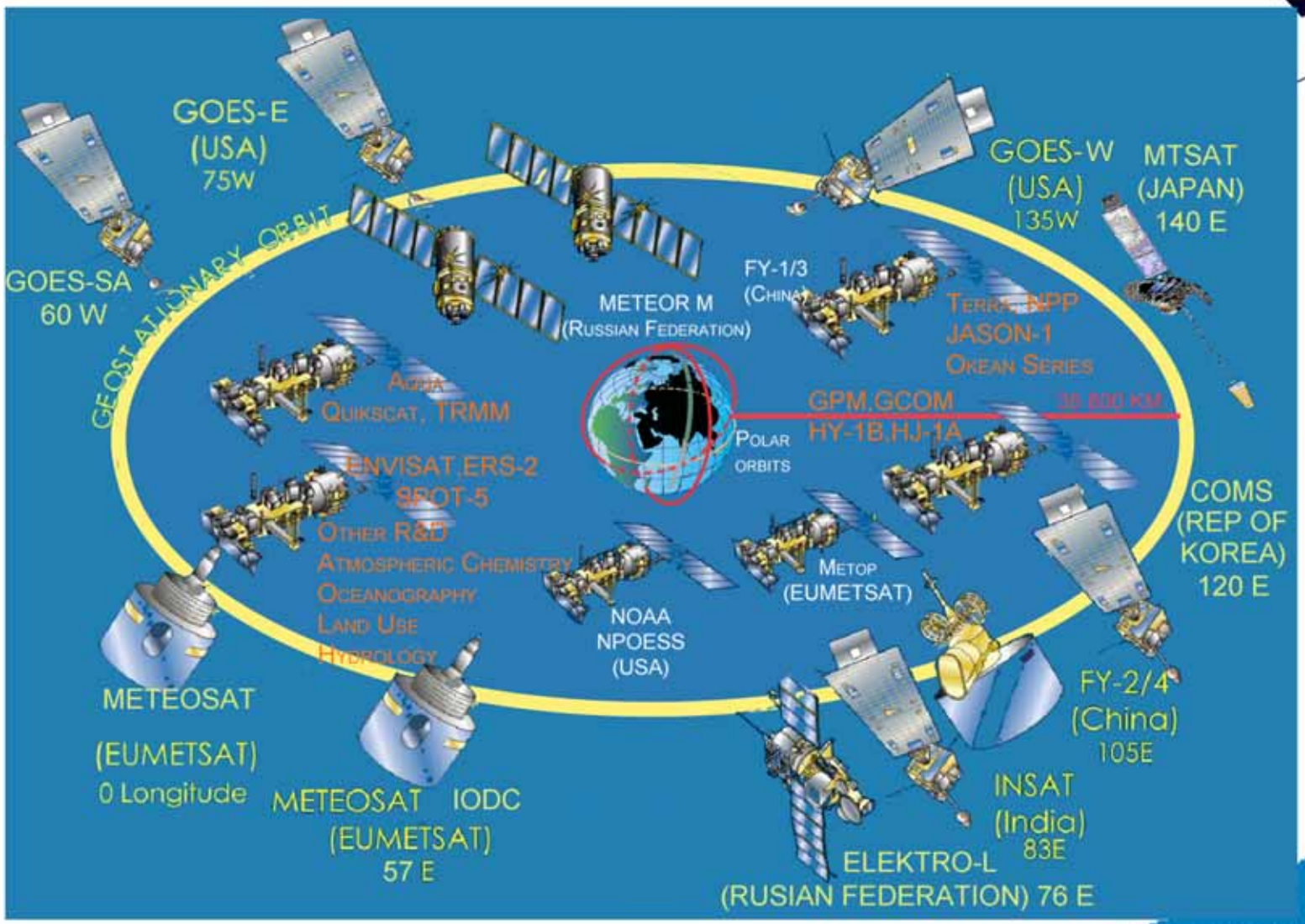


GSICS progress update

National Environmental Satellite, Data, and Information Service

Space-Based component of the Global Observing System (GOS)



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GSICS organization

CGMS

WWW GOS

Space-based component of GOS

WMO Space Programme

GSICS

GEO satellites

LEO satellites

R&D satellites

GSICS Executive Panel

GRWG

GDWG

CSS

GCC

GPRC

Calibration Support Segments (reference sites, benchmark measurements, aircraft, model simulations)

Coordination Center

Regional Processing Research Centers at Operational Space Agencies

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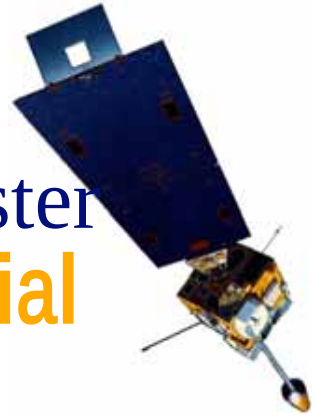

GSICS Information Services and Products Roster

The Roster is a list of current and potential GSICS products and services

- Satellite Instrument Information
- Satellite Instrument Performance Monitoring
- LEO-LEO Inter-calibration
- GEO-LEO Inter-calibration
- Spectral Calibration
- Spatial Calibration
- Vicarious Calibration of Solar Reflective Bands
- Radiative Transfer Simulations of Satellite Instrument Radiances
- Inter-comparison with SI Traceable Aircraft Radiometers
- GSICS Product Guides
- GSICS Communication Tools

Work in progress

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GSICS Procedure for Product Acceptance

The success of GSICS is intimately linked to the quality and usefulness of its products

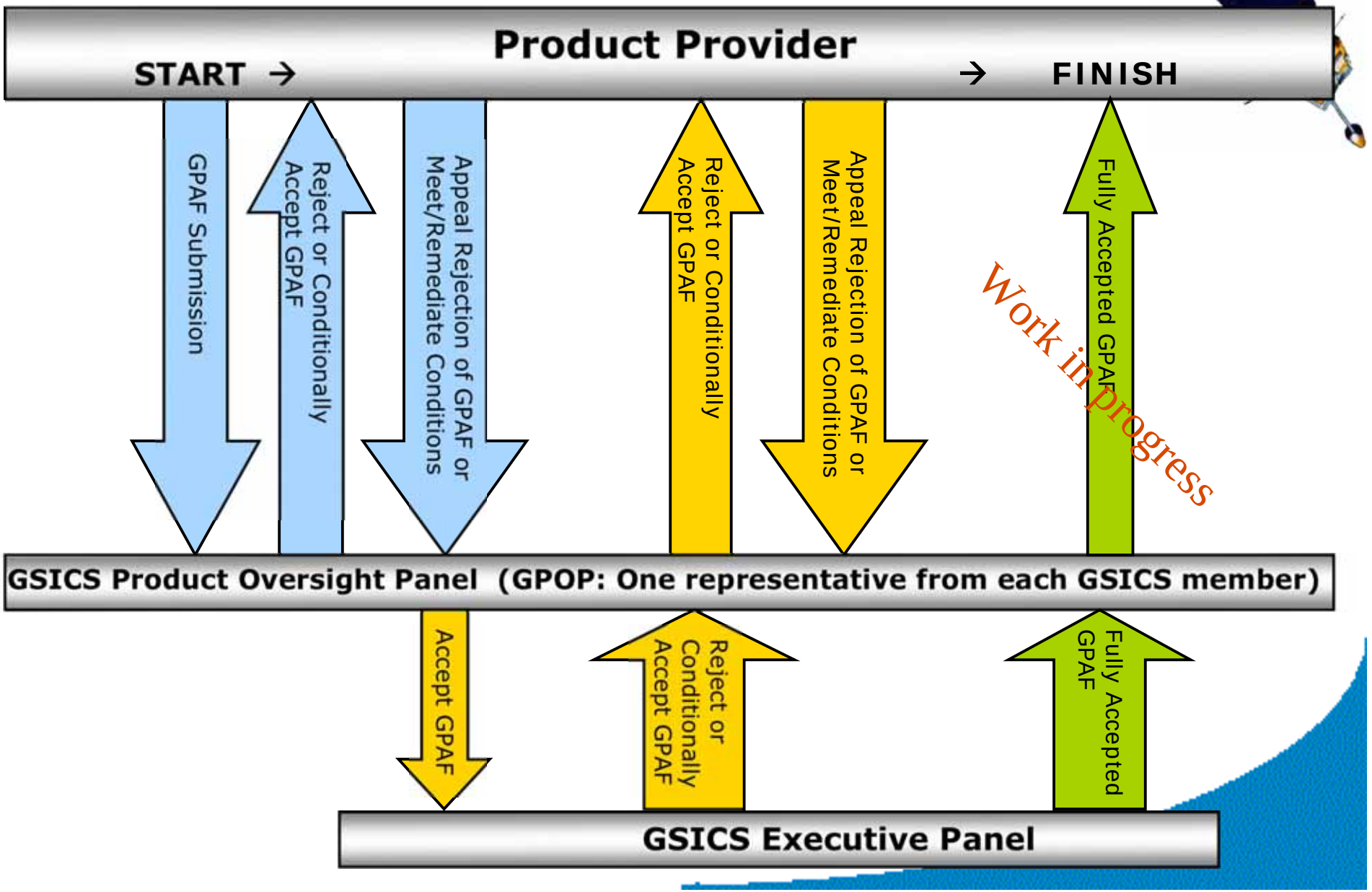
The GSICS Procedure for Product Acceptance (GPPA) is designed to establish a method by which distribution-ready products from data providers around the world can be first carefully inspected, and then accepted as a GSICS product

Work in progress

The procedure consists of three majors steps:

- *The product provider fills out a GSICS Product Application Form (GPAF);*
- *The GPAF is scrutinized by the GSICS Product Oversight Panel (GPOP); and*
- *If the application is accepted by the GPOP, it is sent to the GSICS Executive Panel, who is responsible for the final decision to accept the product application.*

GSICS Procedure for Products Acceptance



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GSICS Web Site Updates

Currently, the NESDIS/STAR web designer is transforming the current GSICS web site using the NESDIS/STAR web site kit.

This web site kit offers:

- Web page templates that do not require design work, and can be edited with a simple text editor
- No frames
- Section 508 compliance
- Conformity with current STAR web site
- Instant approval by STAR for use on STAR computers.

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GSICS Computing Services

GSICS @googlegroups

New GSICS Google Groups E-mail

- Google groups e-mail have been created for the GRWG (gsics-research), GRWG Leads (gsics-research-wg), and GDWG (gsics-data)
- Limited only to invited members
- E-mails go directly to all members of the group
- E-mails are also organized by thread and archived at Google
- Participation **does not** require a Google account, but web access to messages does

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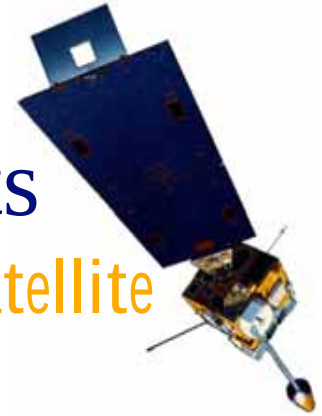
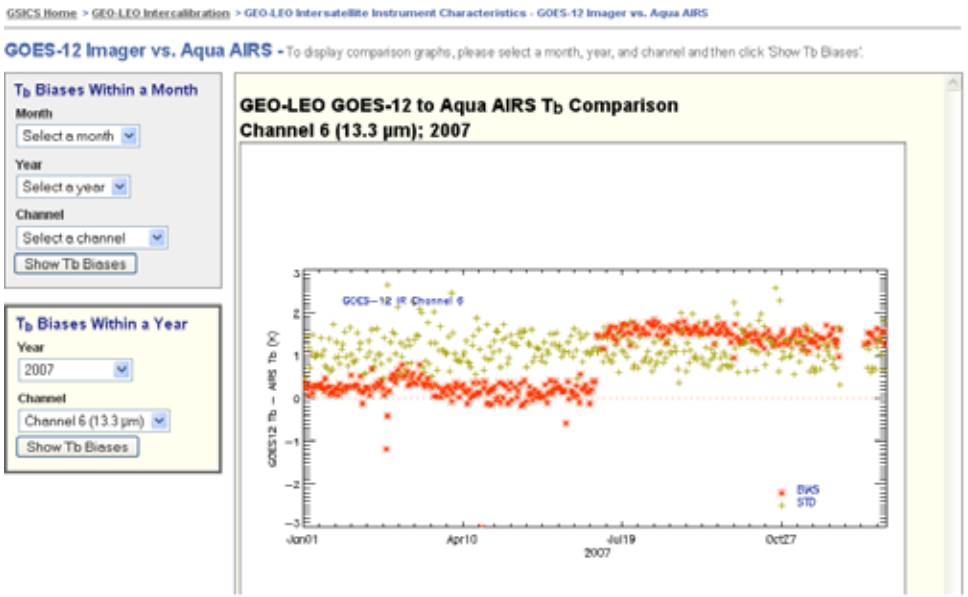
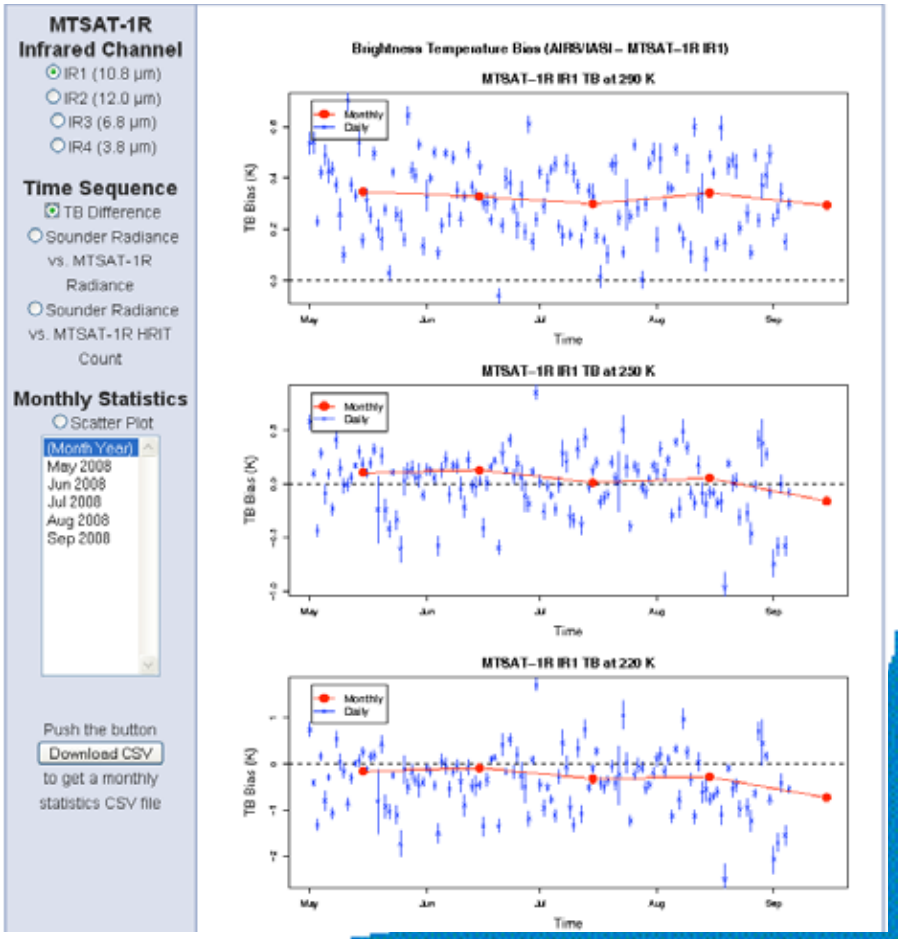
GEO-LEO Inter-Comparison Results

… Towards Web-based Near-Real Time GEO-LEO Satellite Inter-comparisons







ABOVE - NOAA/NESDIS On-line results for GOES-12 Channel 6 to EOS Aqua AIRS Comparisons

RIGHT - JMA On-line results for MTSAT 10.8 micron channel compared to AIRS and IASI

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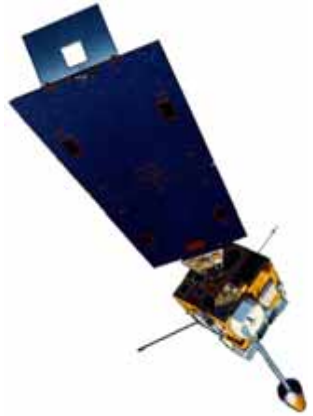

Summary

New progress since last meeting

- Operational calibration support to NOAA-N' launch
- Continued calibration research and development
- GSICS progress
  - Developing products and services
  - Google group established
  - Website updated