# The GSICS Procedure for Product Acceptance ( GPPA )

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# Outline

- **GSICS Introduction**
- **GSICS Products**
- **GSICS Procedure For Product Acceptance( GPPA)**
    - GPPA and QA4EO
    - GPPA Description
- **NCDC Maturity Matrix**
- **GPPA Vs NCDC Maturity Matrix**
- **Conclusion**

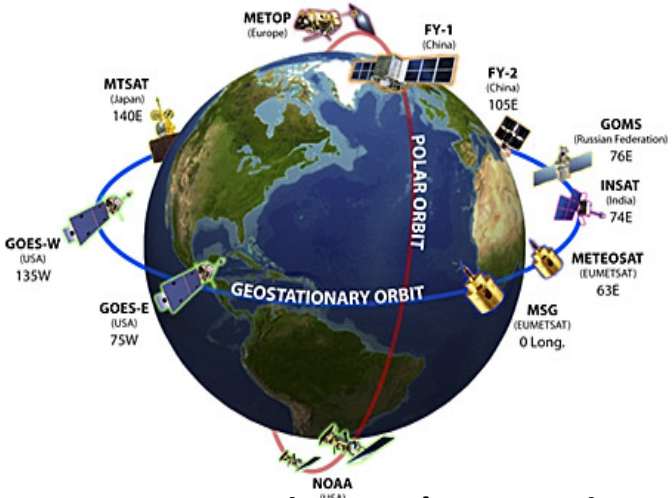
*WGCV-37-3: WGCV to follow-up with GSICS (Tim Hewison) to learn from their experience with implementing maturity matrix type systems within their activities.*



GSICS Global Space-based Inter-Calibration System

# GSICS Introduction

**Global Space Based Inter-calibration System (GSICS) is an international collaborative effort initiated in 2005 by WMO and the CGMS to monitor, improve and harmonize the quality of observations from operational weather and environmental satellites of the Global Observing System (GOS)**




**This is achieved through a comprehensive calibration strategy which involves:**

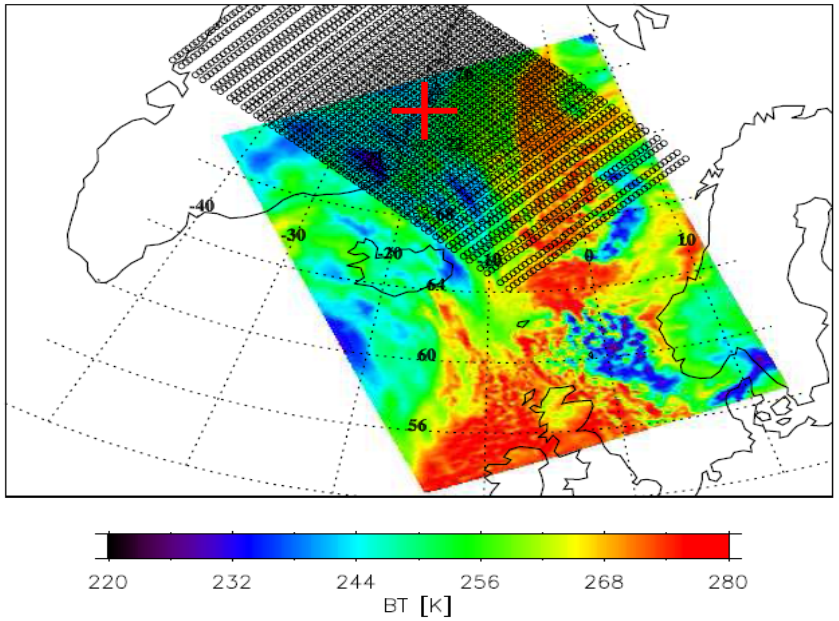
- Monitoring instrument performances.
- Operational inter-calibration of satellite instruments.
- Tying the measurements to absolute references and standards and recalibration of archived data.
- **GSICS delivers calibration products corrections needed for accurately integrating data from multiple observing systems into products, applications and services.**

- **Improve consistency between instruments.**
- **Reduce bias in Level 1 and 2 products.**
- **Provide traceability of measurements.**
- **Retrospectively re-calibrate archive data**
- **Better specify future instruments.**

# Current Products-Method

## Simultaneous Nadir Overpass

### Step 1. Identification of Collocated Pixels that satisfy GSICS selection criterion.




### Step 2. Selection of pixels for inter- comparison

**……Selection Criterion……**

**GSICS collocated pixel selection criterion**

Time difference of observations < 5 Min

Atmospheric path diff Δsec(sat. zenith angle) < 0.01

**Uniformity Constraint**

STD (GEO pixels within LEO FOV) < 0.01 K (yellow in figure below).

STD (GEO pixels around the LEO pixel) < 1 K (Green in figure below).

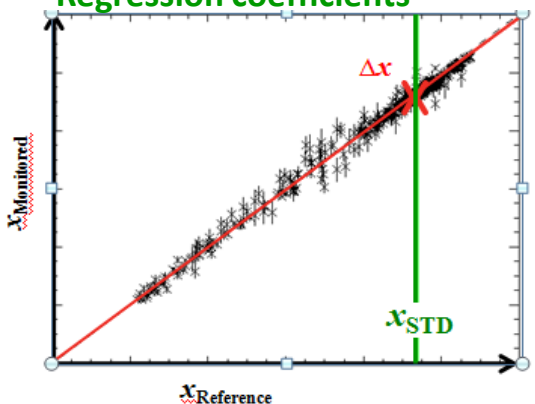
One reference (say IASI) instrument footprint is compare with the averaged value of the GOES pixels falling into that IASI footprint ( see below).

### Step 3. Convolution and Comparison

$$L_i = \frac{\int_{\nu_1}^{\nu_2} R(\nu) S_i(\nu) d\nu}{\int_{\nu_1}^{\nu_2} S_i(\nu) d\nu}$$

R is the Hyperspectral Radiance
S is the spectral response function
L is the IASI convolved radiance
V is the wavenumber

### GSICS Product
### Regression coefficients




**Products**

**Correction Formula To be applied on L1 radiance of Monitored Instrument**



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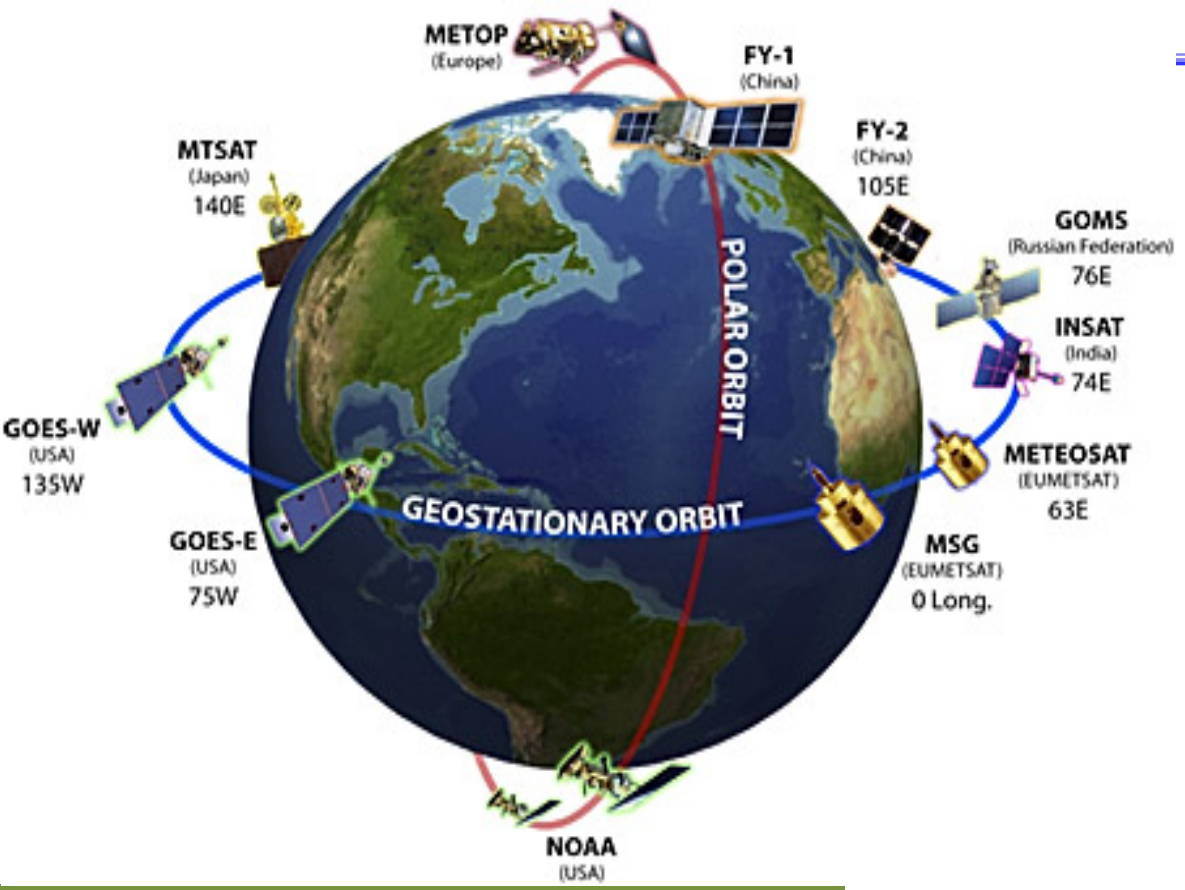
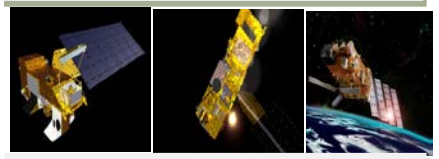
# GSICS Products



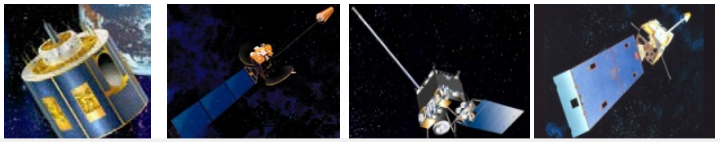

- **Near Real Time Correction Product**
- **Re-Analysis Correction Product**

GSICS Reference Instruments



AIRS MODIS IASI

GSICS Family of Monitored Instruments



SEVIRI MTSAT GOES AVHRR

**GSICS also identifies best practices and principals.**

**GSICS Product application**

- **Bias correction**
- **SRF retrieval**
- **Better SST Retrieval ,Cloud Height, Aerosol retrieval**

**Critical need to evaluate and assign maturity to the product**

GSICS Global Space-based Inter-Calibration System

# The GSICS Procedure for Product Acceptance (GPPA)

- **GPPA was originally developed by Dr. Bob Iacovazzi, following the QA4EO guidelines**

- **The GPPA is the GSICS:**
  - **Product developers pathway to obtain a "Stamp of Approval" for a potential product**
  - **Data users window to GSICS product quality and "fitness for purpose"**
  - **Governing body reference for judging GSICS product fitness**

- **The GPPA defines and documents:**
  - **Scope of product within the GSICS product portfolio – correction of level1b data**
  - **Theoretical basis, traceability, and implementation and distribution strategy**
  - **Product quality (uncertainty, quality indicators, data user's guide, etc)**

- **The GSICS Product Acceptance Form (GPAF) is available at GSICS wiki**
  - **https://gsics.nesdis.noaa.gov/wiki/Development/GppaWorkflow**



Credit: F. Yu, R. Iacovazzi

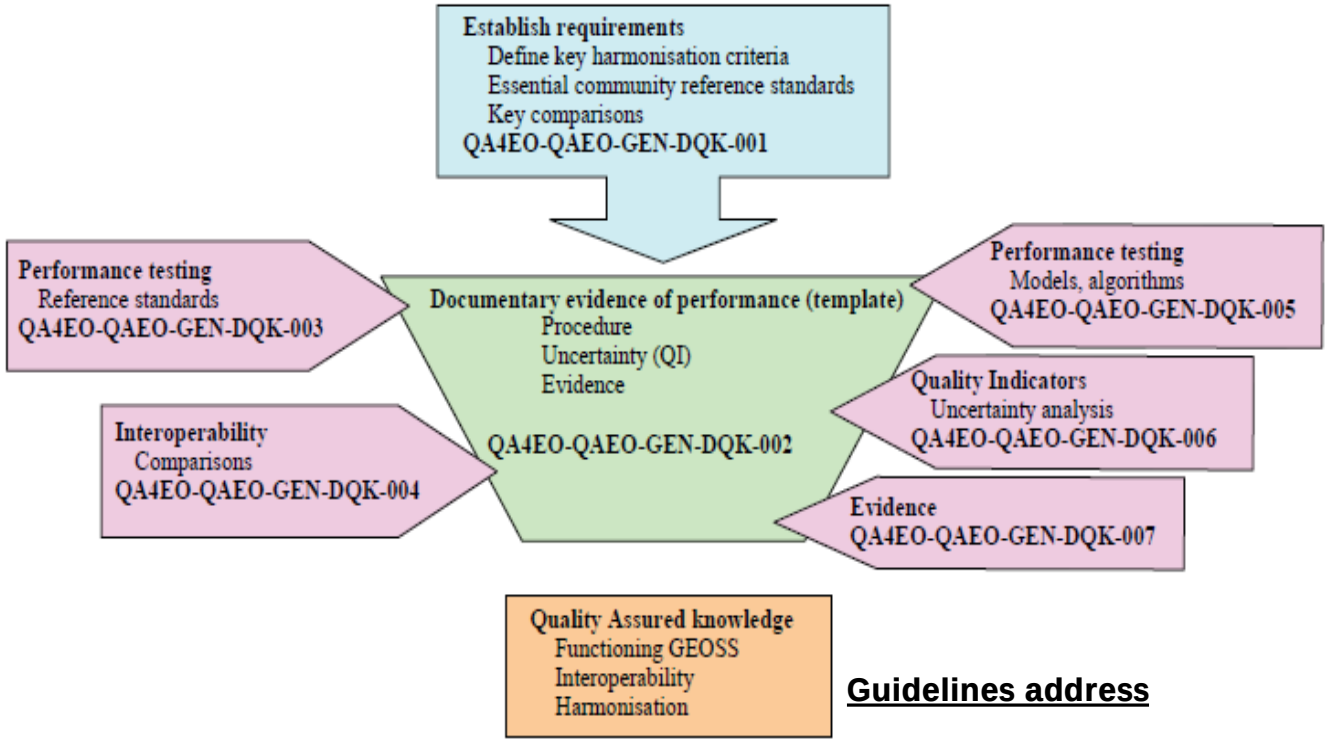
# The GSICS Procedure for Product Acceptance (GPPA)

## QA4EO - Guidelines

“

**The Quality Assurance Framework for Earth Observation consist of ten distinct guidelines linked in the Guidelines Framework**

“




**Guidelines address**

- **Quality Indicators**
- **Traceability**
- **Reference (measurement)Standard**
- **Uncertainty**



**Ref: QA4EO The Guide**

# The GSICS Procedure for Product Acceptance (GPPA)

## QA4EO – GPPA Connection

*Matrix mapping GPPA to QA4EO Key Guidelines*

| GPPA Component ↓ QA4EO → | OG | DQK-001 | DQK-002 | DQK-003 | DQK-004 | DQK-005 | DQK-006 | DQK-007 | DPK-001 | DPK-002 | CEK-001 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Overview Document | X | X | X | | | | | X | | | |
| Algorithm Theoretical Basis Docs | | X | X | | | X | | | | | |
| Implementation Best Practice Docs Software | | X | X | | | X | | | | | |
| Implementation Best Practice Docs Models | | X | X | | | X | | | | | |
| Implementation Best Practice Docs Measurements | | X | X | X | X | | | | | | |
| Implementation Best Practice Docs Version Control Plan | | X | X | | | | | | | | X |
| Product Operations/Distribution Docs Operations/Distribution | | X | X | | | | | | X | X | |
| Product Operations/Distribution Docs Data Quality | | X | X | X | X | | X | | | | |
| Product Operations/Distribution Docs User Guide | | X | X | | | | | | X | X | |

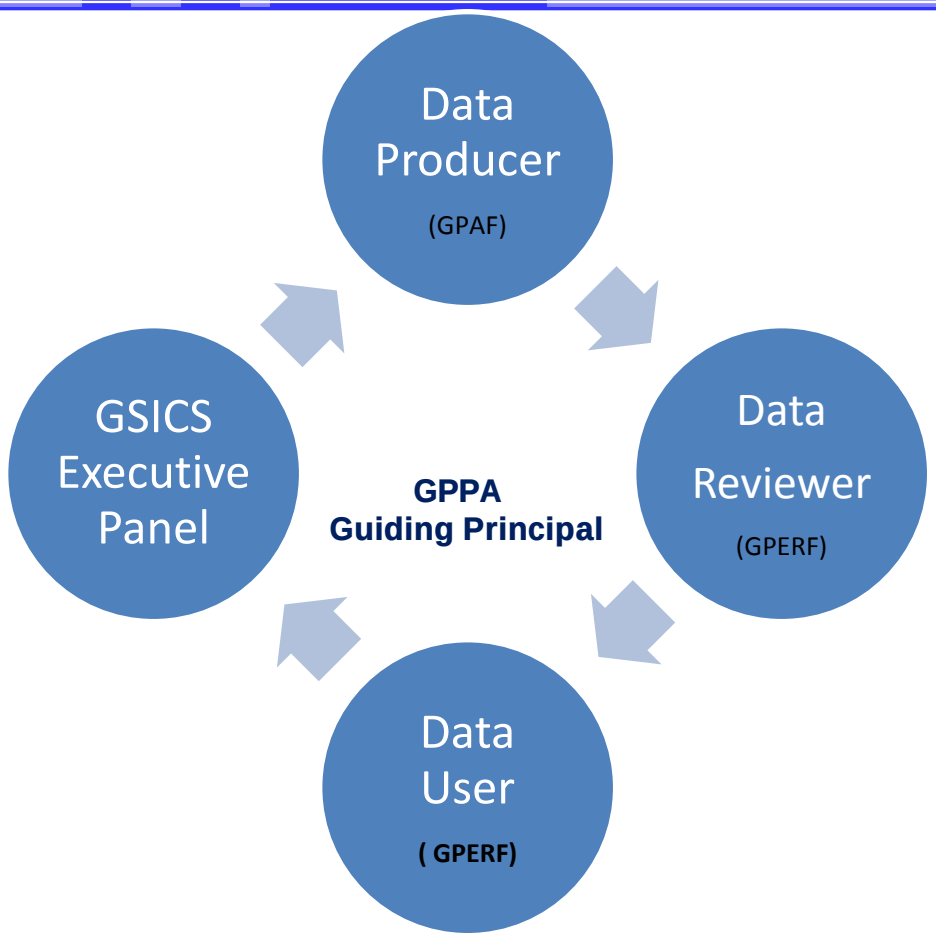


GSICS Global Space-based Inter-Calibration System

# GPPA Description

## Four Product Phases

- **Submission Phase**
- **Demonstration Phase**
- **Pre-operational Phase**
- **Operational Phase**






Credit: F. Yu, R. Iacovazzi

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# GPPA: Submission Phase

- **Data provider is requested to fill out a GSICS Product Acceptance Form ( GPAF ) and provide supporting documents**
- **This form requires…**
  - Information about the provider and nature of the distribution.
  - Contains a checklist of required supporting docs

# GPPA Description

## GPPA Maturity –Submission Phase

**Submission Phase**

**Fill out GSICS Product Acceptance Form ( GPAF )**

**Documents provided to GPRC Rep, GRWG and GDWG Chairs, GCC Dir and Product Users and reviewers**

**GPERF given to GPAT members**



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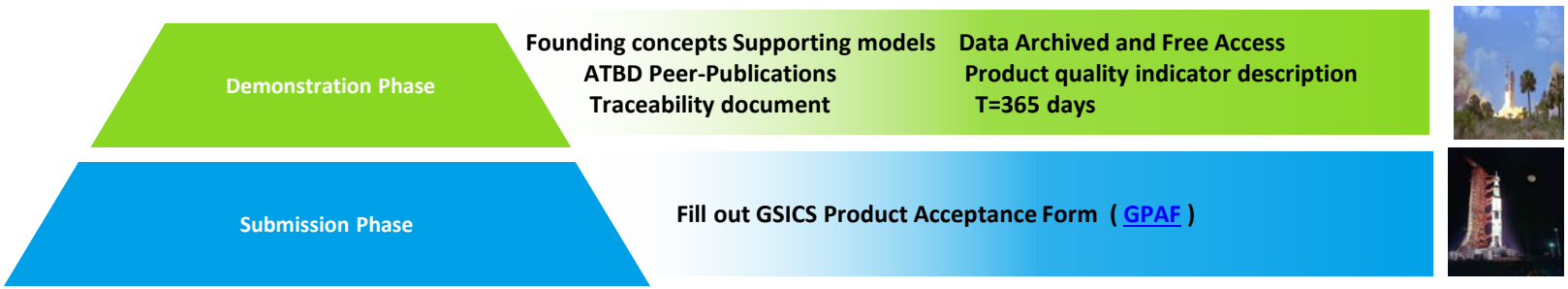
# GPPA Description

## GPPA Maturity-Demonstration Phase

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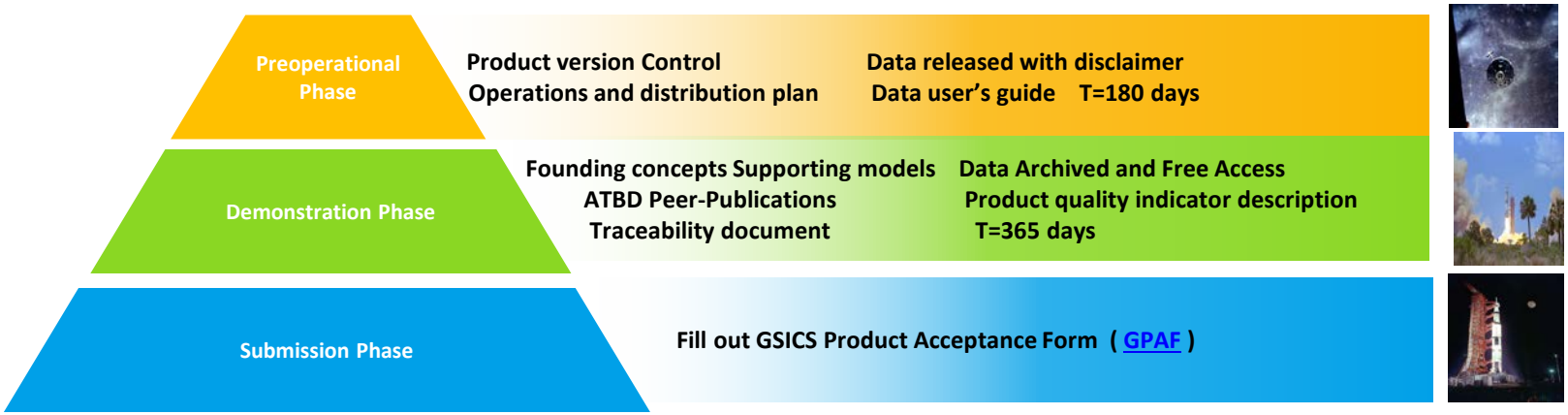
# GPPA Description

## GPPA Maturity-Preoperational Phase

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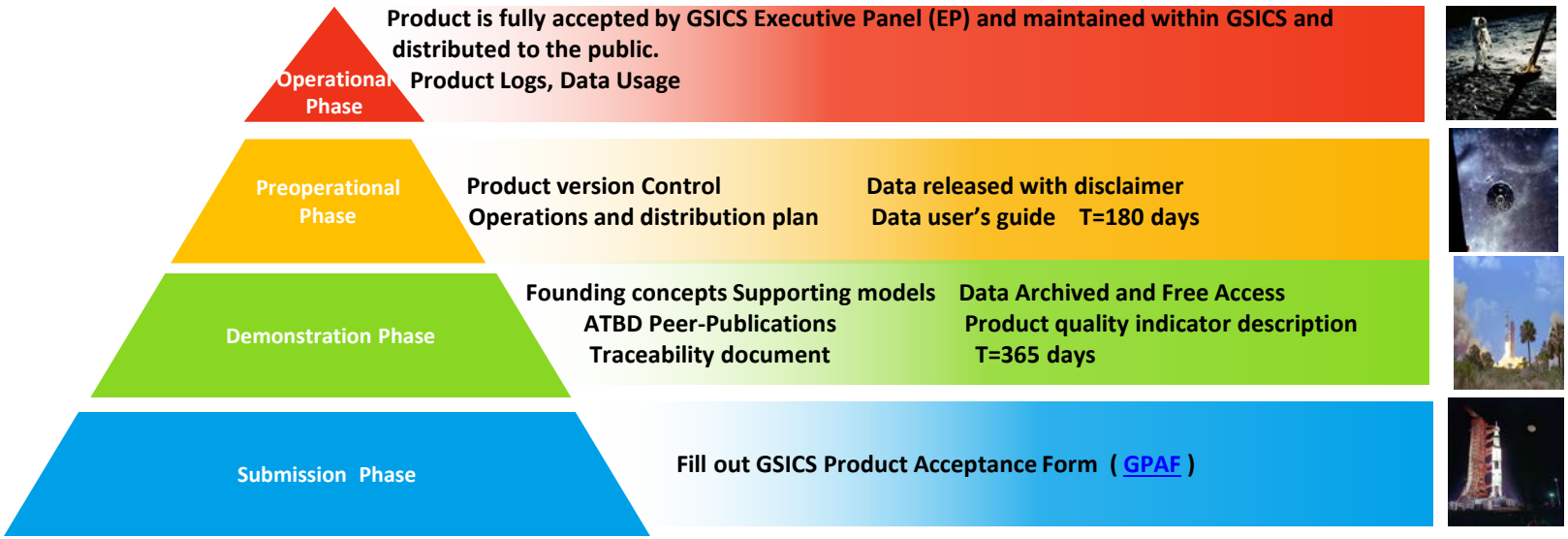
# GPPA Description

## GPPA Maturity-Operational Phase



# GPPA - Adaptability

## GPPA Exempt Clauses from Demo to Pre-Operational Phase

- If insufficient feedback is received from the beta-testers outside the GSICS algorithm development community during one year test period, GCC will make the suggestion to the EP based on the GPAT's review comments. The product provider(s) should systematically seek external feedback.
- In case of incomplete documentation that are not considered to jeopardize product quality, GCC will
  make the suggestion to the EP based on the GPAT and users' feedback. However, all the required documentations shall be completed and submitted for review purpose in the pre-operational phase.

**Potential to save review time.**

# NCDC Maturity Index

No Code Changes expected  Data Archived, long term and Free Access

## Salient Features

1. **Stability in source code that meets certain coding standards.**

2. **Metadata that meets NOAA-recommended standards for collection-level and NCDC CDRP-recommended NetCDF Climate and Forecast (CF)-compliant attributes for file-level metadata**

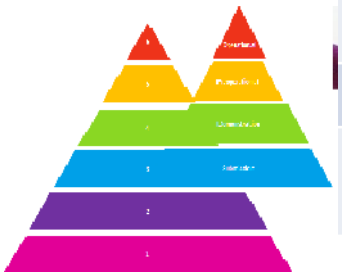
3. **Availability of documentation including a Climate Algorithm Theoretical Basic Document (CATBD) that describes the algorithm and process steps in detail, Publically available data and source code for transparency and traceability of the algorithm and processing.**

4. **Another integral part of CDR readiness is examining the maturity of the algorithms and application of the product in peer-reviewed publications.**

Peng, G., W. Meier, D. Scott, and M. Savoie. 2013. A long-term and reproducible passive microwave sea ice concentration data record for climate studies and monitoring. *Earth Syst. Sci. Data* 5: 311-318. http://dx.doi.org/10.5194/essd-5-311-2013.

# GPPA Vs NCDC Maturity Matrix

| NCDC Maturity Matrix | GPPA |
|---|---|
| | |
| Climate Product Specific<br>-( Six maturity Levels) | Calibration Specific<br>(Three steps: Demo Pre-Op, Op) |
| | |
| Stability in Coding Standards. | Not very stringent. Focuses on the results calculated by the code. |
| | |
| Needs a comprehensive ATBD. | Needs ATBD ( with publication list), User Guide, Uncertainty Analysis etc. |
| | |
| More stress on ensuring accuracy and stability of product ( would clarify further) | Rigorous product review process includes User feedback and review from international partners ( i.e GPATs) |
| | |
| Product generally take 12 months for each stage ~ 6 Yrs | Product can attain max maturity in 18 Months in theory – longer in practice |





GSICS Global Space-based Inter-Calibration System

# Conclusion

- **A Comprehensive GSICS Procedure for Product Acceptance has been derived from QA4EO and applied to 37 GSICS products.**
- **GPPA has helped in creation of high level quality management system and…**
    - Encourages Collaborative ATBD with minimal requirement of additional resources.
    - Adoption of file format, file naming, parameter naming convention.
    - Helps in formation of Cal/Val plans and pre-launch test best practice guidelines .
- **The NCDC Maturity Matrix is extremely comprehensive and tuned for CDR's and TCDR's while GPPA is applicable to calibration corrections as input for such CDRs**

# THANK YOU

# NOAA NCDC Maturity Matrix

| Maturity | Software Readiness | Metadata | Documentation | Product Validation | Public Access | Utility |
|---|---|---|---|---|---|---|
| 1 | Conceptual development | Little or none | Draft Climate Algorithm Theoretical Basis Document (C-ATBD); paper on algorithm submitted | Little or None | Restricted to a select few | Little or none |
| 2 | | | | | | ongoing |
| 3 | | | | | | ts have sitive value. |
| 4 | | | | | | applications; monstrating value. |
| 5 | | | | | | applications stigators; monstrating value |
| 6 | efficient | Meets current international standards for dataset | product | continuous interrogation; quantified errors | Regularly updated | blished y be used by essments demonstrating positive value |

## Salient Features

1. **Stability in source code that meets certain coding standards.**
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| | |
|---|---|
| 1 & 2 | Research |
| 3 & 4 | IOC |
| 5 & 6 | FOC |

**Aims to assign maturity when climate products transitioned from Research to Operations**



Bates, J. J. and J. L.Privette, (2012), A maturity model for assessing the completeness of climate data records, Eos Trans. AGU, 93(44), 441

# THANK YOU

### CDR Organizational Elements

- High-level leadership council
- Advisory council to represent climate research community and other stakeholders
- Fundamental Climate Data Record (FCDR) Teams
- Thematic Climate Data Record (TCDR) Teams

### CDR Generation Elements

- High accuracy and stability of FCDRs
- Pre-launch characterization of sensors and lifetime monitoring
- Thorough calibration of sensors
- Well-defined criteria for TCDR selection
- Stakeholder involvement and feedback for TCDRs
- Well-defined criteria for TCDR validation
- Use of *in-situ* data for validation

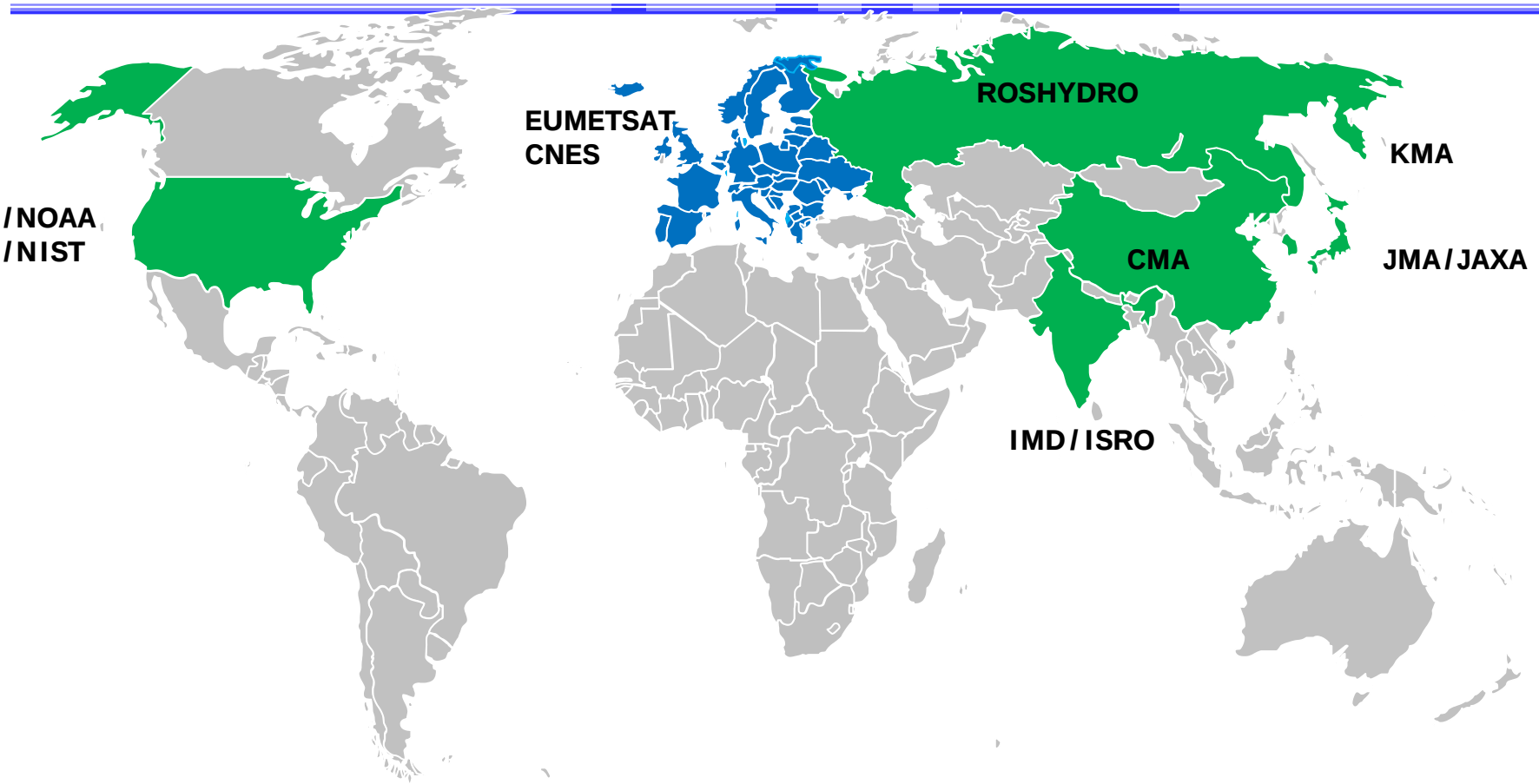
### Sustaining CDR Elements

- Available resources for reprocessing CDRs as new information becomes available
- Provisions for feedback from scientific community
- Long-term commitment of resources for generation and archiving of CDRs and associated data

# GSICS Introduction

## GSICS Members

Global Expansion




Obs. ESA + CEOS
ASSO. GPX

**14 Members Worldwide**



GSICS Global Space-based Inter-Calibration System

# GSICS Introduction

## GSICS Principals

- Systematic **generation of** inter-calibration **products**
  - **for Level 1 data from** satellite sensors
  - **to** compare**,** *monitor* **and** correct **the calibration of *monitored* instruments to community references**
  - **by generating calibration corrections on a routine operational basis**
  - **with specified uncertainties**
  - **through well-documented, peer-reviewed procedures**
  - **based on various techniques to ensure consistent and robust results**

TRACEABILITY / UNBROKEN CHAINS OF COMPARISONS

- **Delivery to users**
  - **Free and open access**
  - **Adopting community standards**
- **To promote**
  - **Greater understanding of instruments' absolute calibration, by analysing the root causes of biases**
  - **More accurate and more globally consistent retrieved L2 products**
  - **Inter-operability for more accurate environmental, climate and weather forecasting products**



Courtesy Tim Hewison EUMETSAT

GSICS Global Space-based Inter-Calibration System

# Product Monitoring at JMA

Meteorological Satellite Center (MSC) of JMA

Home | Calibration | Products | Operations | Supports

Current position: Home > GSICS MTSAT Calibration Monitoring > MTSAT-1R IR Inter-calibration with AIRS/IASI

Back

## GSICS MTSAT Infrared Inter-calibration

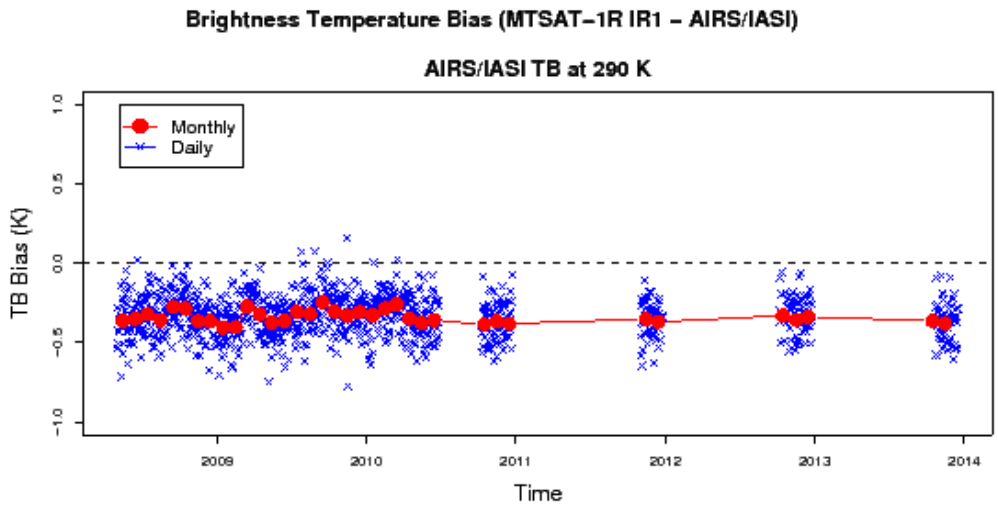
### MTSAT-1R IR Inter-calibration with AIRS/AQUA and IASI/METOP-A

**MTSAT-1R Infrared Channel**

- (•) IR1 (10.8 μm)
- ( ) IR2 (12.0 μm)
- ( ) IR3 (6.8 μm)
- ( ) IR4 (3.8 μm)

**LEO Data**

- (•) AIRS & IASI (all)
- ( ) IASI (des,9:30am)
- ( ) AIRS (asc,1:30pm)
- ( ) IASI (asc,9:30pm)
- ( ) AIRS (des,1:30am)




Courtesy : JMA GPRC

# Product Monitoring at NOAA

NOAA GPRC

*A GSICS Processing and Research Center*

GSICS Global Space-based Inter-Calibration System

Jump

GPRC

Log In or Register

**NOAA GPRC Home**

- Mission
- Organization
- Contact us

**Products**

- GEO vs LEO
- LEO vs LEO
- GEO vs GEO
- Satellite vs Model

**Documents**

- ATBDs
- Tools
- FAQ
- Publications

**Links**

- WMO GSICS
- GCC
- Development Wiki
- Other GPRC's
- Instrument Performance Monitoring(IPM)

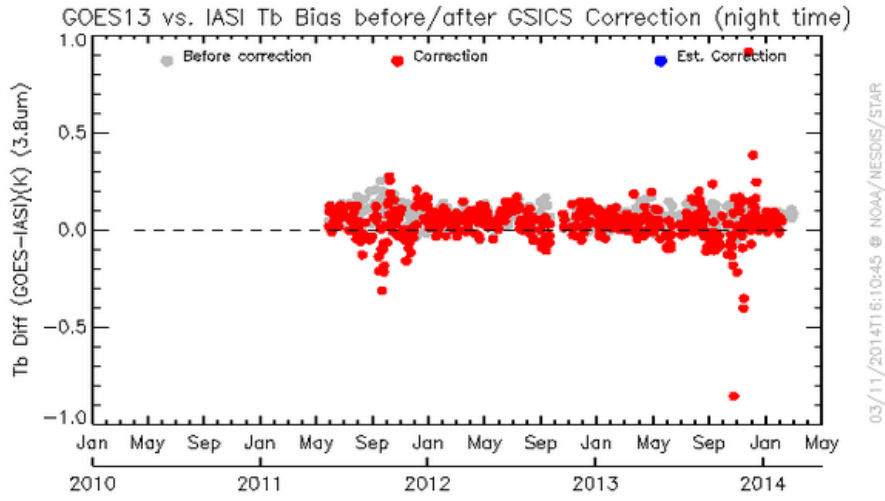
You are here: GSICS Wiki > GPRC Web > GeoLeo > GeoLeo13Imagelasi > GeoLeo13ImagelasiBias (11 Mar 2014, FangfangYu)

**GOES-13 Imager vs. Metop-A IASI**

Standard scene temperature for GOES-13 Imager is defined as [285.7K, 244.8K, 284.0K, 266.8K] for the four IR channels. In addition to the Tb bias at the standard scene temperature, daily mean Tb bias at the homogeneous scenes are also monitored and plotted.

Bias Monitoring

TB Corr validate Ch2 (3.9μm)



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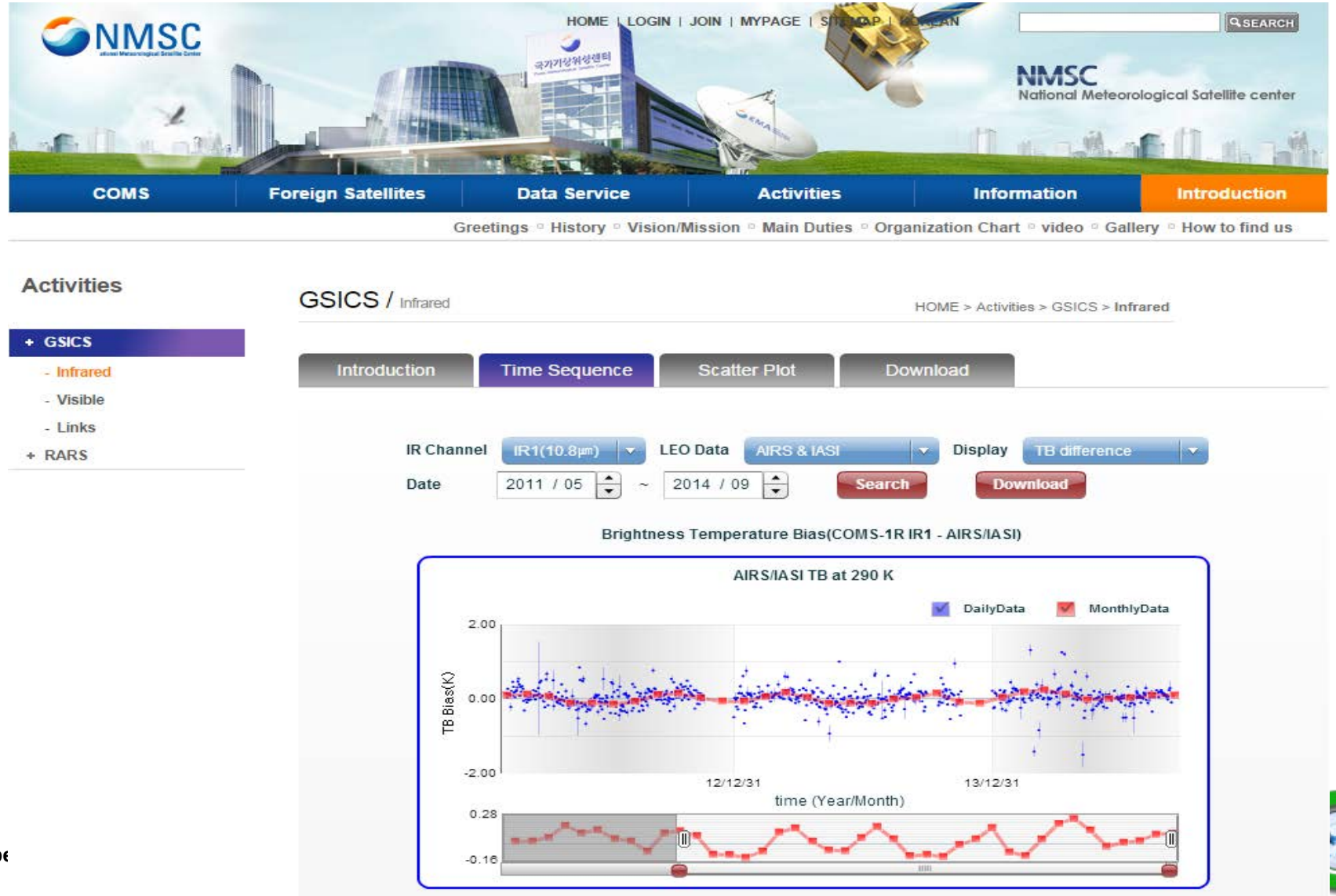
# Product Monitoring at CMA






GSICS Global Space-based Inter-Calibration System

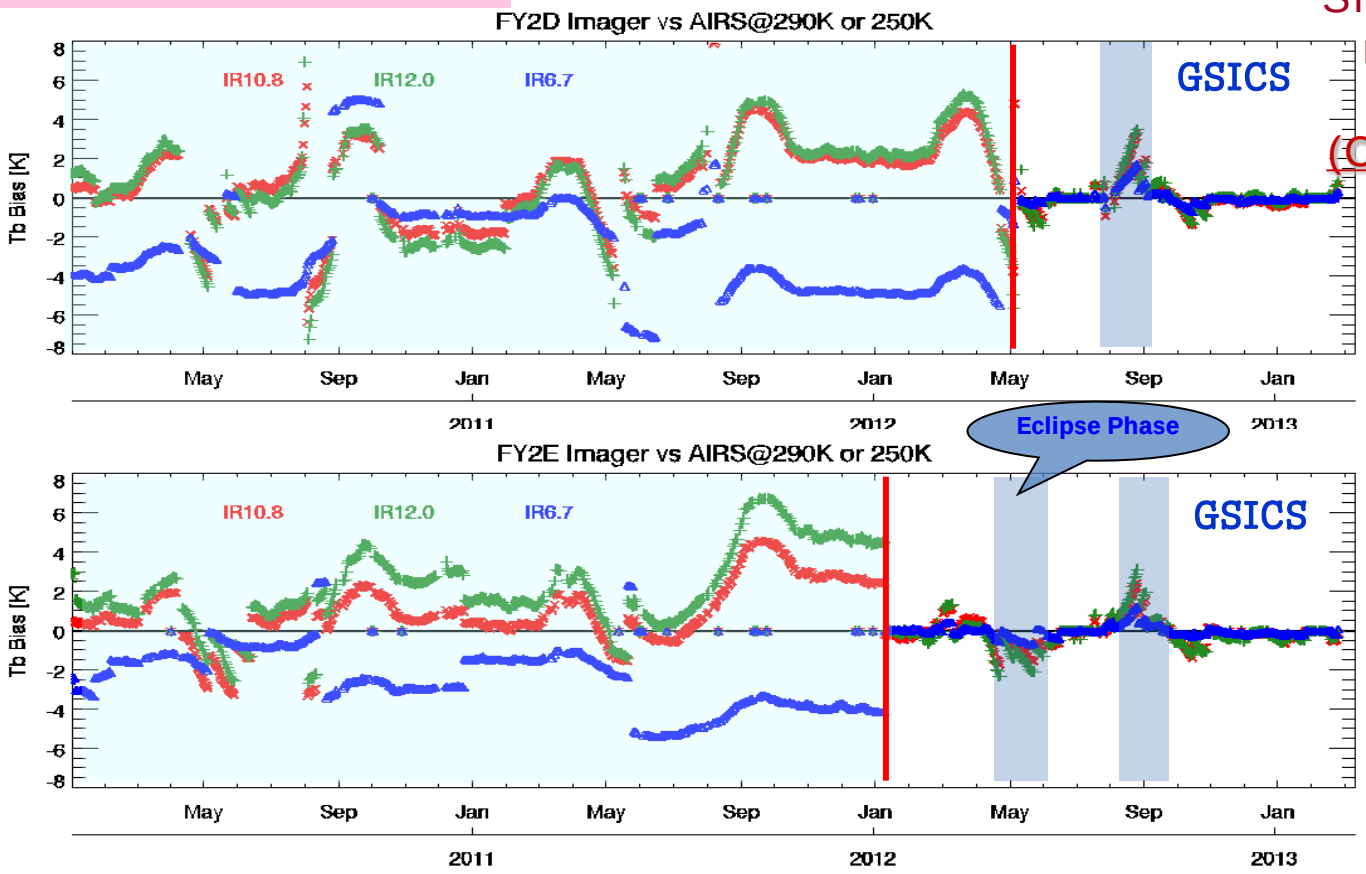
# GSICS PRODUCT USE CASES

# Product Use Case-1

## IR Calibration Bias of FY-2 VISSR

**FY-2 vs IASI+AIRS**

Significant progresses were made in FY-2 operational calibration (Changed to GSICS in 2012)




**Operational calibration of FY-2D/2E was upgraded using GSICS inter-calibration algorithm in 2012-04 and 2012-01 separately.**

**The calibration biases were sharply decreased, and reduced to about 0.5~1K@290K (@250K） without eclipse period.**

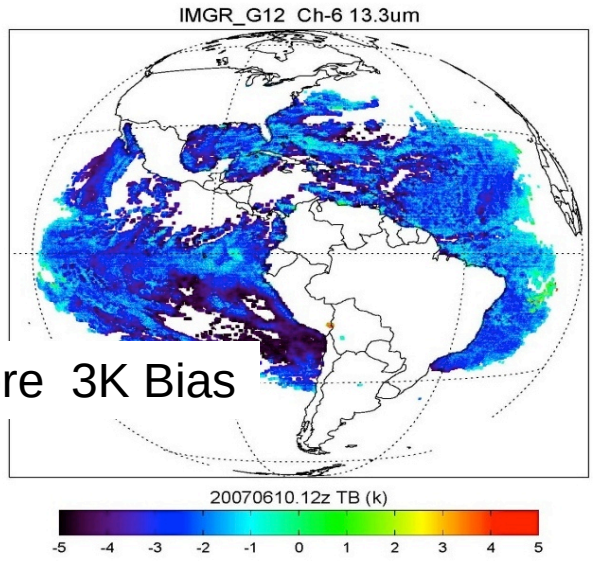
**Time series of TBB biases for IR1~3 channels vs AQUA/AIRS reference scenes (290 K for IR1 and IR2, 250 K for IR3).**



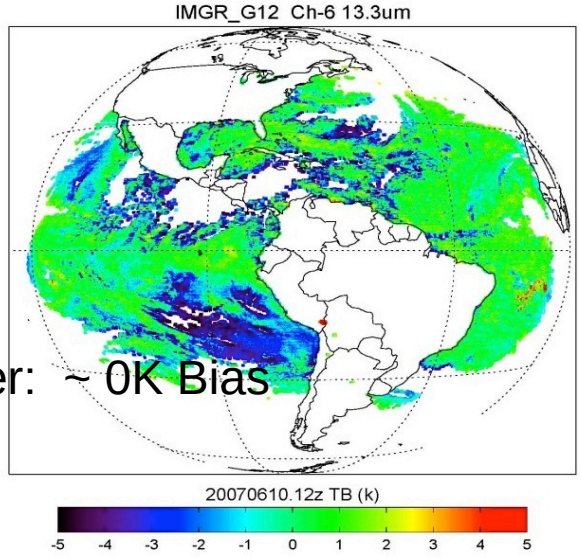
Courtesy: Xiuqing ( Scott ) Hu(CMA)

GSICS Global Space-based Inter-Calibration System

# Product Use Case-2
## GSICS Correction Algorithm for Geostationary Infrared Imagers




Before 3K Bias




After: ~ 0K Bias

The first major deliverable to the user community is the GSICS correction algorithm for geostationary satellites.

The user applies the correction to the original data using GSICS provided software and coefficients.

The correction adjusts the GOES data to be consistent with IASI and AIRS.

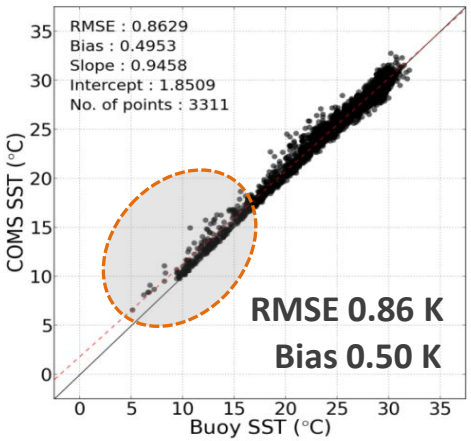
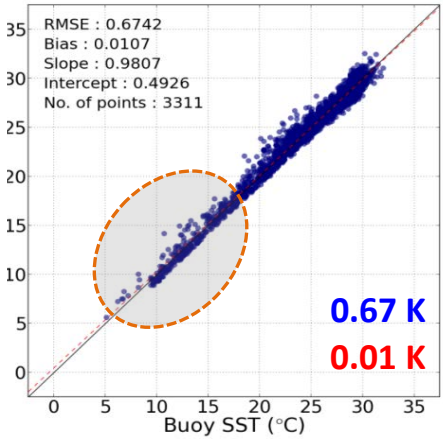
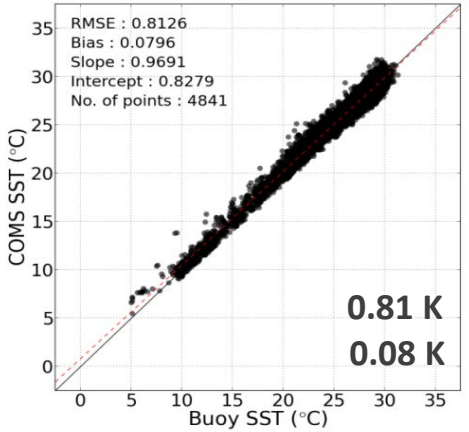
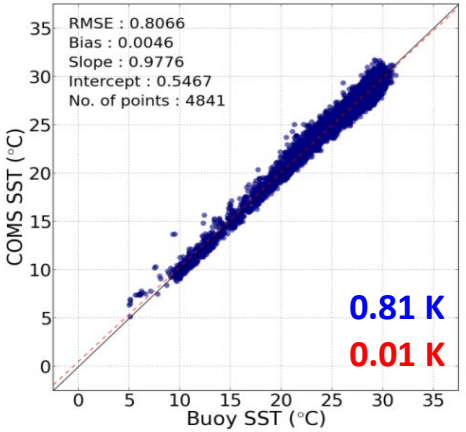
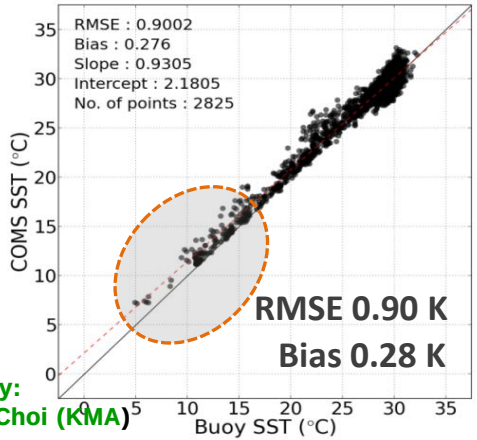
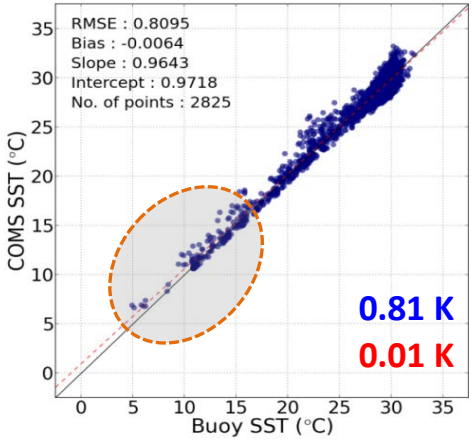
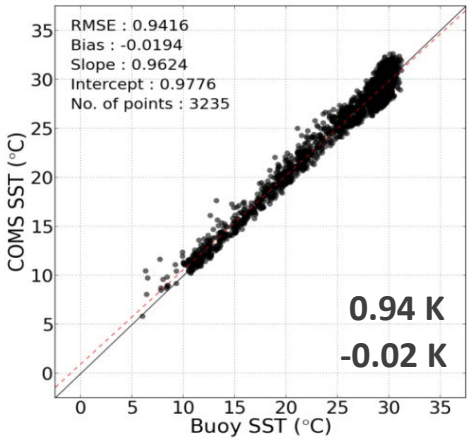
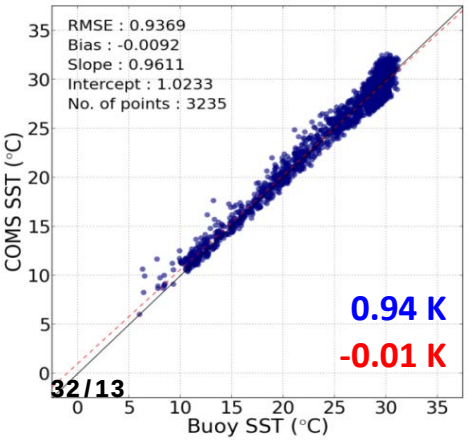
The figures to the left show the difference between observed and calculated brightness temperatures (from NCEP analysis) before and after correction

The bias is reduced from 3 K to nearly zero.

# Product Use Case-3

## Comparison of recalibrated SST with observed buoy SST

$$MCSST = C_0 + C_1 \cdot IR_{11\mu m} + C_2 \cdot (IR_{11\mu m} - IR_{12\mu m}) + C_3 \cdot (IR_{11\mu m} - IR_{12\mu m}) \cdot (\sec(\theta) - 1)$$

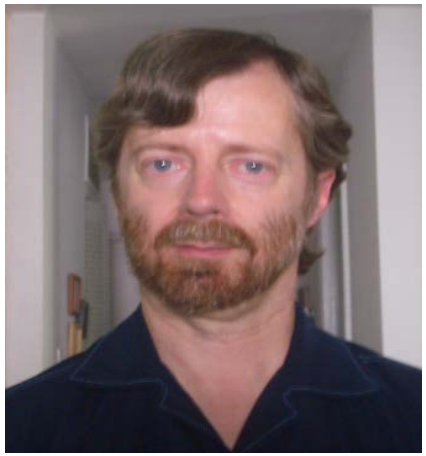
| | daytime | | nighttime | |
|---|---|---|---|---|
| | Before | After | Before | After |
| 2012 |  |  |  |  |
| 2013 |  |  |  |  |



Courtesy:
Minjin Choi (KMA)

# GSICS Coordination Center, NOAA

## Staff



***Larry Flynn***
**Director**

***Manik Bali***

***Xianqian Wu***

**Ralph Ferraro**
**Chair MW Subgroup**
**Support- Lori Brown**



GSICS Global Space-based Inter-Calibration System

# GSICS Coordination Center, NOAA

## Quarterly Newsletter


GSICS Quarterly
Newsletter
Volume 7 Number 3
2013
Fall Issue
Manik Bali, Editor
CMA · CNES · EUMETSAT · IMD · ISRO · JAXA · JMA · KMA · NASA · NIST · NOAA · ROSHYDROMET · USGS · WMO
This Issue:
Lunar Calibration
In This Issue
Articles
Moon as a Calibration Source
by Tom Stone
Absolute Calibration of Lunar Spectral Irradiance
by Claire Cramer
Lunar Calibration of MSG/SEVIRI Solar Bands
by Bartolomeo Viticchié, Sébastien Wagner, Tim Hewison, and Tom Stone
Phases Orbital Lunar Observations (POLO) - Intensive Study of the Moon
by Sophie Lachérade
On the Phase-Angle Dependence of the Moon Calibration Results
by Sophie Lachérade, Bartolomeo Viticchié, Tom Stone, Laurent Lefebvre, Sébastien Wagner, and Tim Hewison
Calibration/Validation of Suomi-NPP/VIIRS Day-Night Band using Moon Light
by Xi Shao, Changyong Cao, and Shilin Uprety
Angular Variation of GOES Imager Sean Mirror Visible Reflectivity
by Fangtang Yu, Xiangqian Wu, Tom Stone, and Gordana Dindo-Rankin
News in This Quarter
A Note from the Executive Panel Chair
by Mitch Goldberg
Semi-Annual Meeting of the NOAA/NESDIS Calibration Product Oversight Panel (CalPOP)
by Xiangqian Wu, NOAA
2013 Field Campaign of Radiometric Calibration for FY Sensors Held at CRCS Dunhuang Site
by Yuan Li, CMA
Improved Accessibility to EUMETSAT GSICS Products
by Tim Hewison, EUMETSAT
FY-3C Satellite Successfully Launched
by Yuan Li, CMA
EUMETSAT Begins Providing Alternative Calibration Coefficients for Meteosat-10/SEVIRI
by Tim Hewison, EUMETSAT
Announcements
Manik Bali Takes Over as Deputy Director of GSICS Coordination Center
GSICS Forms UV Subgroup
Upcoming GSICS-Related Meetings
GSICS-Related Publications
Special Thanks to Fangtang Yu and George Ohring
Moon as a Calibration Source:
Physical Basis and Background
by Tom Stone, USGS
Interest in using the Moon for an on-orbit radiometric reference is driven by the unique calibration capabilities that are made possible by its inherent physical properties. The Moon is accessible to potentially all instruments in any Earth orbit, with no intervening atmosphere. Regarded as a calibration light source at reflected solar wavelengths, the Moon is
GSICS Quarterly
Newsletter – Winter 2014 Issue
This Issue:
Exploring New Horizons in 2014
In This Issue
Articles
Metrological Traceability and Remote Sensing Measurements
by Dr. Raju Datla, NOAA, and Dr. Raghu Kacker, NIST
CrIS Radiometric Uncertainty and Recent Aircraft Underflights to Establish Its On-Orbit Traceability
by Dave Tobin and Joe Taylor, CIMSS/SSEC/UW Madison
GOCE Gradient Validation Using Cross-Overs
by Philip Brieden and Jürgen Müller, Institute of Geodesy, Leibniz Universität Hannover
Pre-launch Calibration Plans for the Sentinel-3 SLSTR
by Soji Ogidiyee and David Smith, Rutherford Appleton Lab (RAL)
Early on-Orbit Performance Assessment of FY-3C/MERSI
by Xiuqing Hu and Na Xu, CMA
SLSTR
GOCE
CrIS
This issue of the Quarterly is first in many ways. It is the first issue of 2014. We start a feature where we invite you to meet other GSICS experts as they share their thoughts. For the first time, we introduce the GSICS community to results of self-validation analysis of a Gravity measuring instrument [the Gravity
GSICS Quarterly
Newsletter – Summer 2014 Issue
Volume 8 Number 2
2014
Manik Bali, Editor
This Issue:
Special Issue on Ultraviolet
In This Issue
Articles
Higher Energy Photons Arrive at GSICS
by Larry Flynn, NOAA
In-flight Characterization of the Solar Diffuser of GOME-2 on Metop-A
by Ruediger Lang, EUMETSAT
Use of Solar Reference Spectra for Satellite Instruments
by Matthew DeLand, SSAI
The Absorbing Aerosol Index
by Omar Torres, NASA
Ozone Measurements from FY-3A
by Weihe Wang, CMA
Measurement of Atmospheric Composition using UV-visible Spectrometers from Geostationary Orbits
by Jhoon Kim, Department of Atmospheric Sciences, Yonsei University, Seoul, Korea
The NAESTRO Spectrophotometer on the Atmospheric Chemistry Experiment
by C.T. McElroy, York University, Canada
News in This Quarter
The NASA Orbiting Carbon Observatory-2 is on its Way!
by David Crisp, NASA
GRUAN-GSICS-GNS SRO WIGOS Workshop on Upper-Air Observing System Integration and Application
by Tim Hewison, Xavier Calbet, and Axel von Engeln, EUMETSAT
Summary of GSICS Executive Panel Meeting
by Jerome Lafeuille, WMO
A Note from the Executive Panel Chair
by Peng Zhang, CMA
Announcements
GSICS Users Workshop to be Held 19-21 Nov, 2014 in Shanghai
by Manik Bali, NOAA
GSICS Lunar Calibration Workshop to be Held in Darmstadt, Germany
by Sebastian Wagner, EUMETSAT, T. Stone, USGS, S. Lachérade, CNES, B. Fougnie, CNES, and X. Xiong, NASA
GSICS-Related Publications
CMA TOU
NASA OMI
EUMETSAT GOME-2
100 166 233 300 366 433 500
Total Column Ozone (DU)
Global total column ozone distribution of March 21, 2009 observed by CMA (FY-3A), NASA (OMI) and EUMETSAT (GOME-2)
Higher Energy Photons Arrive at GSICS
by Larry Flynn, NOAA
This issue of GSICS Quarterly features a new area of the spectrum for GSICS work, the ultraviolet. Unlike some other spectral regions, the primary products for the backscatter ultraviolet (BUV) measurements are the ratios of earth radiances to solar irradiances. These ratios provide information on atmospheric absorption and scattering, and on cloud and surface reflectivity for product retrieval algorithms.
The use of ratios has inherent cancellation of some instrument throughput changes, although the resources and philosophies to track the varying instrument components differ among the instruments. For example, the Ozone Mapping Profiler Suite (OMPS) instruments use pairs of working and reference diffusers to monitor the diffuser changes and identify the changes in the rest of the optical and sensor characteristics over time with a parameter called Calibration Factor Earth, CFE(t). A simplistic representation of the adjusted ratios (related to top-of-atmosphere reflectance) has the form
[Earth_radiance(t) * 1/CFE(t)] / [Day1_Solar_irradiance * AD(t)]
where AD(t) adjusts for the changes in the Earth/Sun distance, while the GOME-2 series of instruments use onboard sources to monitor the solar diffuser changes over time, SDC(t), independent of the rest of the optical and sensor changes, and make daily solar measurements. The simplistic representation of the adjusted ratios has the form
Earth_radiance(t) / [Solar_irradiance(t) * 1/SDC(t)]
GSICS Quarterly
Newsletter – Spring 2014 Issue
This Issue:
Special Issue on Microwave
In This Issue
Articles
Inter-calibration of Microwave Satellite Data: An Ongoing Challenge
by Isaac Moradi ESSIC/CICS, University of Maryland and Ralph Ferraro, NOAA
Passive microwave (MW) satellite measurements and derive products play a very important role in weather forecasting, data assimilation, and also in climate monitoring and assessment. MSU was the first operational MW radiometer flown on the TIROS-1 satellite and subsequently on NOAA-6 to -14 from 1978 to 200
AMSU-A/-B and MHS flown on NOAA-15 through NOAA-19 and EUMETSAT MetOp -(A and -B) satellites since 1998 formed the next generation of operational MW instruments. Most recently, ATMS combined the capabilities of both AMSU and MHS and was initially flown on Soumi-NPP in 2011, and is planned to be flown on JPSS-1 and -2. DMSP also operated a series of operational MW radiometers including SSM/T initially flown in 1979 onboard DMSP F04 to F15, SSM/I onboard F08 to F15, SSM/T-2 onboard F11 to F15, and currently, SSM/IS onboard F16 to F19. Finally, many MW instruments have been in recent years flown on different spectral satellites (e.g., MW
Spaceborne MW measurements, like any other physical measurements, are subject to errors and uncertainties. The errors can be classified into radiometric and geometric errors. Radiometric errors are caused by several sources including drift in sensor calibration, imperfect antenna and local electronics Radio Frequency Interference (RFI), uncertainty temperatures of hot and cold (space-view) targets, and non-linearity the calibration. Due to the lack of reference datasets, alternative methods are used to quantify the radiometric errors. These methods include validation using airborne observations; inter-calibration with similar spaceborne instruments, inter-comparison of brightness tem-
Aqua
NOAA-18
TRMM
MetOp-A/B
NOAA-15
GPM
Suomi NPP
MEGHA-TROPIQUES
News in This Quarter
Message from Outgoing Executive Panel Chair
by Mitch Goldberg
2014 Annual Meeting of GSICS Research and Data Working Groups
by Tim Hewison, EUMETSAT, GRWG Chair, Manik Bali, NOAA Interim GDWG
Microwave Inter-calibration Activities Reported at WorkPlan 2014
by Viva Misfeld, EUMETSAT
Meet GSICS Members
Announcements
Dr. Peng Zhang Accepts Chair of Executive Panel
by Manik Bali
Dr. Ken Holmlund Accepts Vice Chair of Executive Panel
by Manik Bali
GSICS-Related Publications

- **GSICS Quarterly Newsletter**
  - **Brand new format .**
  - **Newsletter has doi.**
  - **Accepts articles on topics related to calibration ( Pre and Post launch).**
  - **Rate and Comment section readers and authors can interact.**
  - **Register at Messaging Service to get Newsletter**

**Articles of 700-800 word length with 2 Figures and 1 Table acceptable . Contact Manik Bali for more info.**



GSICS Global Space-based Inter-Calibration System

# GSICS Coordination Center, NOAA

## GSICS Product Promotion

- GCC established a broad based panel of reviewers.
- GCC ensures that each product follows the GSICS Procedure for Product Acceptance (GPPA)
- Reviewers of GSICS product and Newsletter articles receive letter of appreciation from WMO.

# Things to Come

## GSICS Users Conference in Shanghai, China


**Topics of calibration**

**Contact : Hanlie Xu**
**: Manik Bali**

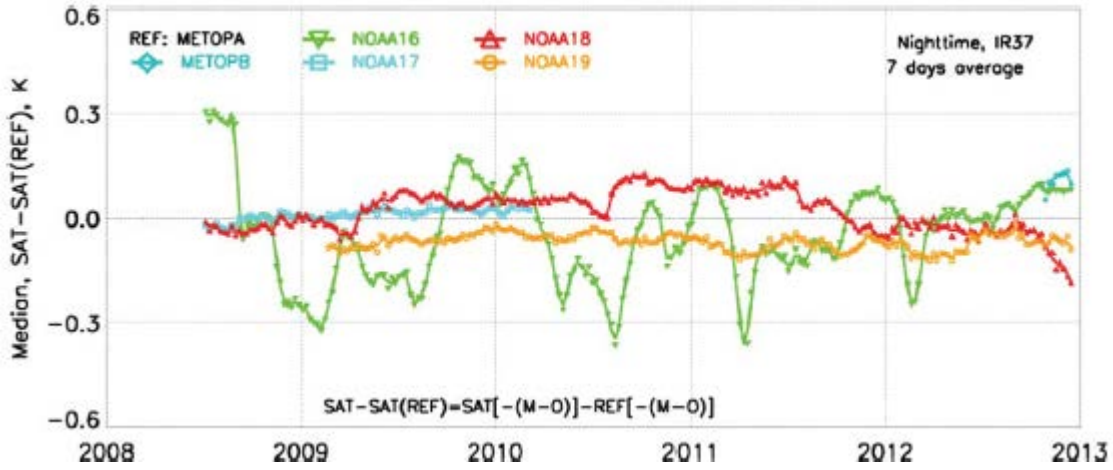
# Conclusions

- **GSICS distributes 37 Cross Calibration products in VIS and IR bands online, via product catalog**
- **Application of products have a positive impact on measured TOA radiances and downstream products ( eg. Level 1 ,SST).**
- **GCC publishes Newsletter brand new format , with a doi number**
- **GCC awards certificate of appreciation backed by WMO.**

***GSICS Users Workshop to be held in Shanghai Nov 19-21 ,2014***



GSICS Global Space-based Inter-Calibration System




**AVHRR, MODIS, and VIIRS radiometric stability and consistency in SST bands**

**XingMing Liang1,2 and Alexander Ignatov1**

**Received 29 January 2013; revised 16 April 2013; accepted 17 April 2013;**

**In order to meet Near Term Goals GCC needs approvals from EP…**

- FCDRs as GSICS Product.
- Awards ( will be discussed separate presentation …)
- GCC Newsletter Article Review Process
  - Next two slides give an overview of the process that we follow.
- Relaxation of GPPA guidelines for new products and operationalization of existing products.
  - Or do we create a new category of GSICS endorsed but not GSICS approved products or housed products?
  - Correct, category exists and the terminology that is normally used in GSICS is 'GSICS Products' and Third Party products.
  - We need EP's approval to deviate/apply relaxation in GPPA in the case of third party products ( for example filenaming meta data).
  - In fact we need EP's guidance on the mechanism to be able to relax GPPA for promoting products.

- GCC to coordinate with WMO to add GSICS products catalogue to WMO OSCAR database.
- GCC will discuss with GPRCs to prepare for the GSICS user conference 2014 to promote the GSICS products.
- GCC shall take a look at WMO/CGMS documents to prepare templates for GSICS documents and provide these to the GDWG for discussion.
- GCC shall provide a Document Management Plan (for example NOAAs) to the GDWG so that GSICS has a framework to publish documents.
- GCC and Tim Hewison to follow up on the support to CEOS WGCV regarding the GPPA as an example for best practises for QA4EO - after reviewing at web meeting in Summer 2014.

# Operations Plan Updates: Unfulfilled Actions

- GRWG06_19: Update GPPA to reflect delta correction due to migrating reference Status: Open, need update file not make a new product
- GRWG06_23: ER2 underflights June 2011 Status: Old action item (Fang Fang to explain why it is closed)
- GWG_13.12: GEO to GEO differences (for NOAA and EUMETSAT Status: Will be discussed in the IR Subgroup
- Joint07_3R GRWG for LEO IR and GEO IR Status: Xingming Liang will present status of this action item in the meeting
- GWG_13.31: Transfer of GCC responsibilities to WMO. Status: Answer is no, Completed/Closed.

# Summary of 2013 GSICS Users' Workshop

- Hosted by NOAA/NESDIS/STAR in College Park, Maryland, the United States on 8 April 2013, in conjunction with the first NOAA Satellite Conference
- More than 50 people from 15 agencies, universities and private companies attended
- A total of 14 oral talks, together with 10 posters presented during the workshop.
- Workshop included four sections: Introduction and Updates on GSICS, insights of current and future instrument inter-calibrations, Users' feedback and requests, and Questions and discussion on the future potential products.
- All the oral presentations and the workshop minutes are available at: https://gsics.nesdis.noaa.gov/wiki/Development/UsersWorkshop2013



GSICS Global Space-based Inter-Calibration System

# Outcomes of 2013 GSICS Users' Workshop

- **Success of GSICS products displayed by the Users**
  - Successful applications of the GSICS spectral response function corrections to improve the GOES imager data quality
  - Some examples of GSICS correction products to improve some GOES Sounder MTSAT products
- **Users plan to continue the investigation of the GSICS correction product impact on the L2 and L3 products**
- **GSICS Inter-calibration is expected to play an important role in the GOES-R on-orbit cal/val project**
- **Users' Requests**
  - Satellite operational anomaly alerting system for the GOES-R series
  - New GSICS sub-groups, ultraviolet (UV) and synthetic observation sub-groups, for a better understanding of UV instrument calibrations and radiative simulation performance
  - Intermediate data-sets requested during the off-line discussion



GSICS Global Space-based Inter-Calibration System

# Backup for Action items as a topic

## Proposed GCC/GDWG discussion on a better solution to tracking GSICS Actions:

- Suggested improvements:
- Add date closed – or replace due date
- Allow actions raised in web meetings to be entered
- With consistent numbering of actions
- Identify responsible person for each action
- Automatic reminders
- Allow outcomes to be recorded
- inline/links
- Allow items to be filtered by actionee, status, date, ...
- would allow customised views