
# Update on GSICS Activities (in an IVOS Context)

CEOS WGCV IVOS-26 Meeting
June 04-06, 2014 at JPL/Caltech, CA

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**(EUMETSAT)**

# Global Space-based Inter-Calibration System

- **What is GSICS?**
  - Global Space-based Inter-Calibration System
  - Initiative of CGMS and WMO
  - Effort to produce consistent, well-calibrated data from the international constellation of Earth Observing satellites
- **What are the basic strategies of GSICS?**
  - Improve on-orbit calibration by developing an integrated inter-comparison system
    - Initially for GEO-LEO Inter-satellite calibration
    - Being extended to LEO-LEO
    - Using external references as necessary
  - Best practices for calibration & characterisation
- **This will allow us to:**
  - 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


EUMETSAT CNES JMA

NOAA CMA KMA

ISRO NASA WMO

USGS NIST JAXA

ROSHYDROMET IMD ESA

# GSICS Principles

- 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**



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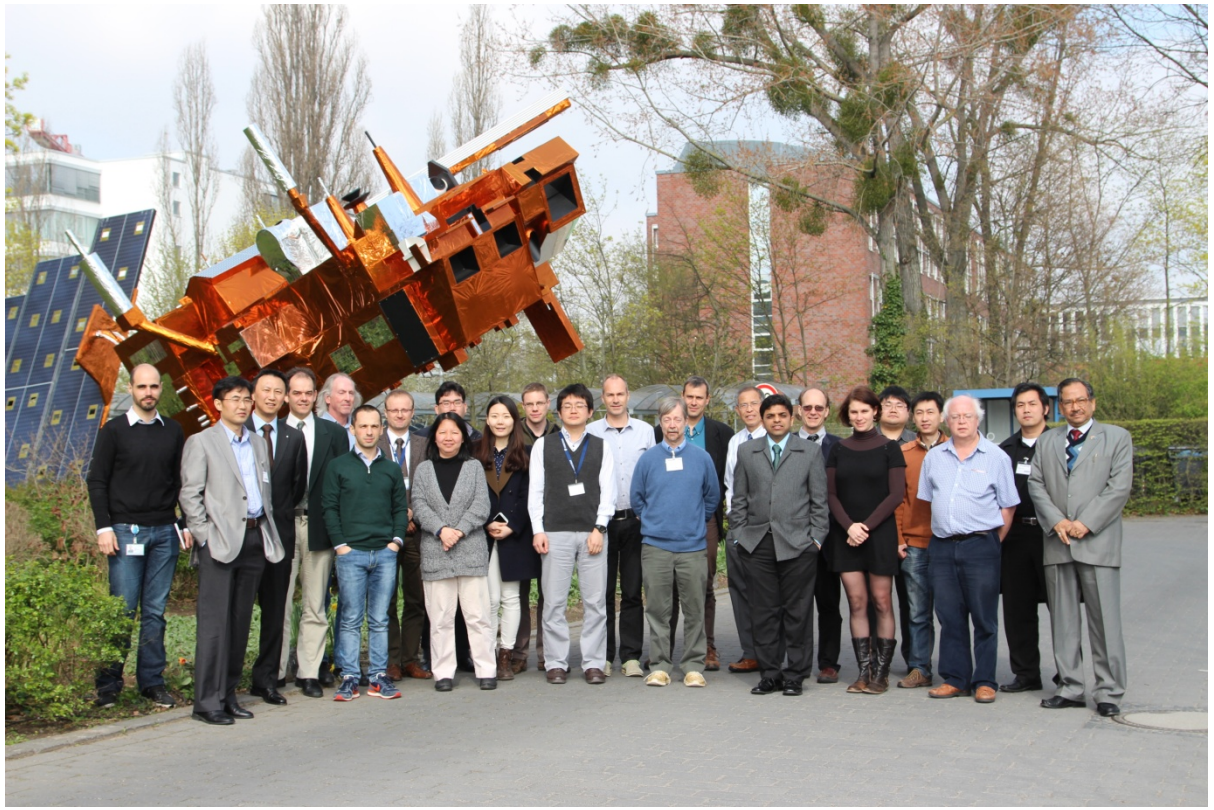
# 2014 Annual Meeting of GSICS Research and Data Working Groups

- Mini Conference
- Plenary Reports
- VIS/NIR Session
- IR Session
- UV Sub-Group
- Microwave SG
- Plenary Wrap-up



EUMETSAT, Darmstadt, Germany, 24-28 March 2014



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# Mini Conference

- Full day of 19 Presentations
- Highlighting range of activities of interest to GSICS
- Included users of inter-calibration products
  - e.g. SCOPE-CM projects working to generate FCDRs
  - GSICS support –by providing methods or products
- Calibration requirements for future instruments
  - Several presentations from EUMETSAT
- **Highlight**: Discussion on possibility of operating reference instruments with on-board SI-traceable calibration onboard Chinese satellites



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# Development of Infrared Products

- Progress with GSICS Corrections for GEO-LEO IR:
  - Some expected to be ready to enter demonstration mode at 3 agencies this year (ISRO, CMA and KMA)
  - and others to become the first operational GSICS products in 2014 (from NOAA, EUMETSAT and JMA
- netCDF format agreed for *delta corrections* in GSICS Corrections
  - to allow users to transfer from one reference to another
- Long-term: Aim to develop community consensus reference,
  - based on a blend of best quality instruments available,
  - May include bias adjustment.
  - Robust system from which to derive FCDRs.
  - Encouraging results were presented for AIRS, IASI and CrIS, as well as MODIS, VIIRS and MERSI, in this regard.



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# Development of VIS/NIR Products

- Chaired by Dave Doelling (Sub-Group Chair, NASA)
- Continued to develop GEO-LEO VIS based on Deep Convective Clouds (DCCs)
  - Soon sufficiently mature to generate demonstration products suitable for study by *beta-testers*.
- Lunar calibration session
  - highlighted the potential for sub 1% accuracy level
  - Discussion of issues faced by implementing ROLO
  - EUMETSAT suggested hosting *Lunar Calibration Workshop*
- What next?
  - Survey of members priorities/interests – Summer 2014



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# UV & Microwave Sub-Groups

**Microwave Sub-Group**

- 2.5hr mostly via Webex
- Interactions with the counterpart in the CEOS WGCV
- Reviewing different interpretations of root cause of bias patterns found in inter-calibration of microwave sounders' window channels

**UV Sub-Group**

- 2.5hr mostly via Webex
- Continued to scope five projects to develop different challenges of calibrating UV instruments
- Nominated Rosemary Munro (EUMETSAT) as chair and Lawrence Flynn (NOAA) as vice-chair of the sub-group.



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# Lunar Calibration Workshop

- Web Meeting for preparation

  https://gsics.nesdis.noaa.gov/wiki/Development/20140624

- 2014-06-24 11:00-13:30 UTC
- Webex

  Invitations to

  – GSICS members (gsics-dev@google-groups.com)

  – IVOS (via Nigel Fox)

  – Ocean Colour (via Ewa)

# GSICS Product Status 2014-03

| GPRC | Monitored Instrument | Reference Instrument | GSICS NRT Correction | GSICS Re-Analysis Correction | GSICS Bias Monitoring |
|---|---|---|---|---|---|
| EUMETSAT | Meteosat-8 – 10 }<br>Meteosat-7 | Metop-A/IASI | Pre-operational | Pre-operational | Prototype |
| JMA | MTSAT-1R }<br>MTSAT-2 } | IASI (+ AIRS) | Demonstration | Demonstration | Prototype |
| NOAA | GOES-13 & -15 Imager<br>GOES-11 & -12 Imager | IASI (+ AIRS) | Pre-operational | Pre-operational<br>Demonstration | Prototype |
| | GOES Sounder | IASI (+ AIRS) | In development | In development | In development |
| CMA | FY2C – E | IASI (+ AIRS) | In development | In development | Prototype |
| NOAA | AMSU/MSU | NOAA14/AMSU | In development | Pre-Operational | In development |
| NOAA Patmos-X | TIROS-N – NOAA – Metop /AVHRR | Aqua/MODIS | - | Demonstration | - |

Full GSICS Product Catalog available at http://www.star.nesdis.noaa.gov/smcd/GCC/ProductCatalog.php



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# GSICS Products Under Development

| GPRC | Monitored Instrument | Reference Instrument | GSICS NRT Correction | GSICS Re-Analysis Correction | Archive Re-Calibration |
|---|---|---|---|---|---|
| **All** | **Current GEO imagers 0.6µm VIS channels** | **MODIS via DCC** | **Demo 2014** | **Demo 2014** | **Demo 2014** |
| **All** | **Current GEO imagers 0.6µm VIS channels** | **MODIS via Moon** | **Demo 2015** | **Demo 2015** | **Demo 2015** |
| **EUMETSAT** | **Metop/AVHRR** | **IASI** | **2015** | **2015** | **2015** |
| **EUMETSAT SCOPE-CM** | **Meteosat-2 – 10 } IR Meteosat-7** | **IASI AIRS HIRS** | | | **2018** |
| **EUMETSAT SCOPE-CM** | **Meteosat-2 – 10 } VIS Meteosat-7** | **MODIS?** | | | **2018** |

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# Conclusions

- GSICS is maturing into a system for generating inter-calibration products
- suitable for integrating into operational processing
- First products soon to be declared operational
- Continuing to develop new inter-calibration products
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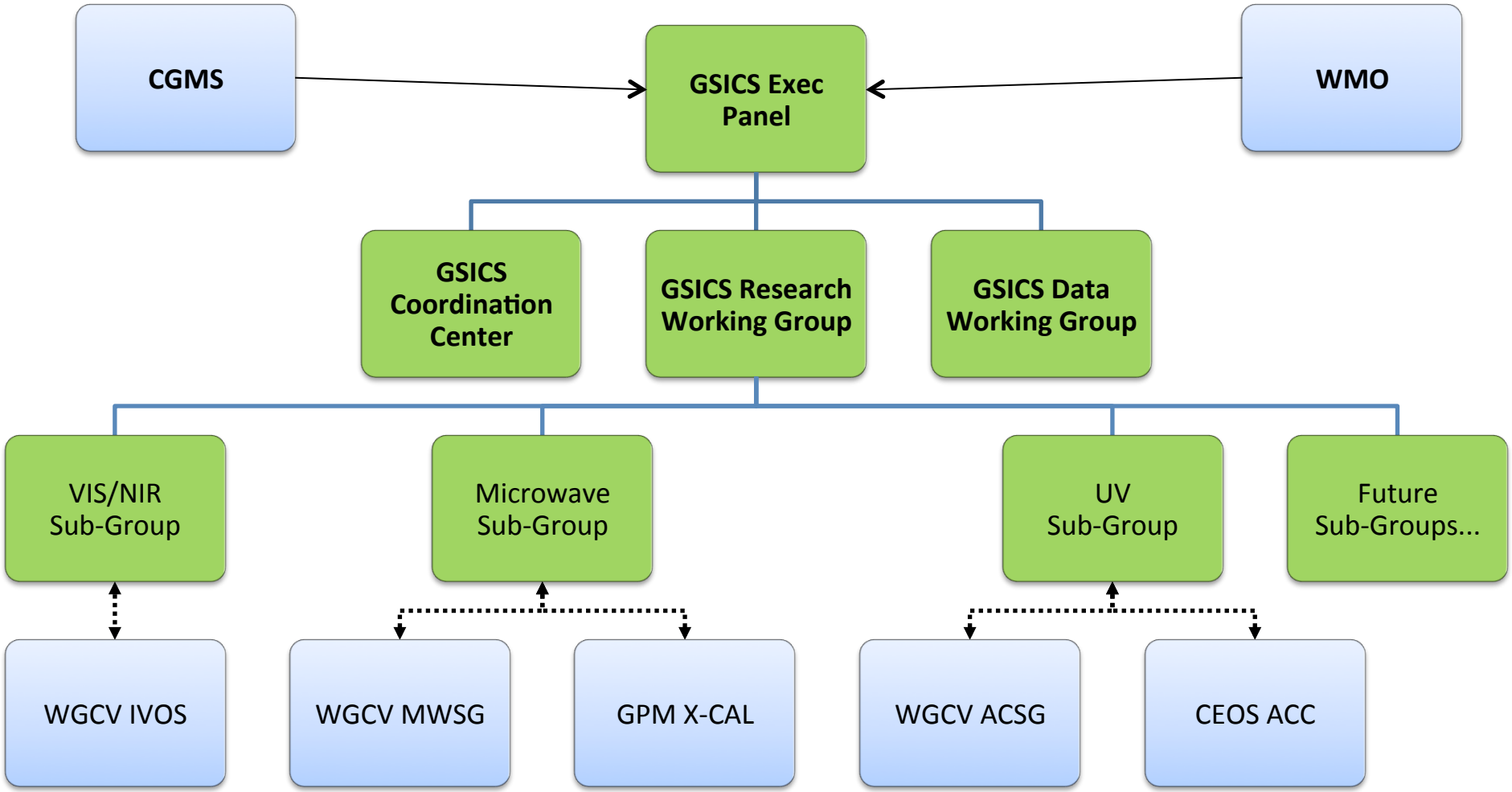
- suitable for integrating into operational processing
- Continuing to develop new inter-calibration products

https://gsics.wmo.int/wiki/

# GSICS Organisation



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# GSICS-IVOS Interaction

- Identified potential IVOS-GSICS interactions on:
  - Deserts (PICS) methods for cross- comparisons (Vis and IR)
  - *Moon as a calibration reference - improved models and usage*
  - LEO – LEO cross-calibration methods in general
  - Cross-comparison tools and databases and results
  - Pre-flight calibration workshop
  - Use of atmospheric hyperspectral imagers for band to band correction
  - Reference solar Irradiance spectrum and convolution
  - *IVOS to make more visible its activities through GSICS newsletters*
  - *Examples of Cal/Val best practise following QA4EO principles as case studies*
  - *Efforts to establish SI Traceable Climate and calibration sat in space*
  - Many overlaps of personnel perhaps some joint co-located meetings
  - Contribution to survey on Cal/val methods: activities/priorities
  - IVOS Participation in monthly GSICS Web Meetings

# The End

Thank You!