Update on GSICS Activities
(in an IVOS Context)

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

Tim Hewison & Sebastien Wagner
(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
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

• 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
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
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
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.
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
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.
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)
<table>
<thead>
<tr>
<th>GPRC</th>
<th>Monitored Instrument</th>
<th>Reference Instrument</th>
<th>GSICS NRT Correction</th>
<th>GSICS Re-Analysis Correction</th>
<th>GSICS Bias Monitoring</th>
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</thead>
<tbody>
<tr>
<td>EUMETSAT</td>
<td>Meteosat-8 – 10 } Meteosat-7</td>
<td>Metop-A/IASI</td>
<td>Pre-operational</td>
<td>Pre-operational</td>
<td>Prototype</td>
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<tr>
<td>JMA</td>
<td>MTSAT-1R } MTSAT-2</td>
<td>IASI (+ AIRS)</td>
<td>Demonstration</td>
<td>Demonstration</td>
<td>Prototype</td>
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<tr>
<td>NOAA</td>
<td>GOES-13 &amp; -15 Imager } GOES-11 &amp; -12 Imager</td>
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<td>Pre-operational Demonstration</td>
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<td>GOES Sounder</td>
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<td>NOAA</td>
<td>TIROS-N – NOAA – Metop /AVHRR</td>
<td>Aqua/MODIS</td>
<td>-</td>
<td>Demonstration</td>
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## GSICS Products Under Development

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<th>Archive Re-Calibration</th>
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<tr>
<td>All</td>
<td>Current GEO imagers 0.6µm VIS channels</td>
<td>MODIS via DCC</td>
<td>Demo 2014</td>
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<td>All</td>
<td>Current GEO imagers 0.6µm VIS channels</td>
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<td>Demo 2015</td>
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<td>EUMETSAT</td>
<td>Metop/AVHRR</td>
<td>IASI</td>
<td>2015</td>
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<tr>
<td>EUMETSAT SCOPE-CM</td>
<td>Meteosat-2 – 10 } IR Meteosat-7</td>
<td>IASI, AIRS, HIRS</td>
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<td>2018</td>
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<td>EUMETSAT SCOPE-CM</td>
<td>Meteosat-2 – 10 } VIS Meteosat-7</td>
<td>MODIS?</td>
<td></td>
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<td>2018</td>
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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
- GSICS is maturing into a system for generating inter-calibration products
- suitable for integrating into operational processing
- Continuing to develop new inter-calibration products
- While cooperating with related activities

https://gsics.nesdis.noaa.gov/wiki/
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!