GSICS MW SubGroup

26 July 2016 – 1100 UTC

Join by WebEx
https://eumetsat.webex.com/eumetsat/j.php?MTID=m1c20e7da09b516841965e5eae2ae15d3
13:00 | Europe Summer Time (Berlin, GMT+02:00) | 2 hrs 30 mins
Meeting number (access code): 953 709 485
Meeting password: gsics

Join by phone
Global call-in numbers: https://eumetsat.webex.com/eumetsat/globalcallin.php
0800-051-3810 Call-in toll-free number (UK)
+44-203-478-5289 Call-in toll number (UK)

Agenda for Today

1. Welcome and general business (Ralph) (15 min)
   - Old Actions
   - Review of 2016 goals and topical area co-leads (need volunteers!)
2. Outcome of joint CEOS-GSICS Microwave Meeting (Cheng-Zhi) (15 min)
3. GRUAN and it's potential contribution to GSICS (Tony) (20 min)
4. Microwave Sub-Group Wiki "Work Space" (Ralph) (10 min)
5. GSICS Users Meeting (Manik, Ralph) (10 min)
6. Potential intercomparison between MW & IR hyperspectral channels (TBD)(15 min)
8. Wrap Up, Next Meeting/speakers, etc. (5 min)

Members

Representation from ~12 space institutions and their related affiliates

Signed up as of July 2016

- NOAA (and affiliates) - Ralph Ferraro (Chair), Huan Meng, Cheng-Zhi Zou, Tony Reale, Manik Bali (Univ. Maryland), Isaac Moradi (Univ. Maryland), Hu ("Tiger) Yang (Univ. Maryland), Wenze Yang (Univ. Maryland), Johnny Lu (City College New York), Nazia Sha (CCNY)
- EUMETSAT (and affiliates) – Tim Hewison, Karsten Fennig, Viju John, Jörg Ackermann, Sabatino DiMichele, Sante Laviola, Vinia Mattoli, Sreerekha Thonipparambil, Christophe Accadia
- NASA (and affiliates) – Ed Kim (GSFC), Tanvir Islam (JPL), Linwood Jones (Univ. of Central Florida), Rachael Kroodsma (Univ. of Maryland), Wes Berg (Colorado State Univ.)
- NIST - David Walker
- CMA (and affiliates) – Songyan Gu, Qifeng Lu, Lin Chen, Hu Yang, Xiaolong Dong, Shengli Wu
- KMA (and affiliates) – Jun Park, Dong-Bin Shin (Yonsei University, South Korea)
- JAXA (and affiliates) - Misako Kachi, Takashi Maeda
- IISC – Ram Ratan

Old Action Items

1. Exploit GRUAN data sets via Tony Reale (NOAA). Ralph to have Tony speak at our next meeting; Tim has invited Tony to participate in a September telecon focused on uses of NWP/RTM as a calibration reference.

2. Group participation at the CEOS-GSICS meeting in Beijing in July; consider either giving an individual talk or contribute to an overview talk that Cheng-Zhi will deliver

3. MW Subgroup Work Space - Ralph to send out information on this.

4. Leaders for MW subgroup topical areas - Ralph to send out information on this.

5. Ralph to plan next meeting for late July (prior to the 2016 GSICS Users Meetings)

Focus Topics for 2016

- Defining CLEAR PATH for **GSICS MW products and algorithms**
  - Methodologies *(TBD)*
    - SNO, Double difference, etc.
  - Reference Standards *(TBD)*
    - A particular sensor? Likely to be wavelength dependent (e.g., window, O_2, H_20); A RTM?
  - LUT/Correction Tables *(TBD)*
    - Near real-time and climate; they will be different
- Tying together other groups/opportunities
  - Engaging more closely GPM X-Cal *(Wes, Rachel)*
  - Formalizing linkages to CEOS MW subgroup *(Cheng-Zhi, Xiaolong Dong)*
    - *CEOS-GSICS Microwave Coordination Meeting – 2016 July 5-6, Beijing, China (at time of IGARSS 2016)*
      - *Can there be a common definition of standards?*
      - *Define some concrete collaborations*
  - Expanding active participation – India, others? *(Manik, Ralph)*
- Participation by subgroup at upcoming meetings of relevance:
  - GSICS; CEOS;CALCON, Microrad 2016, AMS Sat. Met, EUMESAT Satellite, etc.

MW "Work Space" (1/2)

http://gsics.atmos.umd.edu/bin/view/Development/MicrowaveSubGroup

Relevant GSICS Publications

GSICS Quarterly 2014 Q1

GSICS Quarterly 2016 Q4

Microwave Imagers

- Key Scientific Papers
- Key Scientific Presentations
- Intercomparison Plots, Tables, etc.

	SSMI	TMI	AMSR-E	WindSat	SSMIS	AMSR-2	MADRAS	GMI
SSMI								
TMI								
AMSR-E								
WindSat								
SSMIS								
AMSR-2								
MADRAS								
GMI								

Microwave Sounders

- Key Scientific Papers
  - Moradi, I., H. Meng, R. Ferraro, S. Bilanow, 2013: Correcting geolocation errors for microwave instruments aboard NOAA satellites. *IEEE Transactions on Geoscience and Remove Sensing,* **51,** 3625 – 3637.
  - Moradi, I., R. Ferraro, P. Eriksson, and F. Weng, 2015: Inter-calibration and validation of observations from ATMS and SAPHIR microwave sounders, *IEEE Trans. Geosci. Remote Sens.*, **53**, 5915–5925.
  - Yang, W, H. Meng, R. Ferraro, I. Moradi, and C. Divaraj, 2013: Cross scan asymmetry of AMSU-A window channels: characterization, correction and verification. *IEEE Transactions on Geoscience and Remove Sensing,* **51,** 1514 – 1530.
- Key Scientific Presentations
- Intercomparison Plots, Tables, etc.

	MSU	AMSU-A	AMSU-B	MHS	SAPHIR	ATMS	SSM/T	SSM/T2	MWTS	MWHS
MSU										
AMSU-A										
AMSU-B										

MW "Work Space" (2/2)

http://gsics.atmos.umd.edu/bin/view/Development/MicrowaveSubGroup

	MSU	AMSU-A	AMSU-B	MHS	SAPHIR	ATMS	SSM/T	SSM/T2	MWTS	MWHS
MSU										
AMSU-A						See article below - Zou et al.				
AMSU-B										
MHS										
SAPHIR						http://www.star.nesdis.noaa.gov/star/mw-calval.php				
ATMS										
SSM/T										
SSM/T2										
MWTS										
MWHS										

In-orbit Microwave Reference Records

By Manik Bali, Cheng-Zhi Zou, Ralph Ferraro, Fuzhong Weng and Lawrence E Flynn

Introduction

In orbit Microwave instruments are routinely calibrated against in-situ targets and GPS-RO measurements. Howewer these targets get influenced by local weather conditions and usually require a forward model to compute the TOA (Top of Atmosphere) MW reference radiances which are then compared with the monitored instrument.Further, these Intercomparisions do not reveal the full scale of instrument bias such as scan angle dependence of measurements, temporal trends and temperature depedence of bias. Over the past many years the MW community (Moradi et al) has demanded that MW instruments be compared with in-orbit stable references (as done in IR and VIS by using IASI/AIRS/CrIS and Aqua-MODIS) so that the full scale of measurement biases (over a full range of temperature, scan angles time and spectrum) of mw instruments is revealed. This would help in fully understanding the in-orbit instrument performance charecterstics, compute cross-callibration bias and offset coefficients and use them to re-calibrate the instrument and improve the quality of its observations.

Such an an in-orbit reference needs to be several times more stable and accurate than the monitored instrument to be able to reveal the monitored instrument biases (temperature, scan angle spectral etc). Using this basic premise IASI-A/B AIRS and CrIS have been routinely used as a reference to monitor in-orbit GEO instruments in the IR bands by the GSICS community. The intercomparisions have produced cross calibration products and resulted in long time series of monitoring. However it is often felt that design stability and accuracy of a reference instrument alone cannot gurantee its in-orbit performance in the long run. Recently the upper spectrum of the IASI-A develped non linerarities and became anomalously negatively biased.

For the impacted spectrum. this anomaly lowerd the trusworthyness of the IASI-A reference radiances for GSICS style monitoring. This anomaly also initiated discussions in the GSICS community to find solutions of such anomalies should they occur in other GSICS reference instruments. Flynn and Bali, 2016 (GSICS discussions see here)suggested that GSICS should use reference records (i.e trustworthy stable and accurate) instead of using directly L1 radiances produced by reference instruments. The reference records are radiances whose stability accuracy is monitored and corrected and perhaps combined with other stable references. In addition these should satisfy a reference selection matrix suggested by Fuzhong Weng 2016 (See here) and Bali et al 2016.

Backup Slides

What is a GSICS MW Product?

- MW products differ from those from VIS or IR because there are not potential SI standards to consider

- MW products can come in two classes:
  - Retrospective type products (FCDR “components” – geolocation, scan biases, intersatellite corrections, etc.)
  - Forward looking (quasi-real time)

- A possible path forward:
  - Determine from users what specific MW products they would like to see from GSICS
  - Define a MW primary reference
    - WindSat or GMI for MW imagers?
    - ATMS for MW sounders?
    - A radiative transfer model like RTTOVS or CRTM?
  - Work with GDWG to define:
    - Data formats
    - Meta-data standards
    - Distribution mechanism
  - Work with the GCC to see how the products could be reviewed through the GPPA

- Two potential products?
  - AMSU-MSU (C-Z. Zou)
  - SSM/I (K. Fennig)

Scope of Microwave Sub-Group

- Understanding the users' requirements for inter-calibration products for microwave instruments
  - Imagers + sounders – passive only (initially, but eventually consider active if there is a need…)
  - Retrospective calibration (CDR's and their components like geolocation, scan biases, inter-satellite)
  - Forward looking calibration (near-real time uses)
- Identifying existing products that could meet those requirements, but first….
  - Need to define criteria…Reference standards (sensor(s), models, calibration methodologies….)
  - And then a process that adheres to GSICS principles
- We should also focus on tools/algorithms like SNO, Double Difference, RTM, etc.
  - Might be something more feasible in near term?
- Define data standards (jointly with GDWG)
- Encourage the creators of those products to submit them to the GSICS Procedure for Product Acceptance (GPPA), once its defined for MW
  - Candidates include Cheng-Zhi Zou (MSU-AMSU), Karsten Fennig (SSMI), GPM X-Cal LUT's
- GSICS Products could be developed within the Microwave Sub-Group
- Coordination with other groups (e.g., CEOS WGCV MW, GPM X-Cal) would also be required to generate standards and best practices