GSICS MW SubGroup

21 April 2016 – 1200 UTC

14:00 | Europe Summer Time (Berlin, GMT+02:00) | 1hrs 30 mins

Join WebEx meeting
Meeting number: 954 661 237
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)

Access code: 954 661 237

Agenda for Today

1. Welcome and new members (Ralph) (5 min)
2. Articles in the most recent GSICS Newsletter (Ralph) (5 min)
3. Outcomes of 2016 Annual Meeting of GRWG+GDWG (Ralph, Manik, Tim) (15 min)
4. Plans/Status for joint CEOS-GSICS Microwave Meeting (Cheng-Zhi) (5 min)
5. New idea - Wiki "Work Space" (Ralph) (10 min)
6. Science Update:

- MWRI intercalibrations (S. Wu, CMA) (20 min)
- SSMT-2 /AMSU-B intercomparison (J. Luo/N. Shah, City College of New York) (20 min)

7. Looking for leaders for subgroup focus areas (Ralph) (5 min)
8. Wrap Up, Next Meeting/speakers, GSICS Users Workshop, etc. (5 min)

Members

Representation from ~10 space institutions and their related affiliates

Signed up as of April 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
- IISC – Ram Ratan

Annual Meeting of the GRWG+GDWG

Tsukuba Space Center, Japan, 29 February – 4 March 2016

https://gsics.nesdis.noaa.gov/wiki/Development/20160229

Relevant Outcomes for MW

- Day 1 – Mini Conference
  - FIDUCEO Project
  - Calibration of TRMM and GPM Radars
  - GCOM-W AMSR-2 calibration and intercal with GMI
  - Intercal of FY3/MWRI
  - Intercal of ATMS with SAPHIR
- Days 2 – 5 (GRWG, GDWG, plenary) (A lot went on!)
  - Data formats, deliverables, standards, maturity levels, ….
  - I gave an overview of the MW Subgroup
    - I learned that the other groups are still struggling with similar issues we face
  - We heard updates from the various GSICS member agencies on current and future activities/contributions

GSICS Global Space-based Inter-Calibration System

Quarterly

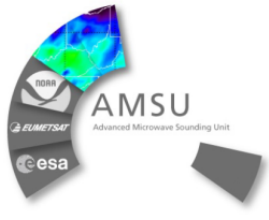
Newsletter– Winter 2016 Issue

Volume 9 Number 4
2016
doi: 10.7289/V5ZC80W8

Manik Bali, Editor

CMA • CNES • EUMETSAT • IMD • ISRO • JAXA • JMA • KMA • NASA • NIST • NOAA • ROSHYDROMET • USGS • WMO

In This Issue



Sentinel-3A placed in orbit

Jason-3 launched

Channel frequency shifts, drifts and uncertainities in microwave sounding observations

By William Bell, Met Office, UK

Observations from microwave sounding instruments have been exploited widely for numerical weather prediction (NWP) and for climate studies assessing long-term trends in atmospheric temperatures. Observations from channels in the 50-58 GHz range have been particularly valuable in providing information on tropospheric and stratospheric temperatures and are currently one of the most beneficial observation types in current global NWP systems.

The homogenisation and reprocessing of this data in support of climate trend analyses and atmospheric reanalyses continue to be active areas of research. As these applications mature, and the data quality tolerances become ever more stringent, new studies are uncovering a range of mechanisms that contribute to the biases observed in the data. For example, several studies have provided evidence of shifts, drifts and uncertainties in the channel center frequencies for several microwave radiometers - and these are the subject of this article. The radiometers of concern here are total power heterodyne radiometers, which generally employ local oscillators (LOs) in the form of Gunn diode oscillators or dielectric relaxation oscillators.

For key tropospheric channels bandwidths are in the range 330 - 400 MHz. For stratospheric sounding channels, the bandwidth decreases as the altitude of the channel peak sensitivity increases – from 33MHz

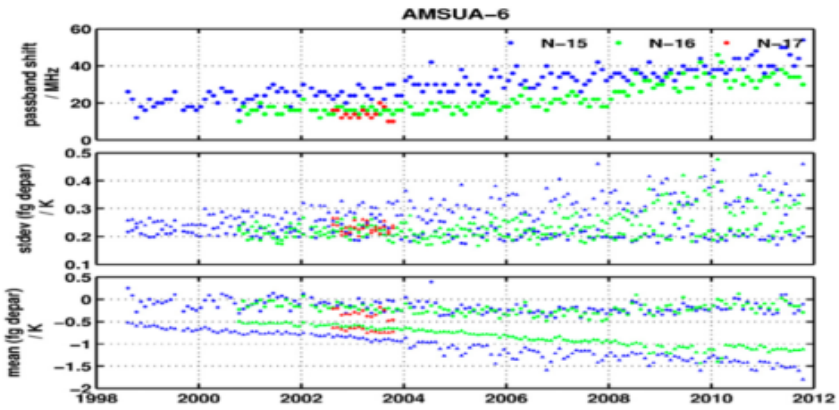


Figure 2: The evolution of channel centre frequency shift estimates and associated departure statistics for AMSU-A channel 6 (nominally centred at 54.40 GHz) covering the period 1998–2012. Estimates were obtained from a single assimilation cycle each month during the period, on the 15th of each month. Shown are (top) the derived frequency drift, (middle) the standard deviation of the first-guess departures for un-shifted (triangles) and shifted (circles) pass bands, and (bottom) the mean first-guess departure for un-shifted (triangles) and shifted (circles) pass bands. Results are shown for NOAA-15, NOAA-16, and NOAA-17 (reproduced from Lu and Bell, 2014).

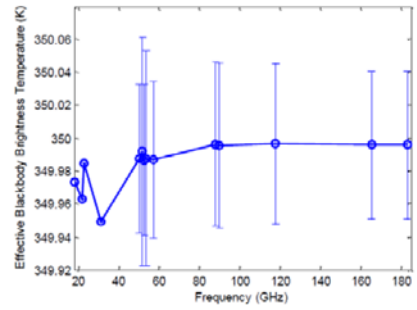


Figure 1: Estimated black body temperature uncertainty for ATMS.

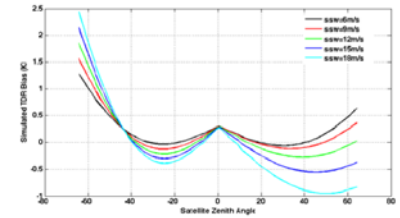


Figure 2 : Biases of ATMS antenna brightness temperature at channel 1 as a function of local zenith angle over oceans. Surface wind speed varies from 5 to 18 m/s. Reflector temperature is assumed as 283 K and its emissivity of 0.0028.

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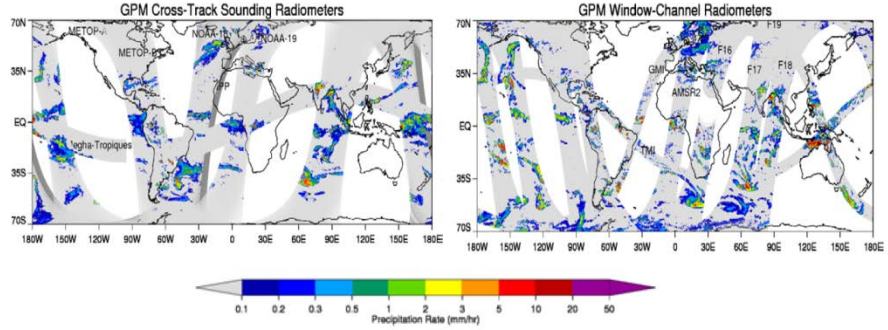

Figure 1: Coverage provide by a single orbital cycle from the GPM microwave constellation for January 1, 2015 for a) window-channel radiometers and b) cross-track sounding radiometers.

MW "Work Space"

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

Microwave Sub-Group of GSICS Research Working Group

Work Space for Intercomparison Results

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

	MSU	AMSU	MHS	SAPHIR	ATMS
MSU					
AMSU					
MHS					
SAPHIR					
MADRAS					

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.

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