Report on the CEOS/WGCV-GSICS Microwave Subgroups Joint Meeting

Cheng-Zhi Zou
Meeting Information

- **Meeting Name:** CEOS/WGCV-GSICS Microwave Subgroups Joint Meeting
- **Place:** National Space Science Center, Chinese Academy of Sciences, Beijing, China
- **Time:** July 6-7, 2016
- **Participants:**
  - Cheng-Zhi Zou (Co-Chair) - NOAA
  - Fuzhong Weng - NOAA
  - Xiaolong Dong (Co-Chair) - NSSC (National Space Science Center, CAS)
  - Zhenzhan Wang - NSSC
  - Qifeng Lu - CMA
  - Shengli Wu - CMA
  - Yang Guo - CMA
  - Dawei An - CMA
  - Wenying He - IAP (Institute of Atmospheric Physics, CAS)
  - Yili Zhao - NOTC (National Oceanic Technology Center, SOA)
  - Xiaoqi Huang - NOTC
  - Gang Zheng - SIO (Second Institute of Oceanography, SOA)
  - Chunyue Cheng - BRIMM (Beijing Institute of Radio Metrology and Measurement)
Presentation

- **Overview**
  - Progress in CEOS/WGCV, Xiaulong Dong
  - Overview of intercalibration activities at GSICS Microwave Subgroup, Cheng-Zhi Zou

- **Instrument Performance**
  - Well-calibrated ATMS, Fuzhong Weng
  - FY-3 Evaluation in NWP by CMA, ECMWF, and UKMO, Qifeng Lu

- **Inter-Comparison**
  - Validation of FY-3 MWTS in lower-stratosphere using COSMIC RO data, Wenying He
  - Cross-Calibration of ESA SMOS and NASA Aquarie brightness temperature, Yili Zhao
  - Intercalibration of ATMS and SAPHIR, Isaac Moradi
  - Inter-calibration of Satellite Microwave Radiometer Brightness Temperatures from AMSU-B & SSM/T-2, Nazia Shah
Presentation

- **Pre-launch Calibration**
  - Vacuum test results of FY-3D/MWRI, Shengli Wu
  - Calibration and validation of FY-3 MHTS, Yang Guo
  - Progress of sea surface height calibration of HY2 Radar Altimeter, Xiaoqi Huang
  - New method of radiometric nonlinear calibration for FY-3C Microwave Thermometer, Dawei An
  - Retrieving wet tropospheric path delay base on the HY-2A calibration of microwave radiometer, Gang Zheng

- **Standard development**
  - Microwave remote sensing radiometry at BIRMM, Chunyue Cheng
Challenges:

Change and development of environmental observing satellites

- The number of Earth-observing satellites has vastly increased
- Onboard instruments are more complex and are capable of collecting new types of data in ever-growing volumes.
- The user community has expanded and become more diverse as different data types become available and new applications for Earth observations are developed
- Users have become more organized, forming several international bodies that coordinate and levy Earth observation requirements
Point of Interest– focusing area

- Collaboration between CEOS and GSICS MW subgroups; not to overlap effort

- **CEOS/ WGCV microwave subgroups is focusing on**
  - Guidelines for prelaunch calibration of microwave radiometer
  - Guidelines for scatterometer calibration and data quality control

- **GSICS is focusing on defining reference instrument**
Criteria for reference instrument

- Fuzhong proposed criteria for selecting a reference microwave instrument (see next slide)

- Cheng-Zhi suggested that a reference instrument shall be channel dependent

In CDR application, an instrument that has the longest availability and stability in both its orbits and radiances is often selected as a reference for developing diurnal drift algorithm. But this is channel dependent since, so far, not a single instrument was used as a reference for all channels. Once a channel failed for a reference instrument, another instrument (same type) will often be used as a replacement for the reference.

In this sense, AMSU-A FCDR should be considered as a reference (see Manik’s presentation)

- Tim sent an email providing ideas on choice of references; however, due to incapable of accessing gmail emails in China, these ideas were not discussed at the meeting
Proposed Criteria for a Reference Instrument (F. Weng)

• The observations from the instrument are used in operations and research
  ✓ ATMS data are used in both global and regional NWPs
  ✓ ATMS data are used for hurricane monitoring and other applications (e.g. climate data record)

• The instrument calibration theory should be well established and documented
  ✓ Peer reviewed publications
  ✓ ATBD, OAD and user manual

• The instrument is well calibrated from the prelaunch tests and meets the specifications
  ✓ Radiometric calibration (e.g. non-linearity)
  ✓ Calibration accuracy from thermal vacuum data (TVAC)
  ✓ Traceable methodology for instrument noise
  ✓ Spectrum response function (SRF measurement)
  ✓ Antenna gain (e.g. side-lobe)

• The instrument performance in orbit is well characterized and meets the specifications
  ✓ Stable performance through trending noise
  ✓ TDR to SDR conversion
  ✓ Bias with respect to NWP and other standard (e.g. GPSRO/RAOB simulations, pitch maneuver)
  ✓ Lunar intrusion correction
  ✓ Inter-sensor bias through uses of resampling SDR
  ✓ Geolocation accuracy
  ✓ Error budget (e.g. antenna reflector emission)