



CGMS-36, CMA-WP-07
Prepared by NSMC/CMA
Agenda Item: II/2

**In response to CGMS Recommendations:
CMA Activities in inter-calibration**

CMA Response to CGMS 35 Recommendations

In response to CGMS Recommendations: CMA Activities in inter-calibration

1 INTRODUCTION

Recommendation 35.02: *Satellite operators are requested to provide near real-time monitoring of instrument performance on easily accessible websites and to archive the information. **Deadline: CGMS-36***

Recommendation 35.04: *Satellite operators to explain significant discrepancies in satellite inter-calibration as part of their contribution to GSICS. Pertinent reports should be delivered to the GCC. **Deadline: CGMS-36***

Recommendation 35.06: *CGMS encourages continuation of the generation of long term satellite-based climatologies.*

2 CMA CAL/VAL WORKING PROGRESS

2.1 Recalibration of historical Satellite Data

To improve the accuracy of satellite observations, particularly the Chinese FY serial satellites for climate study, NSMC is reprocessing the archived data. The expected outcome is the fundamental climate data records (FCDR). NSMC shall re-calibrate the archive such as the FY-1C/1D data.

Database from several field measurements in China has already been established that collects all the data from the past Cal/Val experiments. These measurements are important to calibrate and validate the L1B radiance and the retrieval products.

NSMC is beginning to design and develop a website and database of FY's Sensor Cal/Val.

2.2 FY-2 GSICS Calibration

CMA GSICS Processing and Research Center (GPRC) is being constructed at NSMC since June 2008. The goal is to run the common GSICS GEO-LEO algorithm for FY-2C/2D. NSMC has modularized the GSICS algorithm software to adopt the FY-2C/2D L1B data. The inter-calibration comparison between FY-2C/2D and AIRS has been conducted for some cases. The next step is to make it operational after tests.

2.3 FY-3A A&E

FY-3A launched on May 27, 2008 carries 11 payloads including seven optical sensors (VIRR, MERSI, IRAS, ERM, SIM, SBUS, TOU), three microwave sensors (MWTS, MWHS, MWRI) and a space environment monitor (SEM).

The FY-3 Proto-Flight Model (PFM) was transferred to the manufacturers into their Flight Models (FM) in 2005. The three PFM sensors (MERSI, MWTS, MWHS) were undertaken the airborne flight experiment at the China Radiometric Calibration Sites (CRCS) in 2007 and ideal airborne observation data was obtained

NSMC and the manufacturers of these instruments made comprehensive analysis and evaluation of these sensors before the launching. At present, they are assessing the instrument's in-flight performance by comparing with similar sensors such as AVHRR, MODIS, MERIS, TMI, AMSR-E, SSMIS, AMSU-A, AMSU-B, HSB, MHS, ATMS from foreign satellites (Table 1).

In September, 2008, ground-based synchronous experiment in the three CRCS sites (Dunhuang Gobi, Qinghai Lake, Simao rain forest) were conducted for calibration and validation of these new sensors.

Table 1: FY-3A sensors' calibration and validation activity

Instruments	Preflight Calibration & Characterization	On-board Calibration	In-flight Vicarious Calibration
VIRR	<ul style="list-style-type: none"> ✓ Solar-based VIS-NIR Cal. ✓ Integrating Sphere Cal. ✓ Lab thermal vacuum chamber TIR Cal. ✓ Spectral Response Function 	<ul style="list-style-type: none"> ✓ Black Body ✓ Space View 	<ul style="list-style-type: none"> ✓ CRCS sites Cal. ✓ Cross calibration: AVHRR, MODIS, ✓ Intra-Satellite Cross Calibration with VIRR
MERSI	<ul style="list-style-type: none"> ✓ Solar-based VIS-NIR Cal. ✓ Integrating Sphere Cal. ✓ Lab thermal vacuum chamber TIR Cal. ✓ Spectral Response Function 	<ul style="list-style-type: none"> ✓ VIS/NIR Onboard calibrator ✓ Black Body ✓ Space View 	<ul style="list-style-type: none"> ✓ CRCS sites Cal. ✓ Cross calibration: MODIS, MERIS ✓ Intra-Satellite Cross Calibration with MERSI
MWRI	<ul style="list-style-type: none"> ✓ Antenna Test ✓ Thermal Coupling ✓ Characteristics test of warm reflector ✓ Emissivity test of microwave black body targets ✓ Lab thermal vacuum chamber Cal. 	<ul style="list-style-type: none"> ✓ Black Body ✓ Space View 	<ul style="list-style-type: none"> ✓ CRCS sites Cal. ✓ Cross calibration: TMI, AMSR-E, SSMIS
IRAS	<ul style="list-style-type: none"> ✓ Vacuum Test ✓ Integrating Sphere Cal. 	<ul style="list-style-type: none"> ✓ Black Body ✓ Space View 	<ul style="list-style-type: none"> ✓ Cross Calibration: HIRS, AIRS, MODIS
MWTS	<ul style="list-style-type: none"> ✓ Antenna Test ✓ Emissivity test of microwave black body targets ✓ Lab thermal vacuum chamber Cal. 	<ul style="list-style-type: none"> ✓ Black Body ✓ Space View 	<ul style="list-style-type: none"> ✓ CRCS sites Cal. ✓ Cross calibration: AMSU-A, ATMS, SSMIS
MWHS	<ul style="list-style-type: none"> ✓ Antenna Test ✓ Emissivity test of microwave black body targets ✓ Lab thermal vacuum chamber Cal. 	<ul style="list-style-type: none"> ✓ Black Body ✓ Space View 	<ul style="list-style-type: none"> ✓ CRCS sites Cal. ✓ Cross calibration: AMSU-B, HSB, MHS, SSMIS, ATMS
SBUS	<ul style="list-style-type: none"> ✓ Wavelength Cal. ✓ Radiometric Cal. ✓ Goniometric cal. ✓ Non-linearity cal. ✓ Interrange ratios cal. 	<ul style="list-style-type: none"> ✓ Solar irradiance Lamp 	<ul style="list-style-type: none"> ✓ Cross validation: SBUV/2 ✓ Ground measurement validation: WMO ground ozone measurements
TOU	<ul style="list-style-type: none"> ✓ Wavelength Cal. ✓ Radiometric Cal. ✓ Goniometric cal. ✓ Non-linearity cal. ✓ Interrange ratios cal. 	<ul style="list-style-type: none"> ✓ Solar irradiance Lamp 	<ul style="list-style-type: none"> ✓ Cross validation: OMI ✓ Ground measurement validation: WMO ground ozone measurements

3 Action Plan in the near future

Several actions are being planned including:

NSMC/CMA shall make FY serial GSICS into routine operation in the near future and create the GSICS graphs and table for FY-2 inter-calibration. NSMC shall create a web page to display the results of inter-calibration.

NSMC shall establish a near real-time system to monitor the instrument performance, starting it with the FY-3A's commissioning phase.



Table 2: Timetable for Actions to Implement GSICS

Action	Responsibility	Target Date
Male FY-2C/2D GSICS into routine operation	NSMC	12/31/08
Create CMA GISICS website	NSMC	06/15/09
Establish calibration data platform for FY serial sensors	NSMC	12/15/09
Establish a near real-time system monitoring the instrument performance on FY satellite sensors	NSMC	12/15/09
Recalibration for the FY-1C/1D	NSMC	06/31/10