



CGMS-39, CMA-WP-05

Prepared by CMA

Agenda Item: C.1

Discussed in Plenary

CMA Report on Preparations for Future FY-3

Summary of the Working Paper.

This working paper informs CGMS that the follow-on FY-3 contain at least four spacecraft models: FY-3C/D/E/F. The instrument payloads shall be modified either for the need to replace old instrument models with advanced one, or for the additional measurements that require new instruments to be put on board. New instruments include the **HIRAS** that replaces **IRAS** for vertical air sounding, the **WindRAD** for sea winds, and the **GAS** for greenhouse gases absorption measurement. CMA plans to maintain two FY-3 spacecrafts operational in space (morning and afternoon orbits). The planned schedule for flying the instruments on future spacecrafts guarantees the measurement of each instrument to be taken on a daily basis.

CMA Report on Preparations for Future FY-3

1. Introduction

FY-3s is the CMA polar-orbiting satellite series that plans to cover the duration 2008-2021. Development for FY-3 stated back to 1990s when most of the concept design was based on FY-1 series satellite. To meet the requirements for improved meteorological data services, especially for the numerical weather prediction, the FY-3 series was designed to be able of global, three-dimensional, quantitative and multi-spectral observations in all weather conditions (i.e. cloud-free or cloudy conditions).

The first two flying models of FY-3s, FY-3A and FY-3B, are tasked for the test and demonstration of the system, they were launched 27 May 2008, and 05 Nov 2010 respectively. 11 instrument payloads onboard fulfil the FY-3 mission for multiple spectral band imagery, IR and MW atmospheric sounding, ozone detection, and space environment monitoring.

The follow-on FY-3 spacecrafts contain at least four models, FY-3C/D/E /F. The instrument payloads shall be modified either for the need to replace the old instruments with advanced models, or for the additional measurements that requires new instruments to be put on board.

Table.1 Chronology of the FY-3 programme

Satellite	Launch	End of service	Height	LST	Status (AUG. 2011)	Instruments
FY-3A	27 May 2008	expected 2011	836 km	10.15	Trial operation	VIRR, MERSI-1, MWRI, IRAS, MWTS-1, MWHS-1, TOU/SBUS, ERM-1, SIM-1, SEM,
FY-3B	05 Nov 2010	expected 2013	836 km	13.38	Trial operation	VIRR, MERSI-1, MWRI, IRAS, MWTS-1, MWHS-1, TOU/SBUS, ERM-1, SIM-1, SEM,
FY-3C	2012	expected 2015	836 km	10.00	Planned	VIRR, MERSI-2, IRAS, MWTS-2, MWHS-2, MWRI, TOU/SBUS, ERM-1, SIM-2, SES
FY-3D	2014	expected 2017	836 km	14.00	Planned	MERSI-2, ASI, MWTS-2, MWHS-2, MWRI, (GAS), GNOS, SES
FY-3E	2017	expected 2021	836 km	10.00	Planned	MERSI-2, ASI, MWTS-2, MWHS-2, WindRAD, (OMS), ERM-2, SIM-2, GNOS, SES
FY-3F	2019	expected 2022	836 km	TBD	Planned	MERSI-2, ASI, MWTS-2, MWHS-2, MWRI, (GAS), GNOS, SES

2. Instruments Scheduled for FY-3C/D/E/F

The modification of payloads for follow-on FY-3 models involves sixteen instruments that are scheduled for each model as listed in Table 2. As it is planned to maintain two FY-3 spacecrafts



operational in the orbits (either morning or afternoon), this schedule shall guarantee the measurement of each instrument every day, and the each mission is not over loaded.

Table 2 Instruments Scheduled for FY-3C/D/E/F

satellite Scheduled Instruments	FY-3C 2012	FY-3D 2014	FY-3E 2017	FY-3F 2019
MERSI – Medium Resolution Spectral Imager (I , II)	(I)	(II)	(II)	(II)
MWTS – Microwave Temperature Sounder (II)				
MWHS – Microwave Humidity Sounder (II)				
MWRI – Microwave Radiation Imager				
WindRAD – Wind Radar				
GAS – Greenhouse Gases Absorption Spectrometer				
HIRAS – Hyperspectral Infrared Atmospheric Sounder				
OMS – Ozone Mapping Spectrometer				
GNOS – GNSS Occultation Sounder				
ERM – Earth Radiation Measurement (I , II)	(I)		(II)	
SIM – Solar irradiation Monitor (I , II)	(I)		(II)	
SES – Space Environment Suite				
IRAS – Infrared Atmospheric Sounder				
VIRR – Visible and Infrared Radiometer				
SBUS – Solar Backscattered Ultraviolet Sounder				
TOU – Total Ozone Unit				

3. Expected Improvement on FY-3C/D/E/F

The instruments with improved performance include **MERSI II**, **MWTS II**, **MWHS II**, **SIM II** and **ERM II**.

The advanced MERSI, MERSI- II shall increase channels from 20 to 25, to merge the VIRR channels.

MWTS- II increases channels from 4 to 13, and MWHS- II channels increase from 5 to 15. The advanced MWTS and MWHS will provide similar sounding capability as AMSU.

The advanced SIM that automatically tracks the solar disk shall improve the accuracy of the measured solar constant. The advanced ERM increases one broad channel to measure the outgoing long wave radiance directly.

Five new payloads include the **Hyperspectral Infrared Atmospheric Sounder (HIRAS)**, which is an IASI/Metop-like instrument to improve the measurement of temperature and moisture profile,



CGMS-39, CMA-WP-05

and replaces the IRAS on FY-3A/B. **Ozone Mapping Spectrometer** (OMS) is a SCIAMACHY/Envisat-like instrument to detect the ozone and other atmospheric chemicals and replaces the suite of TOU and SBUS. The total column content and the profile of trace gases can be retrieved from the nadir view and limb view separately. **Wind Radar** (WindRAD) measures the sea wind. **Greenhouse Gases Absorption Spectrometer** (GAS) measures CO₂ and CH₄ globally. **GNSS Occultation Sounder** (GNOS) shall improve the measurement of temperature and moisture profile at the upper atmosphere.