CMA report on the current and future satellite systems

Presented to CGMS-43 plenary session, agenda item [D.1]

Feng LU
National Satellite Meteorological Center, CMA

Coordination Group for Meteorological Satellites

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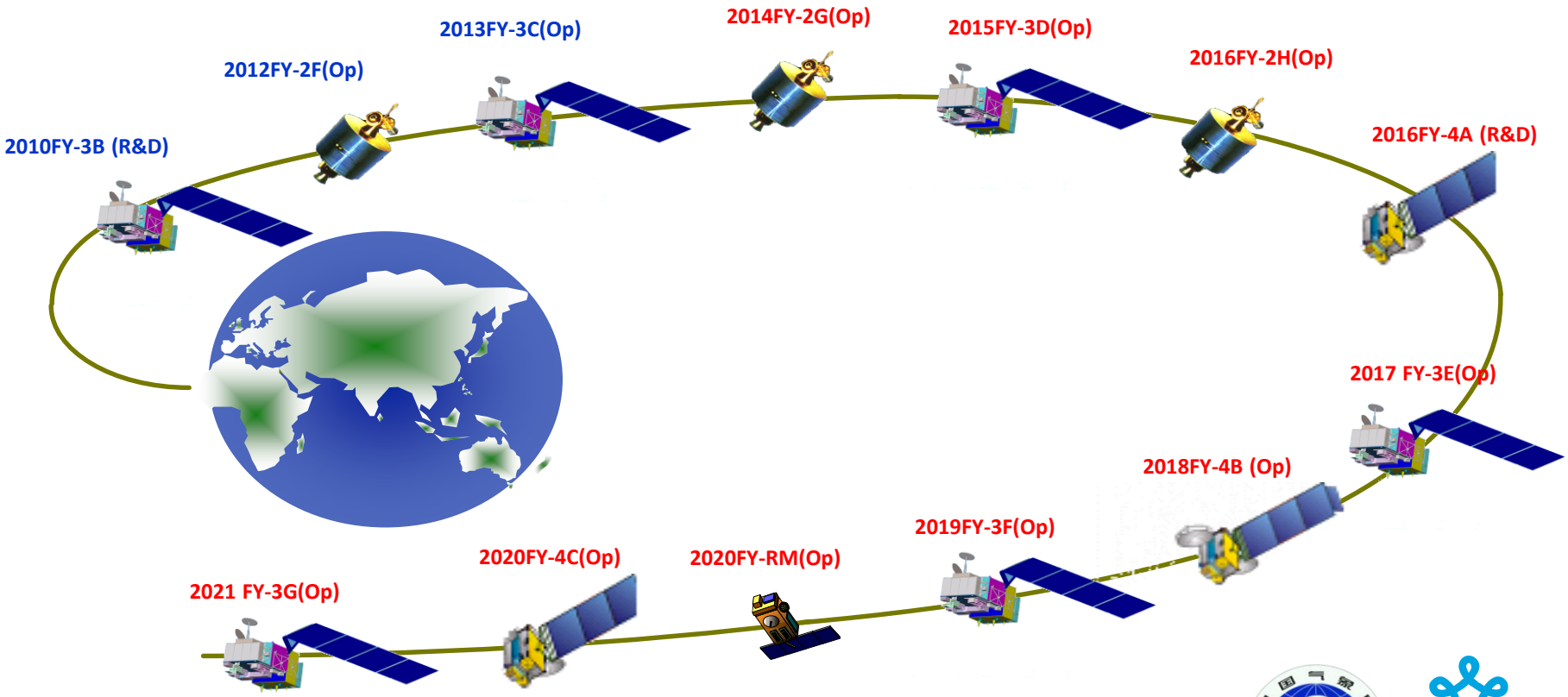
Overview - Planning of CMA satellite systems by year 2020



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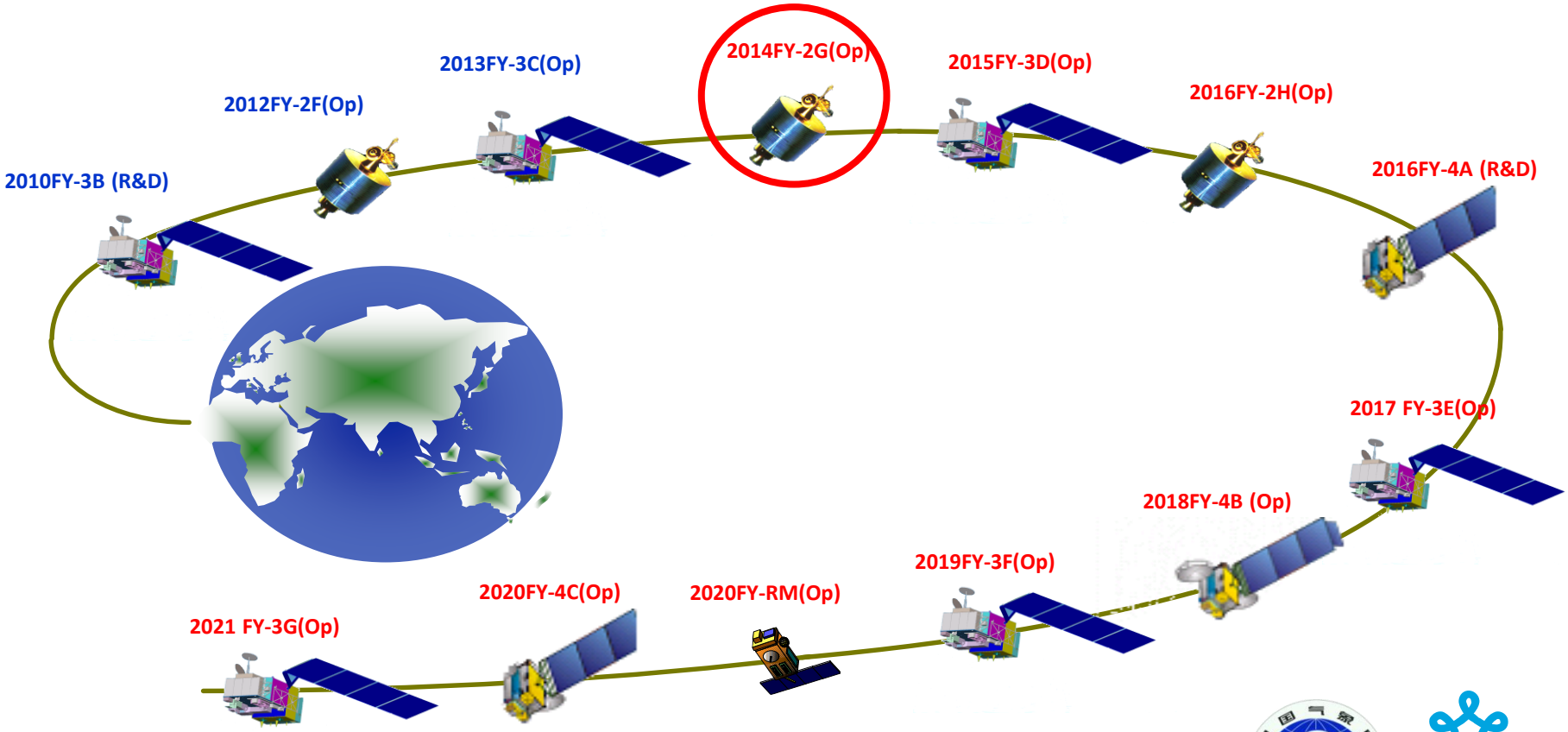

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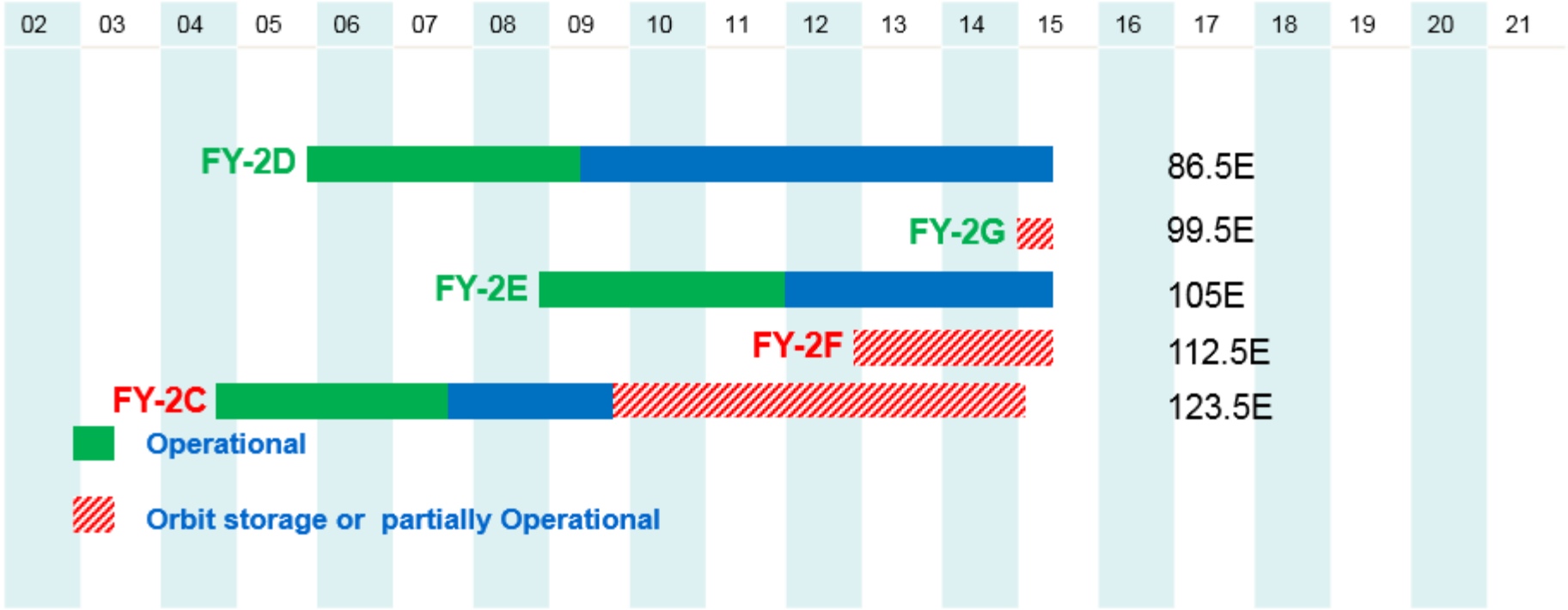
CURRENT CMA GEO SATELLITES

For CMA GEO satellite system. 105E is primary position and 86.5E secondary.



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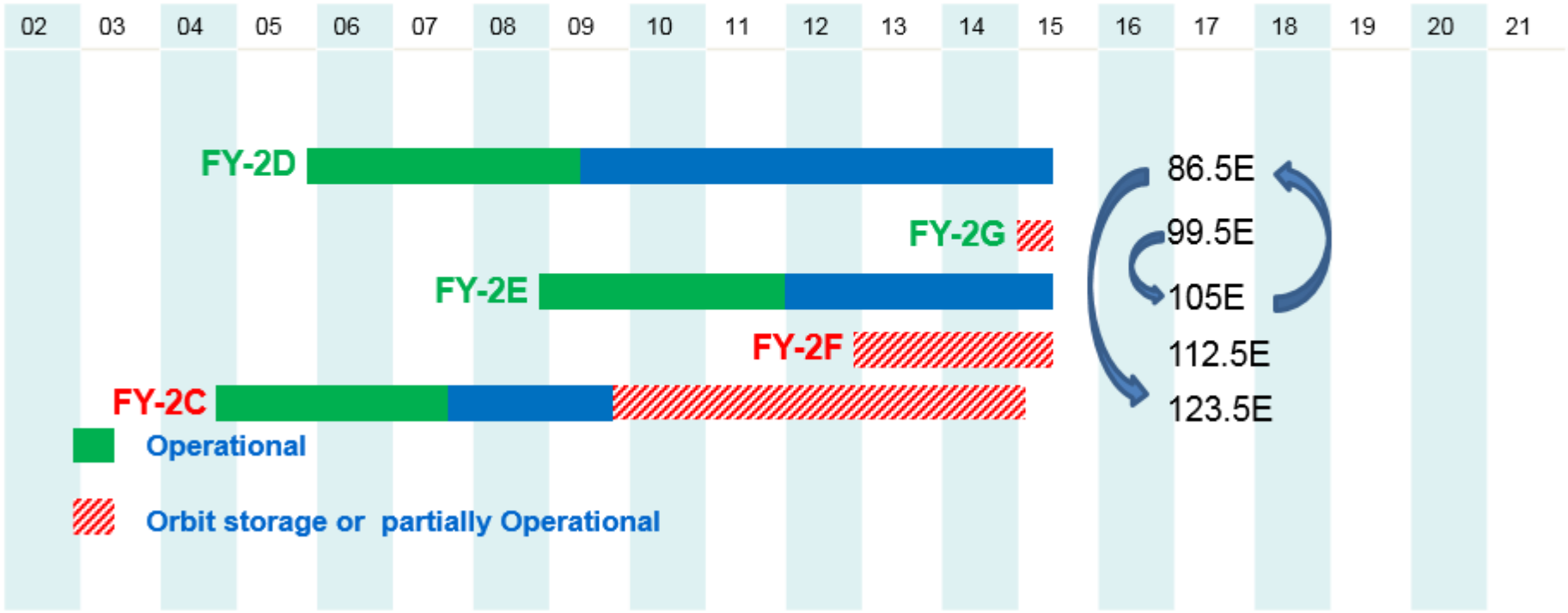

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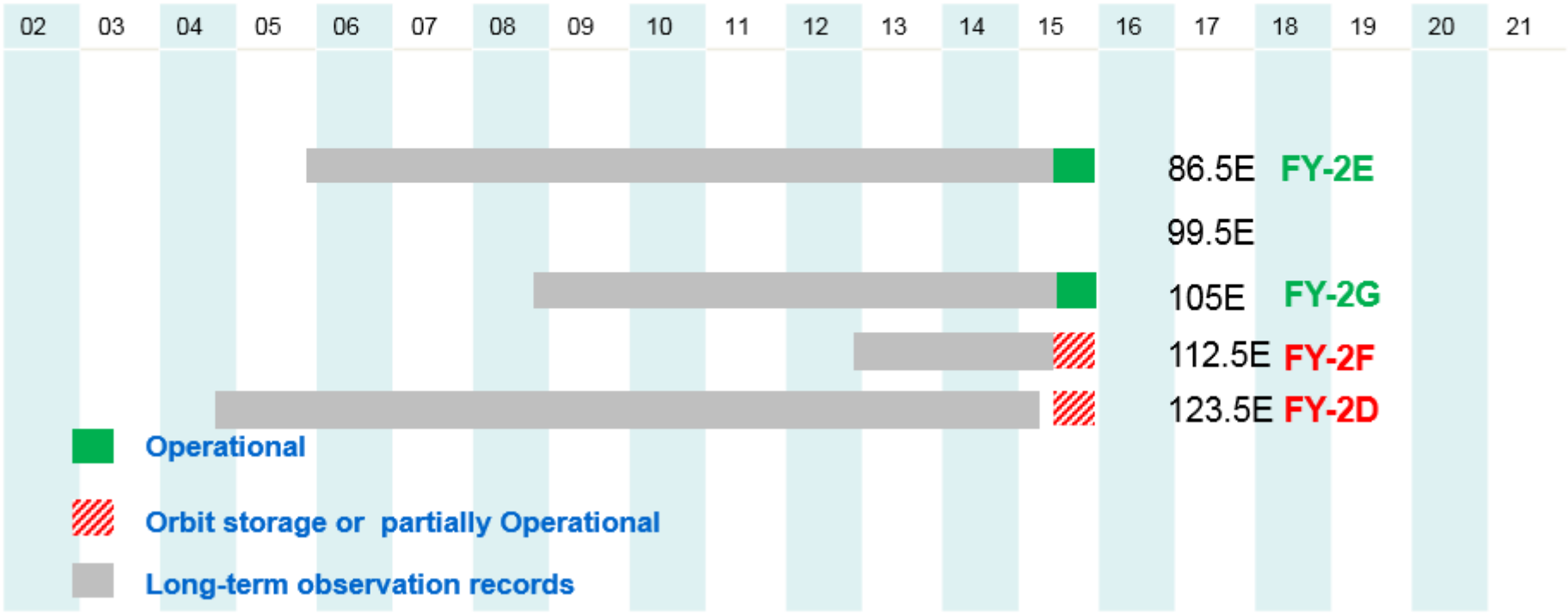

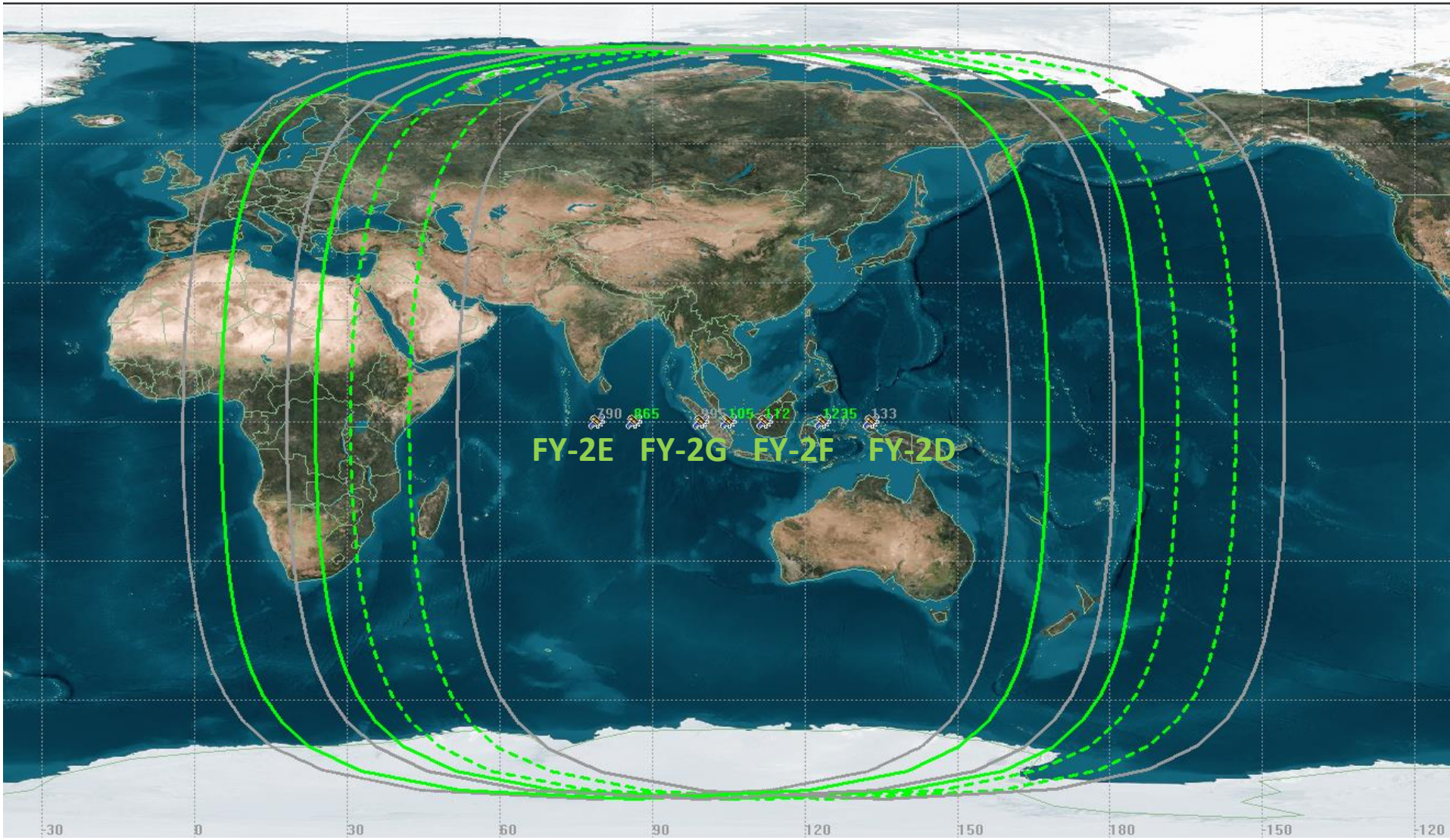

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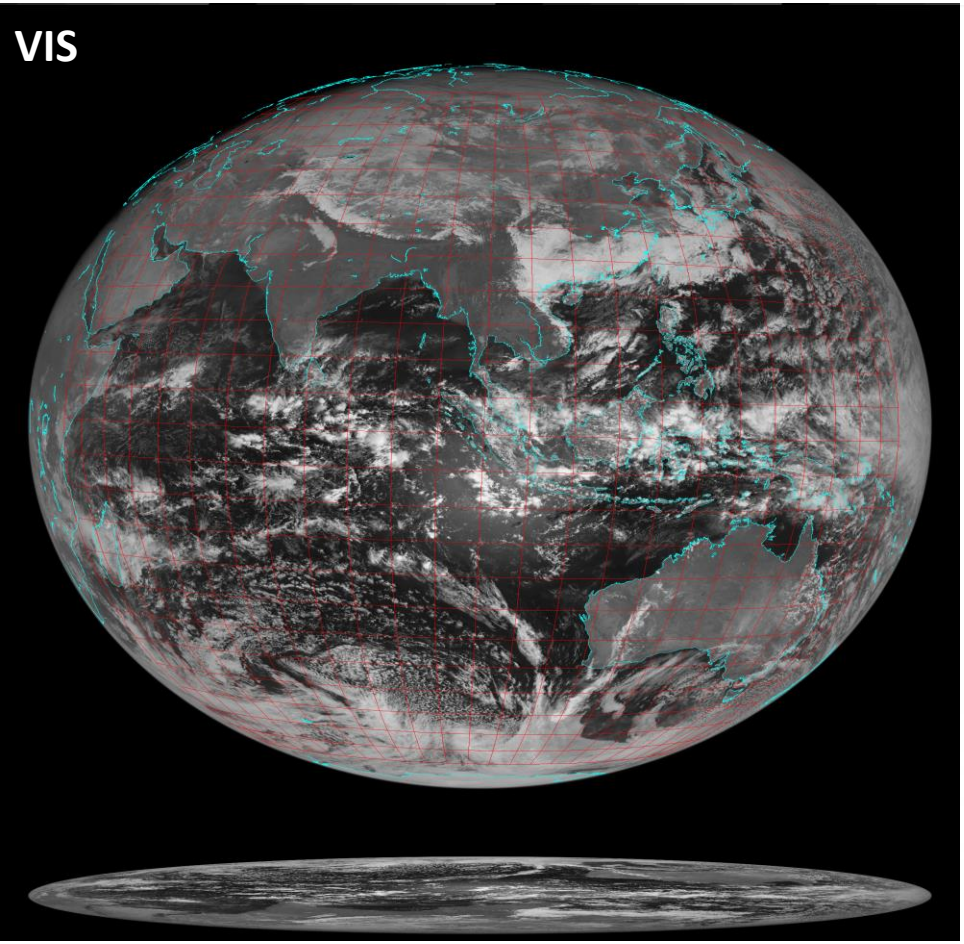
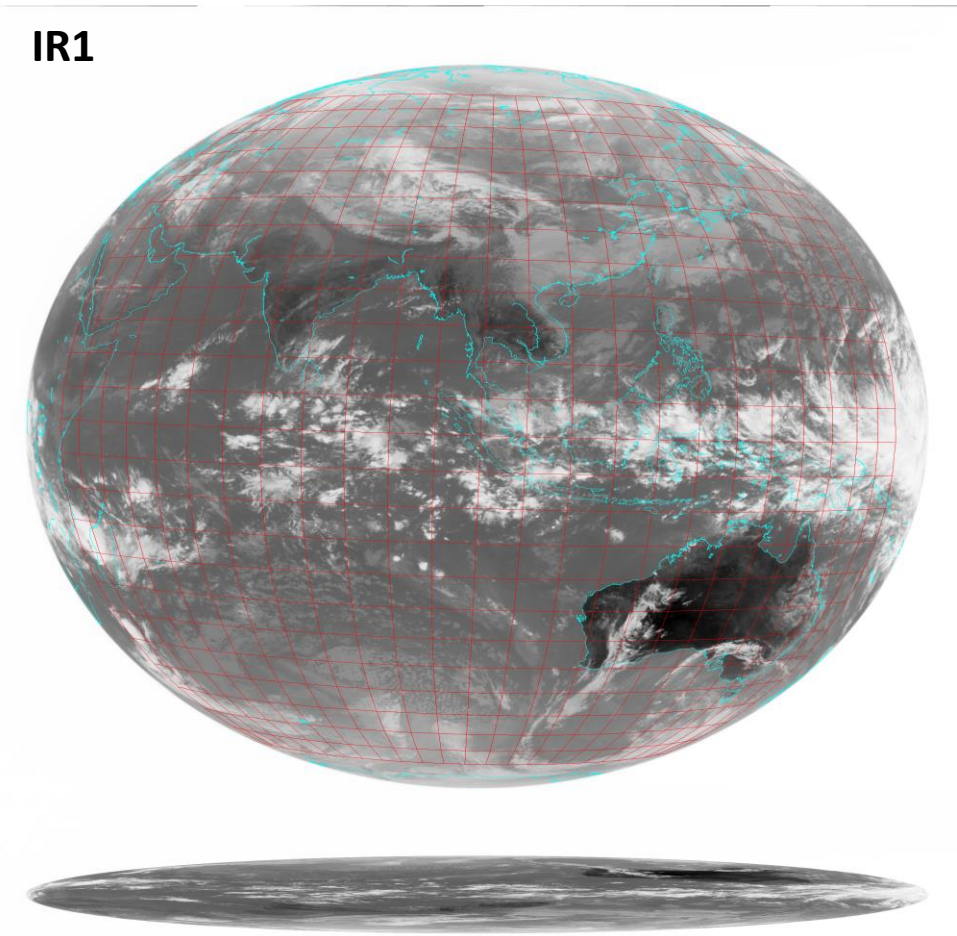
FY-2G 2015/2/4 05:00UTC）





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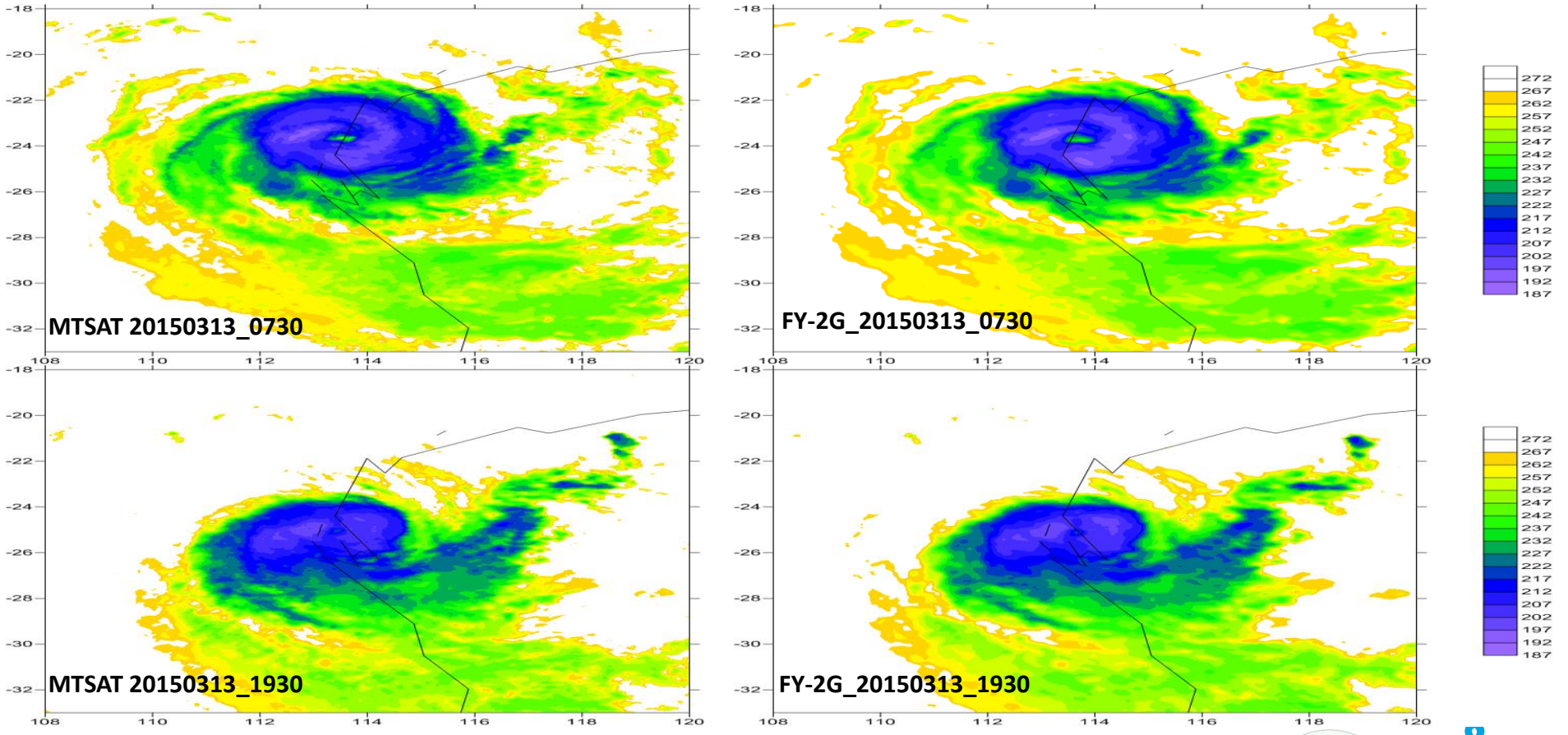
NEΔT	FY-2G		FY-2F	
	A	B	A	B
IR1(10.8μm)	0.10K@300K	0.11K@300K	0.12K@300K	0.14K@300K
IR2(12.0μm)	0.12K@300K	0.13K@300K	0.16K@300K	0.15K@300K
IR3(6.95μm)	0.12K@260K	0.11K@260K	0.30K@260K	0.29K@260K
IR4(3.75μm)	0.26K@300K	0.26K@300K	0.22K@300K	0.20K@300K

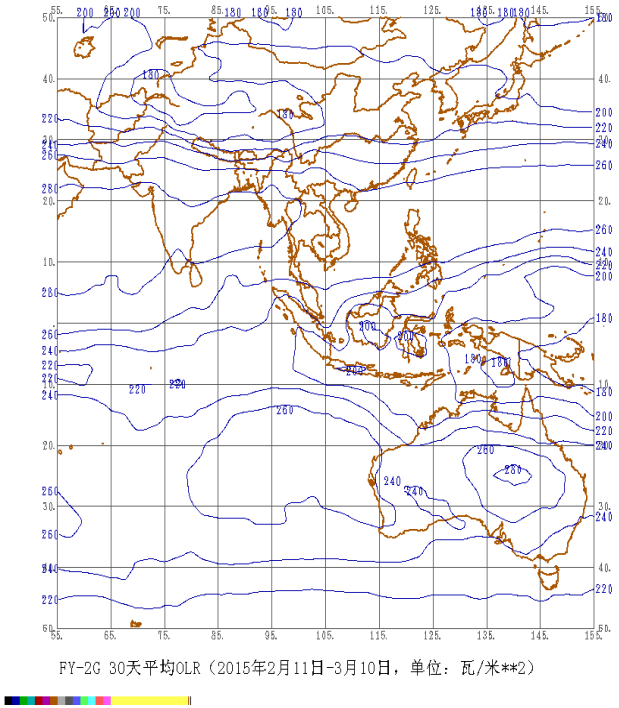
Channel	FY-2G Stray light level energy(compare with FY-2F)
IR1	decrease 50%~60%
IR2	decrease 60%~70%
IR3	decrease 50%~60%
IR4	decrease 50%

Post Lunch test: using GISCS Verify the FY-2G Radiometric Performance Cross check of MTSAT/FengYun shows the calibration improvements

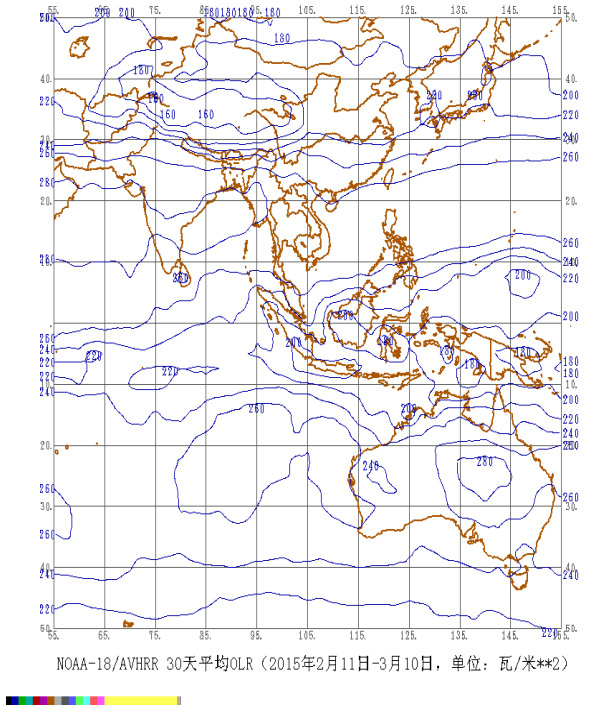


DCC region, dBT<-1.0K@200K

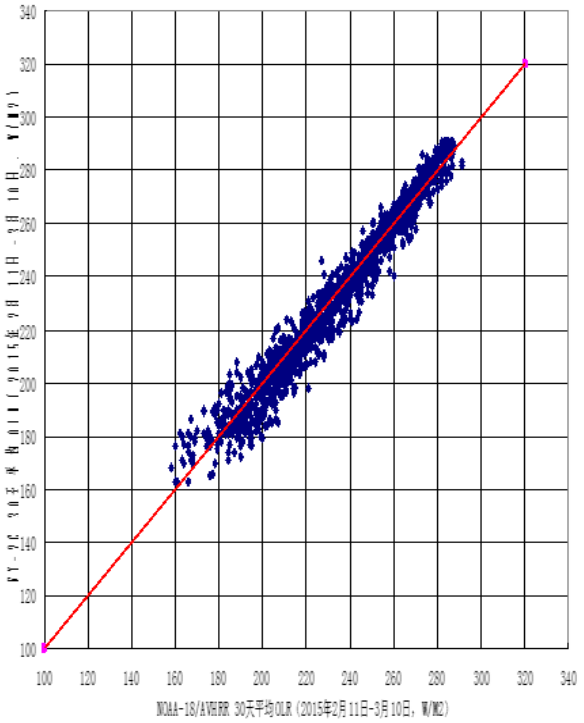
FY-2G Products Validation



FY-2G OLR



NOAA-18 OLR



Systematic bias 1.2W/m2

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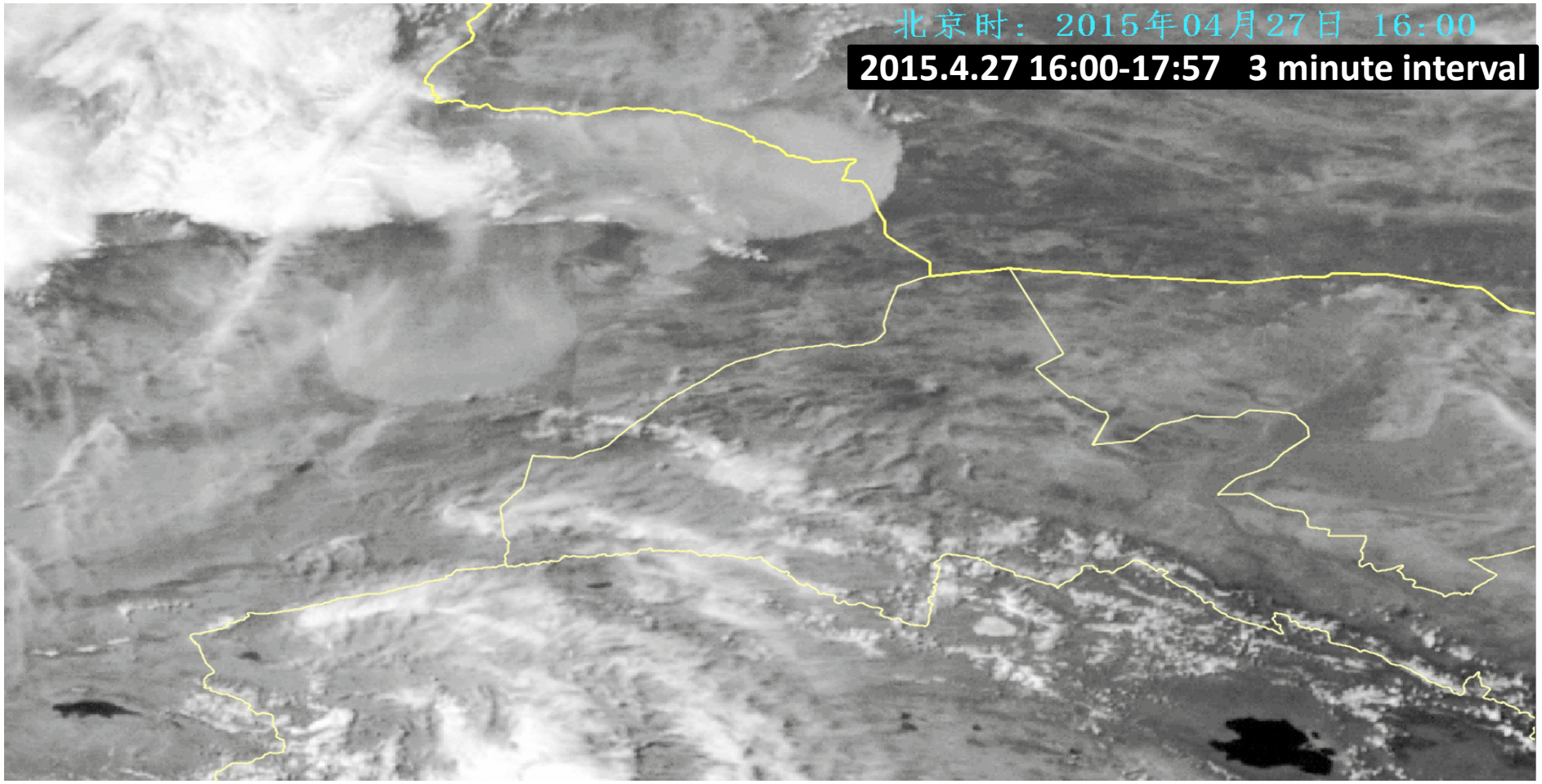
FY-2G Regional Rapid Scan



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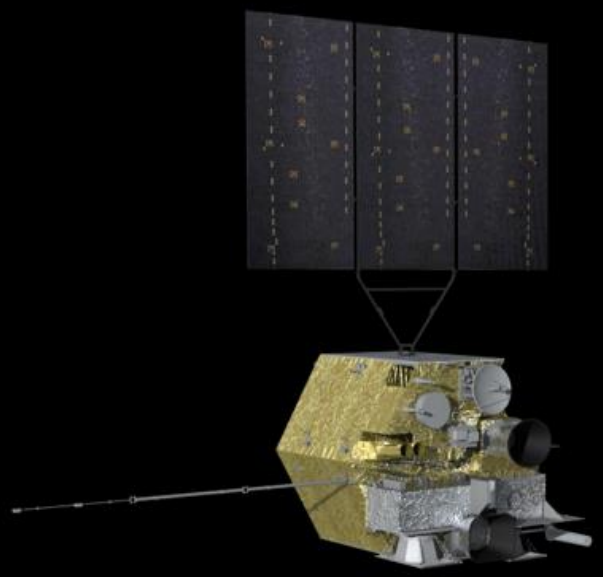
FUTURE CMA GEO SATELLITES:FY-4



Spacecraft:

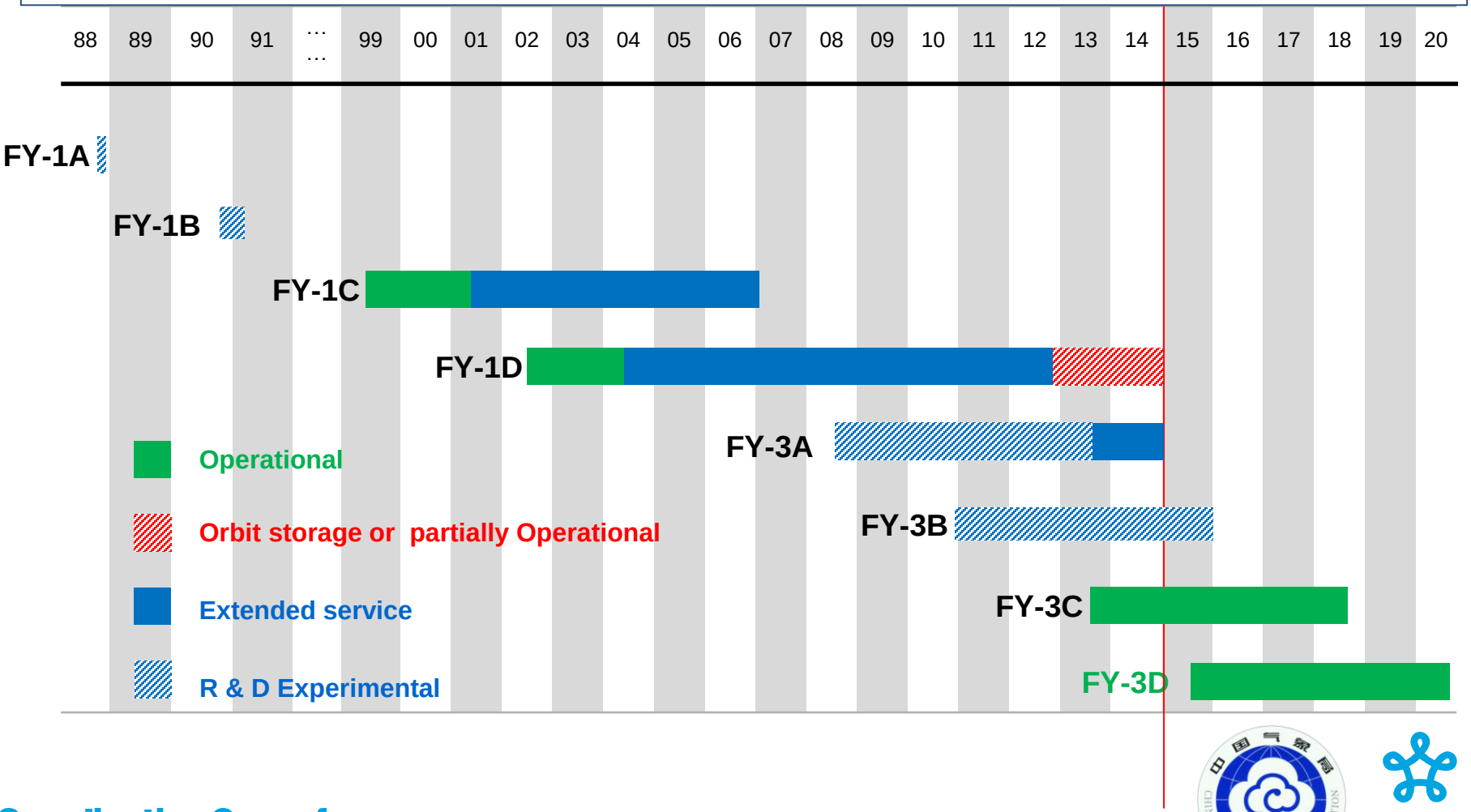
1. Launch Weight: approx 5300kg
2. Stabilization: Three-axis
3. Attitude accuracy: 3″
4. Bus: 1553B+Spacewire
5. Raw data transmission : X band
6. Output power: >= 3200W
7. Design life: over 7 years

GIIRS: Geo. Interferometric Infrared Sounder
AGRI: Advanced Geosynchronous Radiation Imager
LMI: Lightning Mapping Imager
SEP: Space Environment Package

FY-4 Ground System Developing Schedule

PrePhase：	
End user requirement analysis	2006-2009
Instrument requirement	2006-2009
Phase A: Science(Algorithm Development)	
Product requirement analysis & tradeoff study	2008-2011
Algorithm Development	2009-2013
Phase B:	
R&D system design	2011-2013
R&D system integration & test	2012-2014
Phase C: Enginnering (System Integration)	
Operational system Design	2013-2015
Operational system integration & test	2014-2015
Satellite Launch: On orbit test	2016

CURRENT CMA LEO SATELLITES



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ECMWF About Forecasts Computing Research Learning L

- Who we are
- What we do
- Jobs
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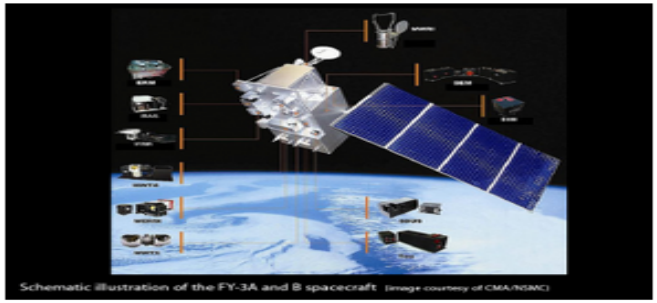
ECMWF starts using Chinese satellite data

29 September 2014



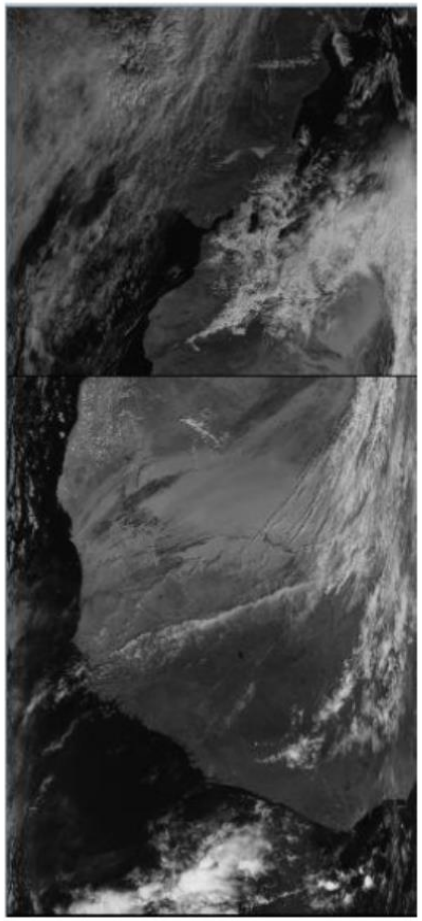
Schematic illustration of the FY-3A and B spacecraft (image courtesy of CMA/NSMC)

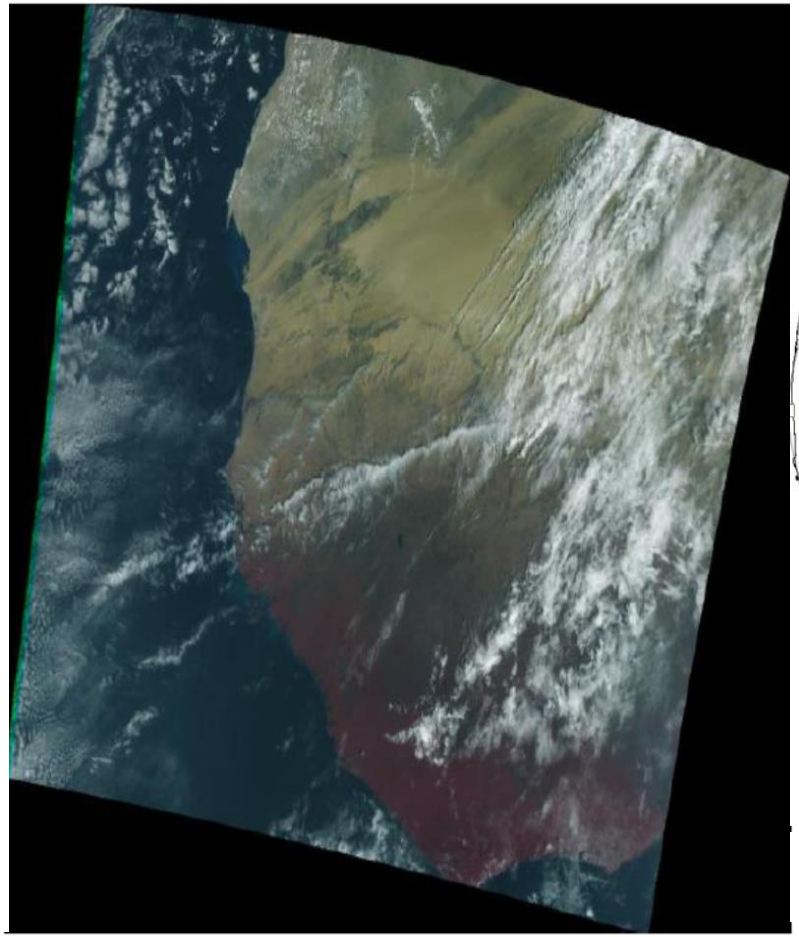
On 24 September 2014, ECMWF actively used Chinese satellite data for the first time in the operational forecasting system. This marks a milestone in ECMWF's fruitful cooperation with the Chinese Meteorological Administration (CMA) and the Chinese Institute of Atmospheric Physics (IAP) in the area of characterisation and use of Chinese satellite data. China is expected to play a leading role in providing meteorological satellite data in the near future, alongside Europe and the US, currently the main providers of satellite sounding data used operationally. Activating the first Chinese satellite data in the ECMWF system is therefore an important step towards a much greater use of Chinese satellite data in the future.

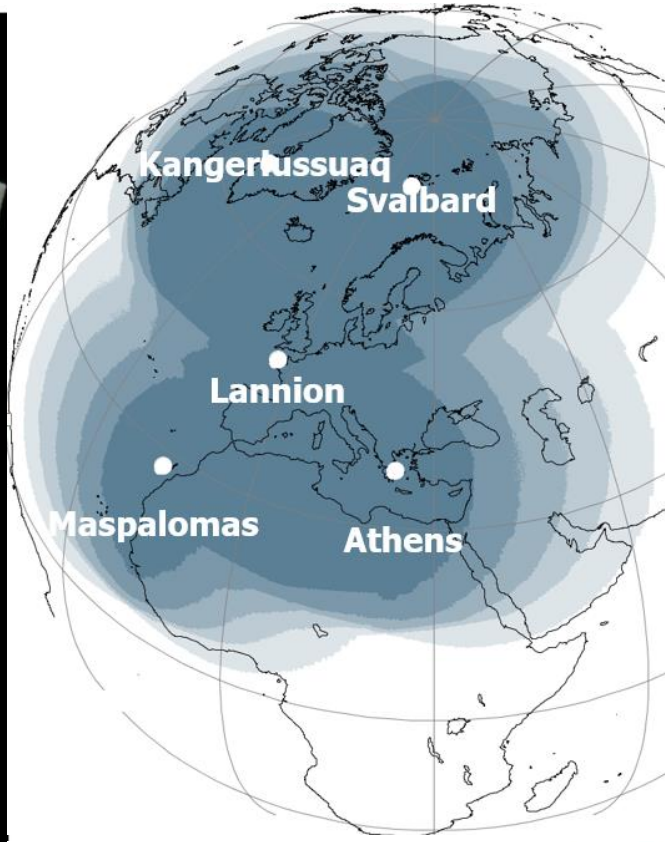
The new data originates from the Microwave Humidity Sounder (MWHS) on-board the Fengyun-3B (FY-3B) satellite. It contributes to an improved analysis of mid- to upper-tropospheric humidity, and adds robustness to the satellite observing system. Although FY-3B is an experimental satellite, the data has been found to be of sufficient quality to further improve ECMWF's atmospheric analysis. Keyi Chen, visiting scientist from IAP, explains: "Our work has shown the data is of reliable quality, and it has an impact comparable to similar European or US satellite instruments that have been used operationally for a long time."

The development is the result of a very constructive partnership with CMA and IAP to characterise Chinese satellite data. During regular visits to ECMWF, Qifeng Lu from CMA has significantly advanced our understanding of the performance of the instruments on the experimental FY-3A and B satellites. This work continues with the analysis of data from the latest Chinese satellite, FY-3C, performed together with CMA, ECMWF, and the UK Met Office. FY-3C is China's first operational meteorological polar-orbiting satellite, and it carries much improved instruments compared to the earlier FY-3A and B satellites. It was launched in September last year and Qifeng Lu is currently visiting ECMWF again. He notes: "The cooperation between CMA, ECMWF and the Met Office is very important to help us evaluate the data and improve its performance. This is also of benefit to the wider community. We very much hope that more Chinese data will be actively assimilated at ECMWF and elsewhere in the future."

FY-3 Ready European Direct Broadcast stations







EUMETSAT

EUM/TSS/TEN/15/797015
v1A, 10 March 2015

Comparison of FY-3 local processing software product and CMA products

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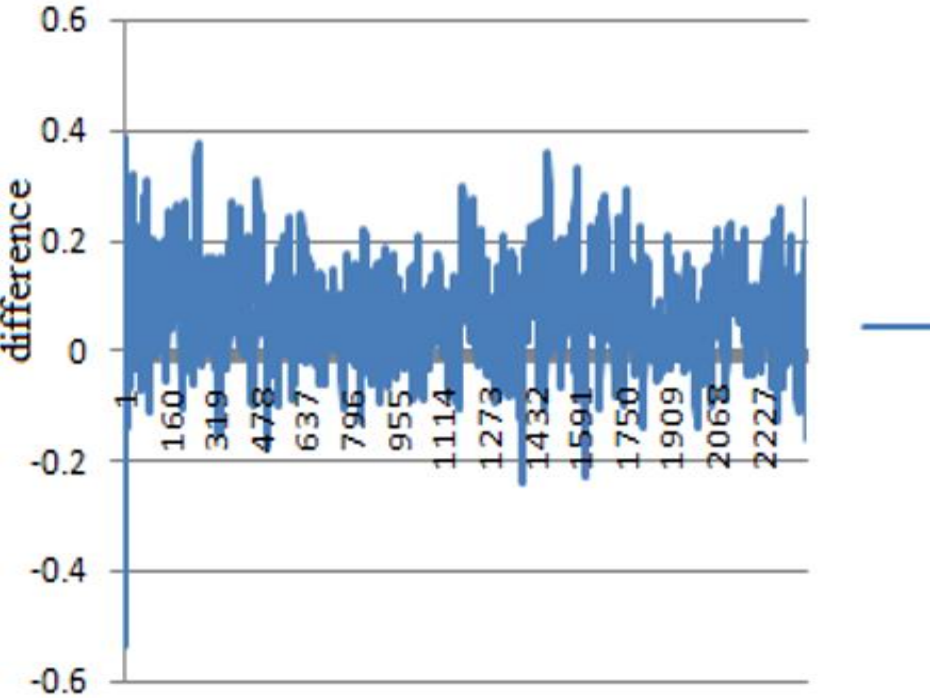
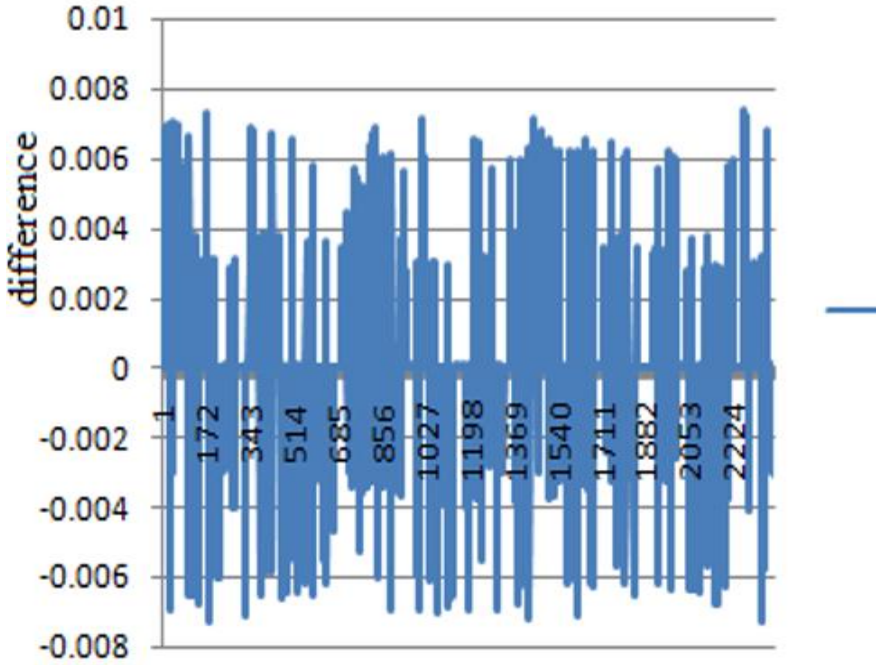
FY-3 IPPS SOFTWARE PACKAGE

- Version update for MWHS support
- Support L0 X-Band processing



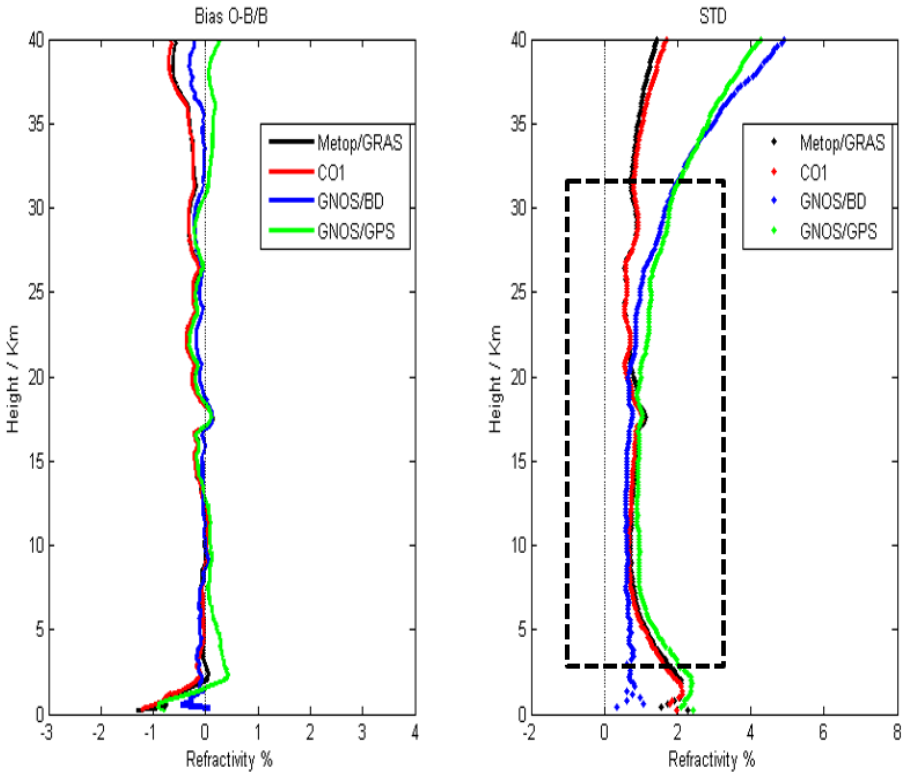
Before Update 2015



After Update 2015

FY-3 GNOS status

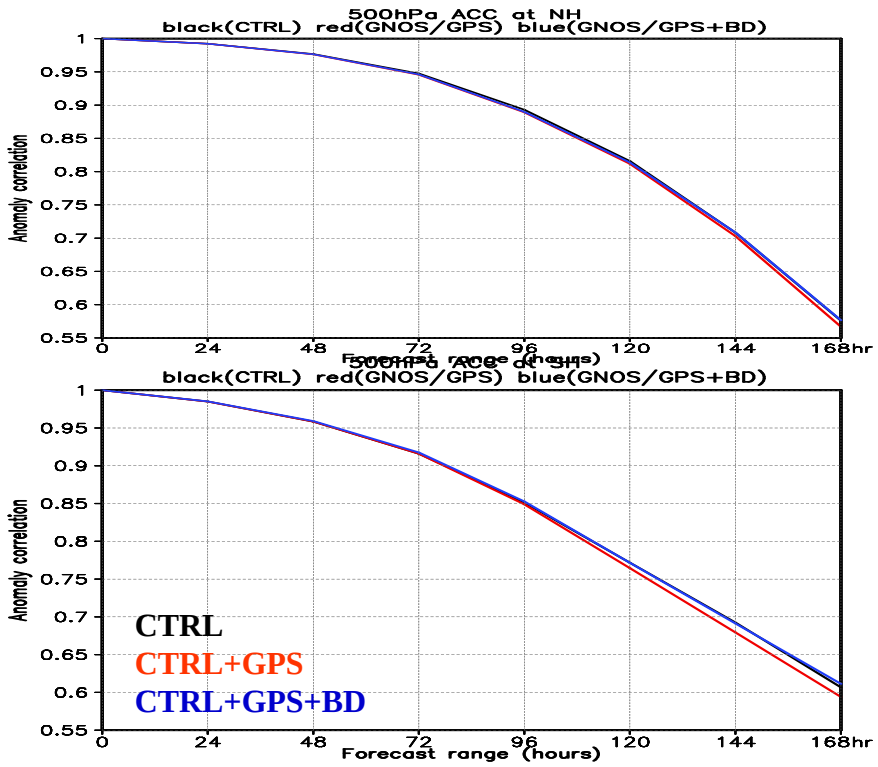
Validation



Exhibiting good agreement with ECMWF in terms of bias

Reconfirming the characteristic of non-bias of radio occultation The most excellent sounding height of GNOS is from 5 to 30 kilometers, standard deviation is within1%

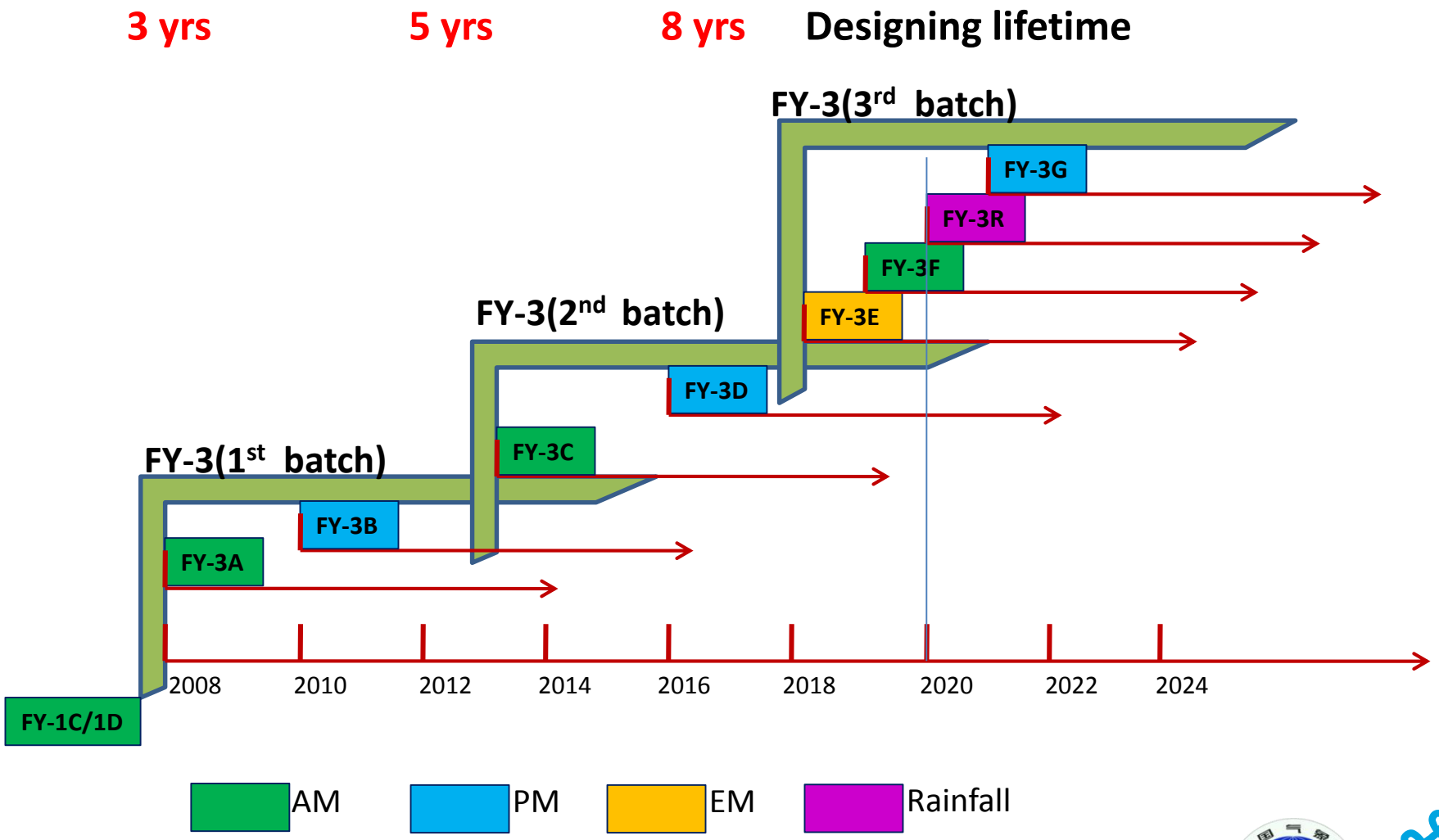
Forecast Impact Experiment



GNOS data has an **neutral and positive** impacts on GRAPES analysis and forecast skill.

Courtesy of Dr.Liao mi&Liu yan CMA

FY-3 02 batch to 03 batch Transition



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Outlook of Future CMA LEO Constellation

Sun-Synchronous Polar-orbiting

FY-3E EM 2018

FY-3F AM 2019

FY-3G PM 2021

Non-Sun-Synchronous

FY-3 RM 2020

Thank you for your attention