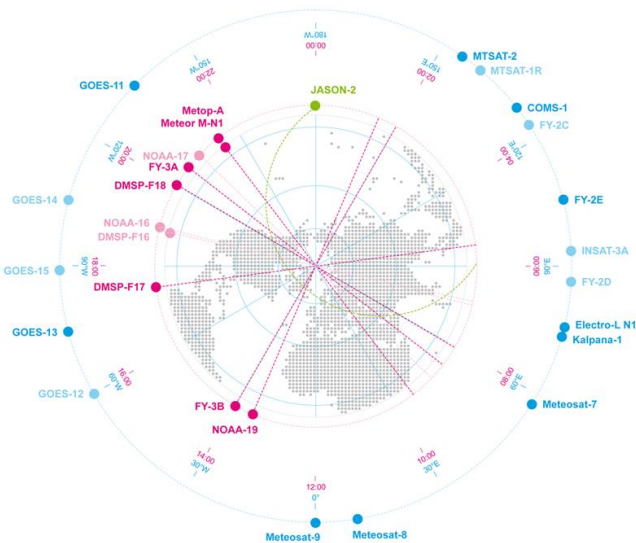


UPDATED REPORT ON FENGYUN SATELLITE PROGRAM AND DEVELOPMENT



Presented to CGMS47-CMA-WP-01, Plenary session, agenda item D.1

ZHANG Peng

**National Satellite Meteorological Center
China Meteorological Administration**

Outline

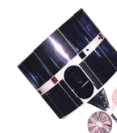
- **Fengyun Program Overview**
- **Current Missions and Services**
- **Latest Progress**
- **Future Programs**

1. Fengyun Program Overview

LEO System

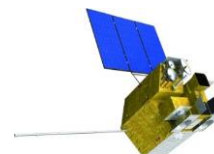
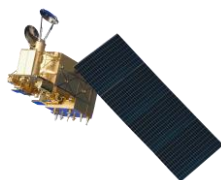
GEO System

First Generation
FY-1 A, B, C, D



First Generation
FY-2 A, B, C, D, E, F,
G, H

Second Generation
FY-3 A, B, C, D



Second Generation
FY-4 A

FY-3E, F, G planned until 2025

FY-4B, C, D planned until 2025

Launched Satellites

Since Jan. 1969, China began to develop his own meteorological Satellite

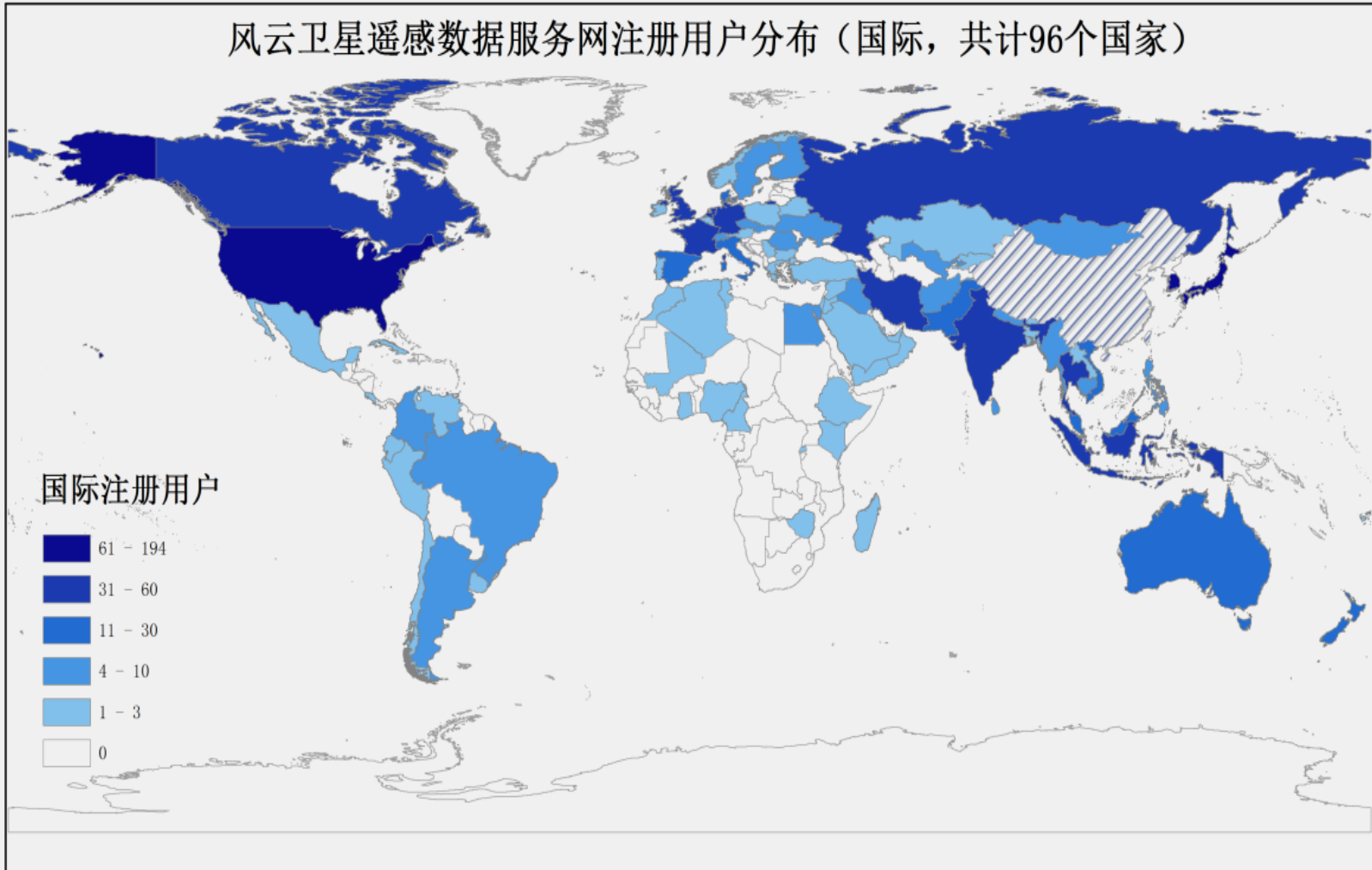
Leo	Launch Data		Geo	Launch Data
FY-1A	Sept. 7, 1988		FY-2A	Jun. 10, 1997
FY-1B	Sept. 3, 1990		FY-2B	Jun. 25, 2000
FY-1C	May 10, 1999		FY-2C	Oct. 18, 2004
FY-1D	May 15, 2002		FY-2D	Dec. 8, 2006
FY-3A	May 27, 2008		FY-2E	Dec. 23, 2008
FY-3B	Nov. 5, 2010		FY-2F	Jan. 13, 2012
FY-3C	Sept. 23, 2013		FY-2G	Dec. 31, 2014
FY-3D	Nov. 15, 2017		FY-4A	Dec. 11, 2016
			FY-2H	Jun. 5, 2018

Overall Development Strategy (4 stages):

- 1) 1970 - 1990: Conducting satellite research and development
- 2) 1990 - 2000: Implementing transition from R&D to operational
- 3) 2000 - 2010: Implementing transition from 1st generation to 2nd generation
- 4) 2010 - 2020: Pursuing accuracy and precision of satellite measurements

Web-based User Location

风云卫星遥感数据服务网注册用户分布（国际，共计96个国家）



Application Tools

SATs: New Observation Capability

Weather monitoring and analysis
---Geostationary Satellite data (FY-2/FY-4)

Satellite Weather Application Platform
SWAP

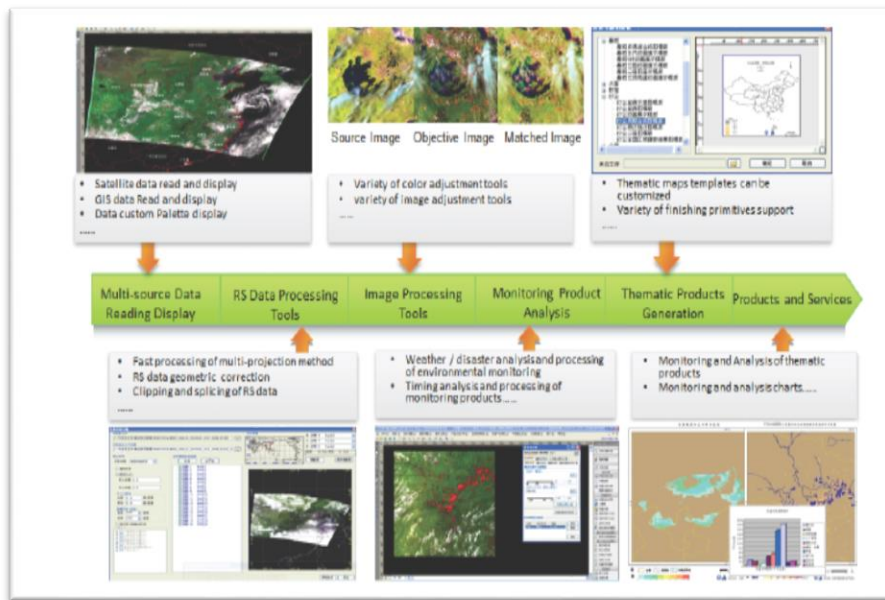
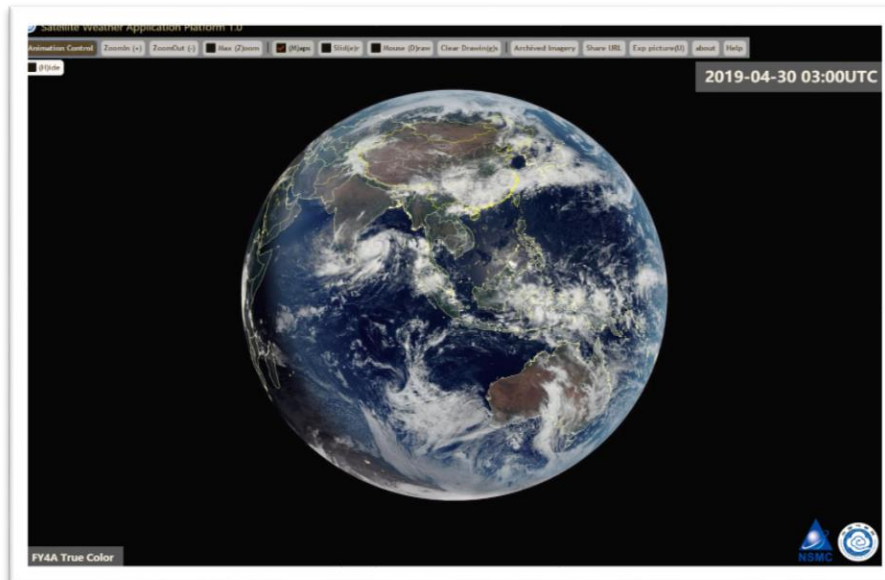
Application tools

Natural disaster and environment monitoring and analysis
---polar orbiting Satellite data

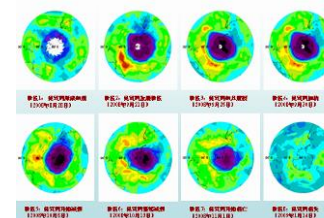
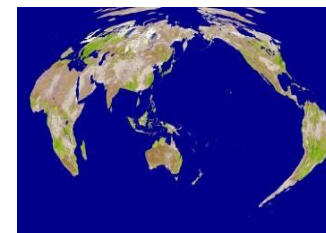
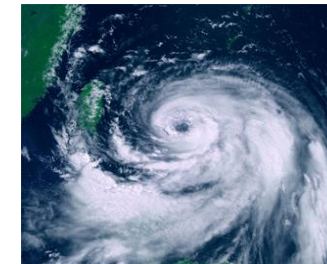
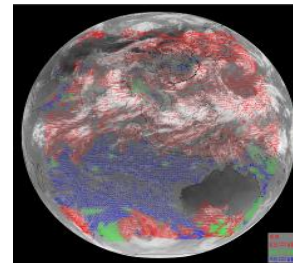
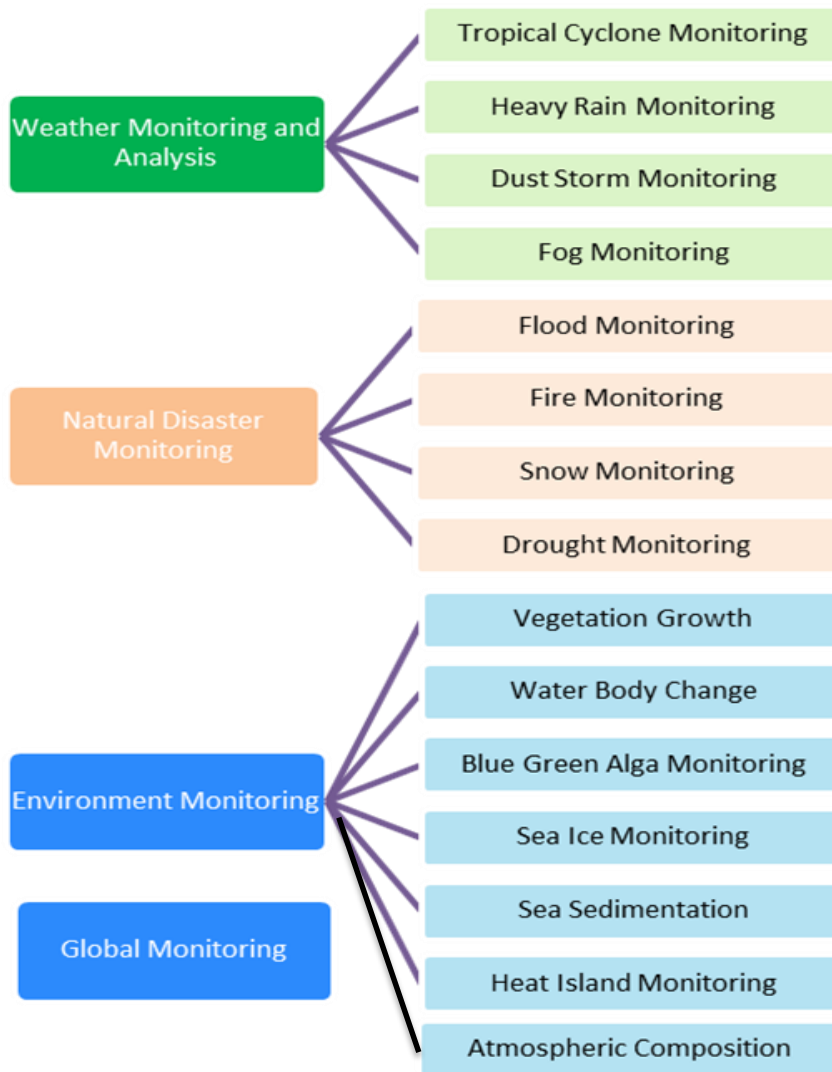
Satellite Monitoring Application Remote sensing Toolkit
SMART

Users: New Applications

Coordination Group for Meteorological Satellites



Application Area



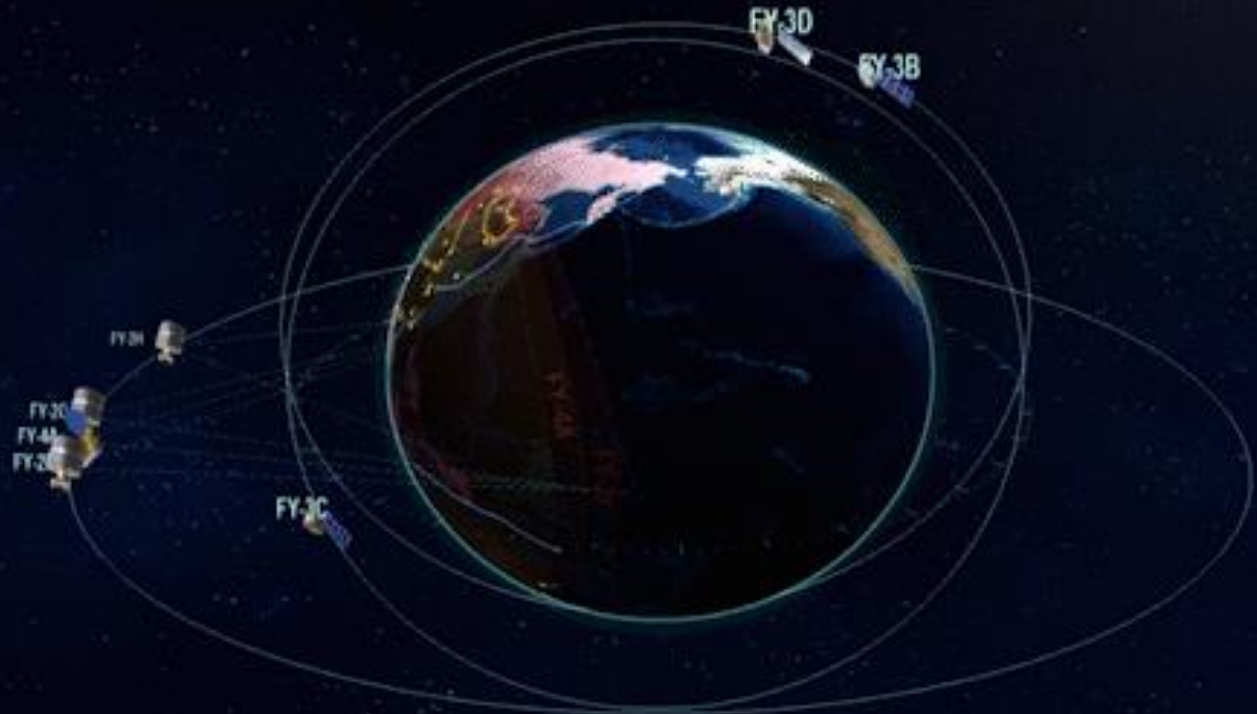
2. Current Missions and Services

FengYun Programs:

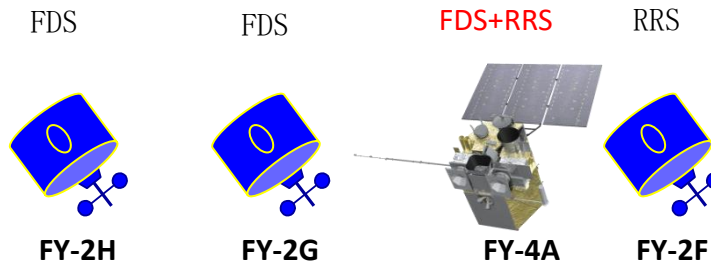
7 in operation
(4 GEO and 3
LEO)

Joint
programs:
Tansat, GF-4

Current FengYun Constellation

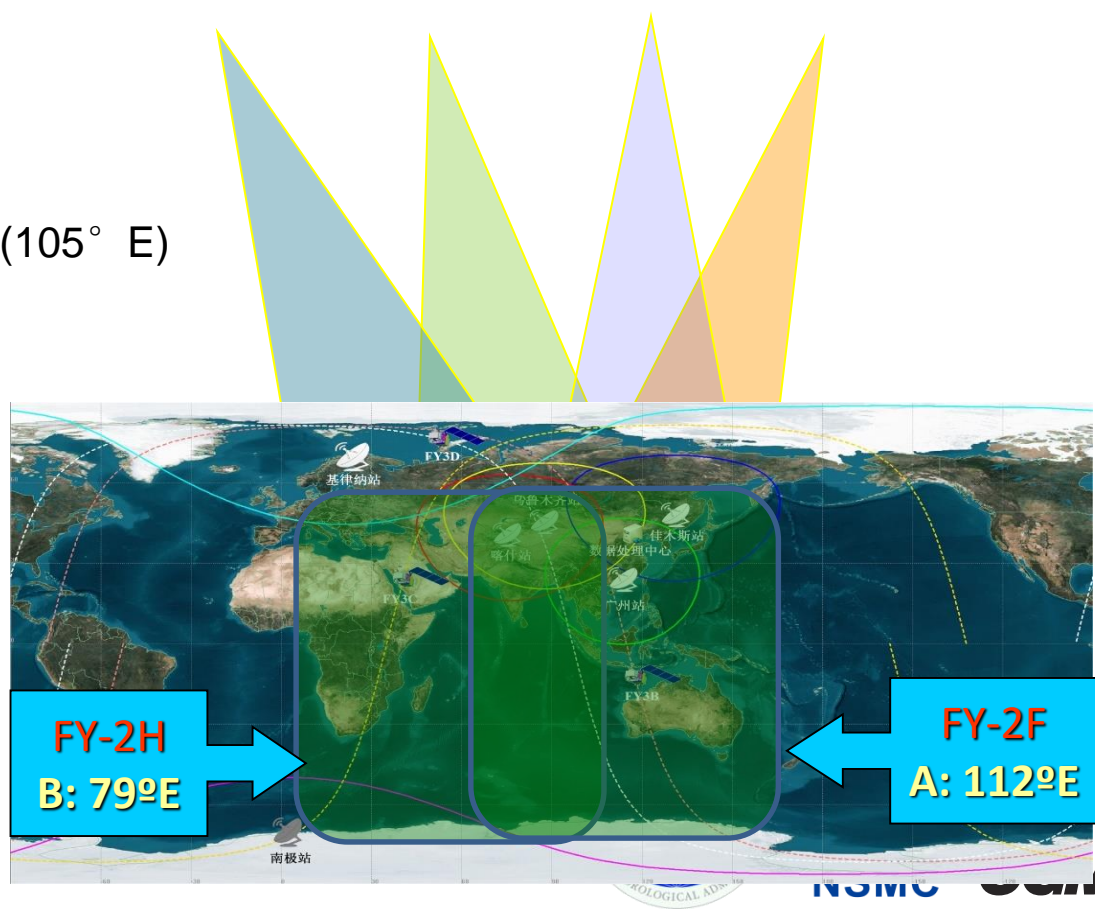


Fengyun GEO Constellation



4 in operation

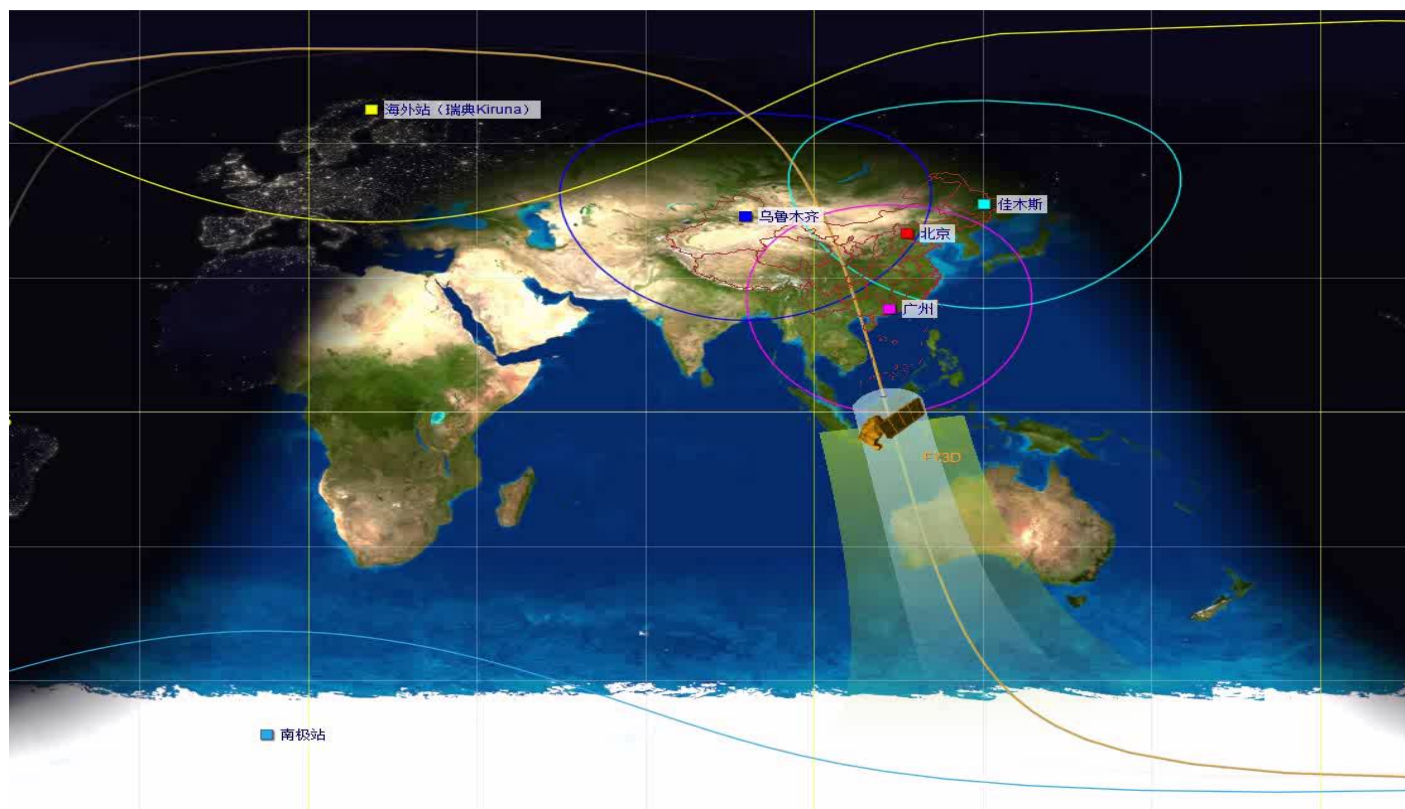
- FY-2H : Full Disk (79° E)
- FY-2G: Full Disk (99.5° E)
- FY-4A: Full Disk + Regional Rapid (105° E)
- FY-2F: Regional (112° E)



Fengyun Polar Constellation

■ In Primary I
Operation (**Global**) :
FY-3C + FY-3D,
**global coverage 4
times per day**

■ In Second
Operation (**Global**):
FY-3B (afternoon
orbit)



FY-3C LTC 10:30 AM

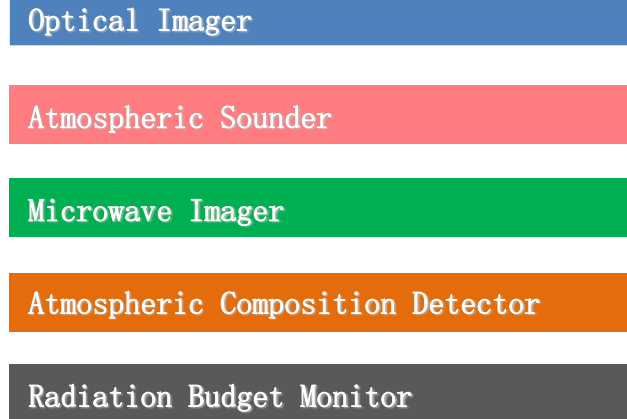
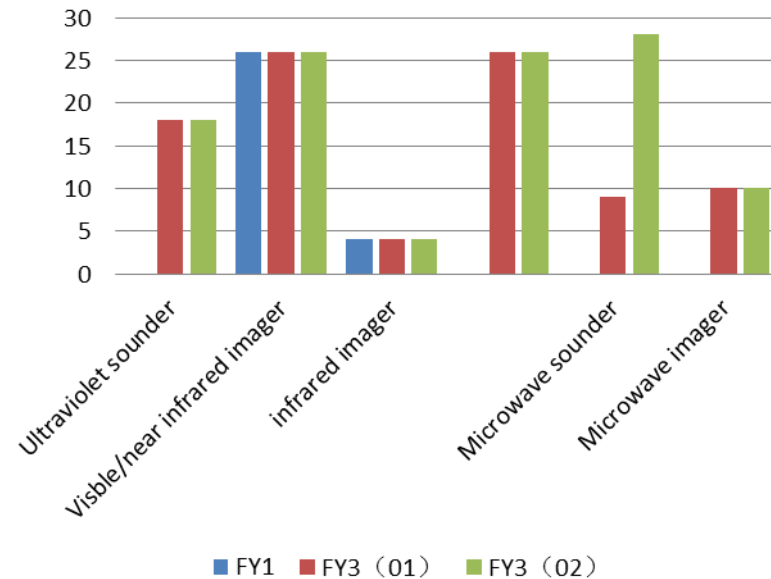
FY-3D LTC 13:40 PM

**Coordination Group for
Meteorological Satellites**



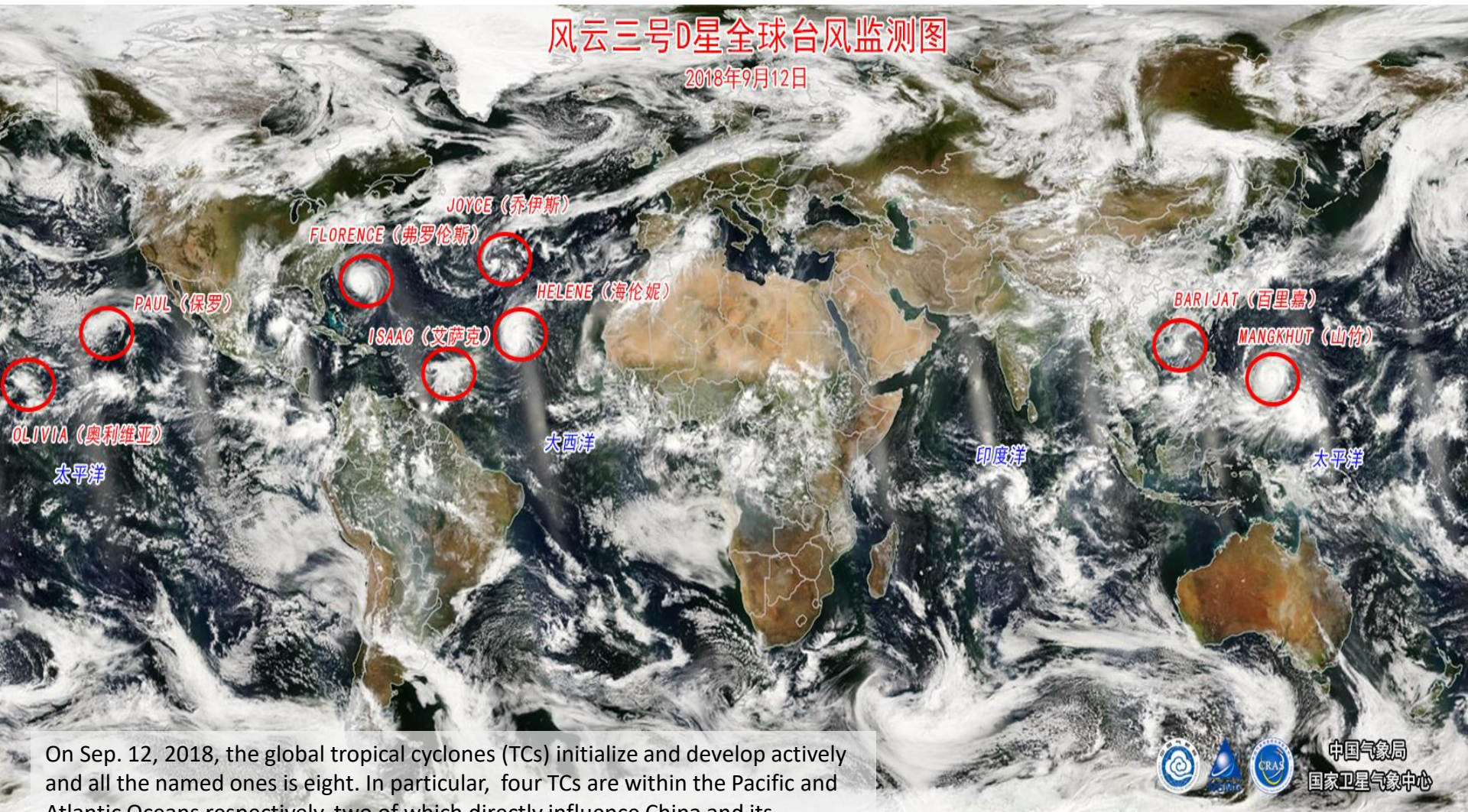
Current Instruments for EO

Satellite		No. of Instruments	Name in Abbrev.
FY-1	FY-1 A/B	2	5-channel VIRR
	FY-1 C/D	2	10-channel VIRR
FY-2	FY-2 A/B	1	3-channel VISSR
	FY-2C/D/E/F/G/H	1	5-channel VISSR
FY-3	FY-3 A/B	10	10-channel VIRR
			MERSI
			IRAS
			MWTS
			MWHS
			MWRI
			SBUS
			TOU
			ERM
			SIM
	FY-3C	11	GNOSS
FY-3D	10	HIRAS	
		GAS	
FY-4	FY-4A	3	AGRI
			GIIRS
			LMI



风云三号D星全球台风监测图

2018年9月12日



On Sep. 12, 2018, the global tropical cyclones (TCs) initialize and develop actively and all the named ones is eight. In particular, four TCs are within the Pacific and Atlantic Oceans respectively, two of which directly influence China and its surroundings.



中国气象局
国家卫星气象中心



国家卫星气象中心
National Satellite meteorological Centre

FENGYUN Satellite Data Sharing and Service Capability

NSMC:

One of the largest satellite data sharing centers in China.

Over 10PB data,
Average daily growth 8TB data,
Total data services about 4.9PB in 2018.

Global Openness,
Real-time Sharing



Integrated Space and Ground Based FY Satellite Data Service System

❖ Real time

- Direct Broadcast
- CMACast

❖ Non-Real Time

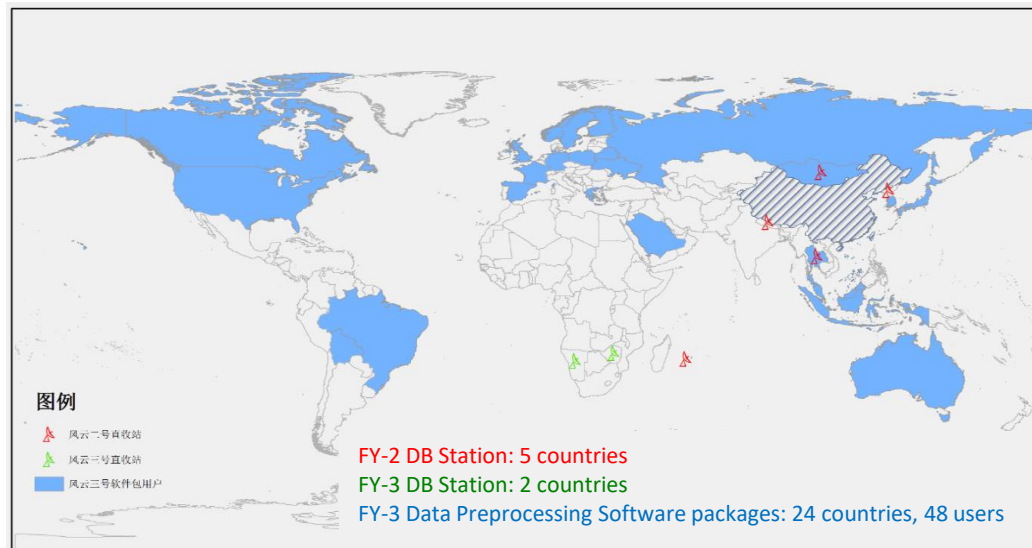
- Website
- Cloud Service
- FTP Service
- Manual Service



Space-based Services

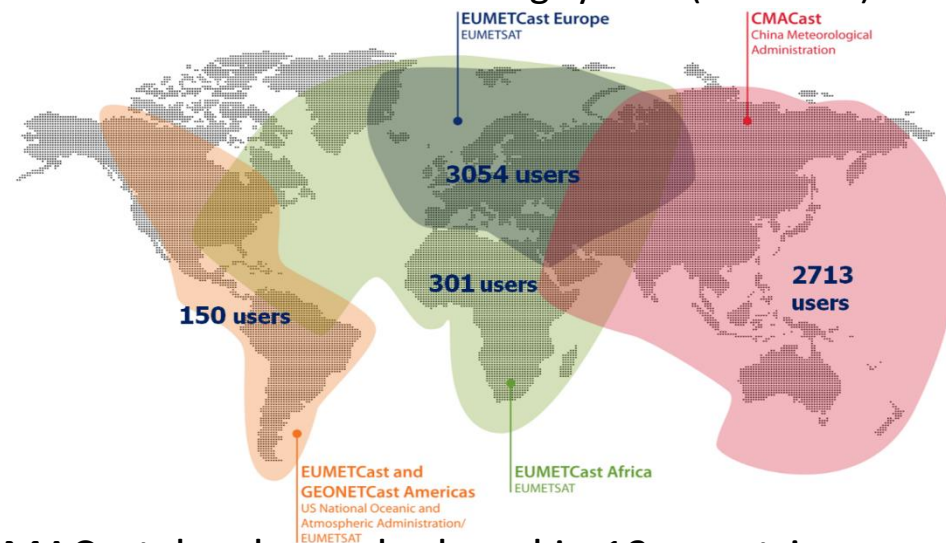


FENGYUN satellite Direct Broadcasting System (FY-DBS)



- Over 2600 DVB-S users
- Over 500 Utilization Stations of Geostationary Meteorological Satellite
- Over 3000 Data User Terminals
- Over billions people viewing Satellite Cloud Images through TV and Internet
- Nearly 100 countries and regions

CMA satellite data broadcasting system (CMACast)



CMACast has been deployed in 19 countries

Web Portal Service

NSMC National Satellite Meteorological Center
China Meteorological Administration

Home About NSMC Satellite Program Operation Imagery and Product Data Access Support

Position: Home

FY Emergency Support

Fengyun Satellites

Legend			
LEO	FY-3D	TBUS	✓
	FY-3B	TBUS	✓
	FY-3C	TBUS	✓
GEO	FY-4A	Time Table	✓
	FY-2H	Time Table	✓
	FY-2G	Time Table	✓
	FY-2F	Time Table	✓

Updated: 18 Feb 2019 02:00 UTC

Announcements

- A Notification on FY2H's Orbital Control
- A Notification on FY4A's Orbital Control
- A Notification on FY2G's Orbital Control
- A Notification on FY4A's Orbital Control

Highlights

A Notification on FY2H's Orbital Control
The Xi'an Satellite Control Center will exercise an east-west orbital control to FY-2H from 8:30 to 9:30 April 18, 2019(UTC). During the period, ground receiving stations shall cease to receive...

A Notification on FY4A's Orbital Control
The Xi'an Satellite Control Center will exercise an east-west orbital control to FY-4A from 9:16 to 9:44 April 15, 2019(UTC). During the period, ground receiving stations shall cease to receive...

Satellite Weather Application Platform

Space Weather NSMC Forecasts
Updated at: 30 April 2019 UTC

Solar Flare

Time	0-24H	24-48H	48-72H
CLASS M:	20%	20%	10%
CLASS X:	1%	1%	1%

Geomagnetic Storm

Time	0-24H	24-48H	48-72H
minor	1%	1%	1%
major	1%	1%	1%

Solar Proton Events

Welcome to FENGYUN Satellite Data Center, Please Sign in Register NSMC Contact us Help 中文

FENGYUN Satellite Data Center
NATIONAL SATELLITE METEOROLOGICAL CENTER

SATELLITES DATA IMAGES PRODUCTS DOCUMENTS TOOLS

Archive

Satellites	File count	Volume(TB)
FY-3D	4871531	915.6
FY-3C	21204294	575.9
FY-4A	56345468	1294.7
FY-3B	37184997	2332.0
TANSAT	615073	65.1
FY-2H	490003	6.6
FY-3A	32641020	1633.9
FY-2G	3177034	27.9
FY-2F	4572413	44.6
FY-2E	5824013	53.3
FY-2D	4759238	58.3

Data Overview >>

Sign In

User ID:

Password:

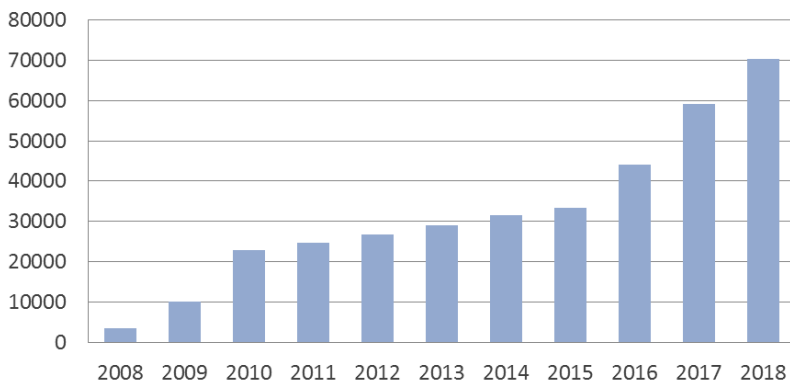
Verify:

Stay Signed In

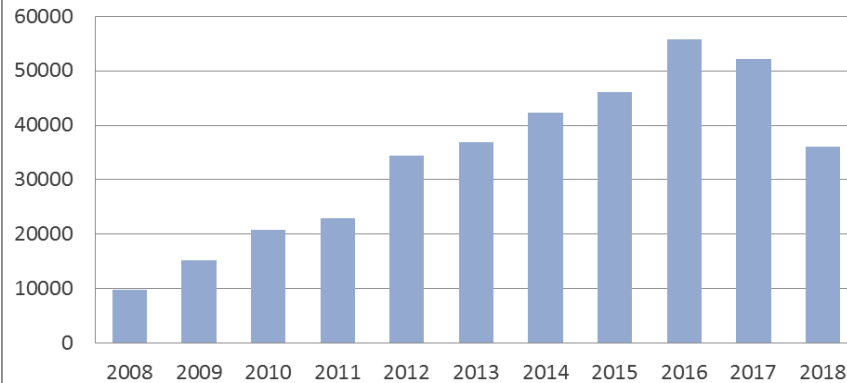
Forget Password? SIGN UP

Sign In

Website Users Number



Website Order Number

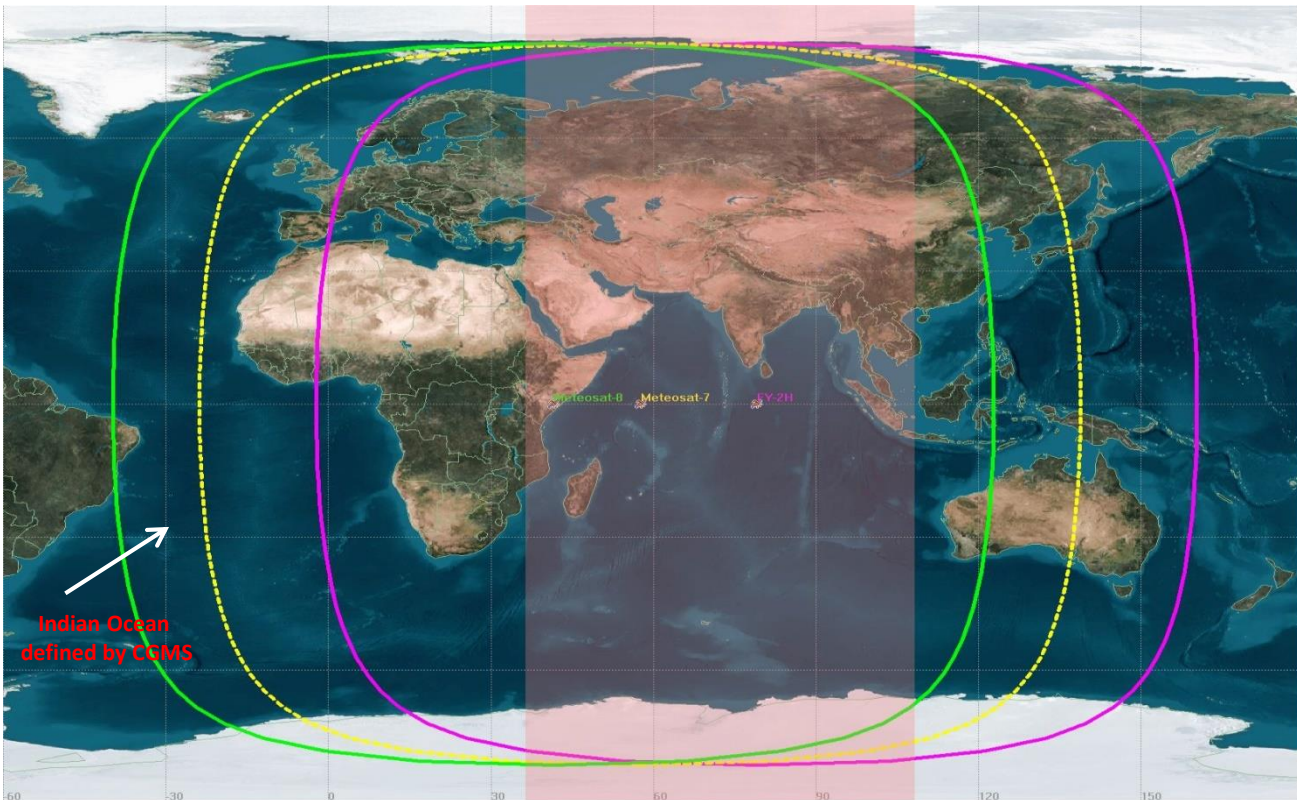


3. Latest Progress

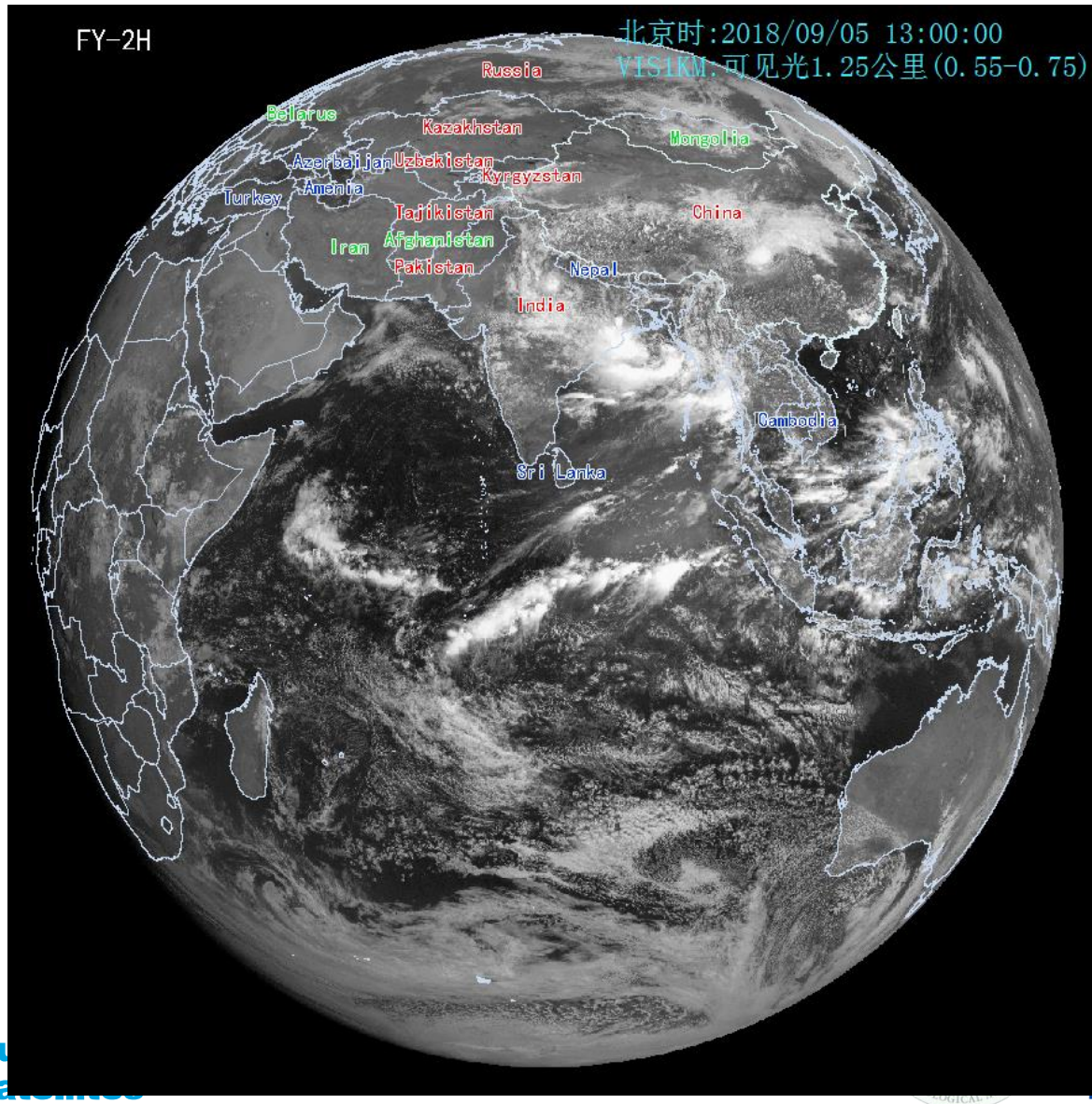
- 1. FY-4A** The first GEO. meteorological satellite of new generation
 - Launched on Dec.11, 2016
 - **Official operation on May 1, 2018**
- 2. FY-3D** A new operational afternoon orbit LEO. satellite, will co-work with FY-3C in morning orbit
 - Launched on Nov. 15, 2017.
 - **Official operation on Jan 1, 2019**
 - **Contracted South polar ground station (Troll) in operation**
- 3. FY-2E** Out of service from Jan. 1 2019
 - Launched on Dec. 23, 2008
 - Coverage at 86.5° E
- 4. FY-3A** Out of service from Jan. 1 2019
 - Launched on May. 27, 2008

5. FY-2H The last one of FY-2 series to support IOC and serve for the belt & road countries

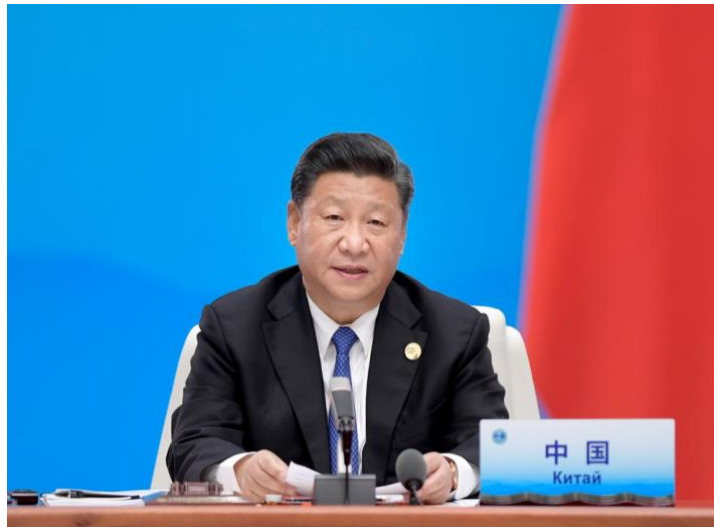
- Launched on June 5, 2018
- Official operation on Jan 1, 2019



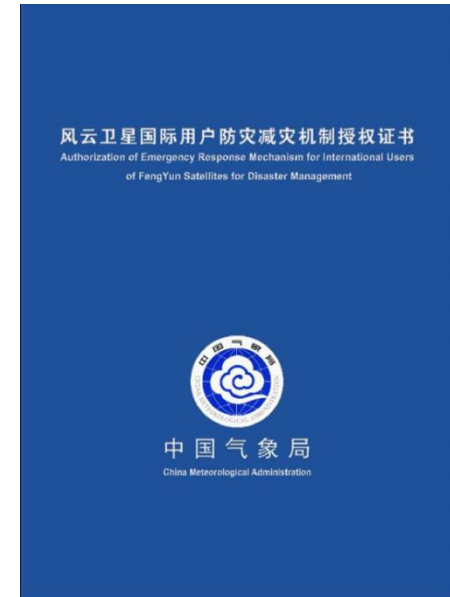
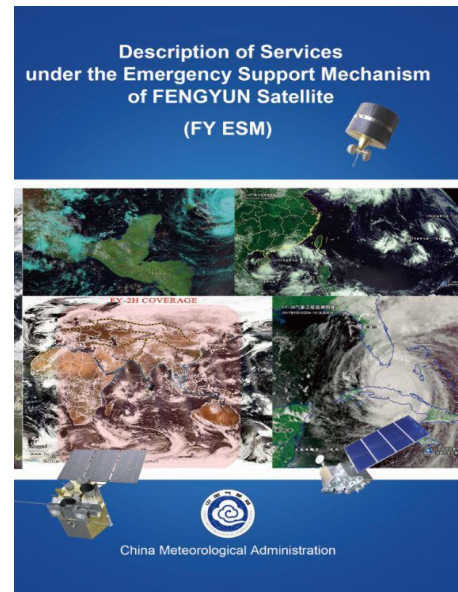
FY-2H (@79°E)



FY-2H : To better support IOC and serve the Belt & Road countries



On June 10, at SCO summit in Qingdao, Chinese President Xi Jinping made a commitment that China will provide meteorological services by using FY-2 meteorological satellite.”



CMA Announced “Emergency Support Mechanism for International Users of Fengyun Meteorological Satellites in Disaster Prevention and Mitigation” on April 24, 2018

Action plan of Fengyun meteorological satellite serving for Belt and Road initiative (2019-2023)

- Satellite direct receiving station
- CMACast
- Public Cloud
- Green Data service Channel
- Emergency service

Enhancing Data Acquisition Ability

- Provide application supporting platform
- Developing adaptive products
- Equipped with mobile terminal
- Open up the path from data receiving to TV showing

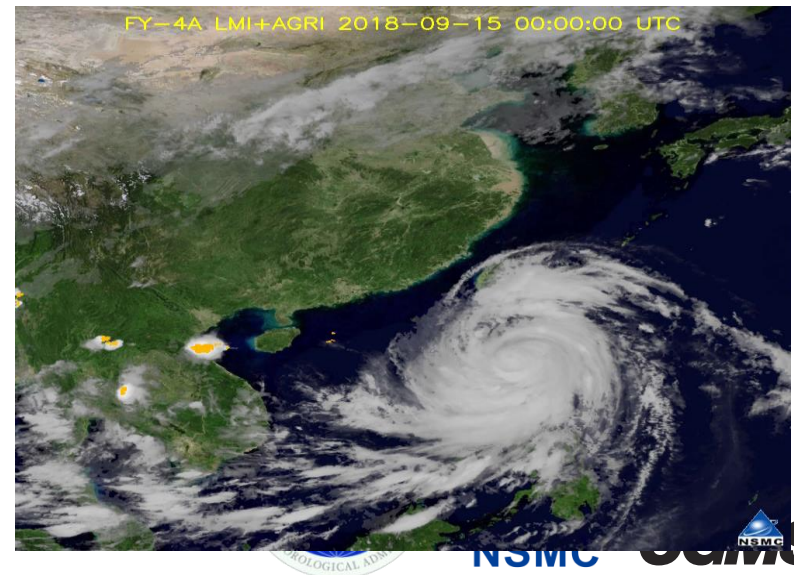
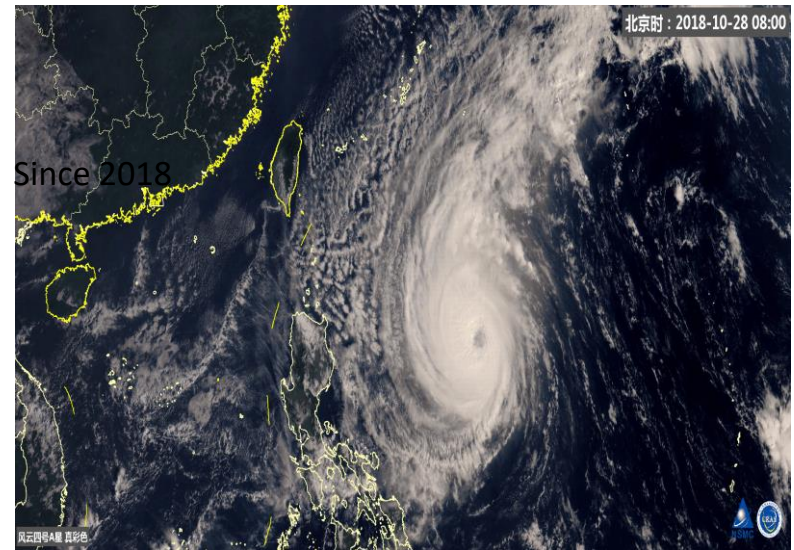
Improving Data Application Ability

- International Training
- Scholars exchange visits
- Regular Video Conference
- Establishment of Fengyun Satellite International Cooperation Fund(TBD)

Carrying out scientific and technological cooperation

Examples of Emergency support for some countries

Start Date	Country	Type	Requestor
17/01/2018	Philippines	Volcano	CHARTER
12/02/2018	Pacific islands	Typhoon	China-GEOSS
29/07/2018	Indonesia	Earthquake	China-GEOSS
16/08/2018	Venezuela	Forest fire	CHARTER
12/09/2018	Vietnam	Typhoon	FY_ESM, UN-SPIDER
30/09/2018	Indonesia	Earthquake	China-GEOSS
30/10/2018	Philippines	Typhoon	FY_ESM
23/12/2018	Indonesia	Tsunami	CHARTER
30/01/2019	Brazil	Dam collapse	China-GEOSS
28/03/2019	IRAN	Flood	China-GEOSS
06/04/2019	Korea	Forest fire	CHARTER





1st FENGYUN Satellite User's Conference 12&13 Nov 2018, CHENGDU



首届风云卫星用户大会在成都召开

11月12日-13日，首届风云卫星用户大会在成都隆重召开。大会由中国空天院主办，并得到中国卫星应用中心、中国气象卫星应用中心、中国气象卫星应用中心、中国气象卫星应用中心等单位的全力支持。大会的主题是“服务气象卫星应用，共筑空天信息新时代”。大会在“一个主题、两个论坛、三个展区、四个环节”的框架下，围绕“服务气象卫星应用，共筑空天信息新时代”的主题，开展了丰富多彩的活动。大会期间，与会代表围绕“服务气象卫星应用，共筑空天信息新时代”的主题，开展了丰富多彩的活动。大会期间，与会代表围绕“服务气象卫星应用，共筑空天信息新时代”的主题，开展了丰富多彩的活动。



刘碧刚理事长会见专家代表



大会开幕式



开幕式现场



大会开幕式



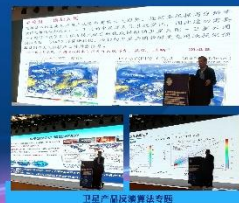
大会特邀报告



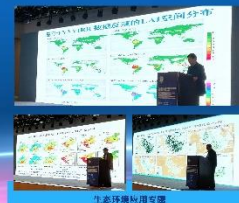
风云气象卫星专题



天气与数值预报专题



卫星产品反演算法专题



生态环流应用专题



气候建模应用专题

6. Projects on Space-based Radiometric Benchmark

Founded by

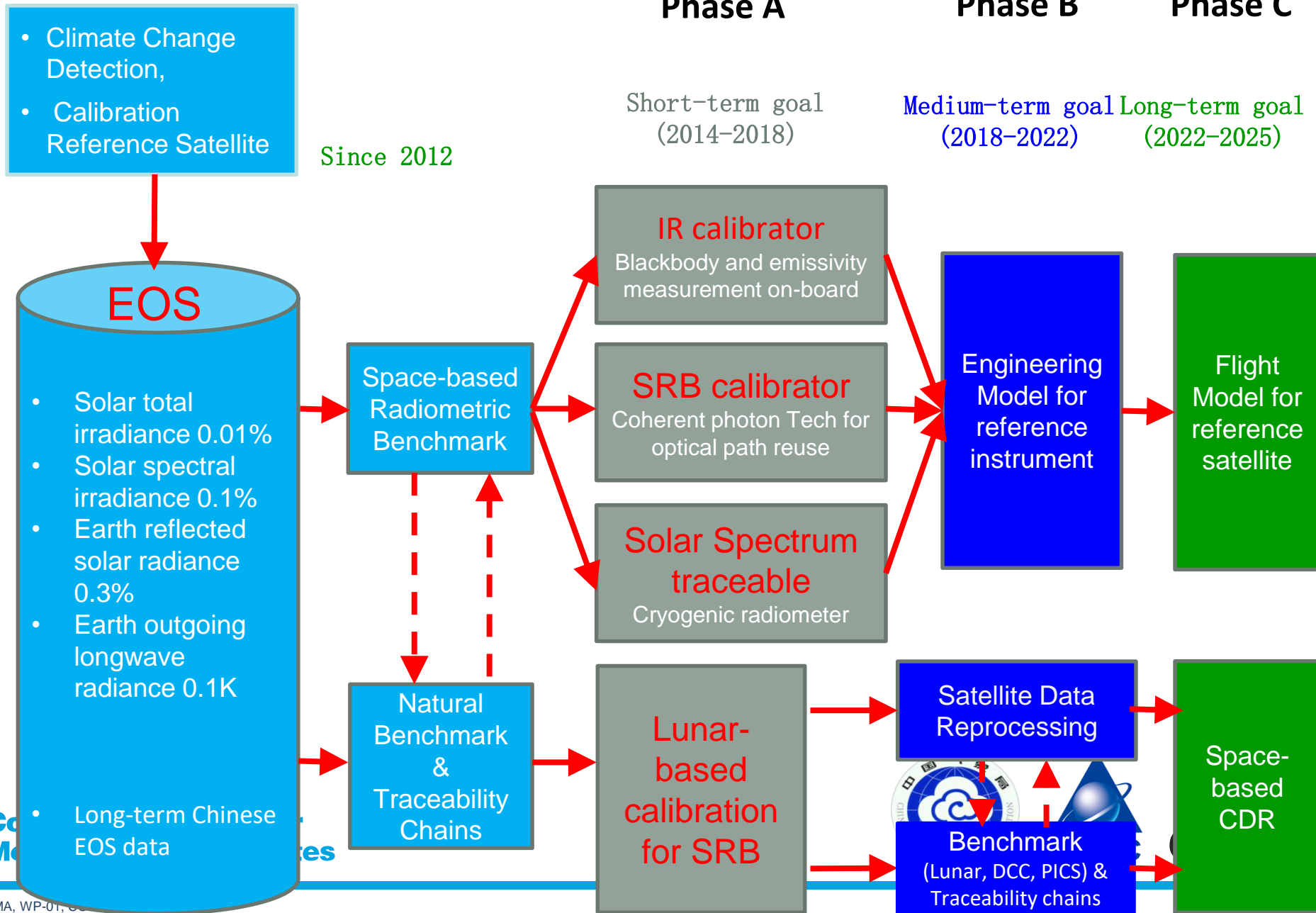
- National High Technology Research & Development Program of China (863 program) before 2018
- National Key R&D Program of China after 2018



Goal

- Chinese SI-traceable reference satellite
- Retrospective calibration of historical Chinese EO satellite data

Projects on Space-based Radiometric Benchmark in China



Phase B (300 million RMB)

- National Key R&D Program of China
- Chinese FY Satellite Program
- Chinese HY Satellite Program
- Chinese ZY Satellite Program

Engineering Model for reference instrument



Shanghai Institute of Technical Physics (SITP), CAS



Anhui Institute of Optics and Fine Mechanics (AIOFM), CAS

Natural Benchmark (Lunar, DCC, PICS) & Traceability chains



Academy of OPTO-Electronics (AOE), CAS

Satellite Data Reprocessing

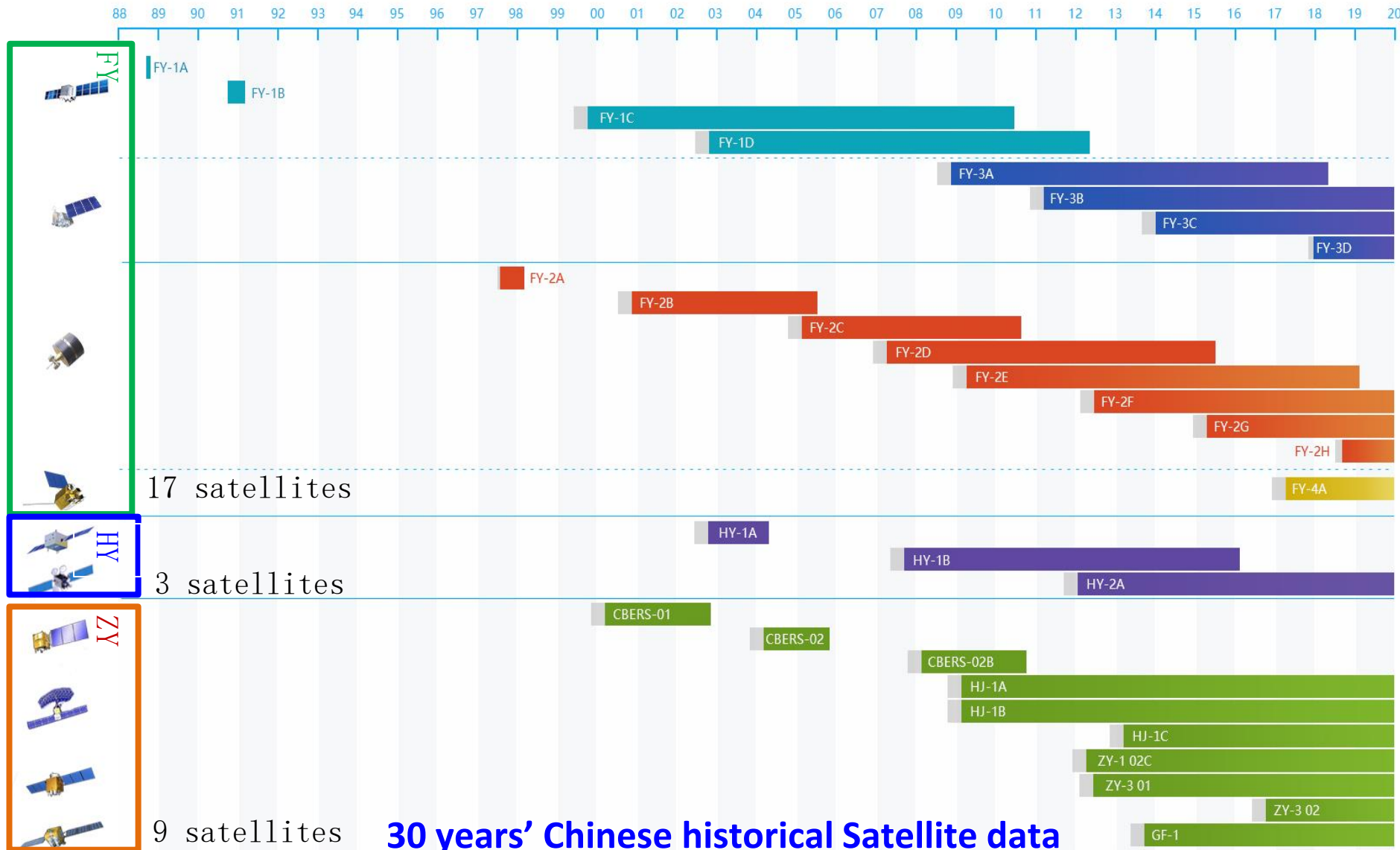


National Satellite Meteorological Center (NSMC), CMA

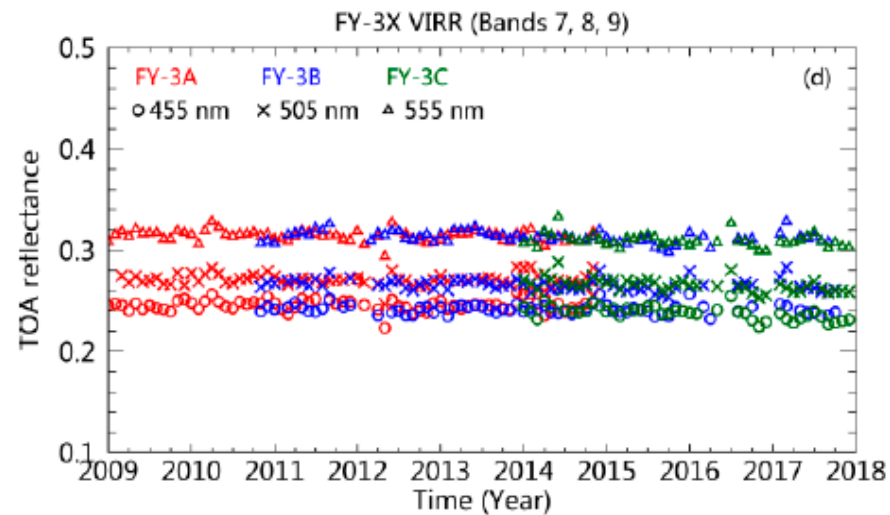
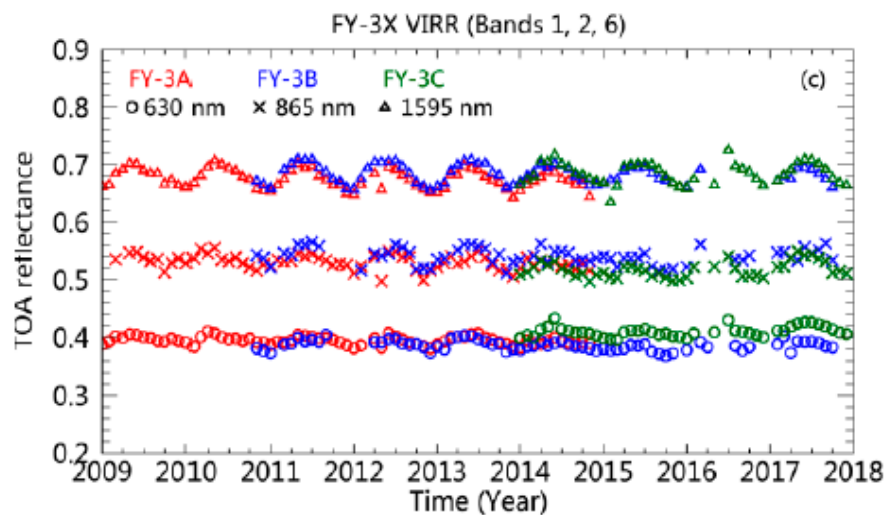
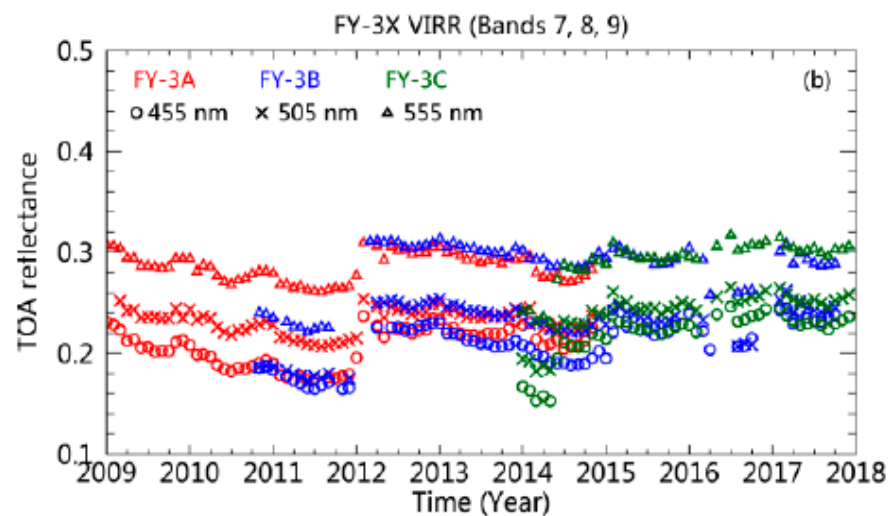
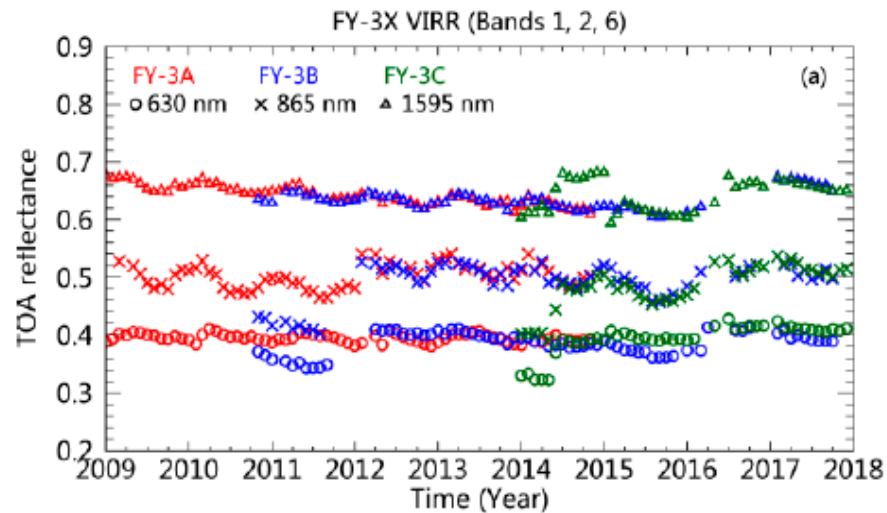


Retrospective Calibration of Historical Chinese EO Satellite data (RICH-CEOS)

(2018-2022)

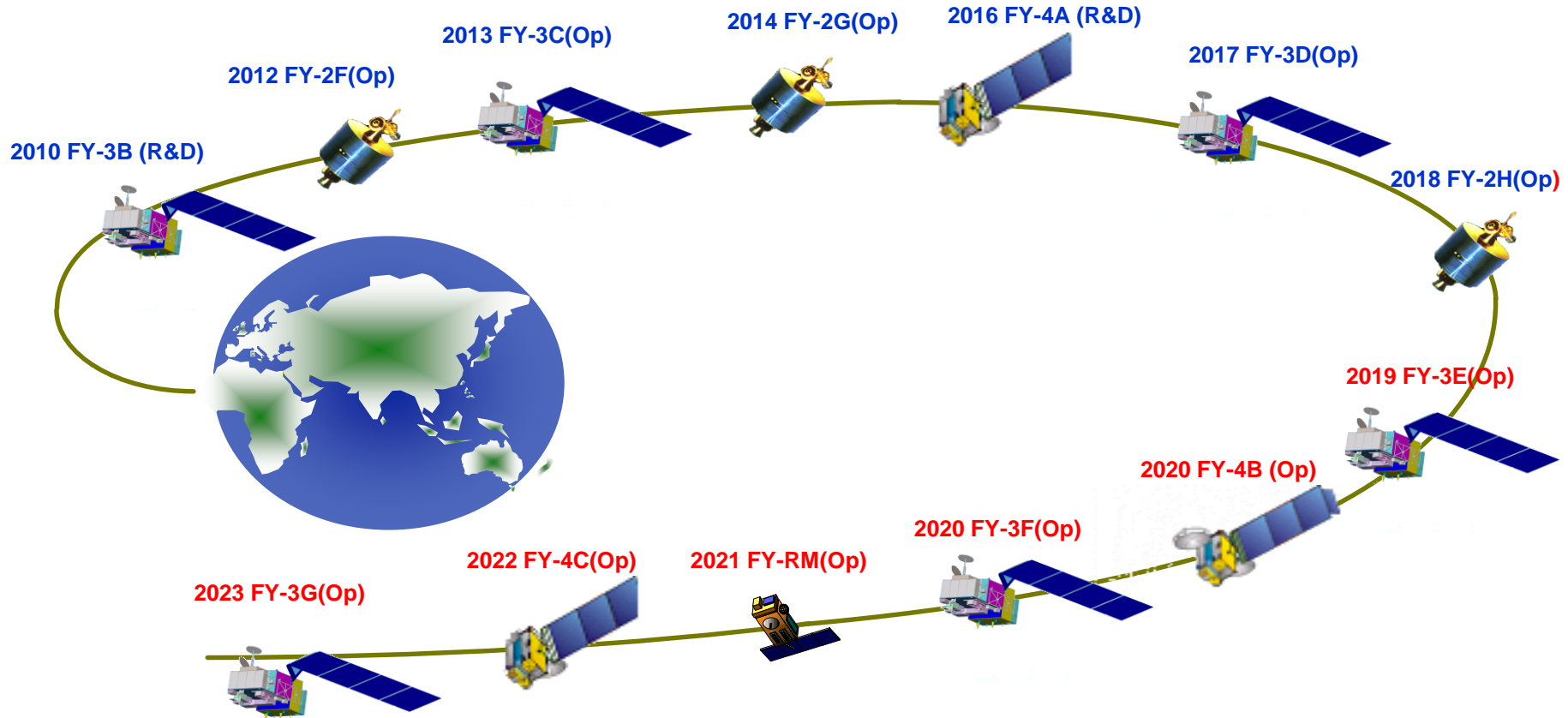


Coordination Group for Meteorological Satellites - CGMS



4. Future Programs

National Program for Fengyun Meteorological Satellite (2011-2020)

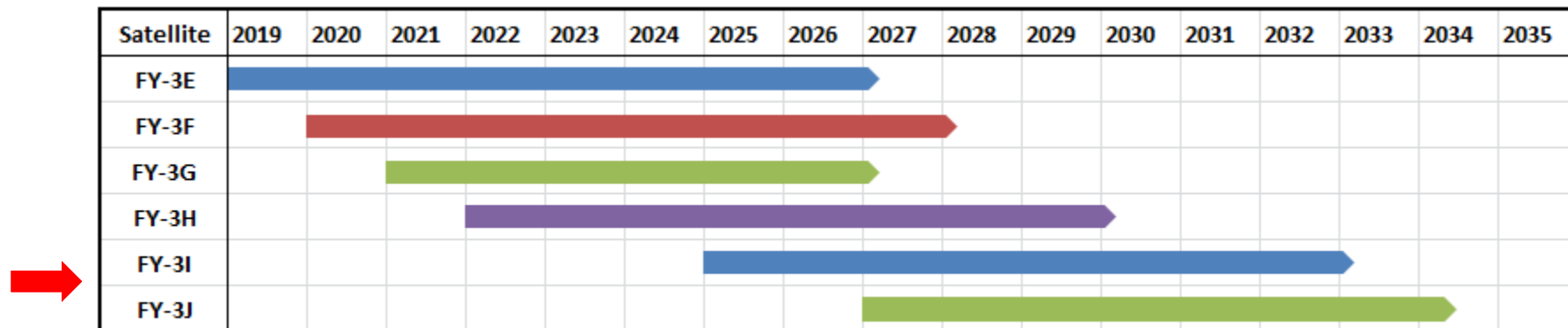
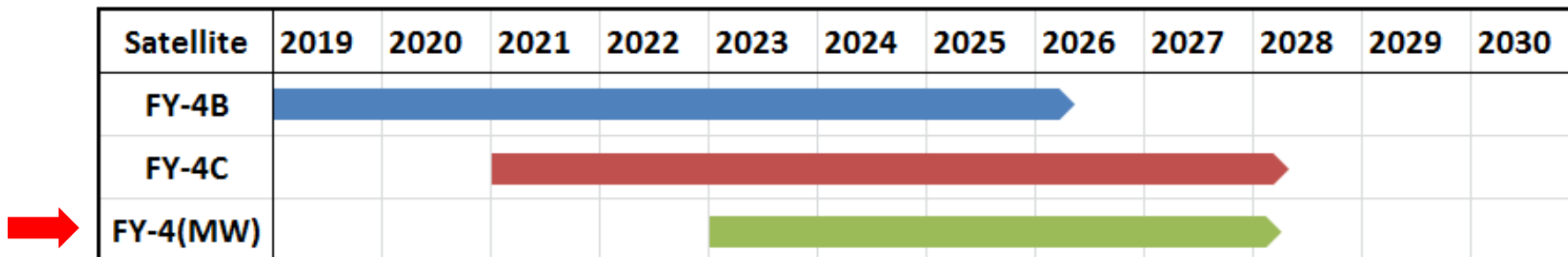


■ 6 satellites will be launched within this decade

**Coordination Group for
Meteorological Satellites**



National Space Infrastructure Program for Meteorological Satellites (from 2020 to 2025) approved by the State Council



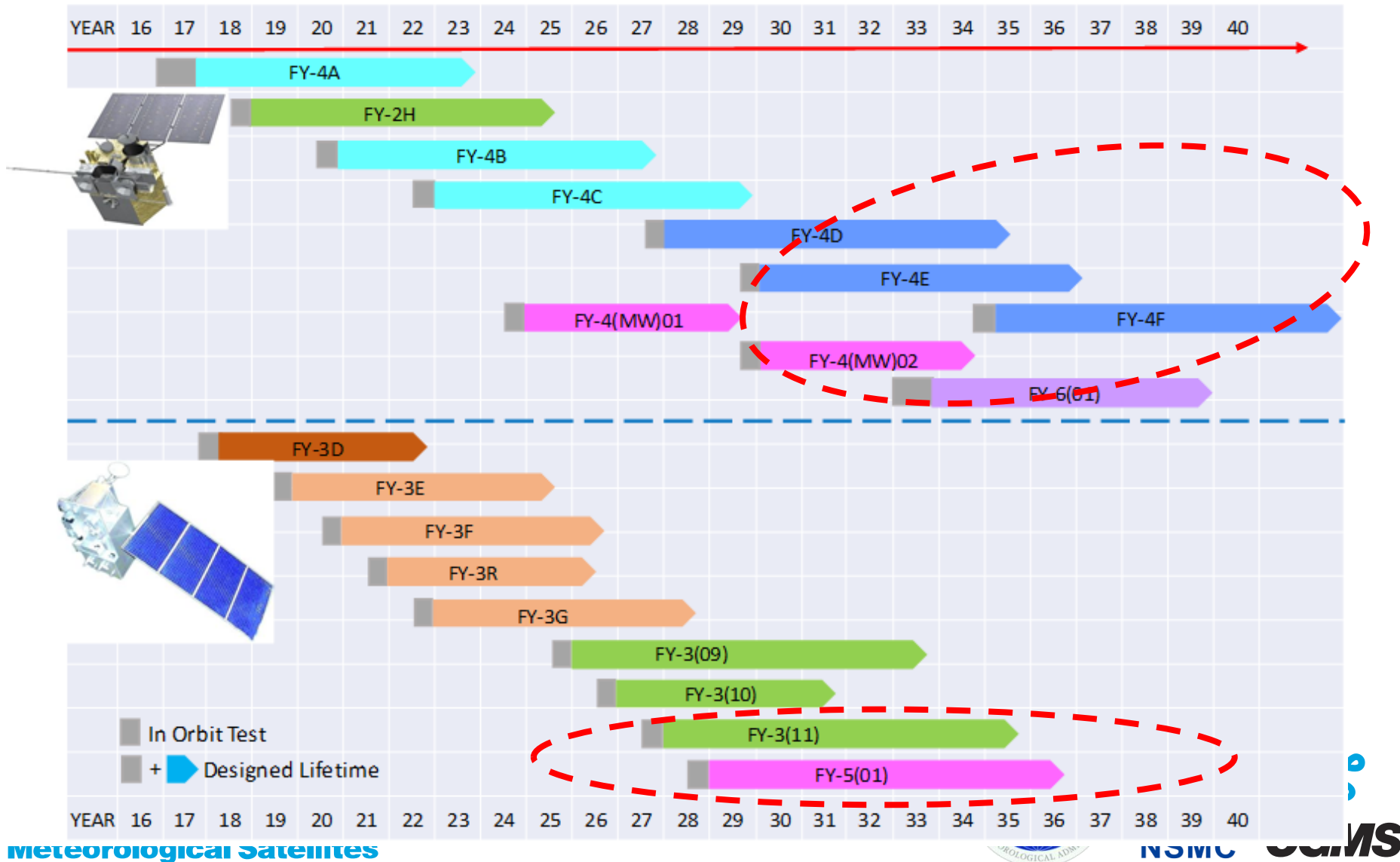
EM

AM

RM

PM

FengYun Vision for 2035



Together
For Better

谢

谢!

**Coordination Group for
Meteorological Satellites**

