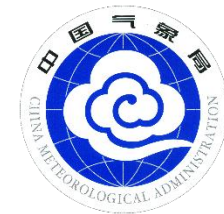


CMA updates since CGMS-53 and report on the medium to long-term future plans on Earth observation

Presented to CGMS-54 Plenary, agenda item 3

**Coordination Group for
Meteorological Satellites**



Executive Summary

This report presents the latest updates and long-term planning of the FengYun satellite series for CGMS-54. It consists of two main sections: first, the latest LEO/GEO satellites FY-3H and FY-4C; second, CMA's near-term and long-term planning for Fengyun satellites.

FY-3H, launched in September 2025, is equipped with 9 payloads and the new GAS-II sensor to support high-precision greenhouse gas monitoring, while FY-4C was launched in December 2025. It carries six payloads including an imager, a sounder and a lightning mapper. The imager features 19 channels with a maximum spatial resolution of 250 meters.,.

FY-3J is scheduled for launch in 2026 with 12 payloads for refined atmospheric and space environment monitoring, and **FY-4M**, a new geostationary microwave satellite, will be launched by the end of 2026 to enable three-dimensional observation of clouds, precipitation and wind fields. The **FY-5** low Earth orbit constellation is in the pre-approval stage with four orbit types to provide upgraded 3D wind and cloud detection, and the **FY-6** geostationary series is in the requirements analysis phase with higher resolution, and new observation capabilities.

GEO

FY-2G, -2H

FY-2G (99.5°E) and FY-2H (79°E)
Full disk every 30 min
FY-2H, last flight unit of FY-2 series.

FY-4A

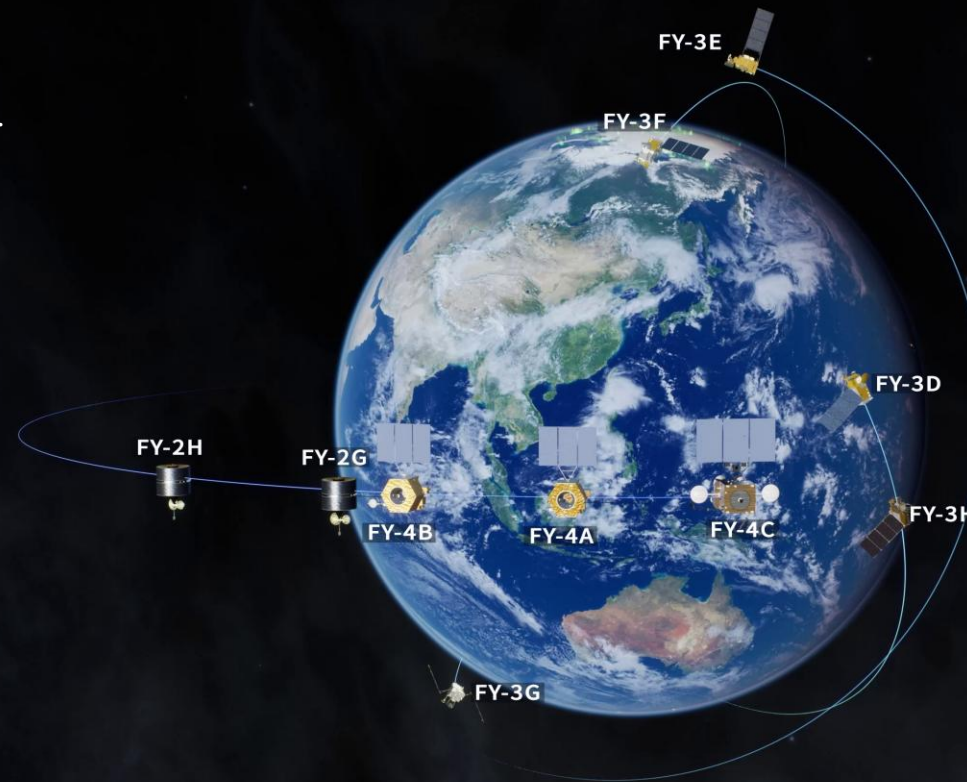
FY-4A (123.5°E), Full disk every 15 min.

FY-4B

FY-4B (105°E), Full disk every 15 min, partial areas rapid scanning at 1 min.
Operational since 1st December 2022

FY-4C

FY-4C (133°E), Full disk every 10 min, partial areas rapid scanning at 1 min.
Launched December 2025



10 Satellites in orbit
5 LEO 5 GEO

LEO

FY-3D

Afternoon orbit, ECT 13:45 local time
10 EO instruments

FY-3E

Early-morning orbit, ECT 5:41 local time
11 EO instruments
Operational since 1 Dec. 2022

FY-3F

Mid-morning orbit
10 EO instruments
Launched 3 Aug. 2023
operational on July 2024

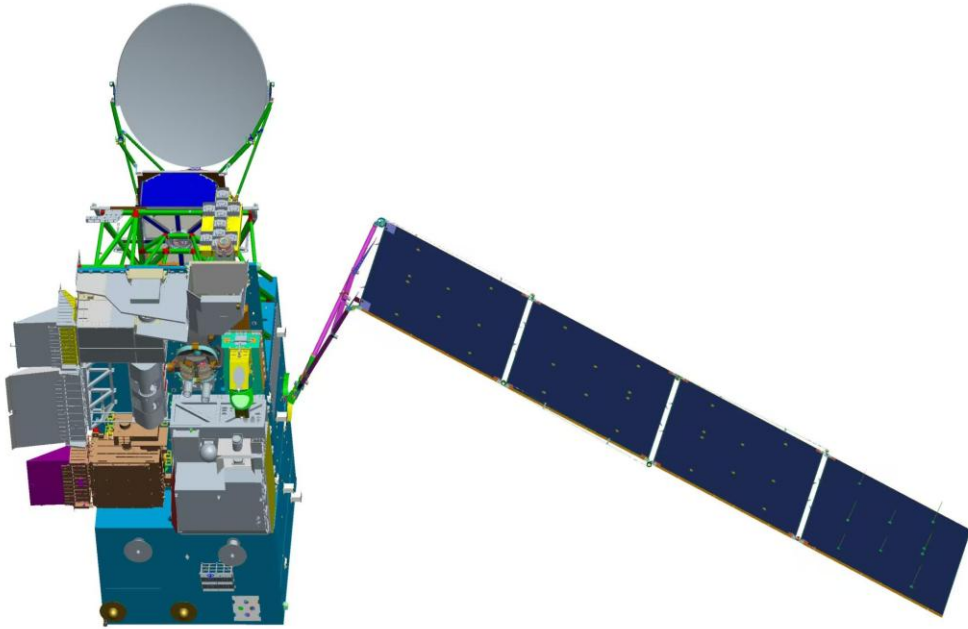
FY-3G

Drifting orbit
6 EO instruments
Launched 16 Apr. 2023
operational on July 2024

FY-3H

afternoon orbit
9 EO instruments
Launched 27 Sep. 2025

The Newest LEO Satellite : FY-3H



FY-3H

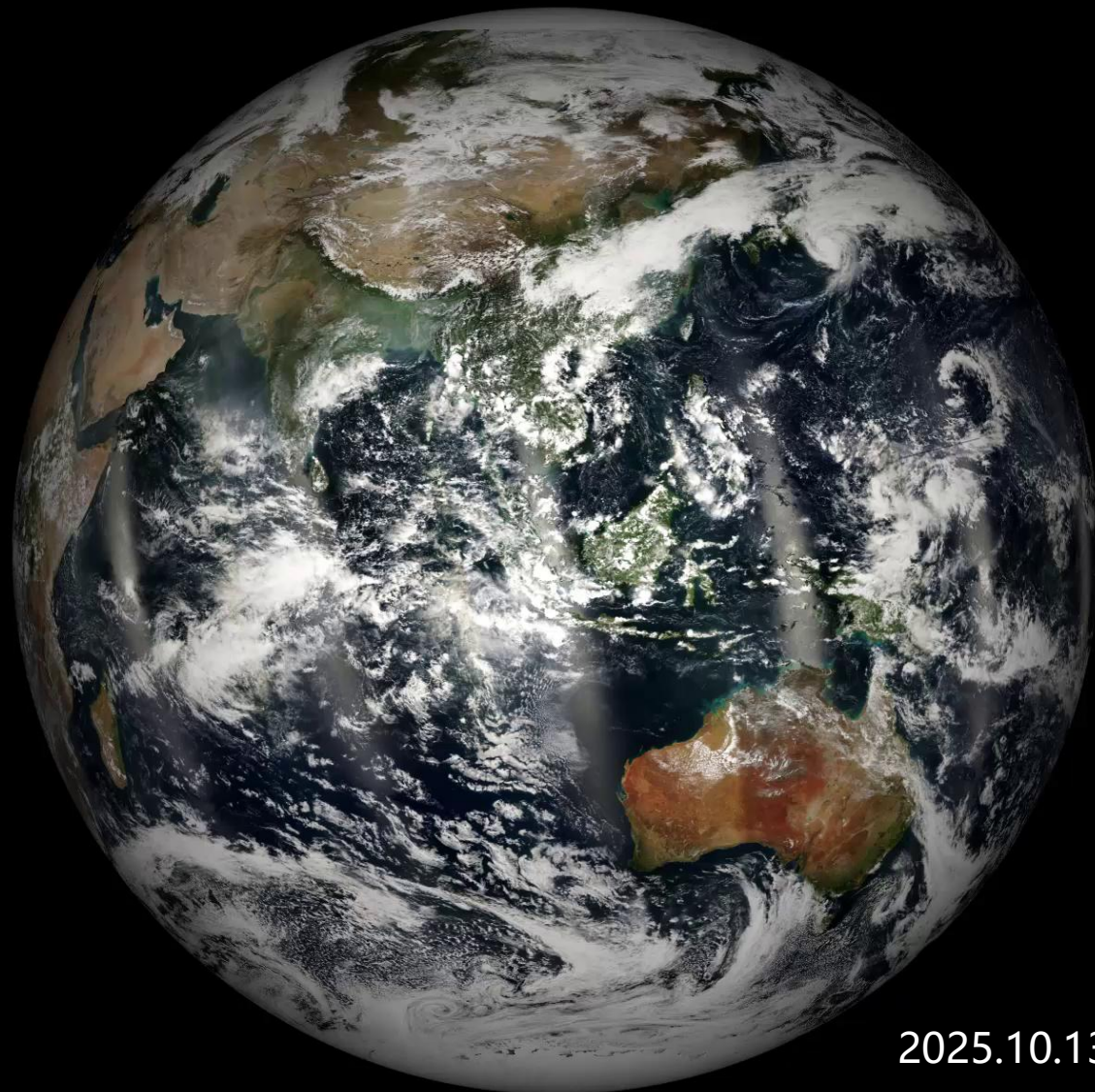
a sun-synchronous
afternoon orbit
satellite

Successfully launched on 27 Sep. 2025

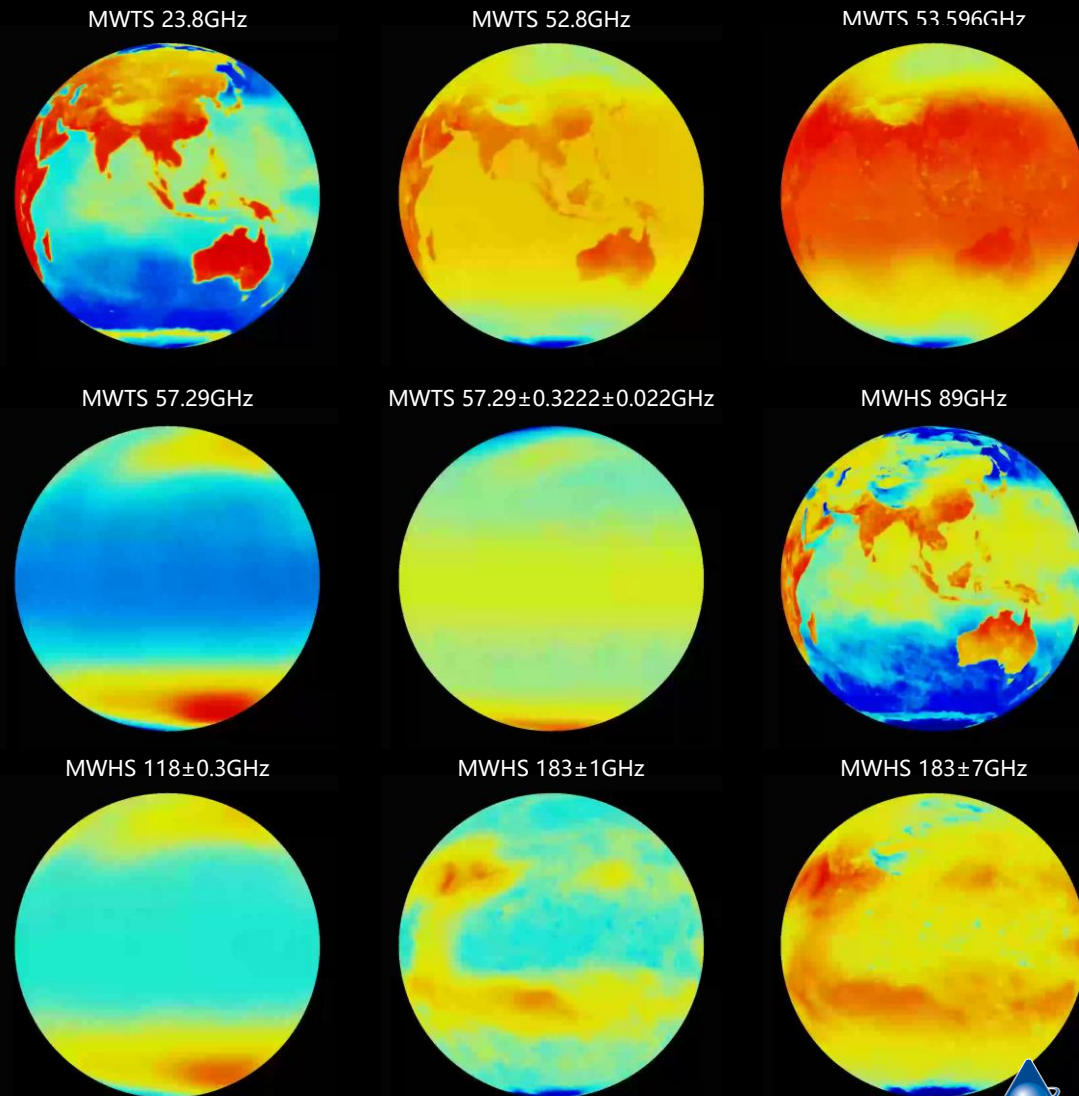
9 instruments, including HIRAS-II, MERSI-III, MWRI-II, MWTS-III, MWHS-II, GNOS-II, GAS-II, WAI-II, IPM-II

Acronym	Full name
MWHS-2	Micro-Wave Humidity Sounder -2
MWTS-3	Micro-Wave Temperature Sounder - 3
HIRAS-2	Hyperspectral Infrared Atmospheric Sounder - 2
GNOS-2	GNSS Radio Occultation Sounder - 2
MERSI-3	Medium Resolution Spectral Imager - 3
GAS-2	Greenhouse-gases Absorption Spectrometer - 2
MWRI-2	Micro-Wave Radiation Imager 2
SWS/WAI	Space Weather Suite / Wide-field Auroral Imager
SWS/IPM	Space Weather Suite / Ionospheric PhotoMeter

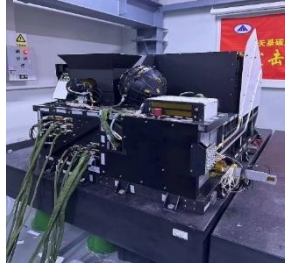
FengYun-3H's Global Observation Capabilities (Global Coverage, Multi-Instruments, Multi-Channels)



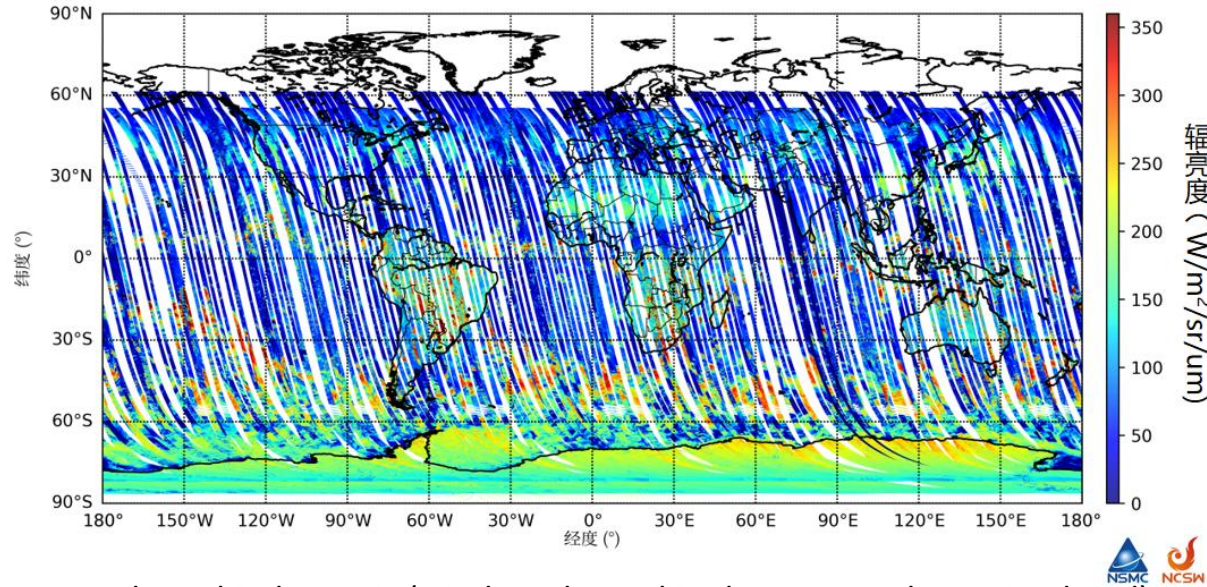
2025.10.13



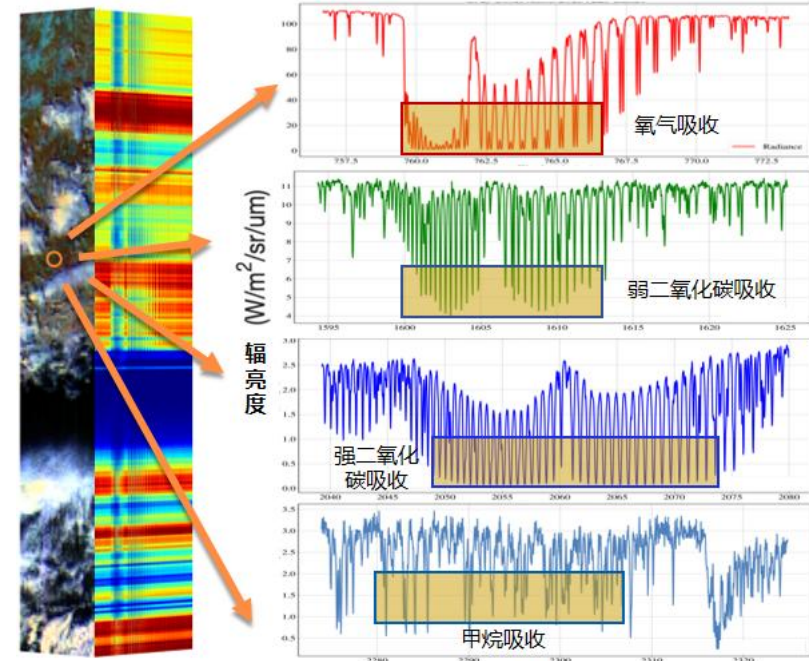
FY-3H—Greenhouse-gases Absorption Spectrometer-II



GAS-II achieves the measurement of greenhouse gas column concentrations (CO₂, CH₄, CO, etc.) with 100 km swath and ultra-high spectral resolution (0.04 nm–0.1 nm), providing key support for global climate monitoring and WMO G3W project.

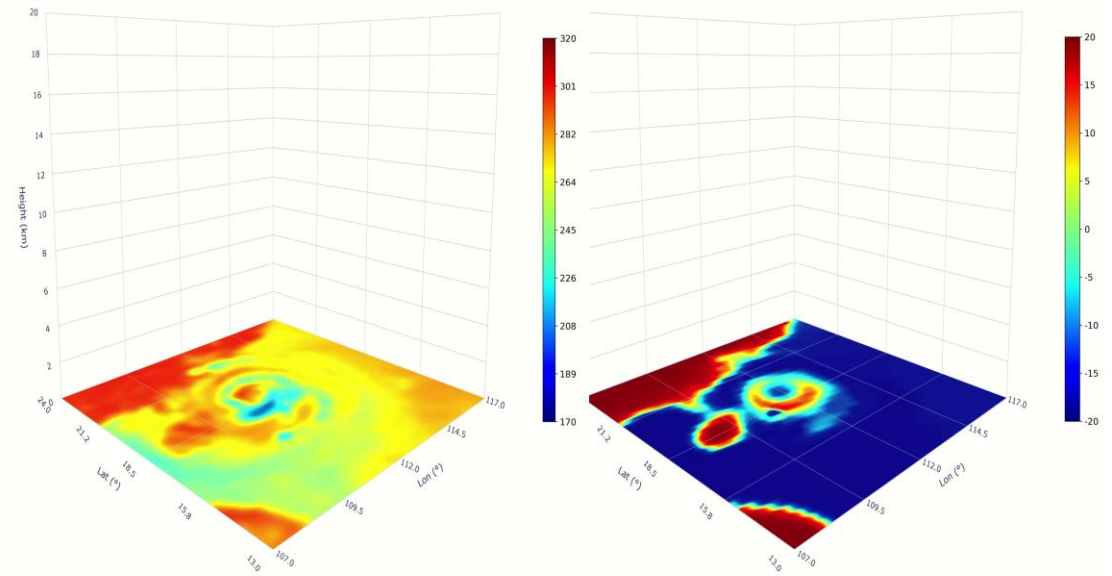
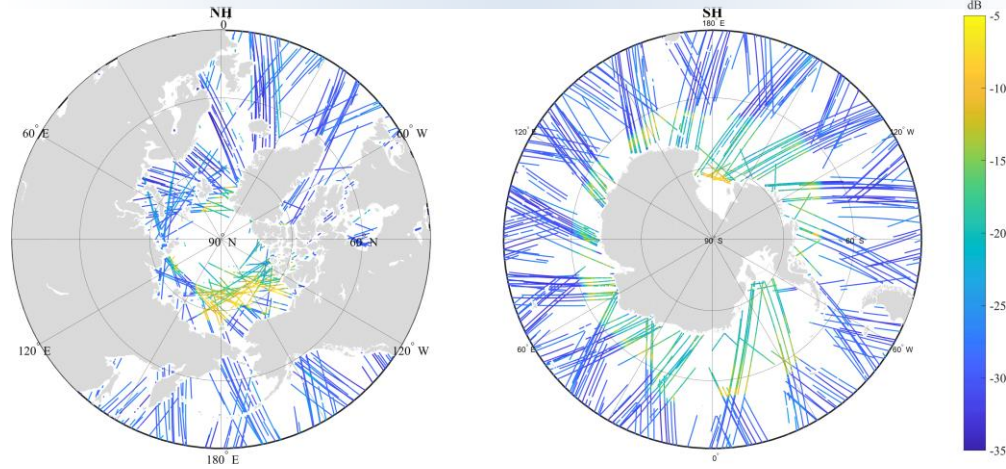


14-day orbital mosaic (window channel in the oxygen absorption band)



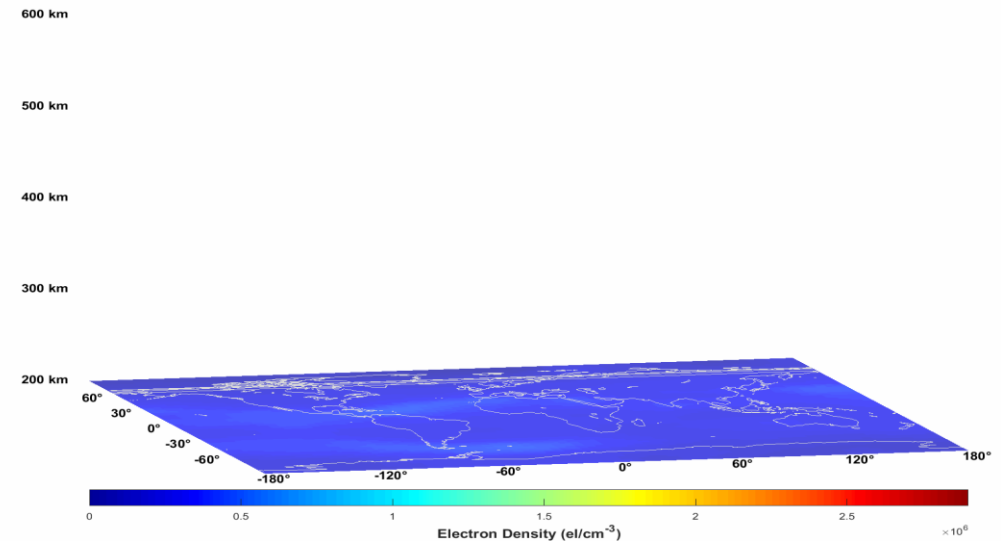
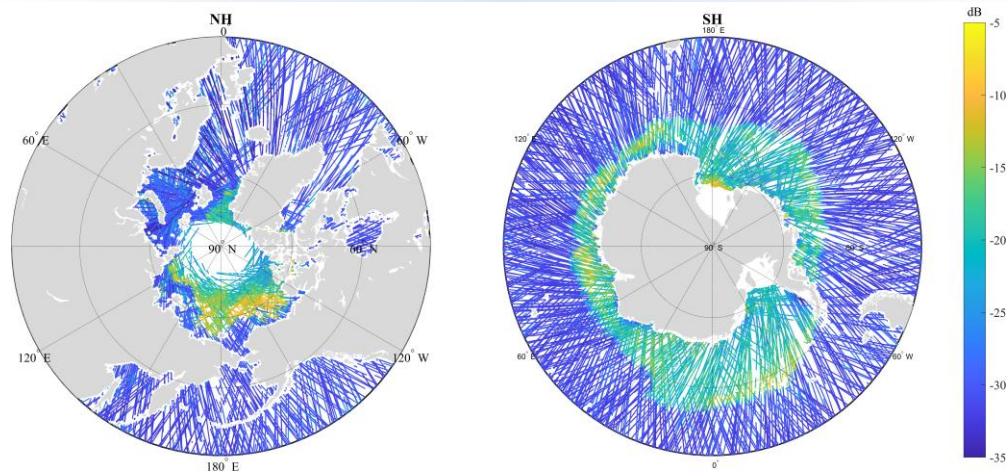
Fine multi-spectral atmospheric absorption spectra

FY-3E/F/H GNOS-II GNSS-R Reflectivity Daily Map (20251001-20251009)

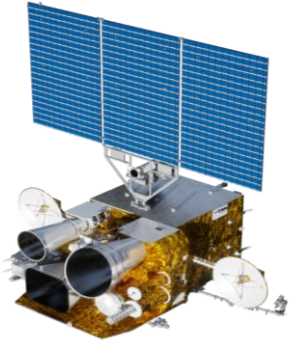


FY-3E/F/H GNOS-II GNSS-R 3D Ionosphere Electron Density (2025.10.06-2025.10.10)

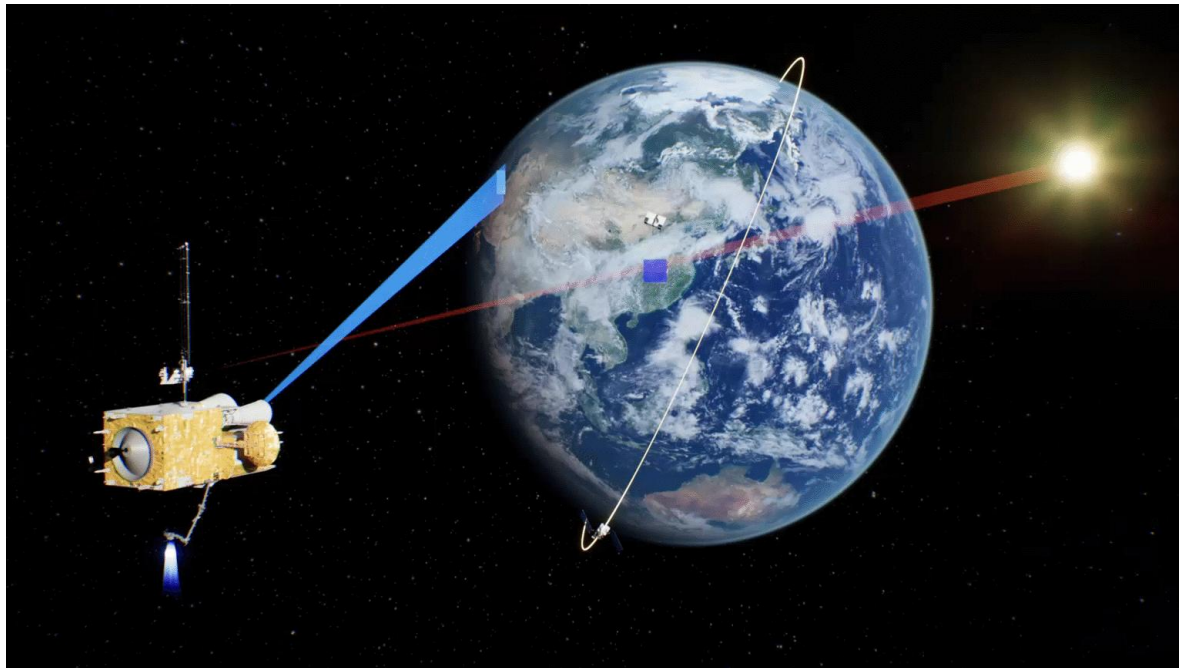
FY-3H GNOS-II GNSS-R Reflectivity (20251001-20251010)






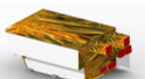


The Newest GEO Satellite : FY-4C

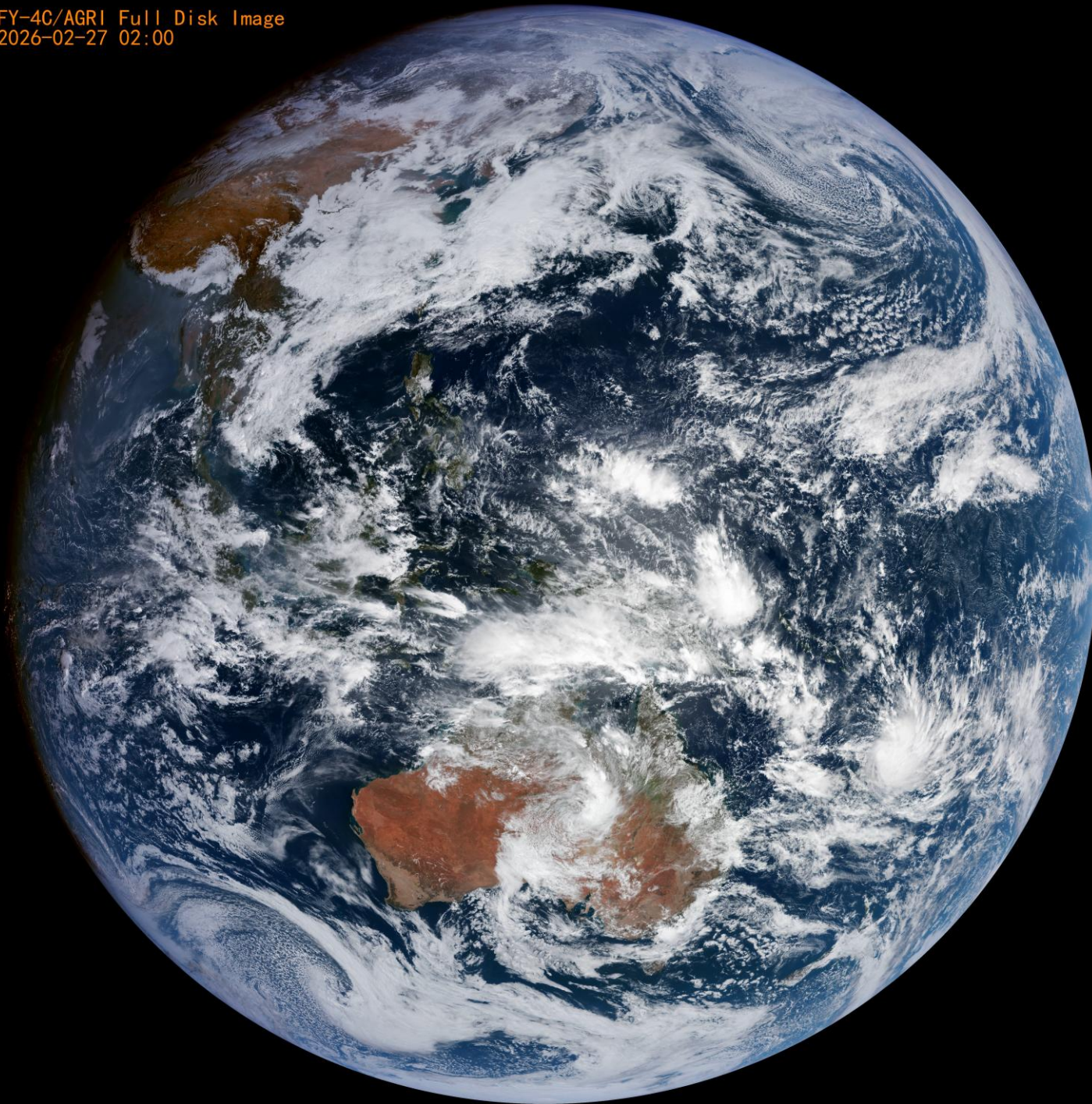


FY-4C, the 3rd GEO satellite in FY-4 series, was launched on **Dec. 27, 2025**, and positioned at 133°E. Significant improvement: For imager, 5 new channels are added to enhance the detection capability of fire and the upper levels of Troposphere. **Full-disk scan time is shortened to 5-10 minutes, and the maximum spatial resolution reaches 250 meters.**



	AGRI	Advanced Geostationary Radiation Imager
	GIIRS	Geostationary Interferometric Infrared Sounder
	LMI	Lightning Mapping Imager
	SUVI	Solar extreme-Ultraviolet Imager
	MUSI	Multi-band ionosphere Ultraviolet Spectral Imager
	SXUS	Solar X-ray and extreme-Ultraviolet Spectral fluxmeter

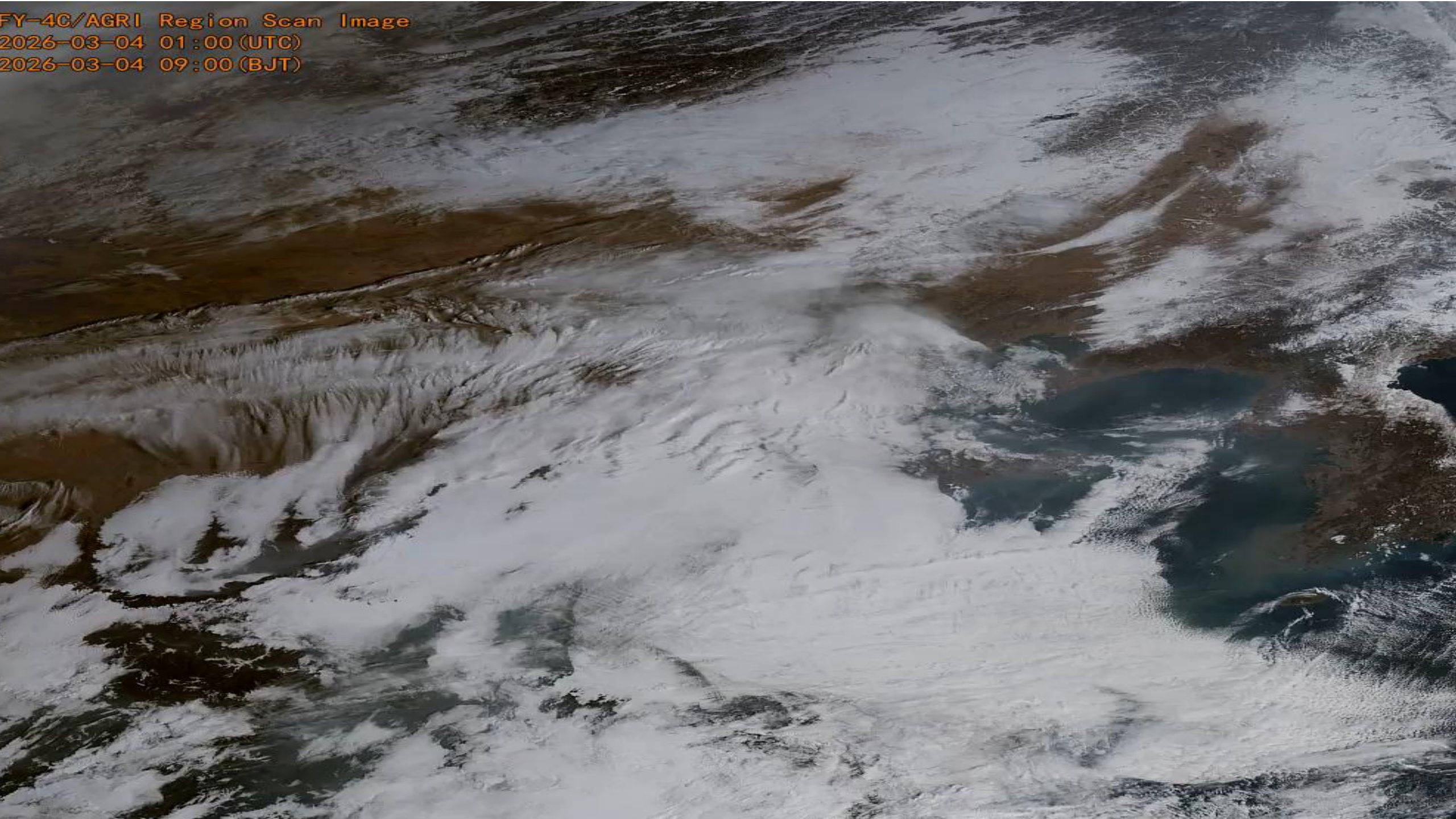
FY-4C/AGRI Full Disk Image
2026-02-27 02:00

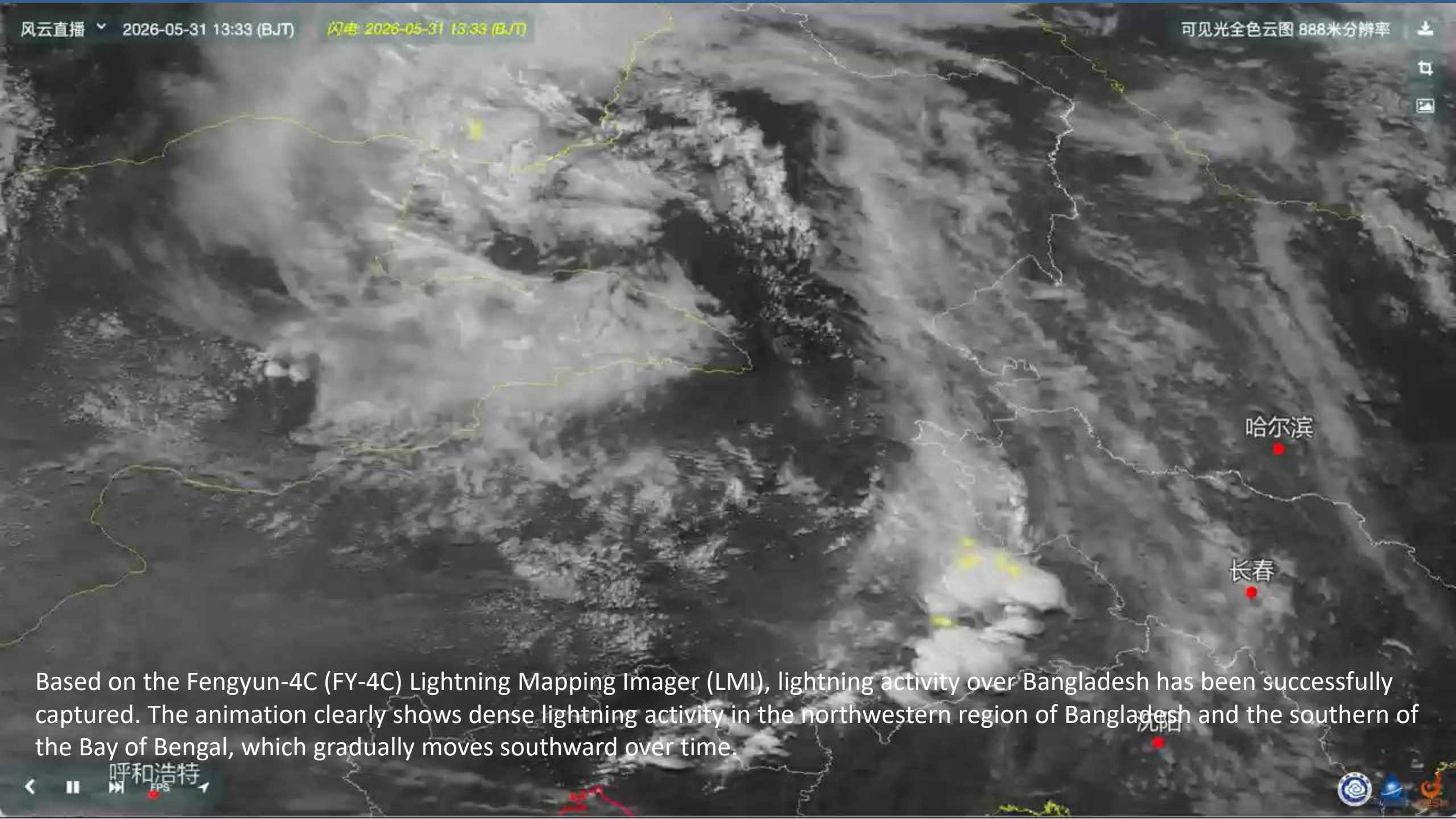


FY-4C/AGRI Region Scan Image

2026-03-04 01:00 (UTC)

2026-03-04 09:00 (BJT)



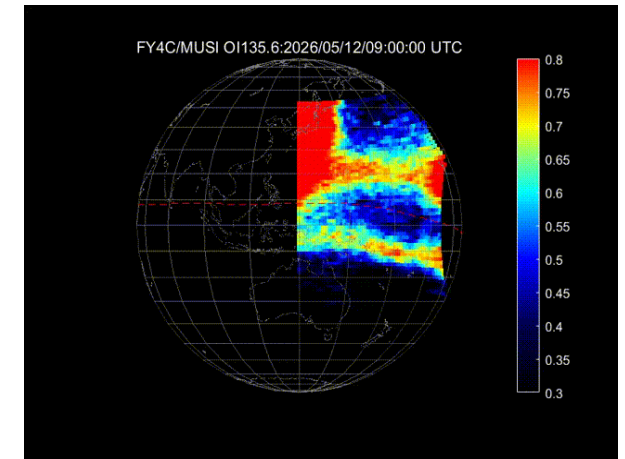
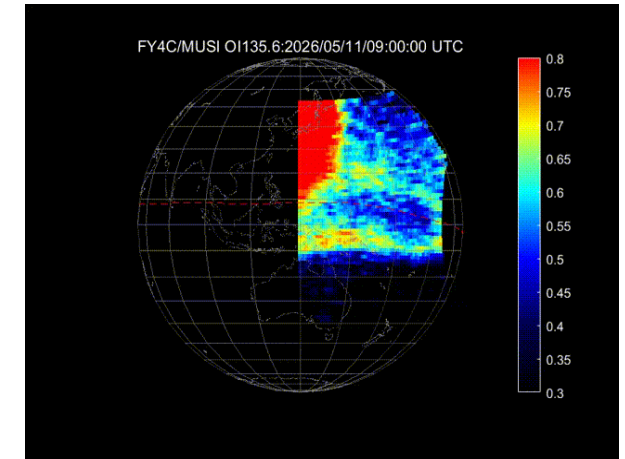
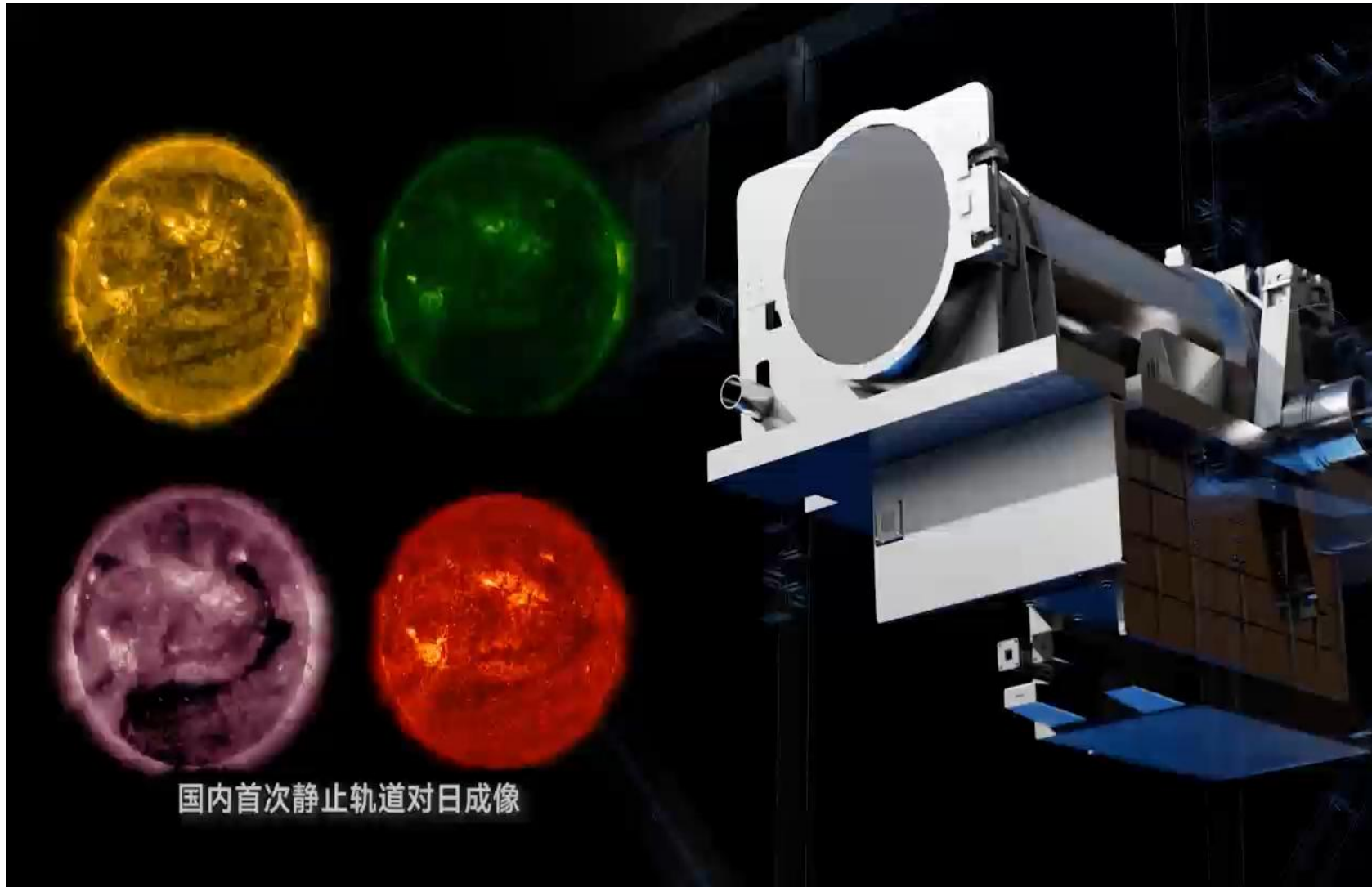


哈尔滨

长春

合肥

Based on the Fengyun-4C (FY-4C) Lightning Mapping Imager (LMI), lightning activity over Bangladesh has been successfully captured. The animation clearly shows dense lightning activity in the northwestern region of Bangladesh and the southern of the Bay of Bengal, which gradually moves southward over time.

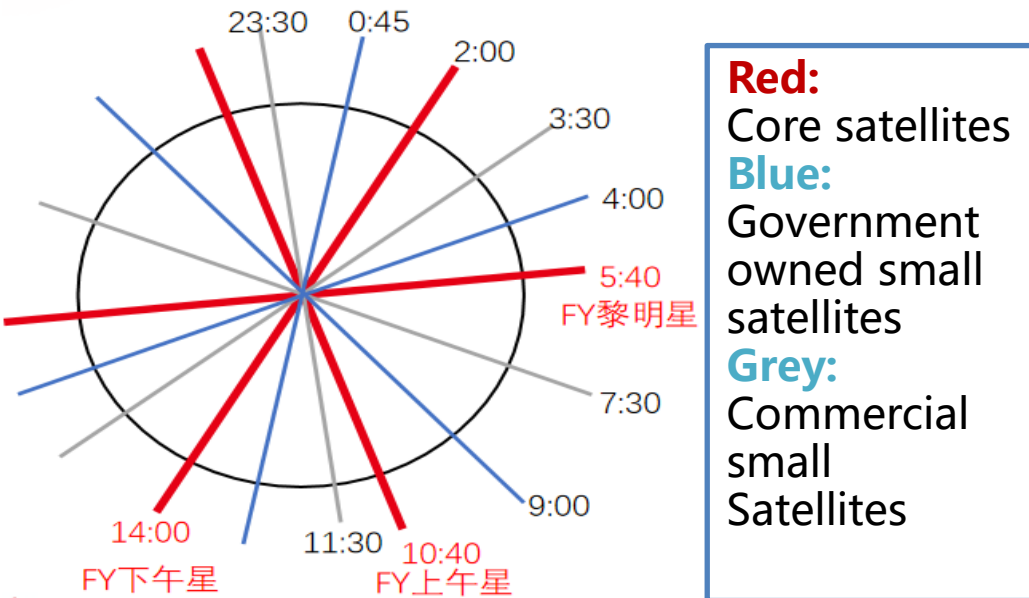


**Coordination Group for
Meteorological Satellites**



Guided by meteorological operational needs, CMA encourages and regulates the coordinated development of commercial meteorological small satellites.

In August 2025, CMA launched the **Guidance on Promoting the Development and Application of Commercial Meteorological Small Satellites**.



Optimize data policies	Promote orderly development
Provide data support	Encourage collaborative innovation

Coordination Group for Meteorological Satellites



Developed Commercial Satellite Data Standards



Product Standards: Standardize the grading, classification, and definition of product outputs, clarifying technical indicators and service connotations for different products.



Data Format Standards: Establish unified data storage and exchange formats to eliminate data silos between different systems and improve sharing efficiency.



Data Quality Inspection Standards: Define evaluation indicators and inspection methods for data quality to ensure accuracy, completeness, and usability.

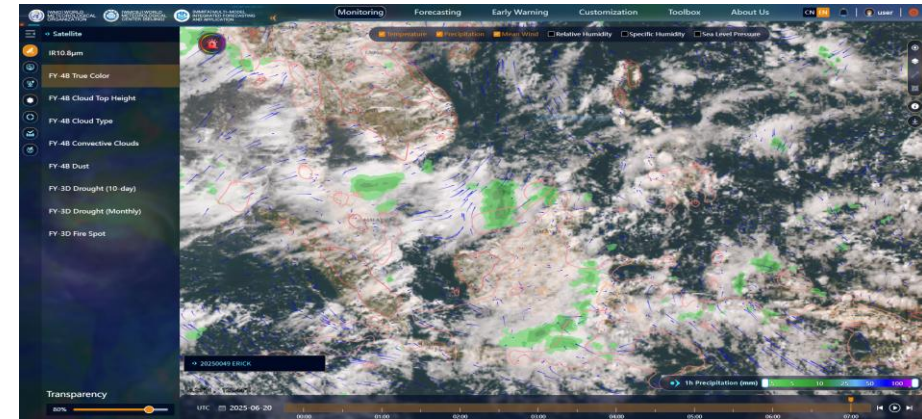


Data Naming Conventions: Establish unified naming conventions for data files to enable efficient management and quick retrieval.

User readiness: CMA delivers free services to global users through multiple channels such as the Internet, direct broadcasting system, GTS, etc. As a major monitoring tool for global early warning, Fengyun satellite data and products are being integrated into the CMA early warning system *Mazu* as a toolbox to support the WMO EW4ALL Initiative.



Multi-hazard
Alert
Zero-gap
Universal



Coordination Group for Meteorological Satellites

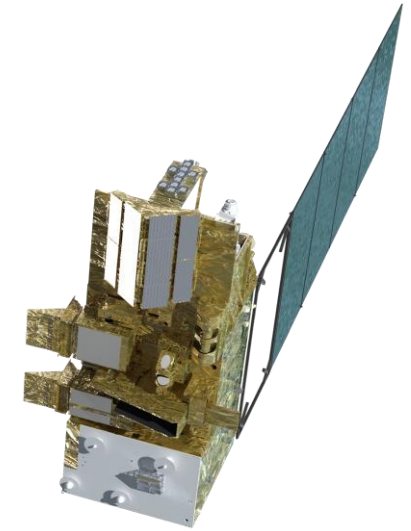


Near future and long-term Planning

FY-3J - To be launched this year

➤ Satellite details

- Sun-synchronous orbit
- Attitude: 836 km
- Inclination: 98.75°
- **LT of Ascending node: 5:20**
- Design life: 8 years



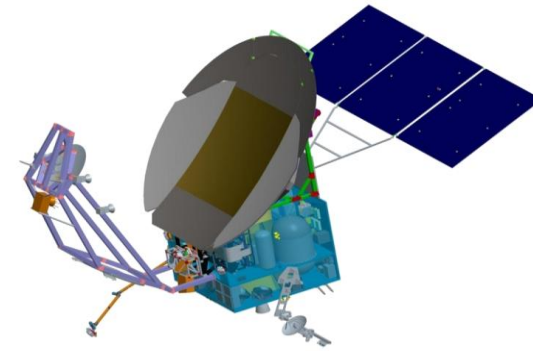
➤ Instruments:

1	Medium Resolution Spectral Imager (MERSI)
2	Microwave Temperature Sounder (MWTs)
3	Microwave Humidity Sounder (MwHS)
4	GNSS Radio Occultation Sounder (GNOS)
5	Wind Radar (WinRAD)
6	Hyperspectral Infrared Atmospheric Sounder (HIRAS)
7	Solar Spectral Irradiance Monitor (SSIM)
8	Solar Irradiance Monitor (SIM)
9	Solar X-ray and Extreme Ultraviolet Imager (X-EUVI)
10	Space Environment Monitor
11	Triple-angle Ionospheric PhotoMeter (Tri-IPMI)

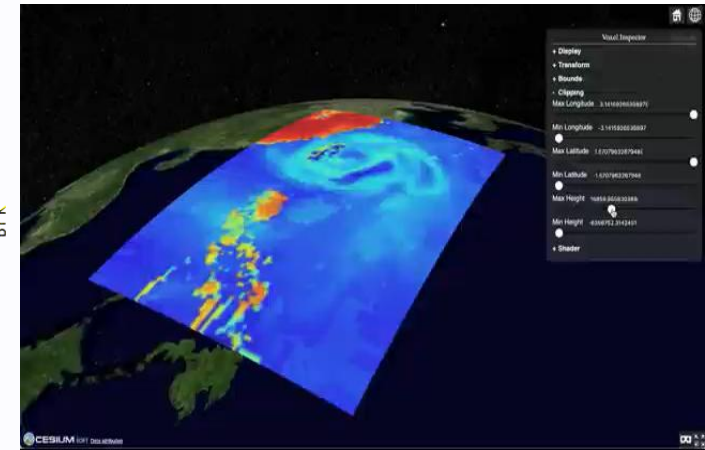
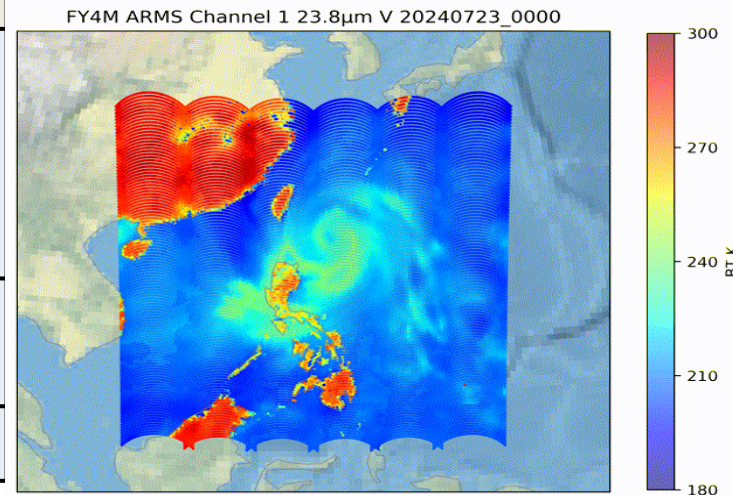
Near future and long-term Planning

FY-4M, a brand-new GEO microwave satellite in the FY-4 series, equipped with a multi-frequency microwave sounder, is planned to be launched by the end of 2026.

It enables continuous dynamic observation of the three-dimensional structure of clouds, precipitation, and the atmosphere, capturing wind field structure information within cloud regions.

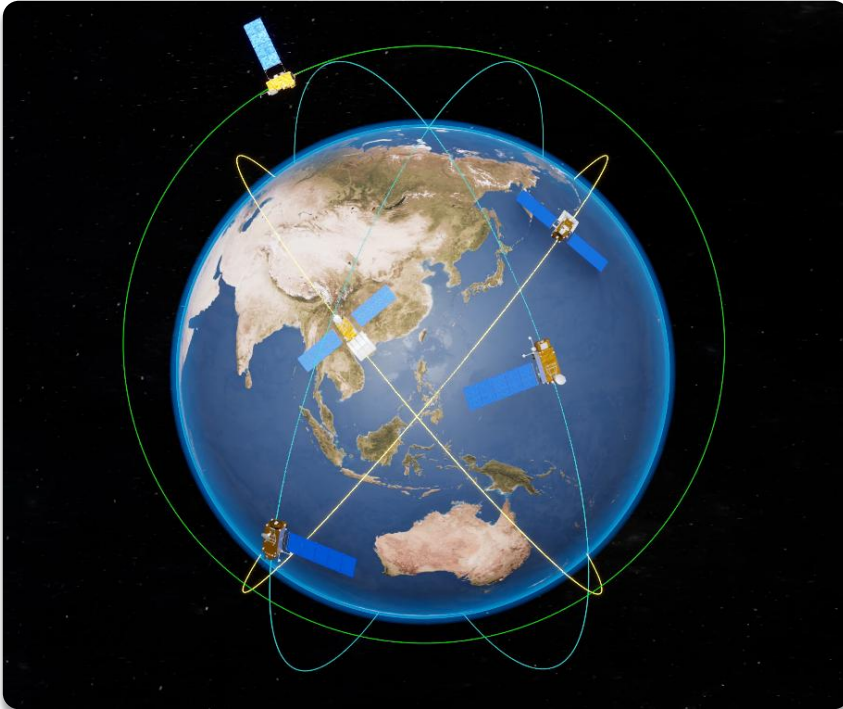


Geostationary Microwave Sounder	
Band	1) Frequency: 23-425GHz, 10 Bands 2) Channels: 135 (with fine-spectrum channels) 3) Band width: 3MHz-2000MHz
Required Accuracy	1) Sensitivity: 0.5-1.5K 2) Calibration accuracy: <1.5K
Observation Mode	Full coverage+ Regional + Quick Scan



FY-5 series: the first satellite in pre-approval phase

Covering **four** orbital plane: morning, afternoon, early-morning, and low inclination.



Satellite Functions:

Morning Orbit: Earth surface imaging, cloud microphysics, aerosols, and absolute spectral measurement, supporting to climate change monitoring and numerical weather prediction.

Afternoon Orbit: Atmospheric sounding (temperature, humidity, ozone) for numerical weather prediction, ecological, and environmental monitoring.

Early-morning Orbit: High-precision atmospheric temperature/humidity profiling and wind vector detection for global numerical weather prediction.

Atmospheric Dynamics & Precipitation Satellite: Dedicated to atmospheric dynamics, precipitation, water vapor, and hydrometeor monitoring for typhoon and heavy rainfall warning.

Key Upgrades over FY-3 Series:

- ❑ Enhanced existing observation capabilities of FY-3
- ❑ Add new 3D atmospheric wind and cloud detection capabilities

**Coordination Group for
Meteorological Satellites**



FY-6 Plan: Requirements analysis phase

Goal

Continue core missions of FY-4 optical satellites

Upgrade capabilities & ensure stable GEO service

Add detection of atmospheric chemistry, clouds, aerosols, space weather

Explore new observation modes: polarization, quantum detection

Core Capability Upgrades

- High spacial resolution, high temporal resolution, **low-light detection** capability;
- Higher spacial resolution lightning imaging;
- 2 km horizontal / 500 m vertical resolution; 0.5-h full-disk hyperspectral sounding
- geolocation & calibration precision

New Capability exploring

- **New detection capability of atmospheric chemistry, clouds, aerosols;**
- Explore feasibility of **quantum radiometric reference, active laser wind profiling, etc.**
- **Expand space weather monitoring:** solar magnetic field, solar flux, space electric field
- **AI-enabled intelligent & maneuverable observation;** automatic detection & tracking of severe convection

Thank you

