Status of FengYun Satellite Program and Future Development

National Satellite Meteorological Center (National Center for Space Weather)
China Meteorological Administration

- Since AOMSUC-11, CMA's FengYun satellite status has been updated as follows:
  - 2 Recruit: FY-4B and FY-3E
  - 2 Retired: FY-3B and FY-2F

7 FengYun Satellites in orbit

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, -4B

China's second generation GEO meteorological satellites.

FY-4A (104.7° E) , Full disk every 15 min.

FY-4B (133° E), Full disk every 15 min, partial areas rapid scanning at 1 min.
Pre-operational

LEO

FY-3C

Mid-morning orbit
Operational with degraded performance

FY-3D

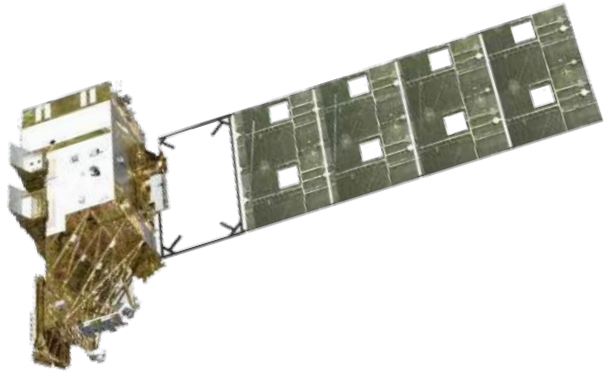
Afternoon orbit, ECT 13:45 local time
10 EO instruments

FY-3E

Early-morning orbit, ECT 5:41 LT
11 EO instruments
Pre-operational

Since 1st June,2022, FENGYUN-3E and FENGYUN-4B as well as their ground application systems officially start trial operation.

FY-3E status

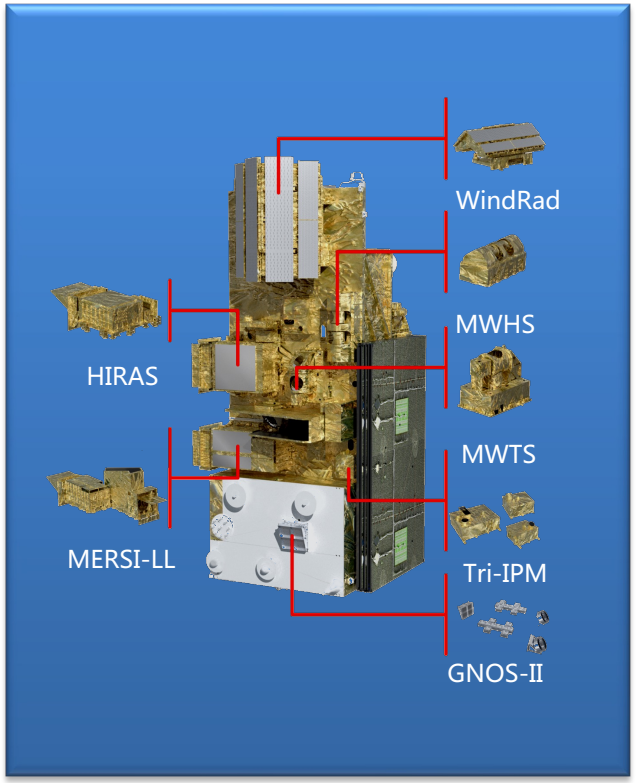


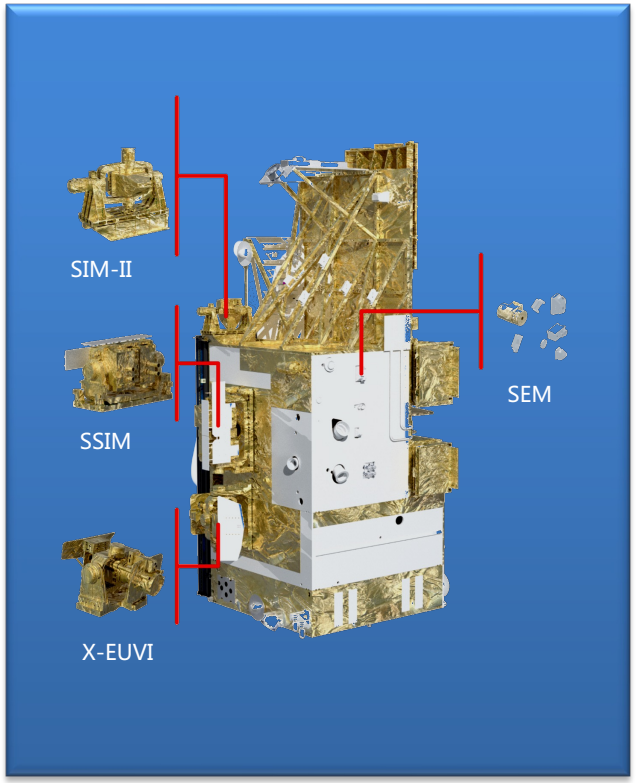
- Launched on July 5th,2021, local Equator Crossing Time: 5:40 desc.
- First operational meteorological satellite in EM orbit for civil use.
- Satellite data is available on NSMC website for trial application since June 1, 2022.
- FY-3E provides an optimal temporal distribution with the mid-morning and afternoon satellites. NWP communities will significantly benefit.
- 46 baseline products(L2) have been developed.

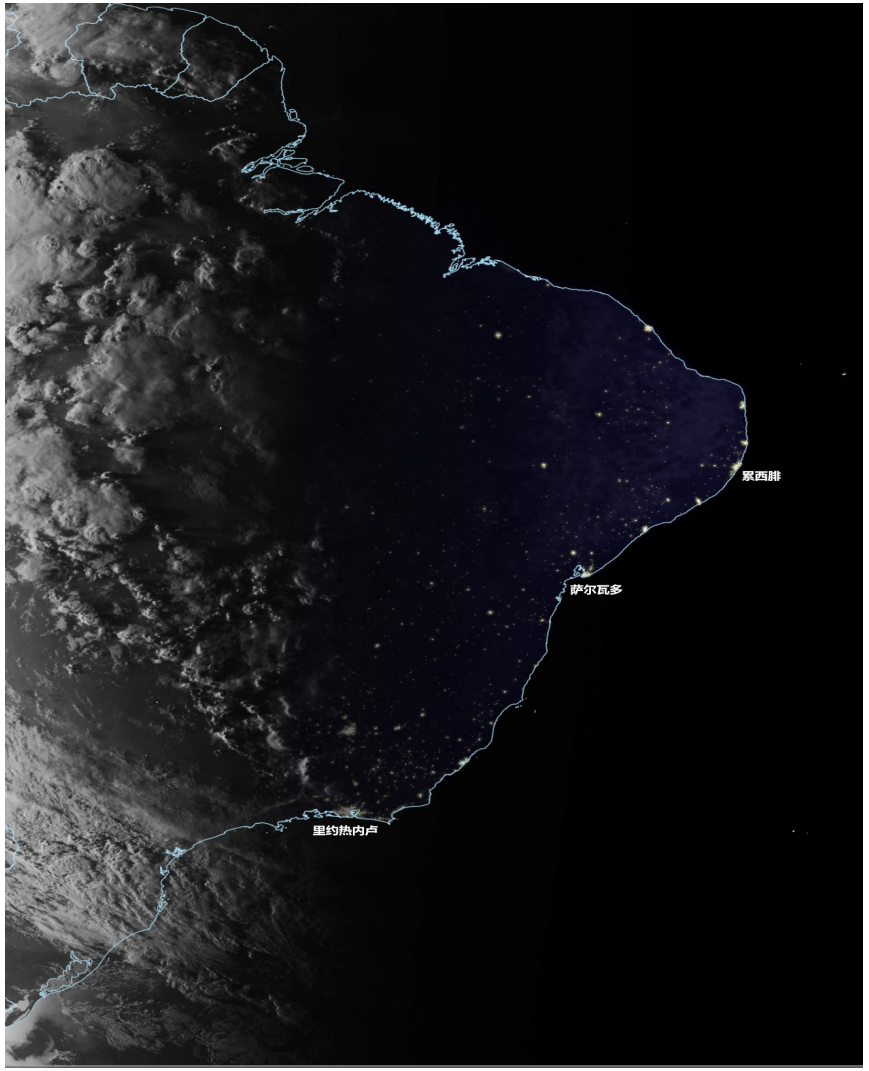
NO.	Instruments	Status
1	WindRad (Wind radar)	**new**
2	SSIM (Solar Spectral Irradiance Monitor)	**new**
3	XEUVI (Solar X-ray and Extreme Ultraviolet Imager)	**new**
4	MERSI-LL (medium resolution spectral imager),	**improved**
5	MWTS-III (Micro-Wave Temperature Sounder),	**improved**
6	HIRAS-II (hyper-spectral infrared atmospheric sounder),	**improved**
7	GNOS-II (GNSS Occultation Sounder)	**improved**
8	SIM-II (Solar Irradiance Monitor),	**improved**
9	SEM (Space Environment Monitor),	**improved**
10	Tri-IPM (Triple-angle Ionospheric PhotoMeter)	**improved**
11	MWHS-II (Micro-Wave Humidity Sounder),,,	inherited

FY-3E status

- WindRad is the first active microwave remote sensing instrument of Fengyun series satellites. This is a dual-frequency, dual-polarization radar.
- XEUVI is the first solar X-ray - extreme ultraviolet dual band imager and China's first space solar telescope.
- MERSI-ll has 7 channels, including 1 low-light channel and 6 thermal infrared channels. Two of the infrared split-window channels (10.8 and 12.0 μm) have a spatial resolution of 250m, and the other channels have a spatial resolution of 1000m.
- GNOS-ll receives both occultation and surface reflection signals from GPS and China's Beidou satellite.






累西腓
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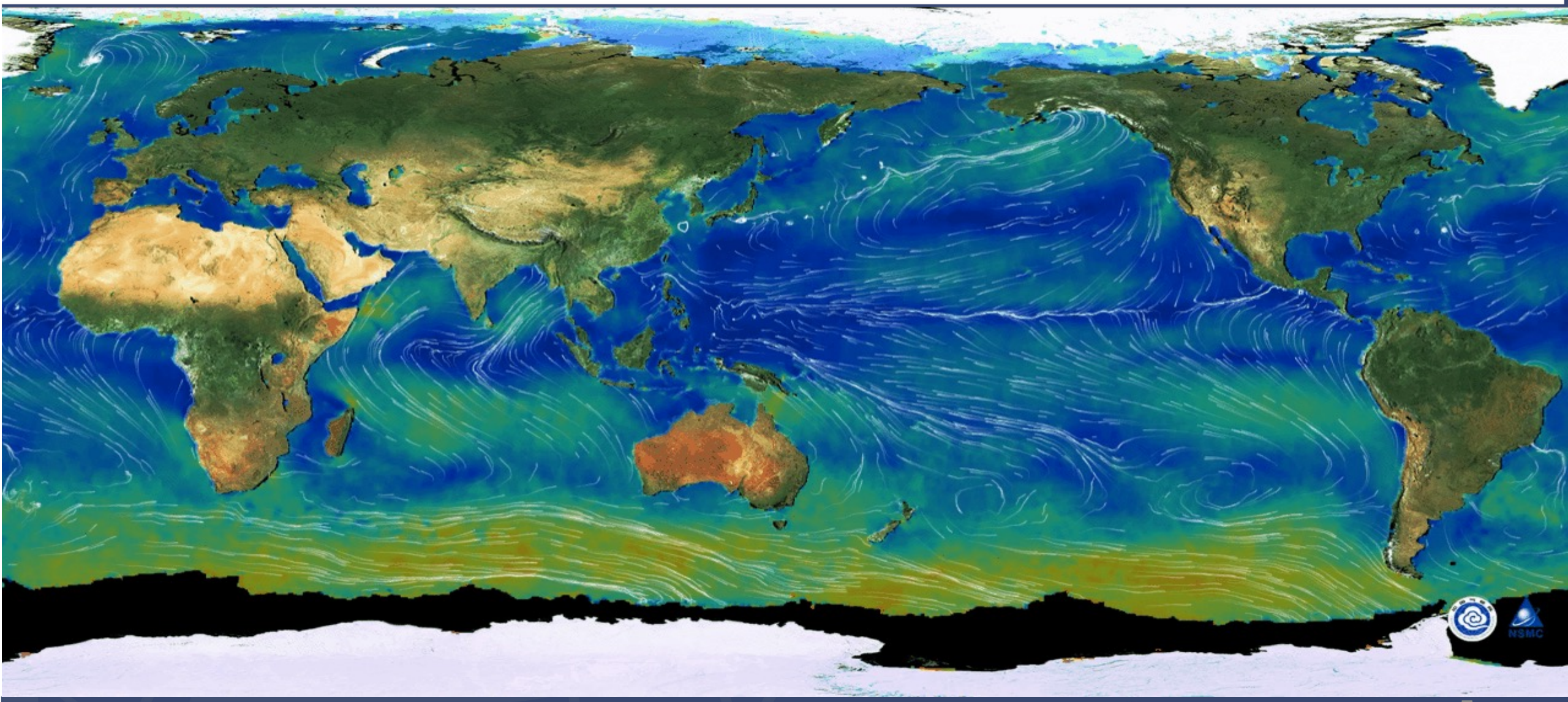
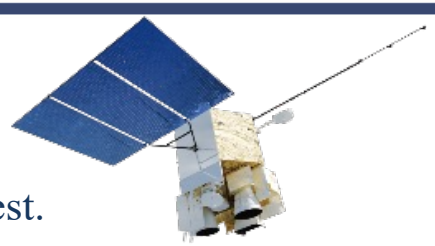
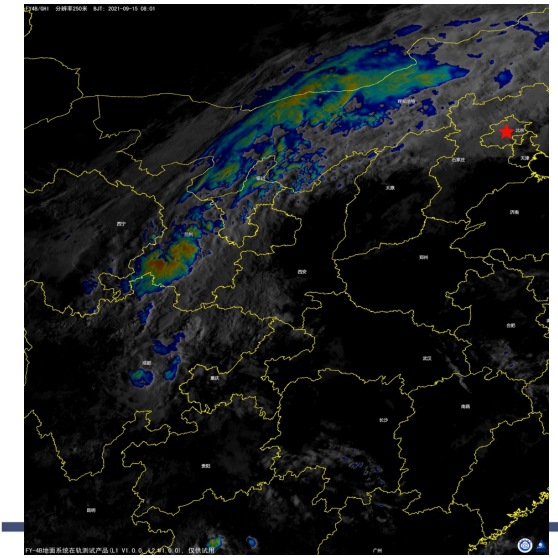


FY-4B status

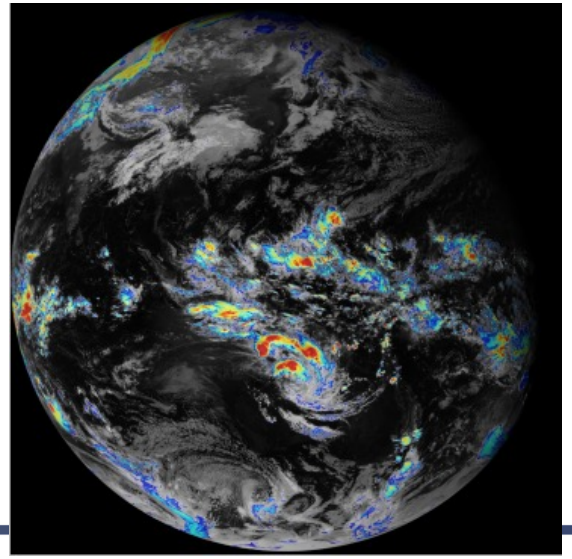


- Launched on Jun. 3rd, 2021. Located at 133ºE now.
- Satellites with 4 instruments onboard have passed the post-launch test.
- Satellite data is available on NSMC website for trial application since June 1, 2022.
- 52 baseline products(L2) have been developed.
- Key Improvement :
  - GHI: High-speed imager, 1miniute interval;
  - GIIRS: Improved calibration;
  - SEP/FGM: Wide-range energetic and multi-direction particles, high-time resolution magnetic field.

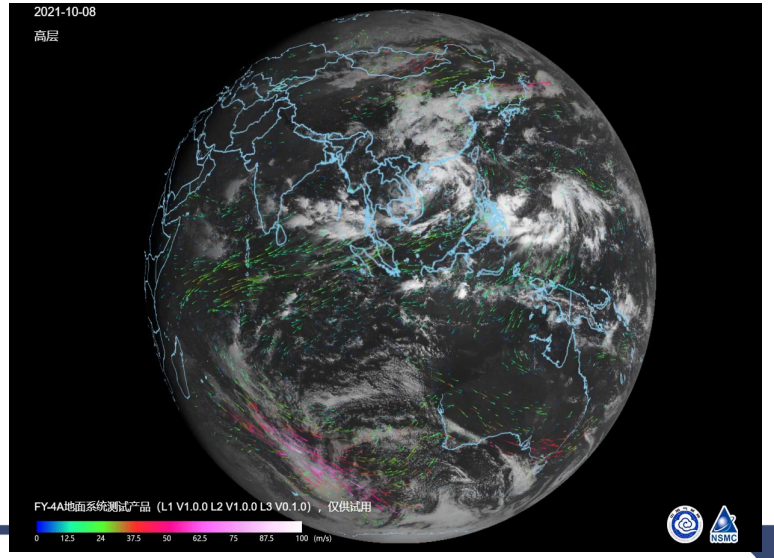
GHI 1 Minute Interval Cloud Animation



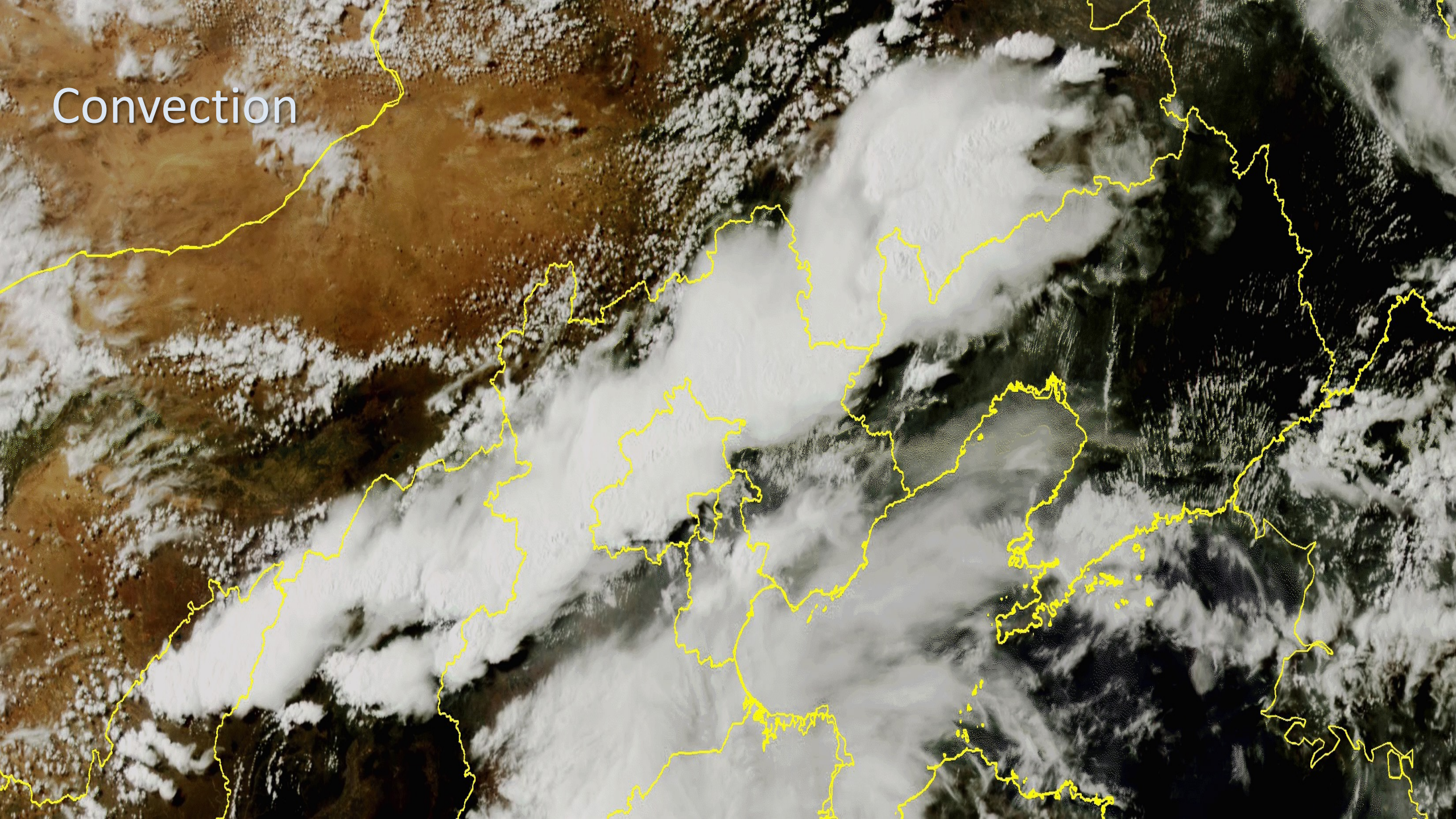
Fusion convection (Sandwich) image

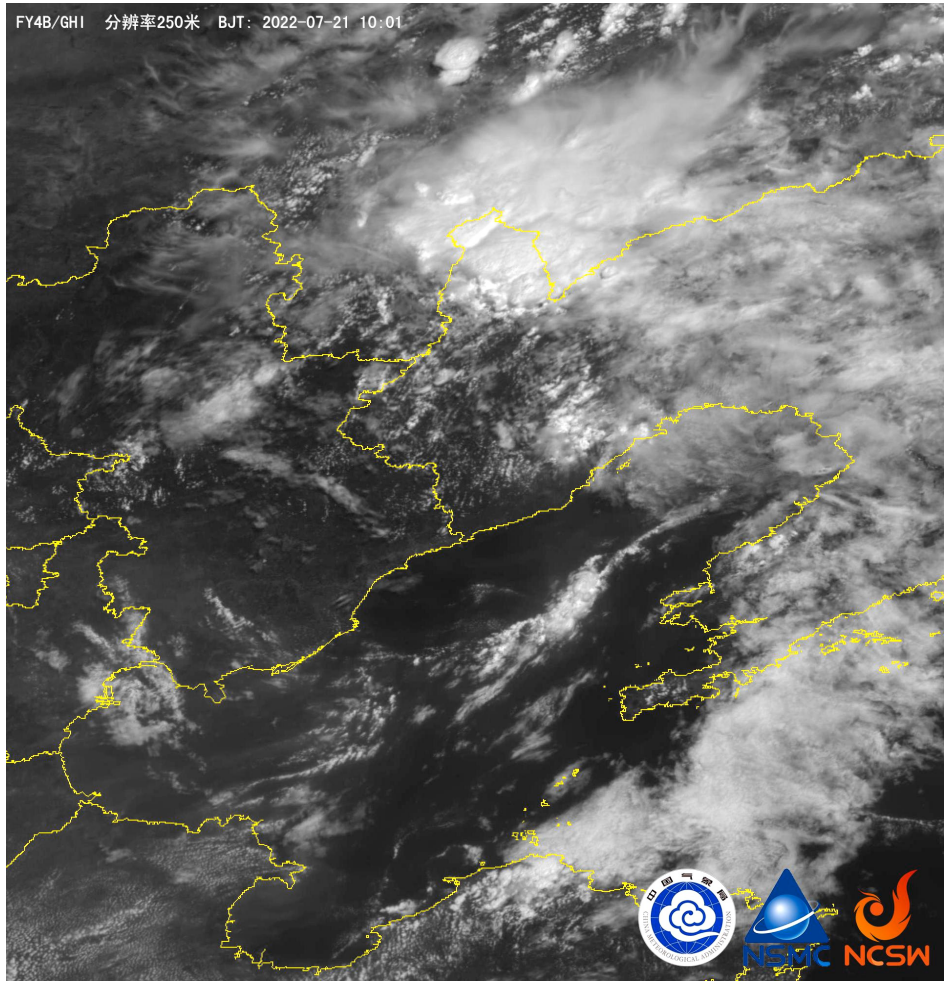


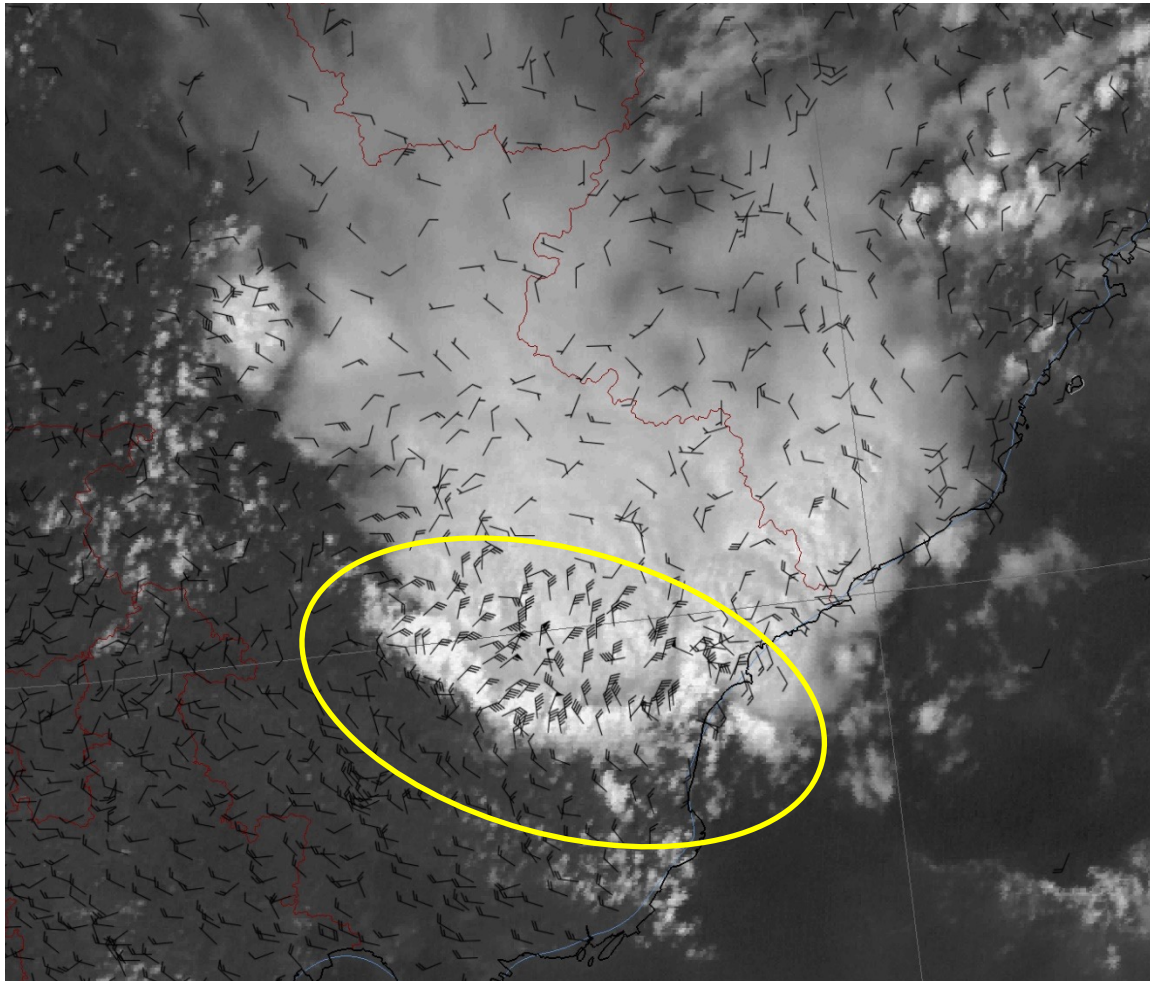
Atmosphere Motion Vectors（High level）

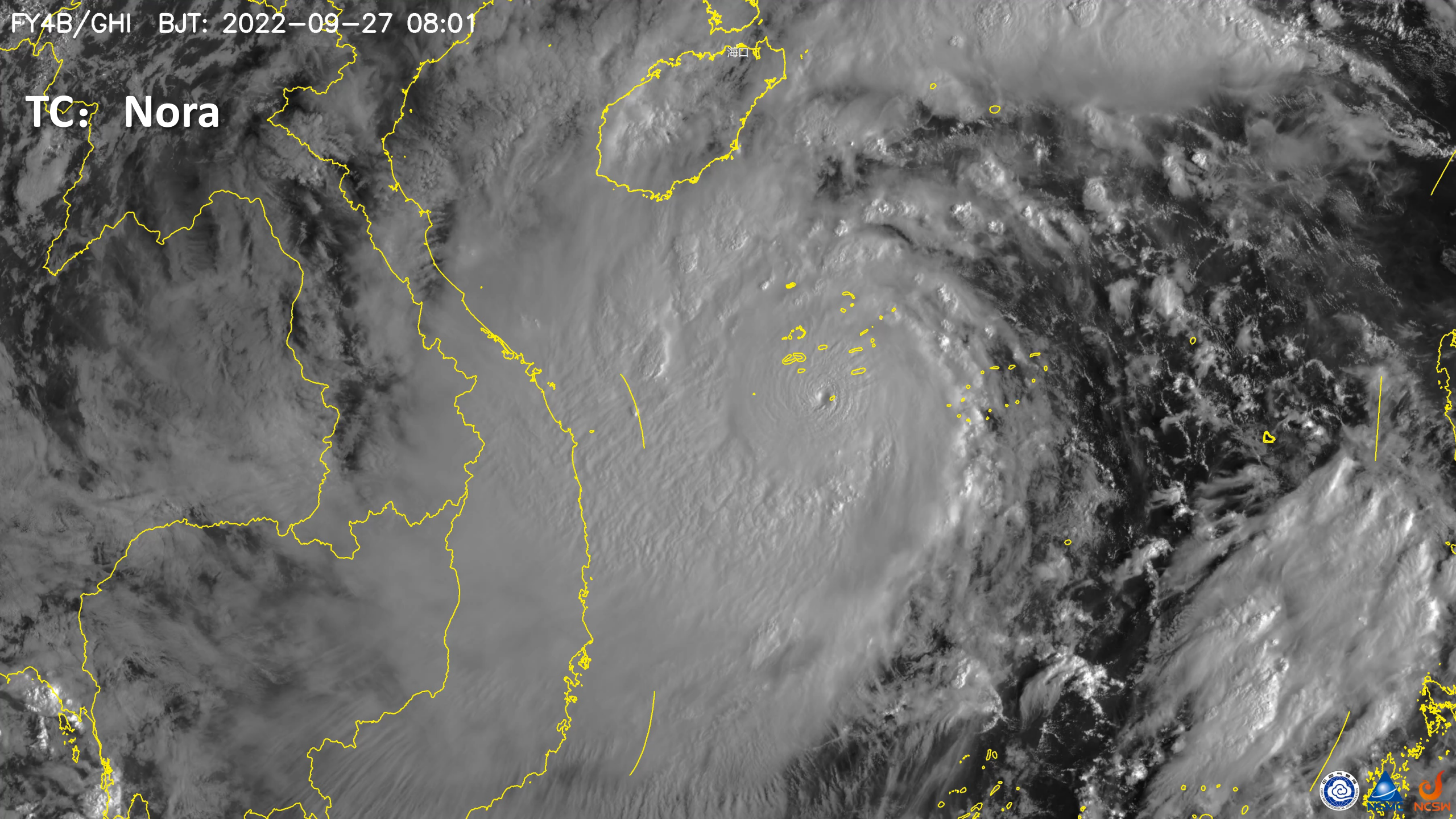


	Instruments
1	Advanced Geostationary Radiation Imager(AGRI)
2	Geostationary Interferometric Infrared Sounder(GIIRS)
3	Geostationary High Speed Imager(GHI)
4	Space Environment Package(SEP)


Convection

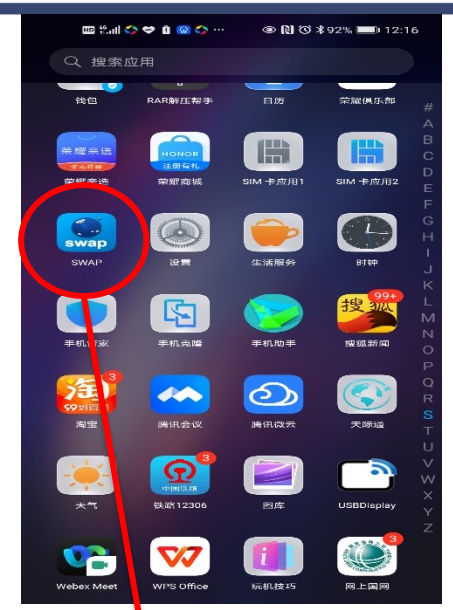

FY4B/GHI 分辨率250米 BJT: 2022-07-21 10:01
NSMC
NCSW

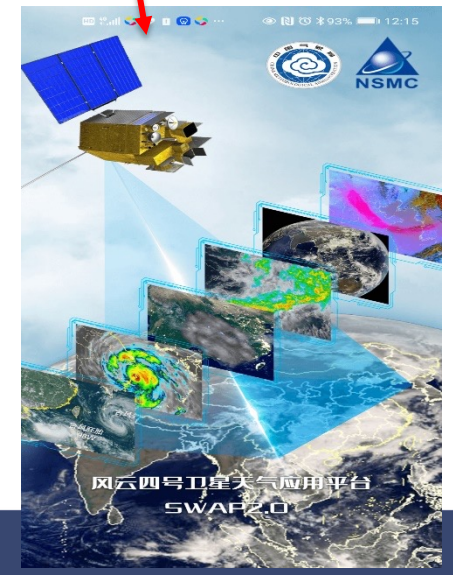



FY4B/GHI BJT: 2022-09-27 08:01
TC: Nora
海口

Progress in satellite application

At the same time, in order to facilitate users to obtain and use satellite data, CMA also developed many application systems or mobile phone applets, some of which are available in multiple languages for international users.



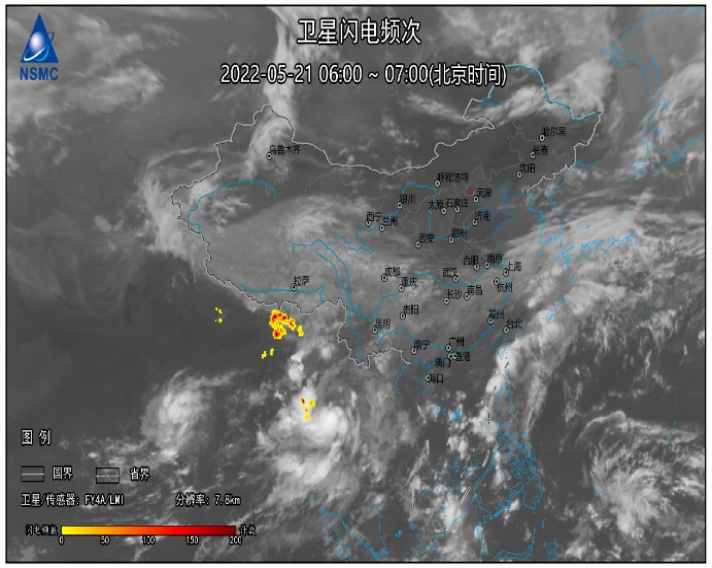


FengYun Earth

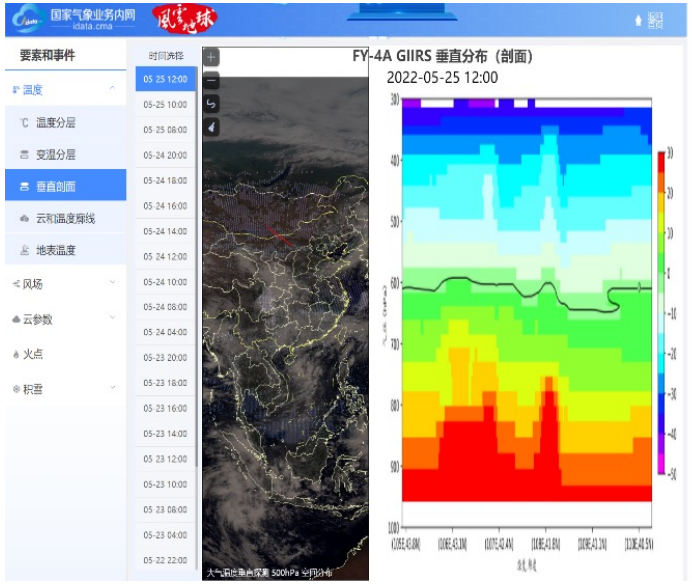
- FengYun Earth is a satellite weather application platform designed for weather forecasters in CMA;
- Developed in Q1 2022, now starting the trial application in National, Provincial, City-level, and County-level Meteorological Services of CMA.

FengYun Earth

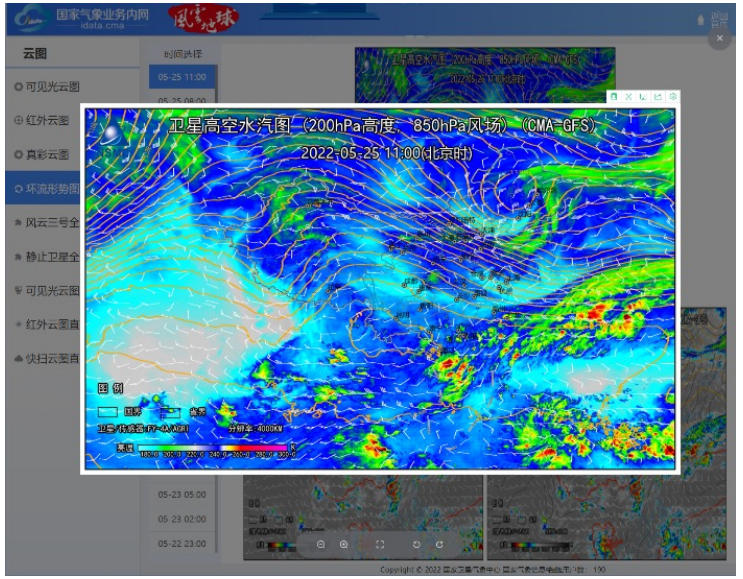
Lighting frequency



FY-4A GIIRS temperature profile



High-altitude water vapor map



Progress in data reprocessing

Retrospective Calibration of Historical Chinese Earth Observation Satellite Data

www.richceos.cn

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Position: Data

Refine By

Type

- Meteorological satellite (13)
- Radiation reference (4)
- Land satellite (5)
- Ocean satellite (6)

Spatial coverage

- GBAL (18)
- DISK (1)
- REGC (1)
- OTHER (8)

Spatial resolution More

- 10M- (1)
- 100M+ (1)
- 10-100M (1)
- 1000M (1)
- 4000M (1)

Time resolution

- ORBT (6)
- POAD (12)
- POAM (8)
- OTHER (2)

Satellite microwave instrument primary climate product data for MWTS

Start Date:2008-11-29 **End Date:**2020-05-09 **Dataset series:**Meteorological satellite **Time resolution:**Orbit

Description: The dataset is created through recalibration based on the FY-3A/B/C/D MWTS L0 data, providing the global atmospheric temperature data from 2008 to 2020. The recalibration process includes the nonlinear modeling, noise characteristic optimization and static parameter modification, and the accuracy of the dataset is less than 1K evaluated by reference instrument comparison.

View details

Fundamental Climate Data Record of meteorological satellite passive microwave instrument-Microwave Radiation Imager (MWRI)

Start Date:2010-11-10 **End Date:**2020-12-30 **Dataset series:**Meteorological satellite **Time resolution:**Orbit

Description: The dataset are created using the new algorithm that improved based on the operational calibration algorithm of MWRI, and the FY3B/C/D MWRI L0 data. The improvement of algorithm including correction of MWRI back lobe emission, correction of MWRI hot reflector emission, correction of hot load efficiency, correction of correction of nonlinear factor. compared with the operational brightness temperature dataset, recalibration dataset are improved in both accuracy and stability.

View details

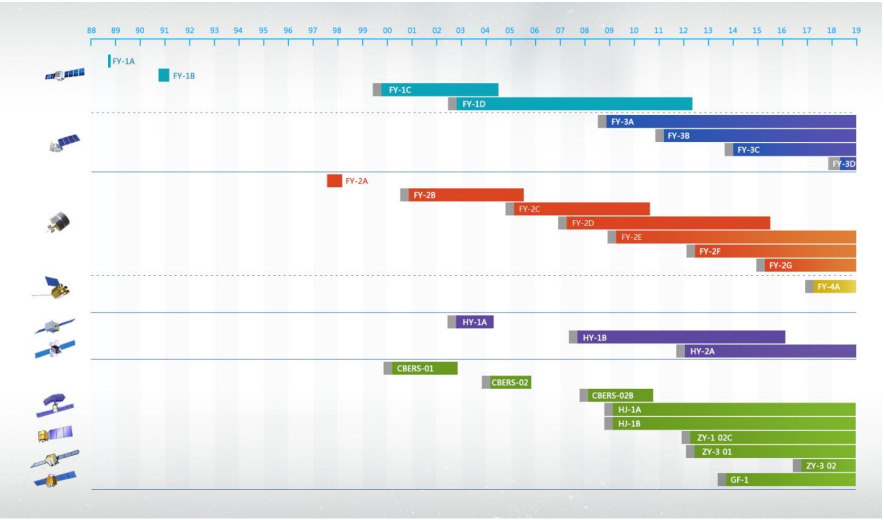
The Fundmental Climatic Data Record(FCDR) of Visible and Infrared Raiometer(VIRR) on Meteorological Satellites (FY-3)

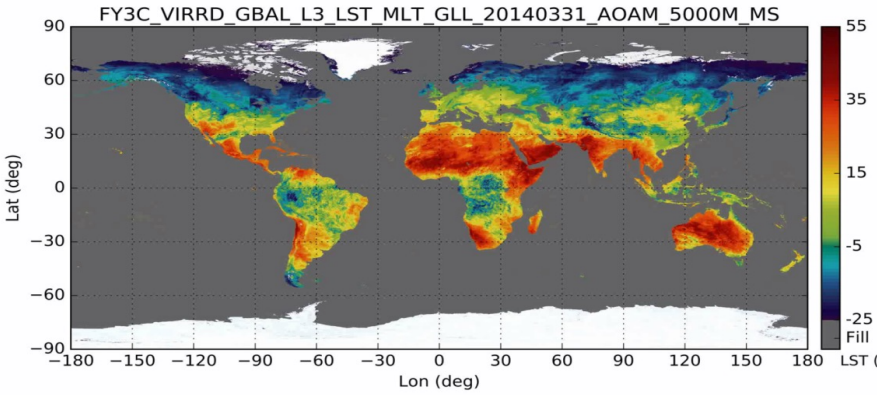
Start Date:2000-01-20 **End Date:**2019-12-30 **Dataset series:**Meteorological satellite **Time resolution:**1 day

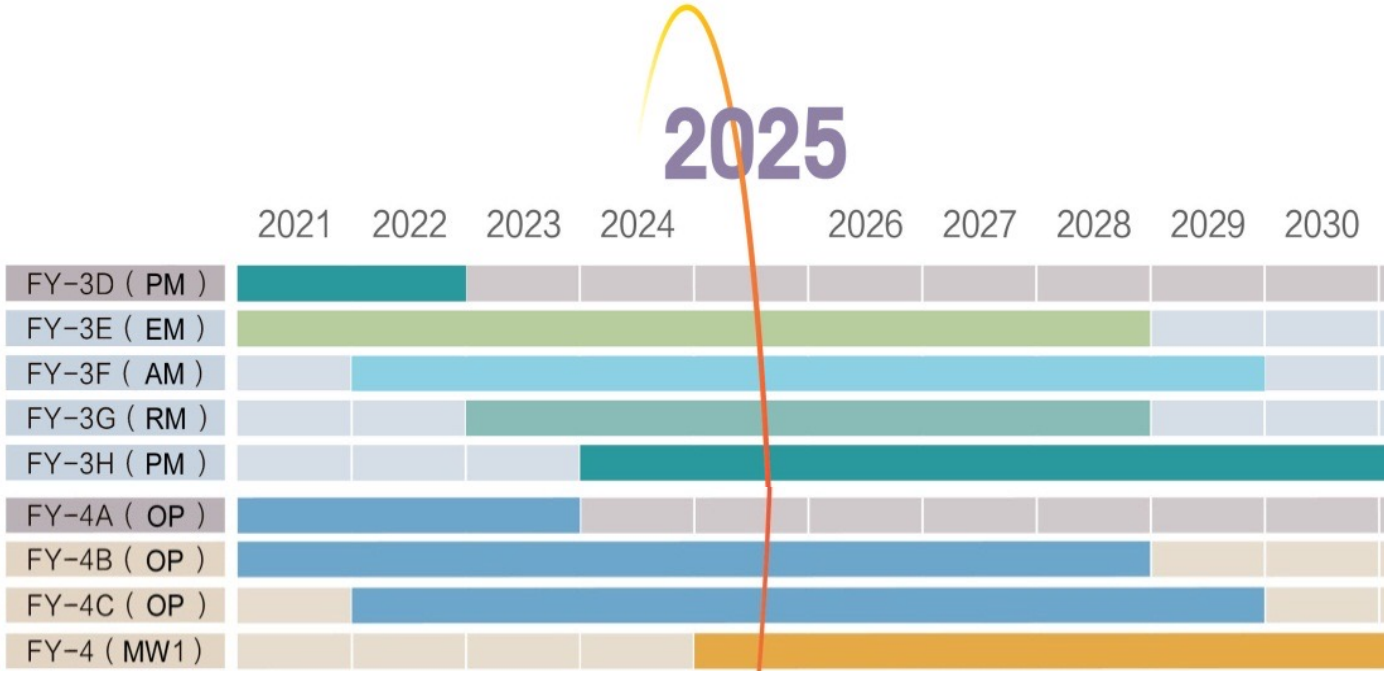
Description: This dataset provides the daily recalibration parameters for FY-1C/D and FY-3A/B/C VIRR long-term records for reflective solar bands. Using the calibration coefficients, the recalibrated reflectance could be calculated from the digital number of earth view observations in the operational L1 product, and the recalibrated data records shows improved accuracy and stability.

View details

- 26 CDRs, including meteorological, ocean, land satellites.
- Over 30 years.







- 2 FY-3 polar-orbiting satellites to be launched, which will be arranged by the layout of three solar synchronous polar-orbiting satellites in early-morning, mid-morning and afternoon, and one precipitation measurement satellite in inclination orbit by 2025.
- 1 FY-4 GEO optical satellites to be launched.
- 1 FY-4 GEO microwave satellite to be launched.

Thanks for your attention

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