



WIS 2.0 Training Workshop (China)

SWAP application of integrated CMACast System

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FengYun Series Satellites: Wide Coverage High Precision Full Quantification

» 极轨序列：上午、下午、晨昏、倾斜四类不同时段轨道

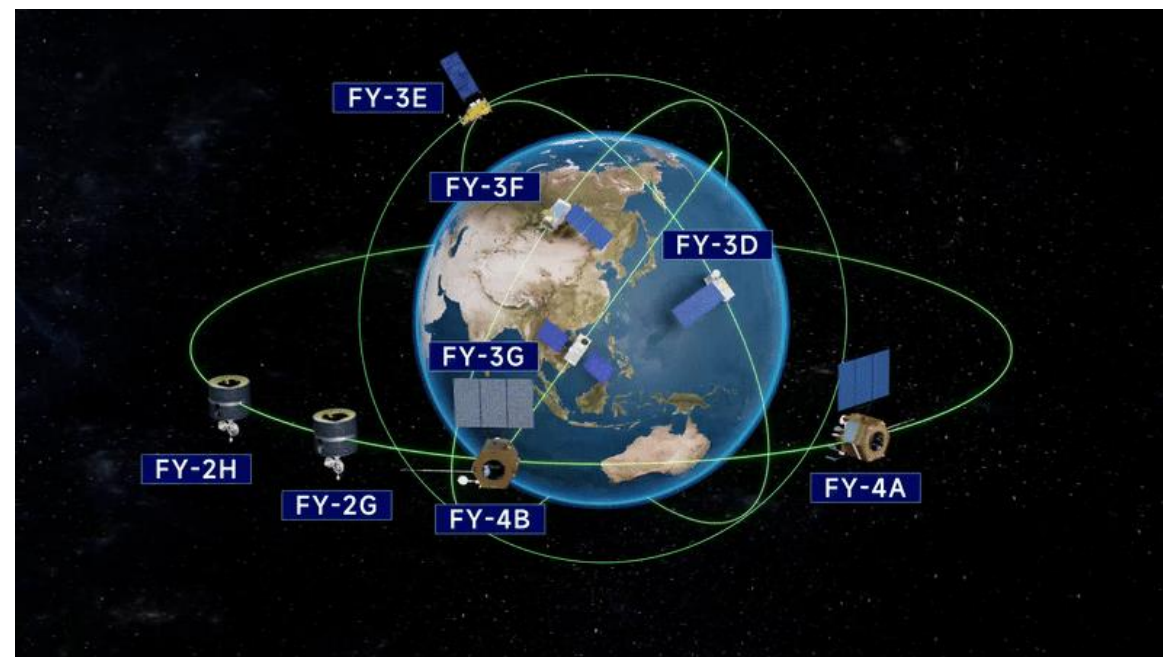
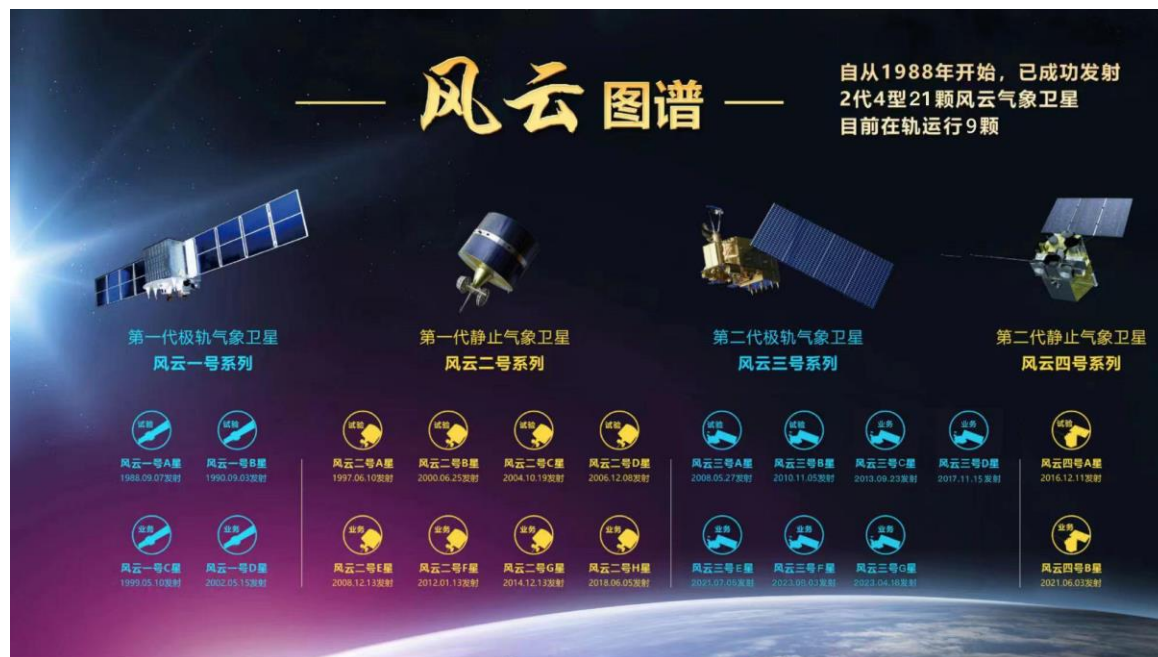
Polar orbit satellite series: four different orbits: early morning, morning, afternoon, and inclination orbit

» 静止序列：在轨备份、适时加密、东西布局

Geostationary satellite series : in orbit backup, timely intensified observation, east-west layout

» 已发射2代4型21颗，在轨运行8颗，实现覆盖全球、高精度、全定量的系列化、业务化自主发展

21 satellites, two generations and four types. Currently, there are 8 FengYun satellites in orbit, achieving global coverage, high precision, and full quantitative serialization and operational oriented independent development

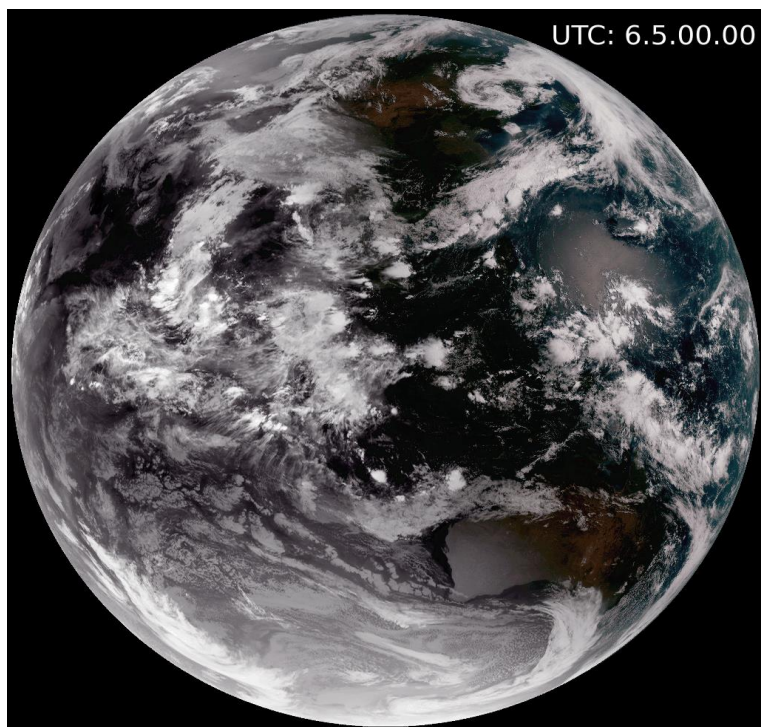


Polar Orbit and Geostationary Series Complement Each Other

静止气象卫星观测特点（哨兵）

1. 轨道高度约**35800公里**，可每**15分钟**获取一张地球**全圆盘图**
2. 可进行区域快速观测，**最高分辨率1分钟、250米分辨率**

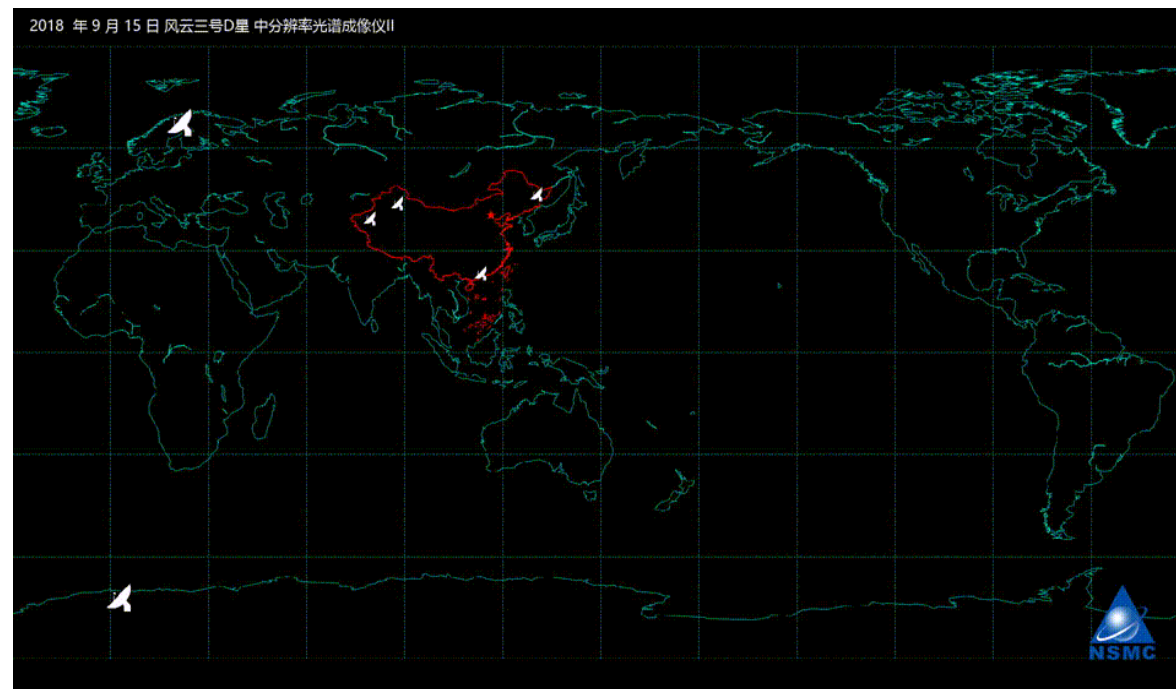
1. Orbit altitude is about 35800 km, and a full disk map can be obtained every 15 minutes
2. Rapid regional scan with 250 meters resolution at 1 minute interval



极轨气象卫星观测特点（巡逻兵）

1. 在约**800公里**轨道高度绕地球南北极飞行，**每12小时**无缝隙覆盖**全球**
2. 搭载多种遥感仪器，获取大气和地球环境综合探测信息

1. Fly around the Earth's North and South Poles at the orbital altitude of approximately 800 km, covering the globe seamlessly one time every 12 hours.
2. Equipped with multiple remote sensing instruments to obtain comprehensive information of the atmosphere and environment.



Outline



Platforms

- **SWAP stand-alone version**
- **SWAP web version**

Application

- **FengYun EARTH**
- **FY_ESM**
- **Data Sharing**
- **User Conference**

Platforms: SWAP

Cloud Platform for Geostationary Satellites

Main User: **Meteorologist**

Typical Applications: **Tropical Cyclone, Convection, Fire, etc.**

SWAP (FengYun Satellite Weather Application Platform) is **implemented with BS** (Browser Service) architecture and accessed through web browser.

SWAP has the ability of **rendering single/multiple channel composites**, and **overlying L2 products**.



Satellite Weather Application Platform - SWAP



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

Platforms: SWAP (stand-alone version)

Data Access

- ◆ Provincial CMACast default folder structure support
- ◆ Provincial direct receiving station HRIT format support
- ◆ Custom data access with configuration file
- ◆ System file selector and manual file selection support

Comprehensive FY4 and FY2 satellite data display

- ◆ Nominal geostationary satellite coordinate system support
- ◆ Single-frame cloud atlas and multi-frame animation support
- ◆ Flexible channel toggle and layer management
- ◆ Single channel pseudo-color enhancement with specific color map
- ◆ L2 data overlay display
- ◆ Cloud atlas animation file export
- ◆ FY-4A true color composite

Thematic application

Strong convective system interactive analysis

- ◆ Default and manual ROI selection
- ◆ Interactive parameter configuration, real time analysis result display

Cyclone positioning and intensity estimation

- ◆ Pixel level positioning and inverse positioning based on cloud atlas
- ◆ Interactive point selection and spiral fitting
- ◆ Spiral parameter adjustment

Platforms: SWAP

Interface layout

File Satellite Image Product Data Weather Application Tool View Settings

Menu Bar

toolbar

Animation control bar

Shortcut toolbar

Main view area

UTC:2018/09/27 06:15:00
Channel 12:Long Wave Infrared(10.8μm)

Interactive panel

Interactive panel switching

Animations Channel Layers

Animations

Data Settings

Satellite type: FY4A

Data Type: FY4A China Region

Data Path: R:\FY4A\AGRI\L1\FDI\REGC

Animation Content :

Last Session (Hours): 6

Arbitrary Session (UTC)

2018/9/27 days 8 Hour 14

to

2018/9/27 days 14 Hour 14

Custom session 51/51

2018/09/27 00:15:00

2018/09/27 00:30:00

2018/09/27 00:34:17

2018/09/27 00:38:34

2018/09/27 00:45:00

2018/09/27 00:49:17

2018/09/27 00:53:34

2018/09/27 01:00:00

2018/09/27 01:15:00

2018/09/27 01:19:17

2018/09/27 01:23:34

2018/09/27 01:30:00

2018/09/27 01:34:17

2018/09/27 01:38:34

2018/09/27 01:45:00

2018/09/27 01:49:17

2018/09/27 01:53:34

2018/09/27 02:00:00

2018/09/27 02:15:00

Animation Options

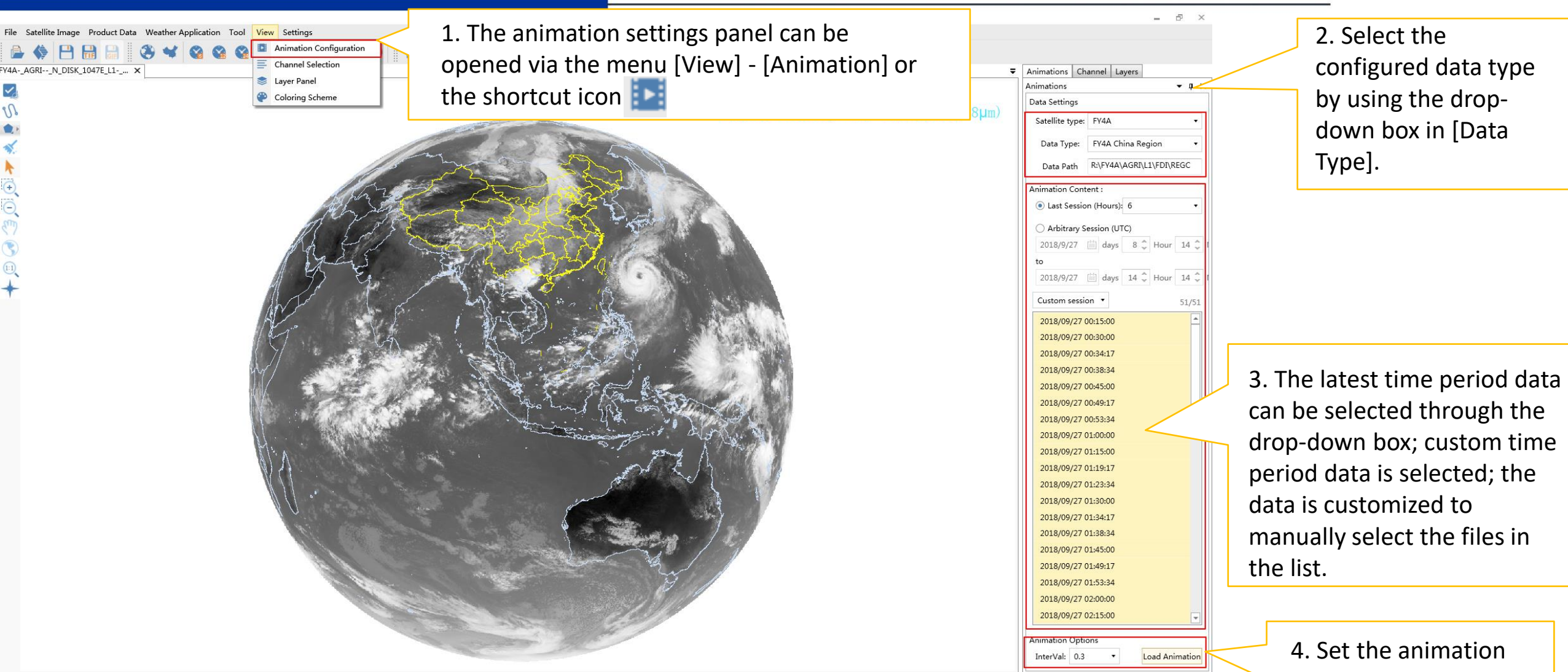
InterVal: 0.3

Load Animation

A large satellite image of Earth from the FY-4 Satellite Weather Application Platform. The image shows a view of the Pacific Ocean and East Asia. A yellow outline highlights the geographical region of China. The interface includes a menu bar at the top with options like File, Satellite Image, Product Data, Weather Application, Tool, View, and Settings. Below the menu bar is a toolbar with various icons for file operations and viewing. To the left of the main view area is a 'Shortcut toolbar' with additional navigation icons. To the right of the main view area is an 'Interactive panel' displaying the current time (UTC:2018/09/27 06:15:00) and the selected channel (Channel 12:Long Wave Infrared(10.8μm)).

Platforms: SWAP

View panel introduction: animation settings panel



The screenshot displays the SWAP software interface. On the left, a satellite image of Earth is shown with a yellow outline of China. The top menu bar includes 'File', 'Satellite Image', 'Product Data', 'Weather Application', 'Tool', 'View', and 'Settings'. The 'View' menu is open, showing 'Animation Configuration', 'Channel Selection', 'Layer Panel', and 'Coloring Scheme'. The 'Animation Configuration' panel is highlighted with a red box. The 'Data Settings' section includes 'Satellite type: FY4A', 'Data Type: FY4A China Region', and 'Data Path: R:\FY4A\AGRI\L1\FDI\REGC'. The 'Animation Content' section shows 'Last Session (Hours): 6' selected, with a list of time periods from 2018/09/27 00:15:00 to 2018/09/27 02:15:00. The 'Animation Options' section shows 'InterVal: 0.3' and a 'Load Animation' button.

1. The animation settings panel can be opened via the menu [View] - [Animation] or the shortcut icon .

2. Select the configured data type by using the drop-down box in [Data Type].

3. The latest time period data can be selected through the drop-down box; custom time period data is selected; the data is customized to manually select the files in the list.

4. Set the animation interval and click the button [Animation Load] to create the animation.

1. The channel panel can be opened via the menu [View - Channel Selection] or the shortcut icon.

2. Support true color cloud overlay display

3. The results of single channel or color synthesis can be displayed by [Grayscale] or [Synthesis].

The screenshot displays the FY-4 Satellite Weather Application Platform 1.0 interface. The main window shows a satellite image of Earth with a yellow outline of China. The top menu bar includes File, Satellite Image, Product Data, Weather Application, Tool, View, and Settings. The View menu is open, showing options: Animation Configuration, Channel Selection, Layer Panel (highlighted with a red box), and Coloring Scheme. A callout box points to the Layer Panel option. The right side of the interface features a panel with tabs for Animations, Channel, and Layers. The Layers tab is active, showing a list of layers with checkboxes. The layers are grouped under 'Map' and include: Geographic Information Data (checked), Bohai Anti-Taiwan Cordon (unchecked), Typhoon Detective Line (unchecked), Provincial Boundaries (checked), Nine-Dashed Line (checked), Coastline (checked), Borders of China (checked), National Borders (checked), Grid (checked), Fictitious Graticule (unchecked), Raster Layer (checked), and FY4A-AGRI--N_REGC_1047E_ (checked). A callout box points to the 'Map' group. The bottom of the interface shows a large satellite image of Earth with a yellow outline of China.

1. After loading the data, you can open the Layers panel via the menu [View - Layer Panel] or the shortcut icon . (Data layer panel blank is not loaded)

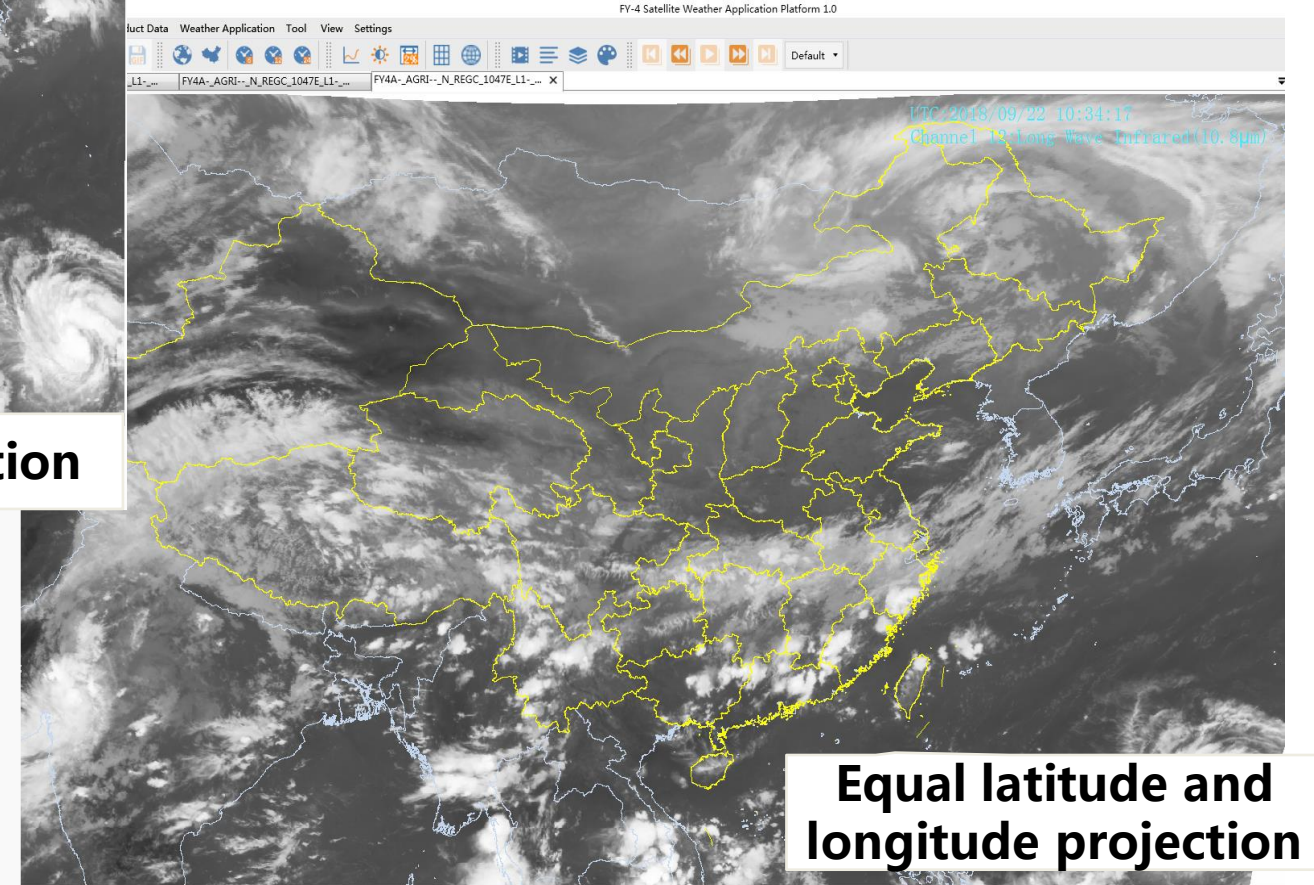
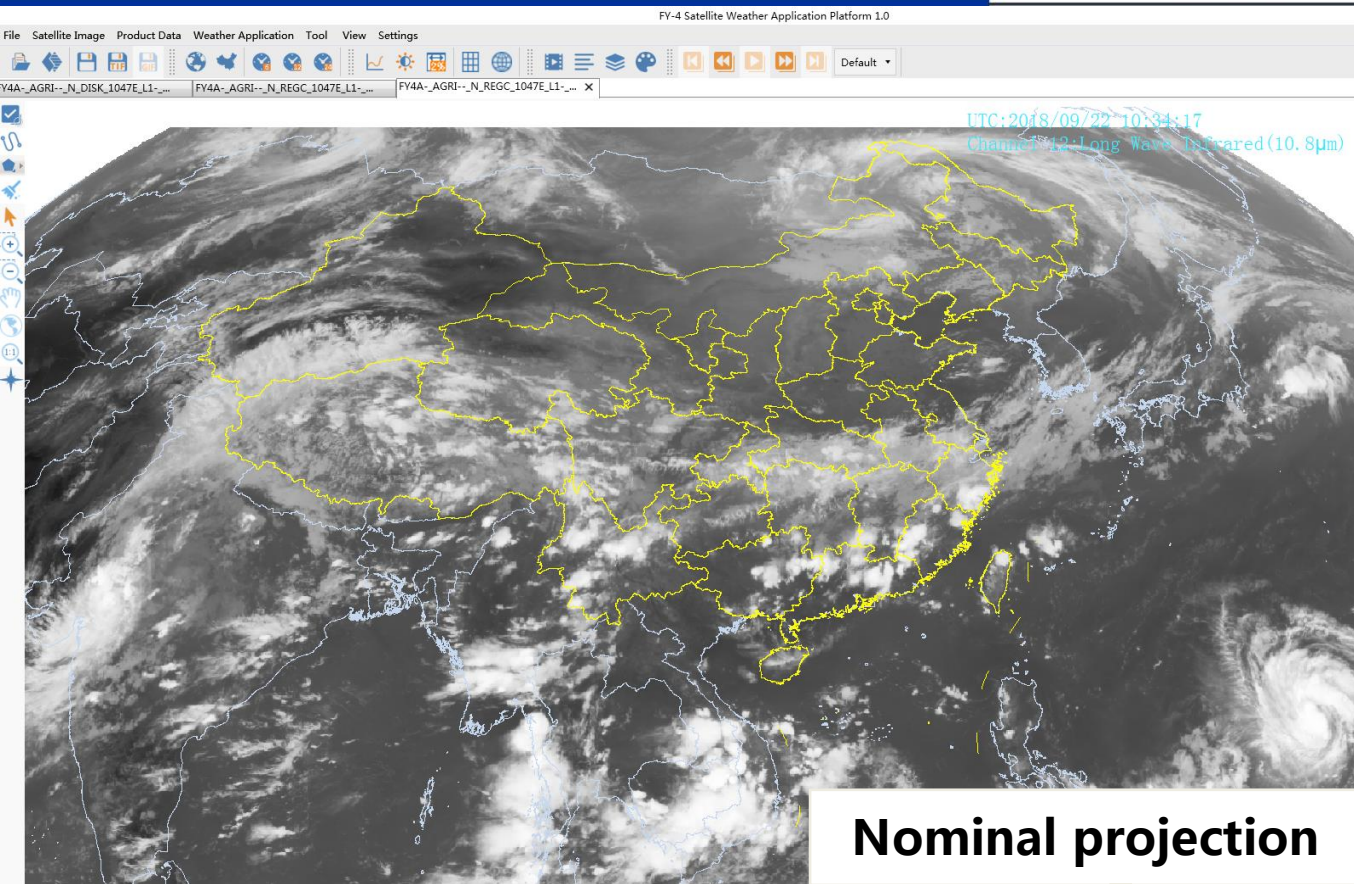
2. The layer panel after loading data contains three parts: geographic information data, grid, and raster layer. The expandable list check layer is displayed in the view window.

1. The display scheme panel can be opened via the menu [View - Display Scheme] or the shortcut icon .

2. Click any display scheme to display it in the view window.

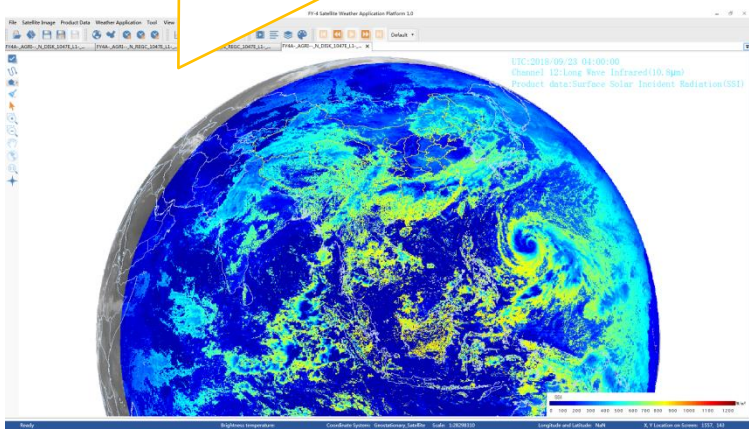
Platforms: SWAP

Dynamic switching of multiple projection modes

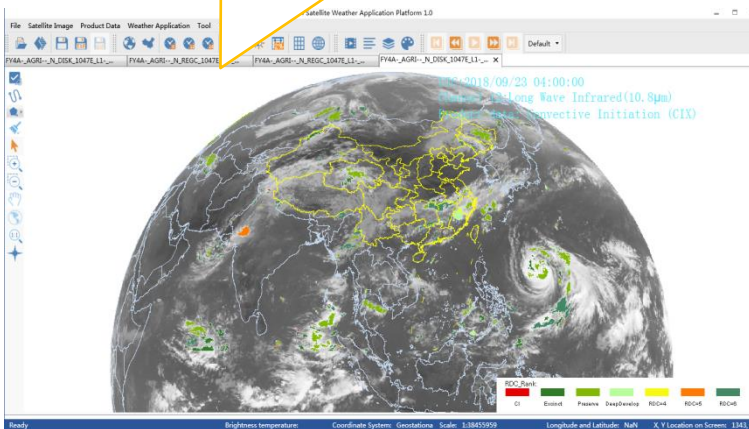


Platforms: SWAP

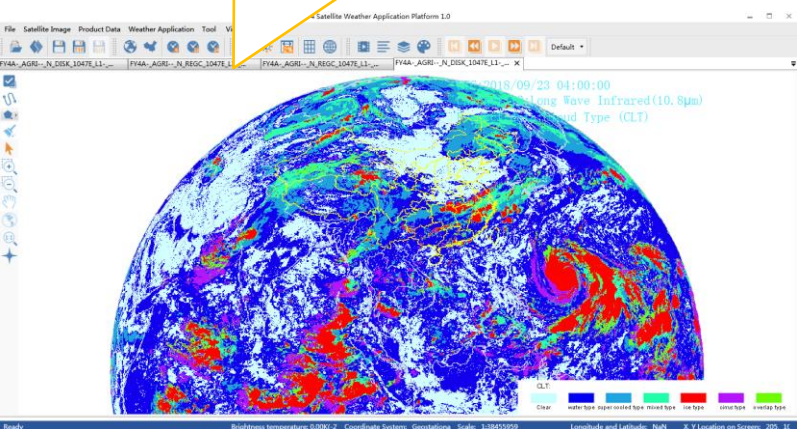
SSI Surface solar incident radiation



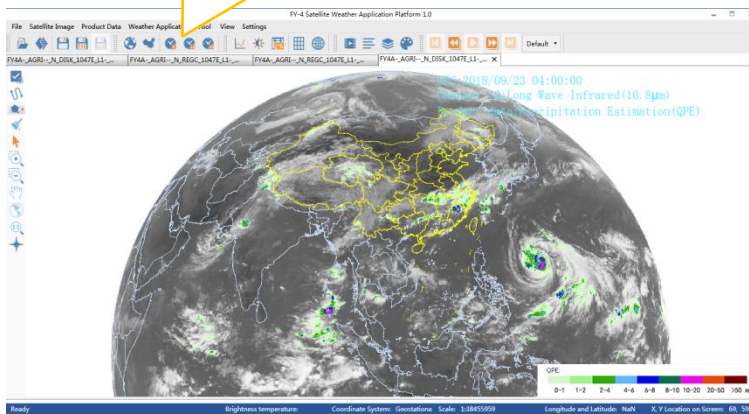
CIX Convection



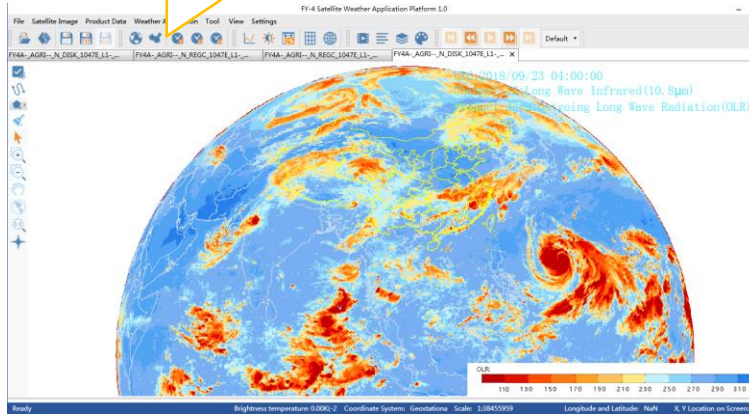
CLT Cloud type



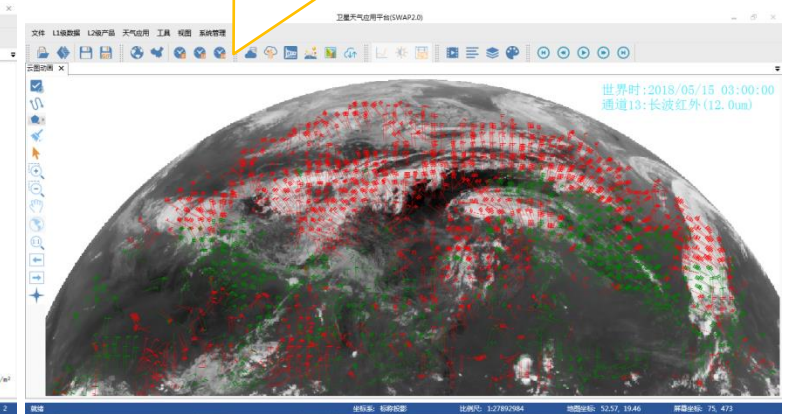
QPE



OLR Long-wave radiation

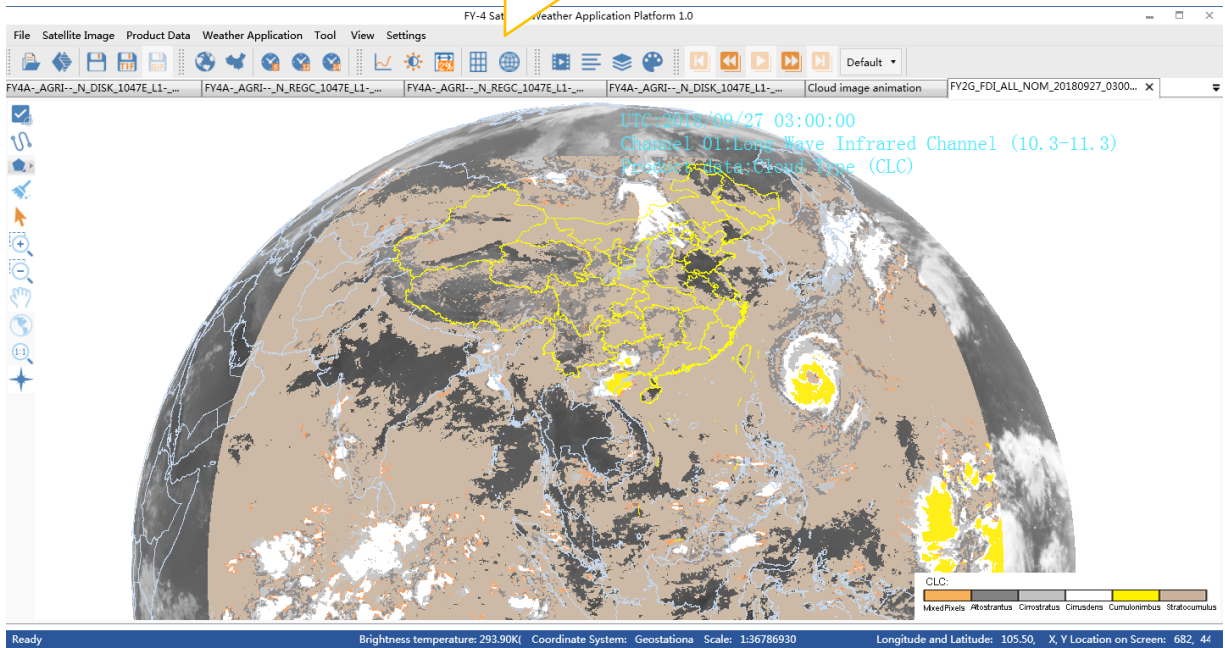


AMV

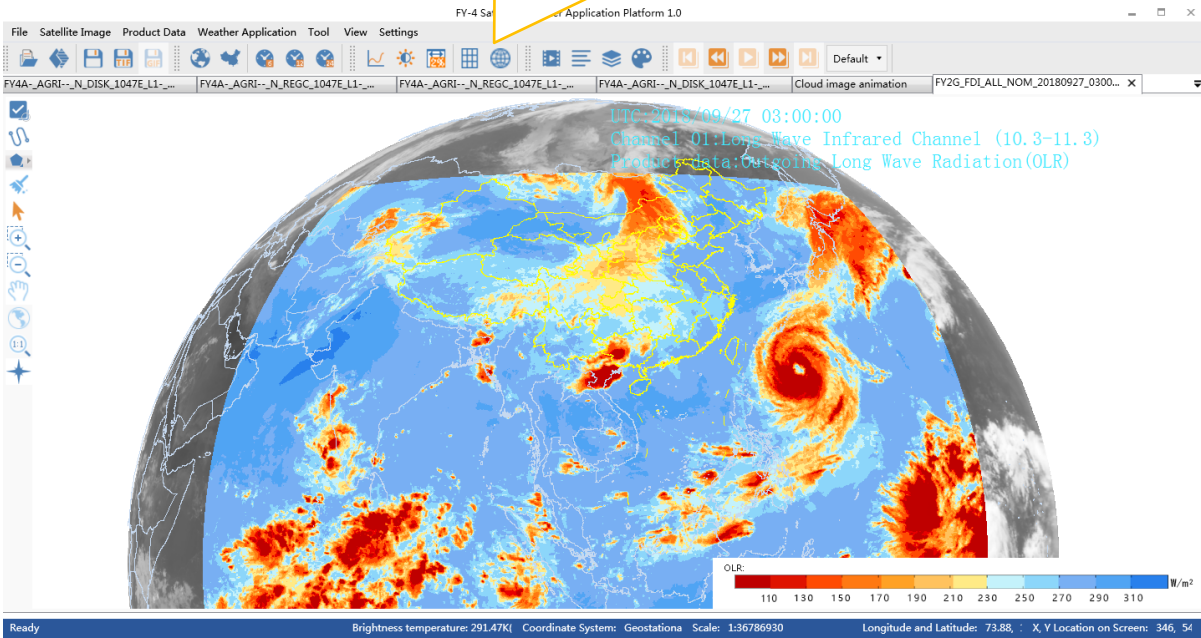


Platforms: SWAP

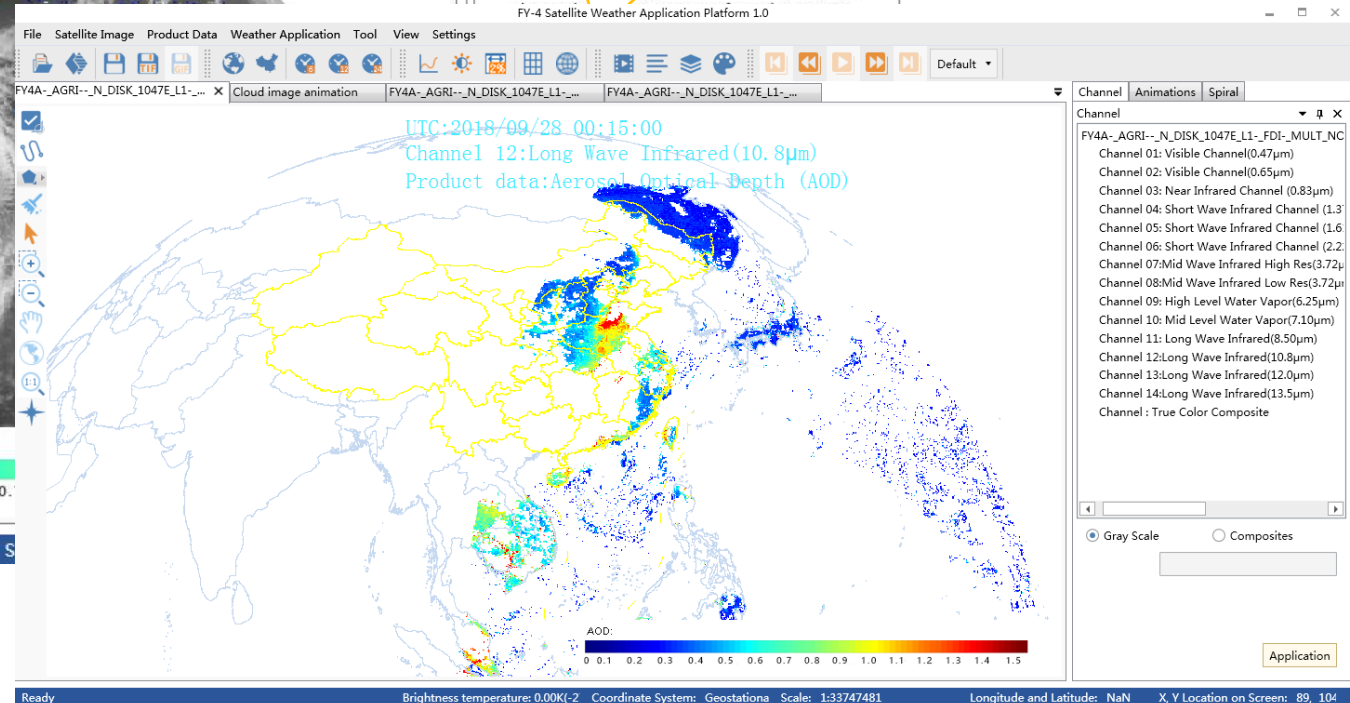
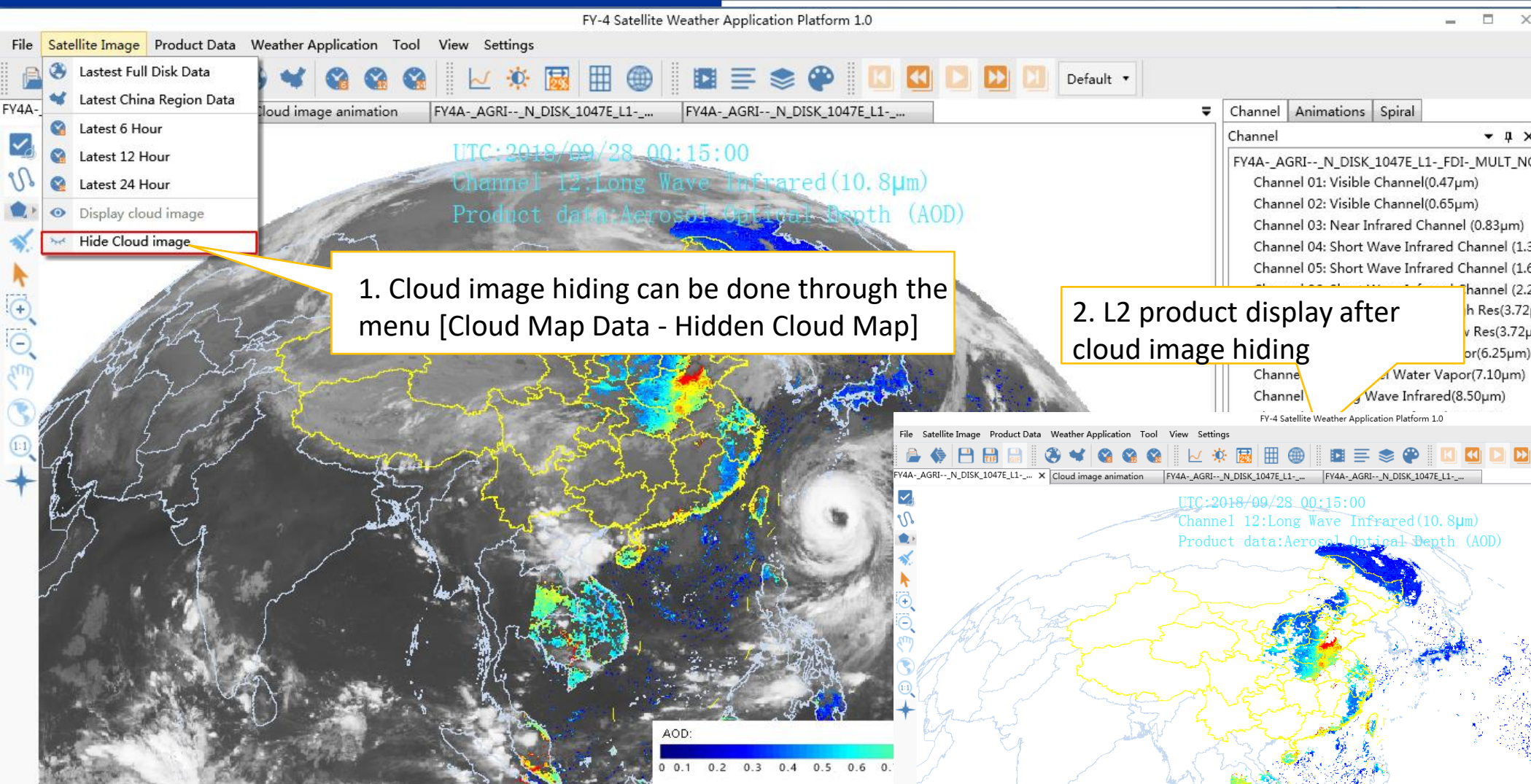
CLC Cloud type



OLR Long-wave radiation



Platforms: SWAP



Output save

Animated GIF format save

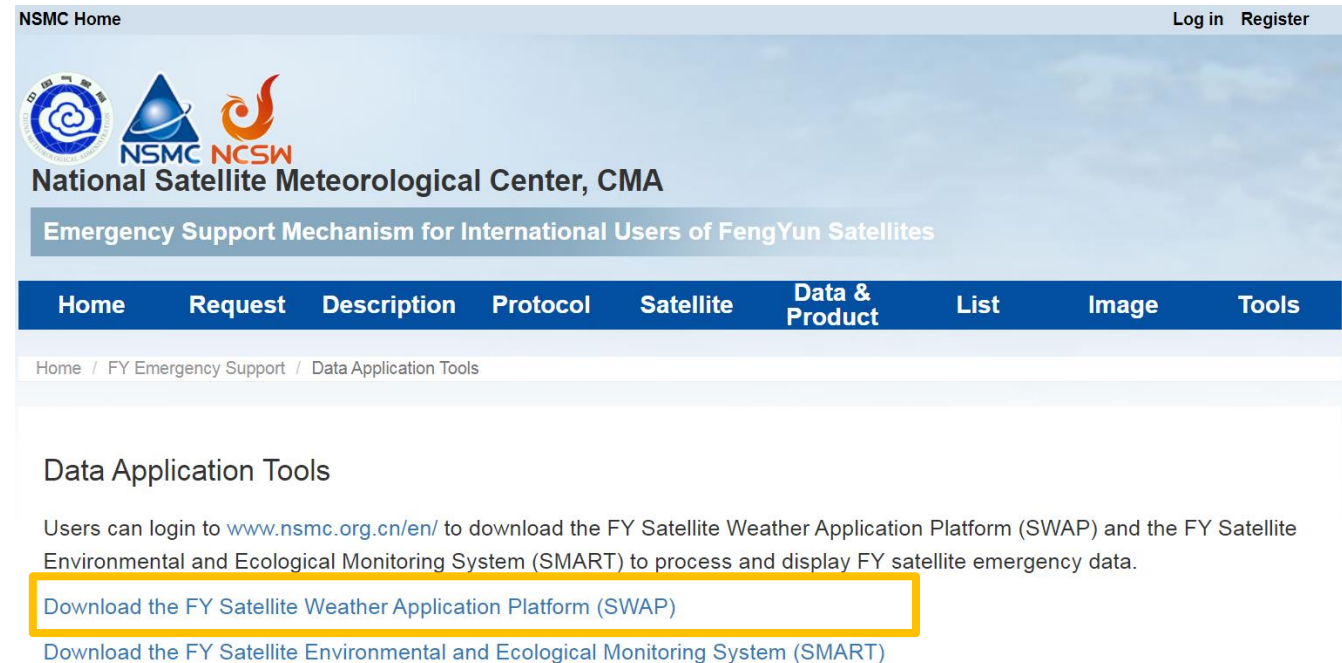
Click the menu bar [File - Save GIF Animation] or click the shortcut icon  to select the file path; Click [Apply] to save the parameter configuration.

Picture save

Click the menu bar [File - Save Picture] or click the shortcut icon  to select the file path; Click [Apply] to save the parameter configuration. (Save as a set of images in an animated scene; save a single image in a non-animated scene.)

Platforms: SWAP

Users can login to www.nsmc.org.cn/en/ to download the FY Satellite Weather Application Platform (SWAP)



SWAP

<http://www.nsmc.org.cn/service/en/emergency/tools.html>

Platforms: SWAP (web version)

Main functions

- Near real-time images of FY-2H and FY-4A
- 30+ GEO satellite products
- Special applications on weather forecasting
- Animation generation and sharing

- English

<http://rsapp.nsmc.org.cn/geofy/en>

http://rsapp.nsmc.org.cn/test_geofy/en

- Russia

<http://rsapp.nsmc.org.cn/geofy/ru>

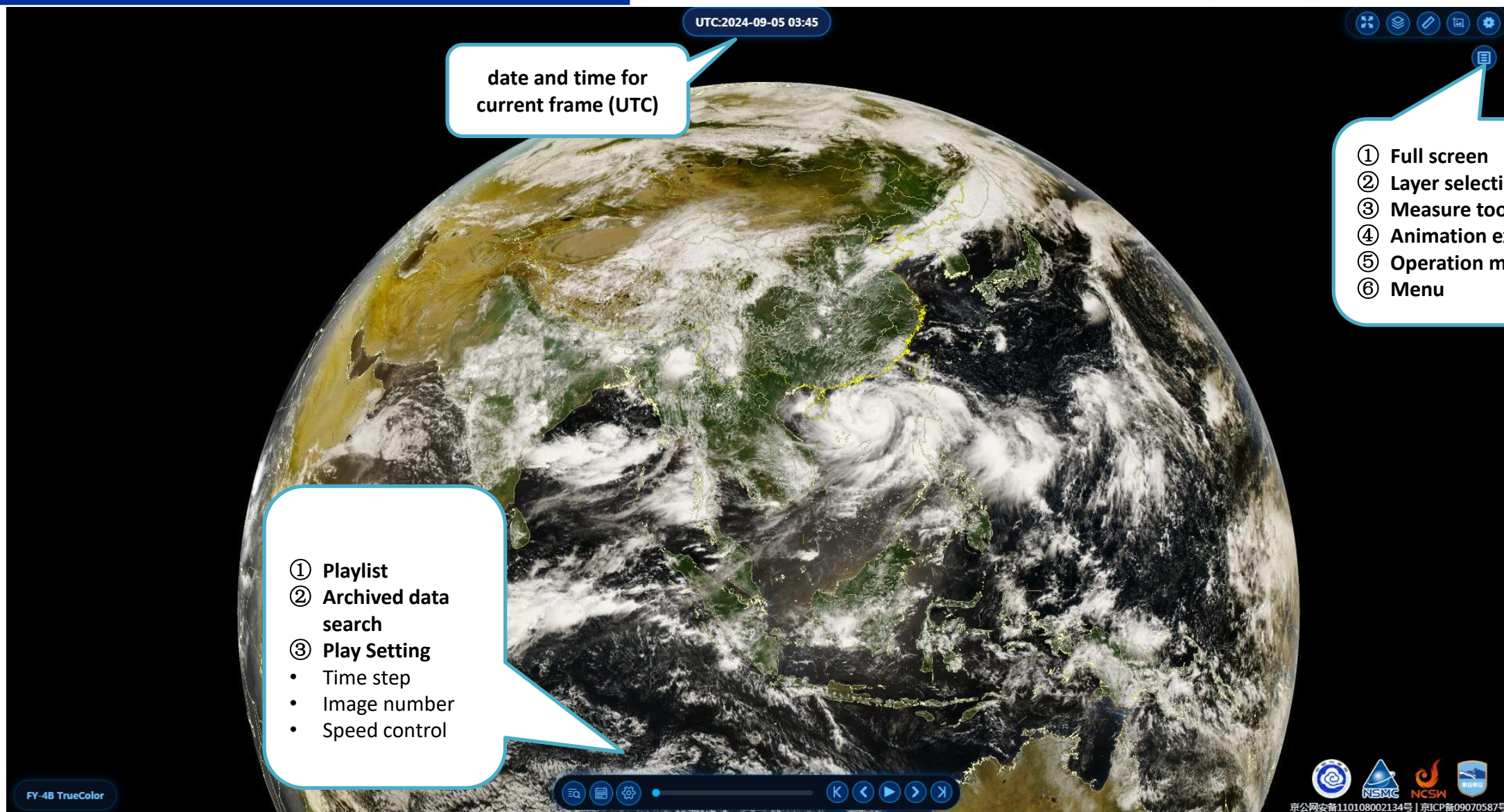
http://rsapp.nsmc.org.cn/test_geofy/ru

Chrome is recommended for best user experience.

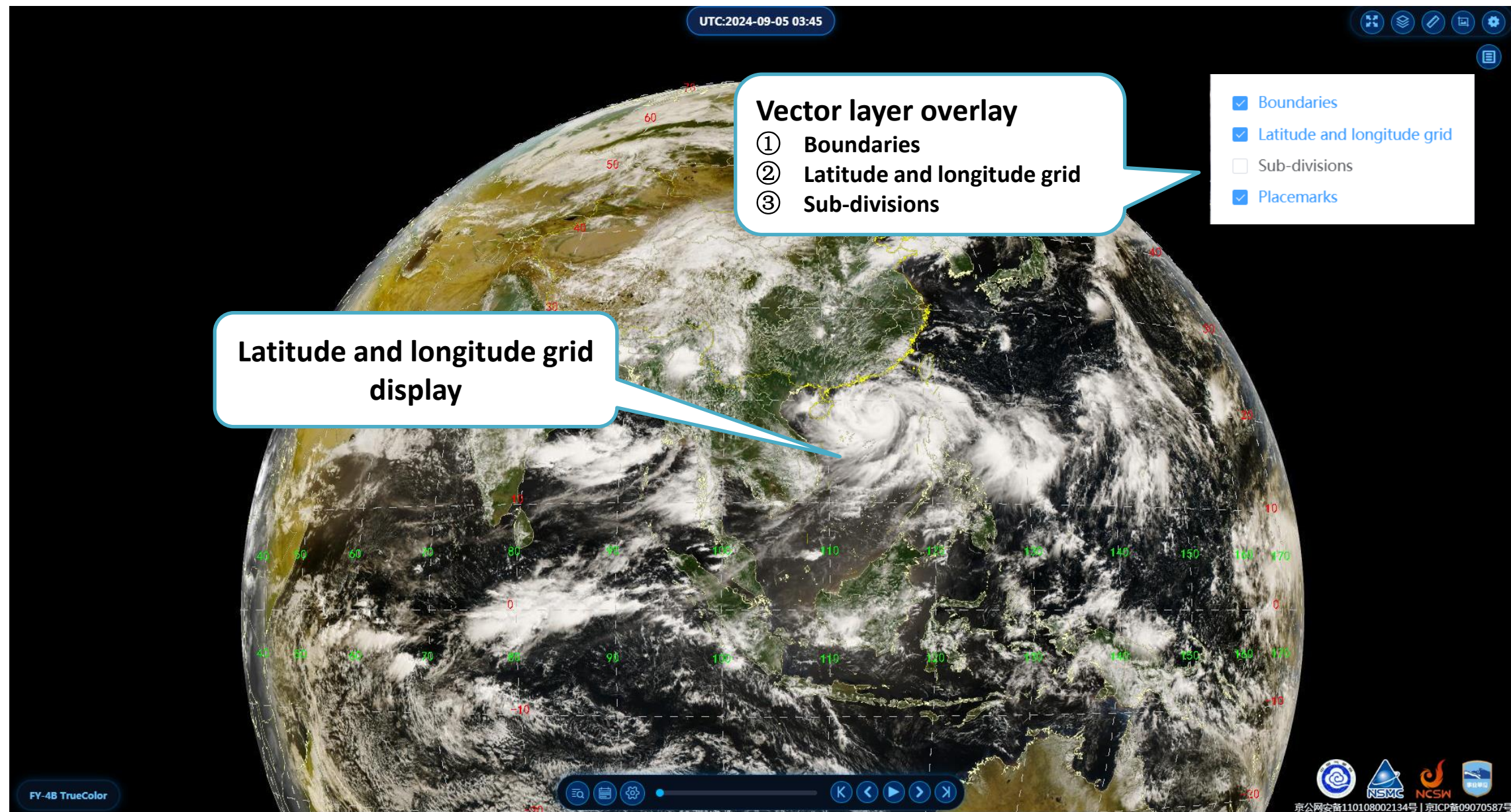
Supported browser:

IE 10+	Edge 18+	Chrome 26+	Safari 8+	Opera 18+
YES	YES	YES	YES	YES

Platforms: SWAP



Platforms: SWAP



Platforms: SWAP

The screenshot displays the SWAP interface with a satellite image of Earth. The interface includes a top navigation bar, a right sidebar for settings, and a bottom control bar. Callouts highlight key features:

- UTC:2024-09-05 04:00**: Date and time for current frame (UTC)
- ① Playlist**
 - ② Archived data search
 - ③ Play Setting
 - Time step
 - Image number
 - Speed control
- ① Satellite selection**
 - ② Projection selection
 - ③ Band selection
 - ④ Scheme selection
 - ⑤ Products selection

The right sidebar shows the 'Satellite Observation' section with the following settings:

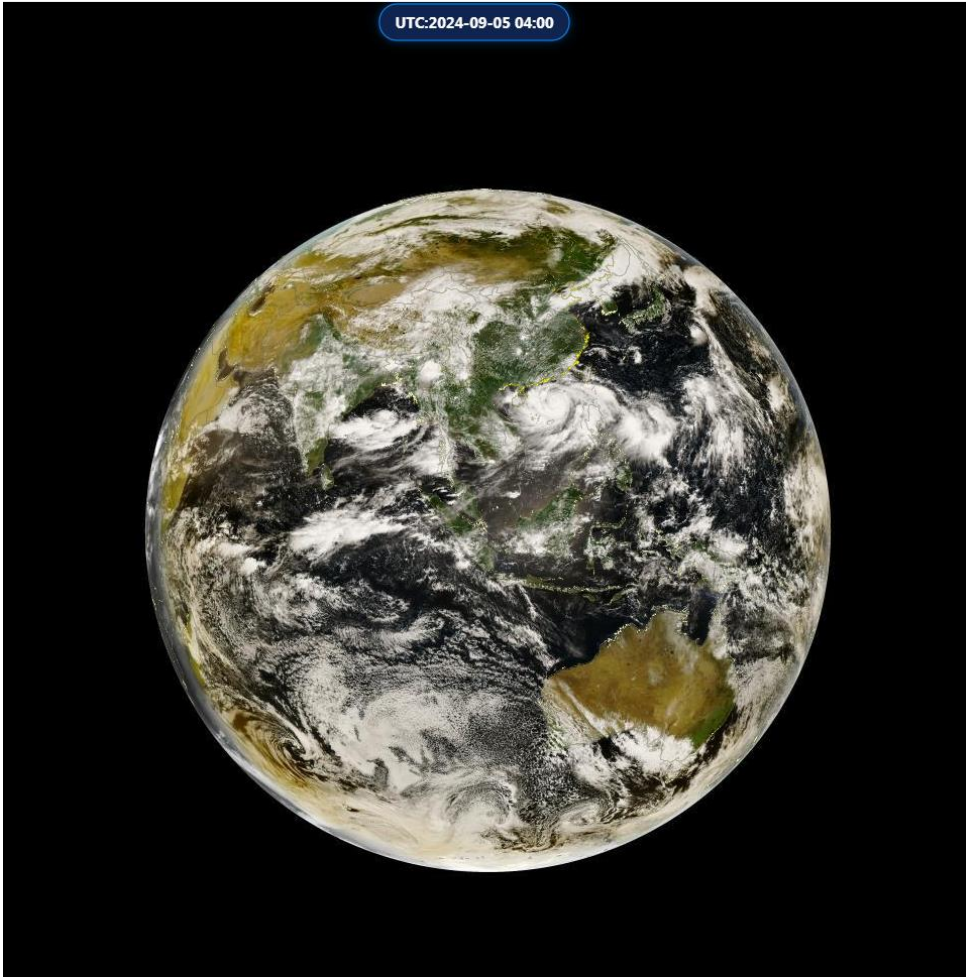
- Satellite: FY-4B
- Projection: Nomin
- Band: AGRI
- Observation Area: Asia Region
- Full disk
- Band, Scheme, Products tabs
- TrueColor selected
- Products list:
 - Natural Color RGB Composite (From WMO)
 - Dust RGB Composite (From WMO)
 - AirMass RGB Composite (From WMO)
 - Fog/Snow RGB Composite (From WMO)
 - Severe Storms RGB Composite (From WMO)
 - CloudsConvection RGB Composite
 - Volcanic Ash RGB Composite (From WMO)
 - Day Convective Storms RGB Composite
 - Day Microphysics RGB Composite (From WMO)
 - Night Microphysics RGB Composite
 - Dust RGB Composite (From CMA)
- GIIRS and LMI icons

The bottom control bar includes a 'FY-4B TrueColor' label, a search icon, a settings icon, a play/pause button, and navigation arrows.

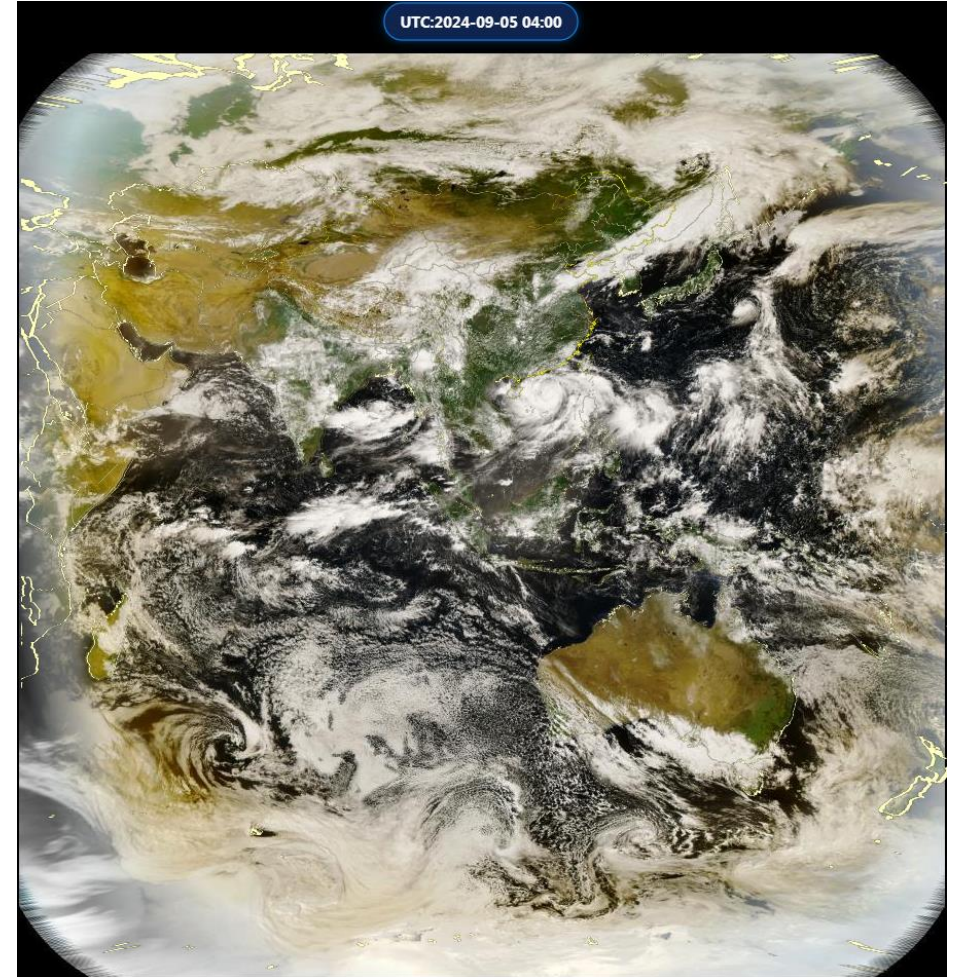
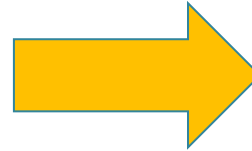
京公网安备110108002134号 | 京ICP备09070587号

Platforms: **SWAP**

Dynamic switching of multiple projection modes

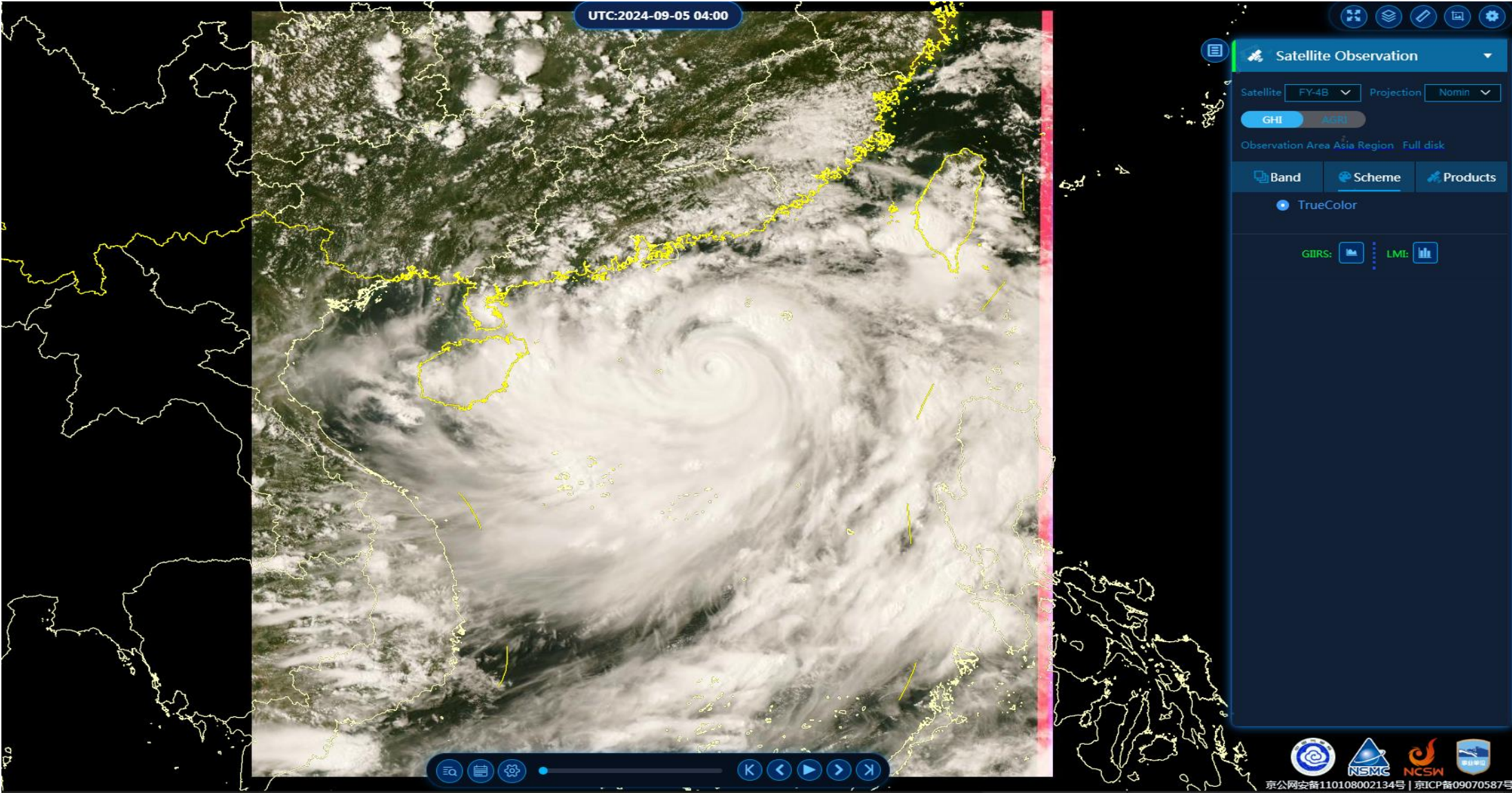


Nominal projection



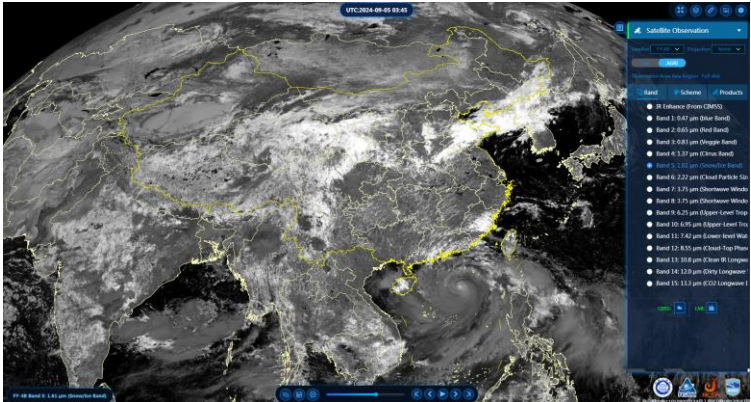
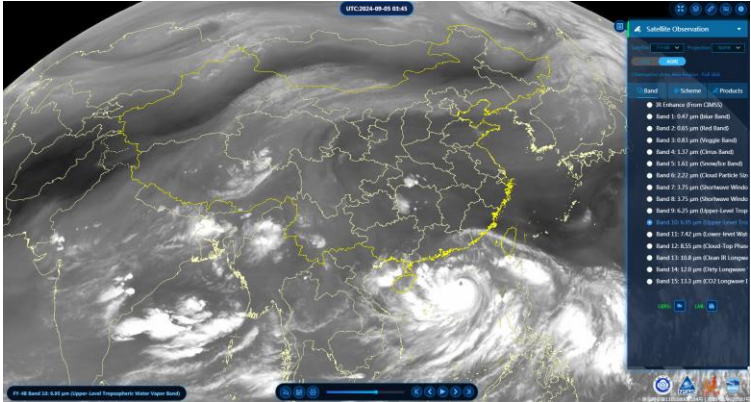
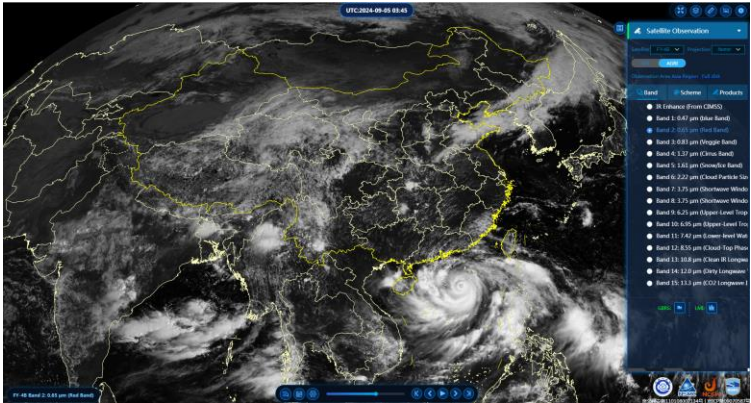
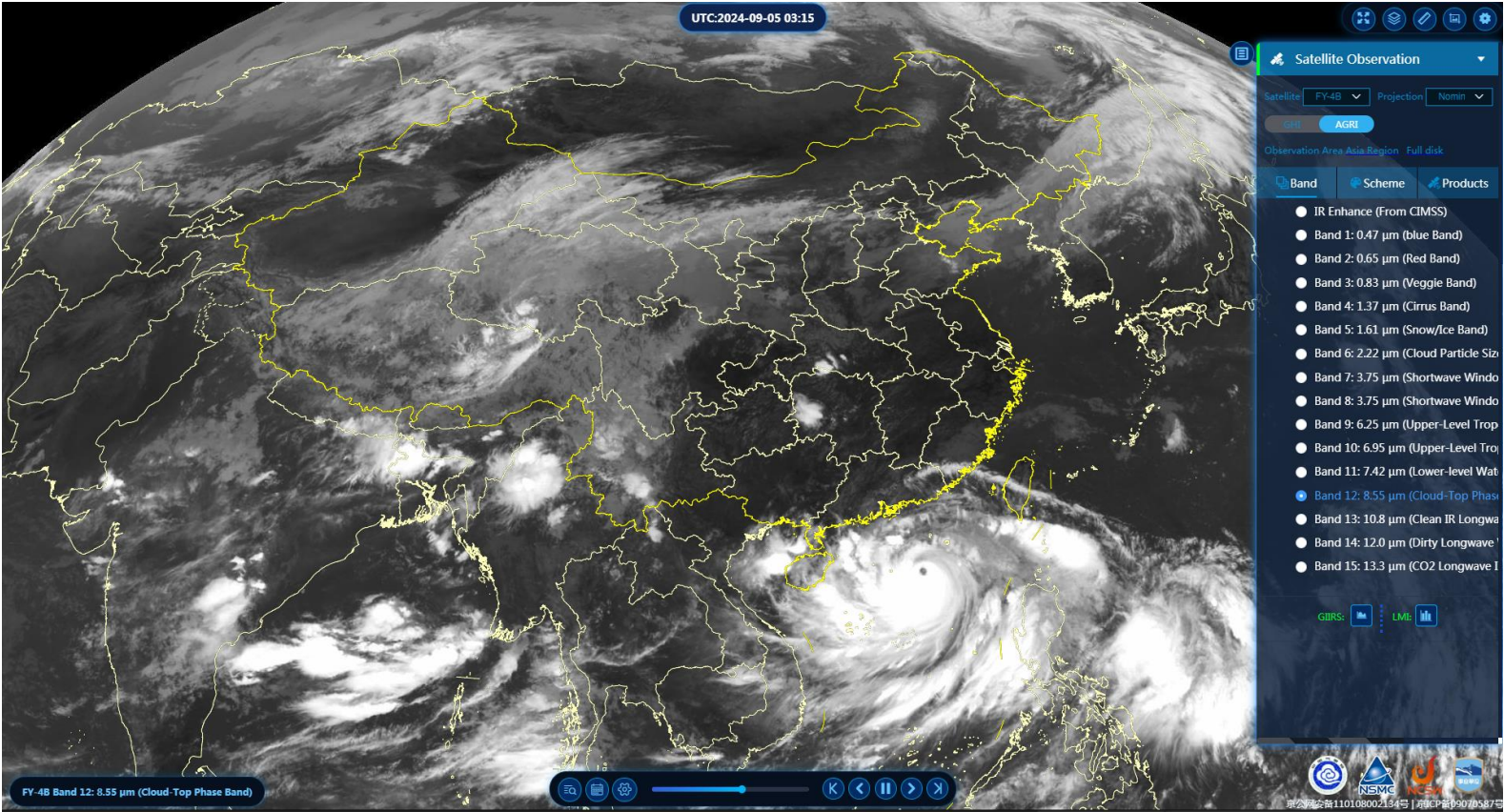
Equal latitude and longitude projection

Platforms: SWAP



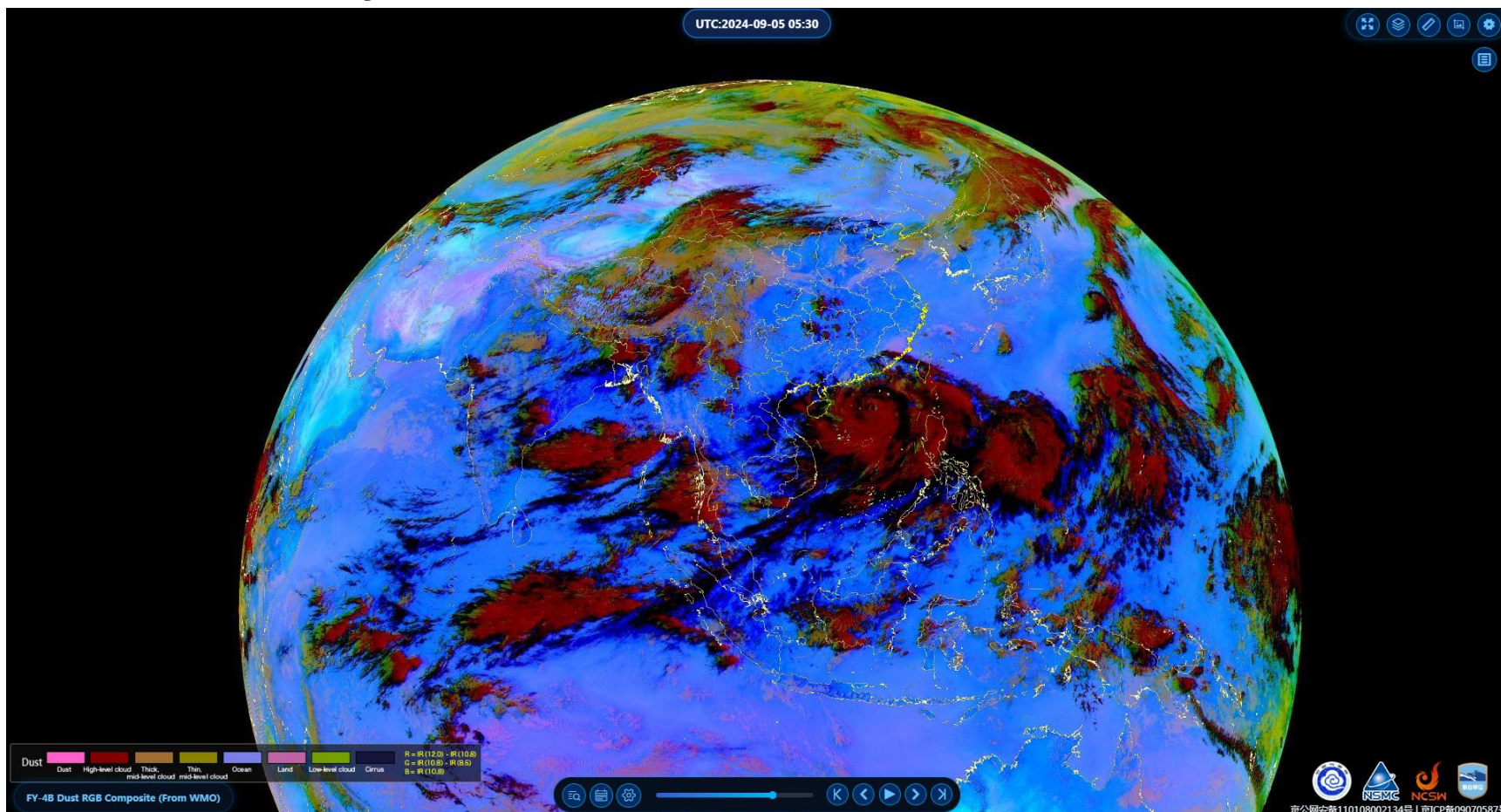
Platforms: SWAP

Feature: Satellite Channel View



Platforms: SWAP

Feature: Synthetics Scheme



SWAP Support 12 Synthetics scheme

True Color

Natural Color RGB Composite

Dust RGB Composite From WMO

AirMass RGB Composite

Fog/Snow Composite

Clouds Convection RGB Composite

Volcanic Ash RGB Composite

Severe Storms RGB Composite

Day Convective Storms RGB Composite

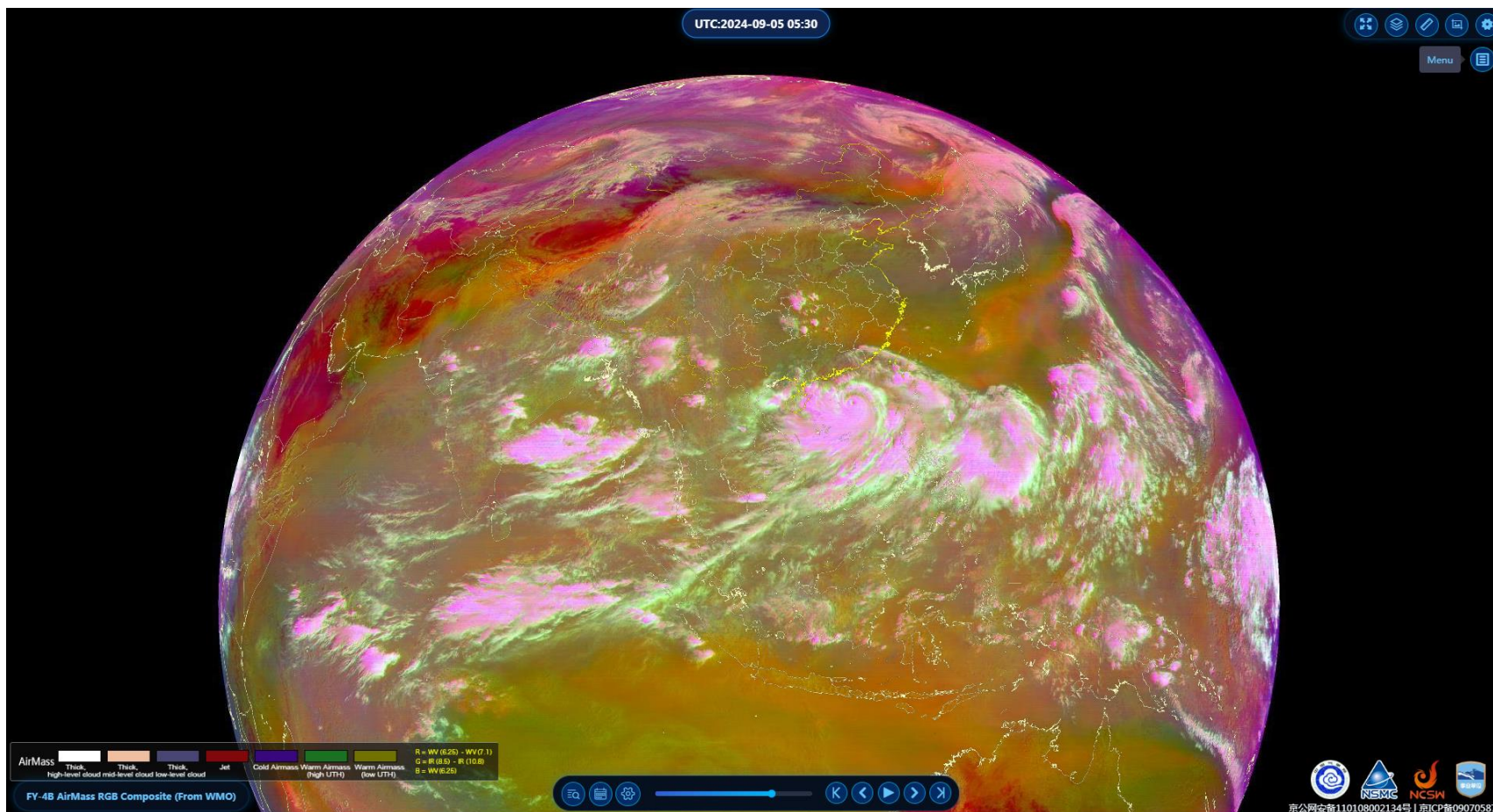
Day Microphysics RGB Composite

Night Microphysics RGB Composite

Dust RGB From CMA

Platforms: SWAP

Feature: Synthetics Scheme



SWAP Support 12 Synthetics scheme

True Color

Natural Color RGB Composite

Dust RGB Composite From WMO

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Severe Storms RGB Composite

Day Convective Storms RGB Composite

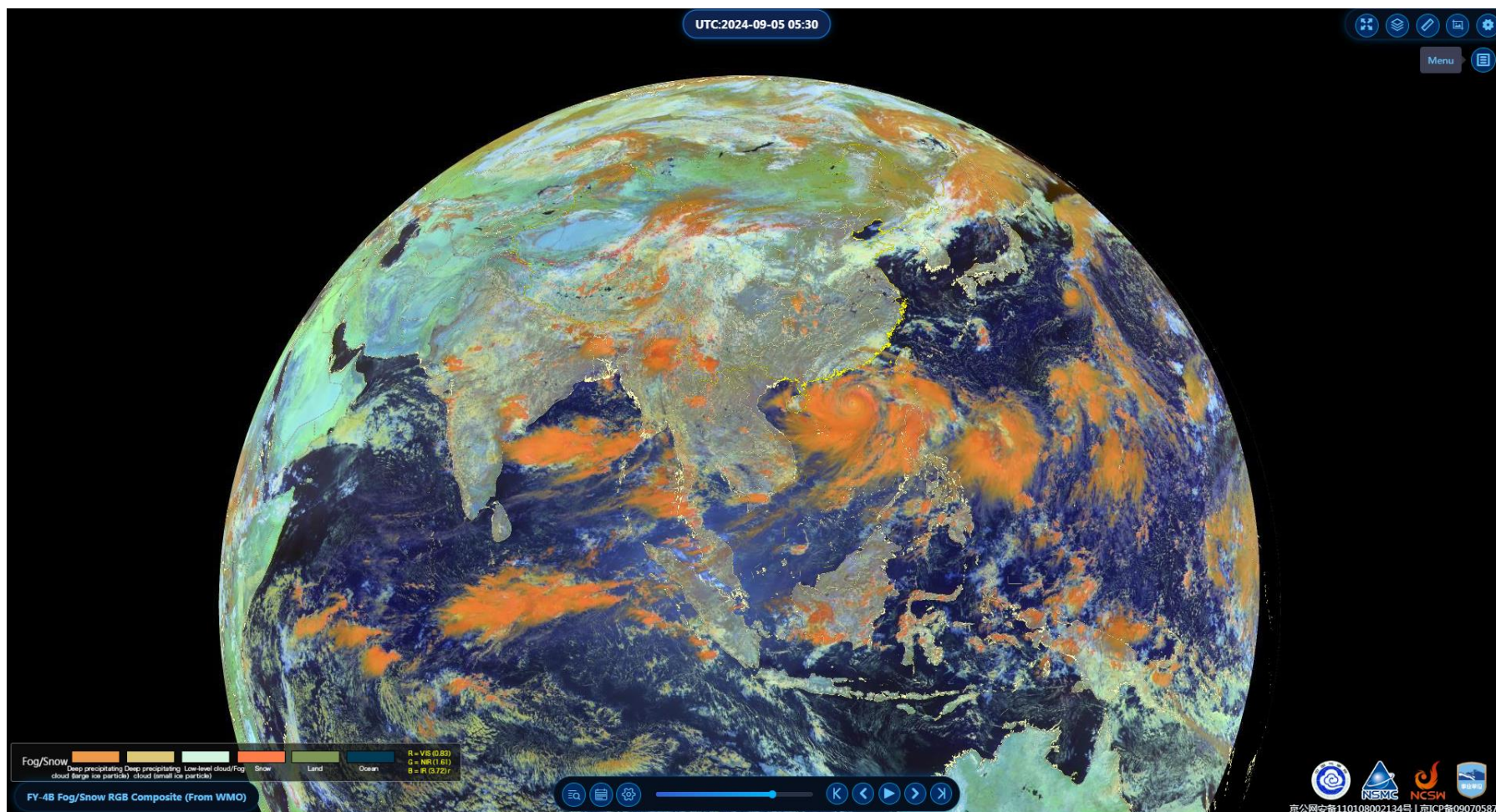
Day Microphysics RGB Composite

Night Microphysics RGB Composite

Dust RGB From CMA

Platforms: SWAP

Feature: Synthetics Scheme



SWAP Support 12 Synthetics scheme

True Color

Natural Color RGB Composite

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Fog/Snow Composite

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Severe Storms RGB Composite

Day Convective Storms RGB Composite

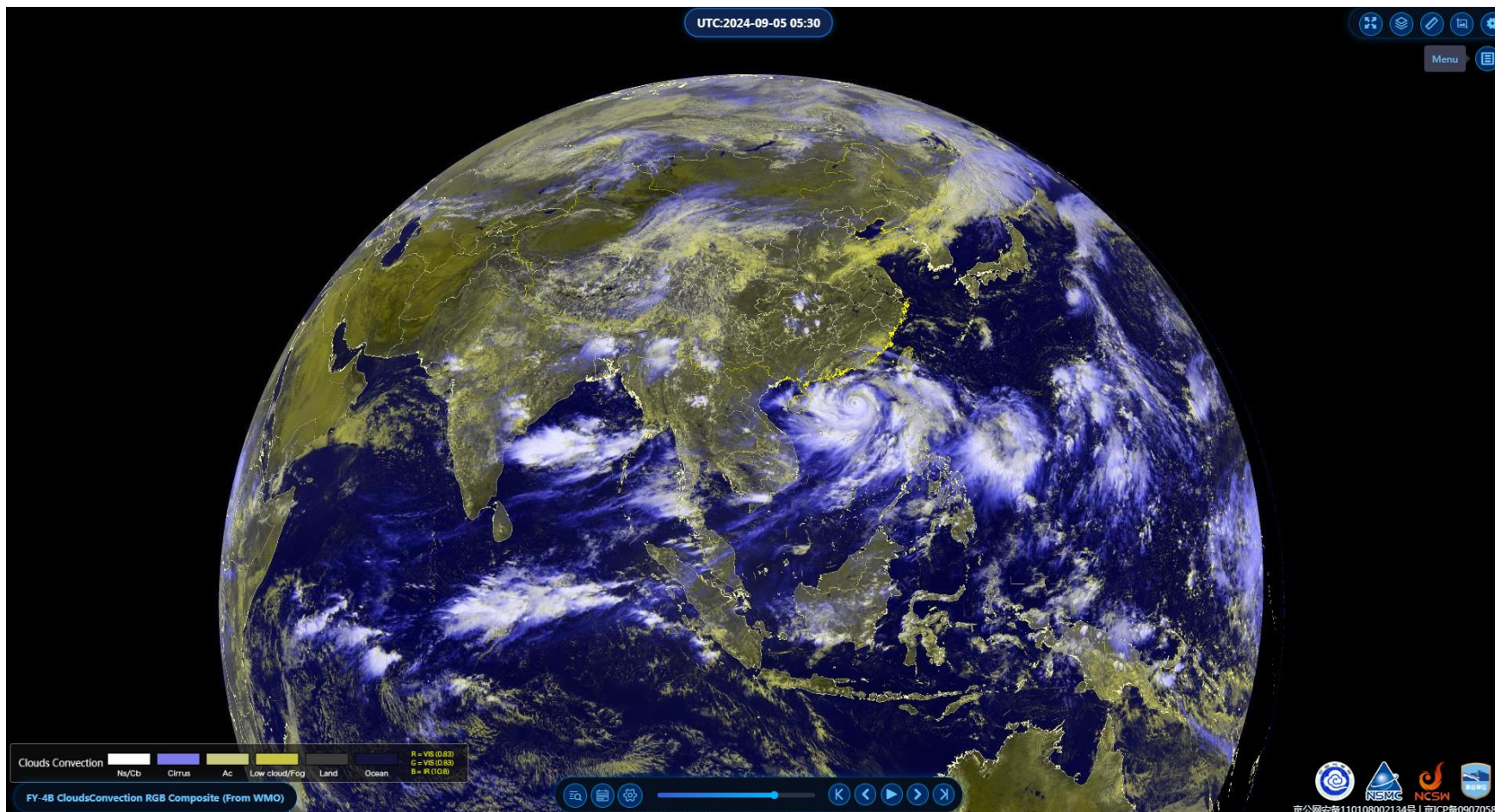
Day Microphysics RGB Composite

Night Microphysics RGB Composite

Dust RGB From CMA

Platforms: SWAP

Feature: Synthetics Scheme



SWAP Support 12 Synthetics scheme

True Color

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Day Convective Storms RGB Composite

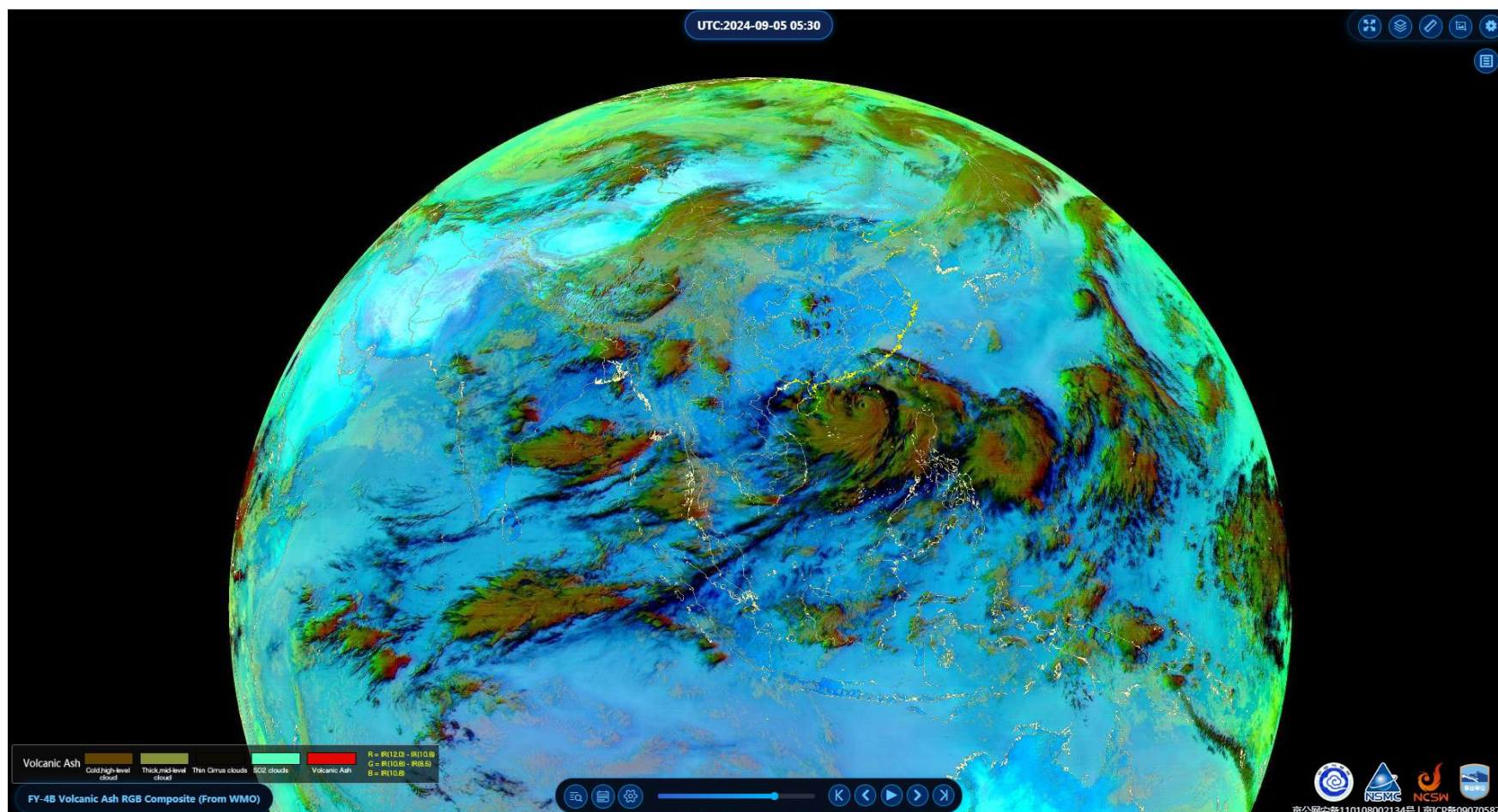
Day Microphysics RGB Composite

Night Microphysics RGB Composite

Dust RGB From CMA

Platforms: SWAP

Feature: Synthetics Scheme



SWAP Support 12 Synthetics scheme

True Color

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Volcanic Ash RGB Composite

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Day Convective Storms RGB Composite

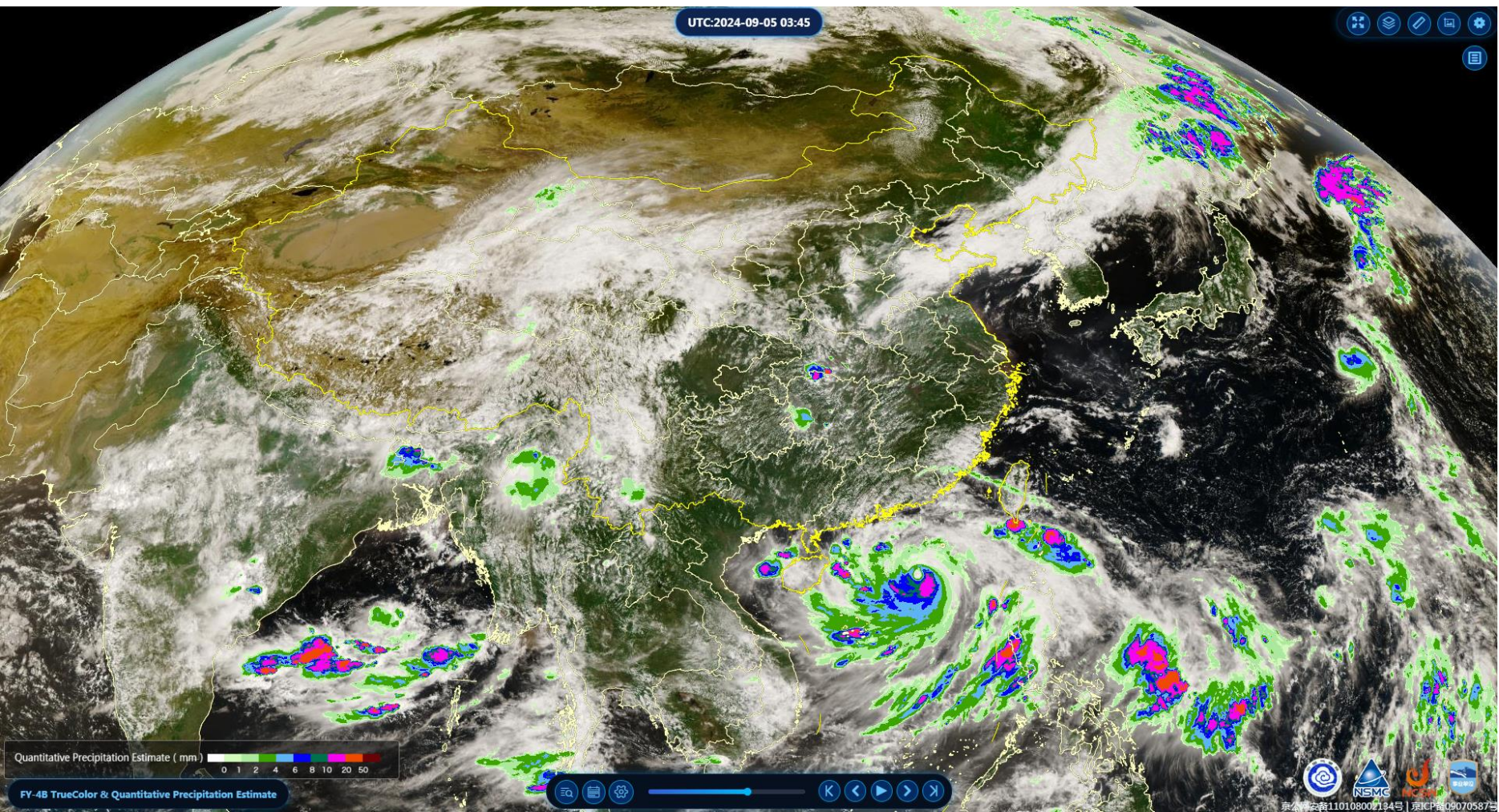
Day Microphysics RGB Composite

Night Microphysics RGB Composite

Dust RGB From CMA

Platforms: SWAP

Feature: Satellite product overlay



SWAP Support 14 Products

Quantitative Precipitation Estimate

Upper-Level Water Vapor Atmospheric Motion Vectors

Lower-Level Water Vapor Atmospheric Motion Vectors

Infrared Atmospheric Motion Vectors

Cloud Mask

Cloud Phase

Cloud Type

Cloud Top Height

Cloud Top Temperature

Cloud Top Pressure

Temperature(500hPa)

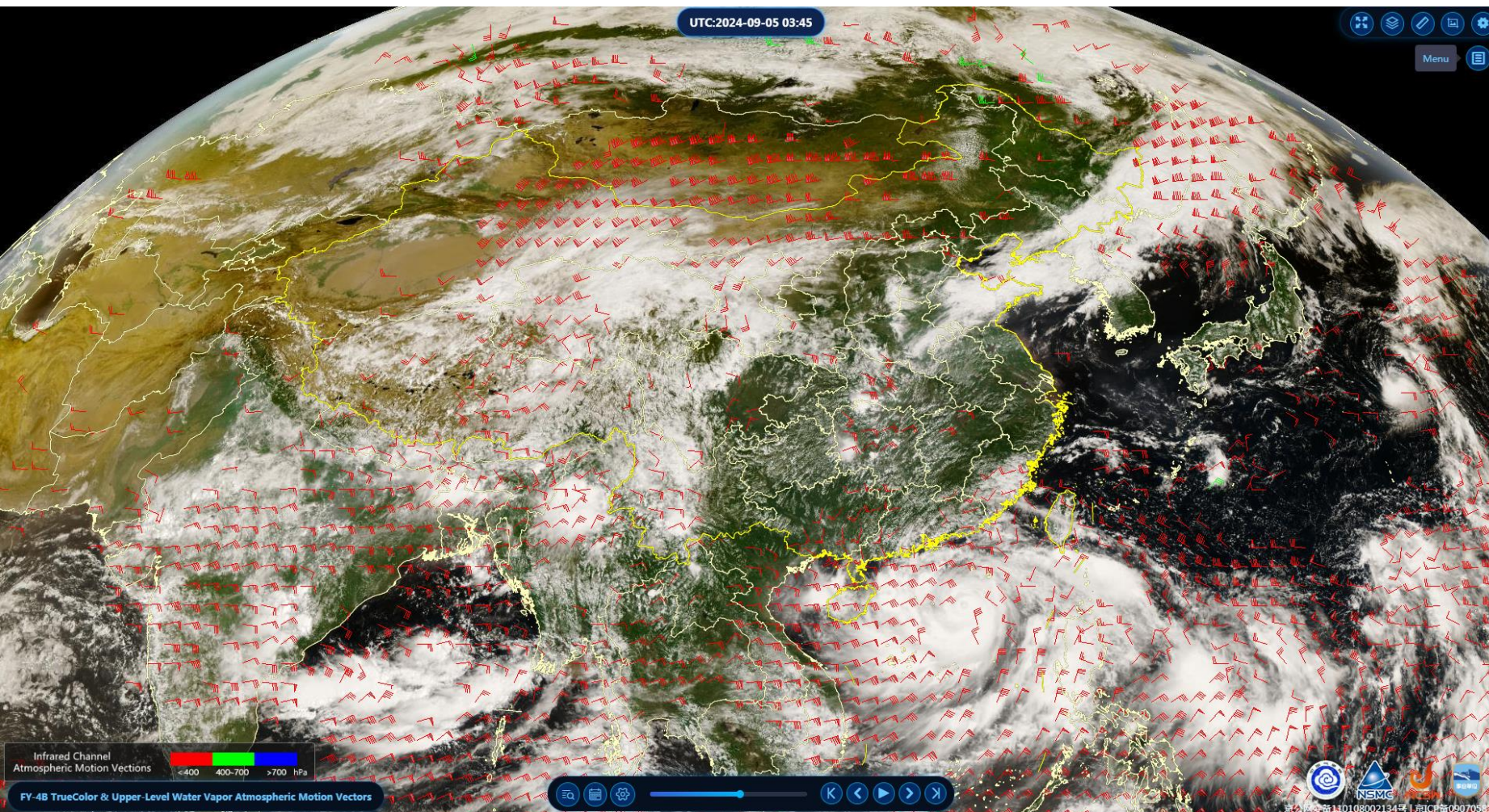
Temperature(700hPa)

Temperature(850hPa)

Temperature(1000hPa)

Platforms: SWAP

Feature: Satellite product overlay



SWAP Support 14 Products

Quantitative Precipitation Estimate

Upper-Level Water Vapor Atmospheric Motion Vectors

Lower-Level Water Vapor Atmospheric Motion Vectors

Infrared Atmospheric Motion Vectors

Cloud Mask

Cloud Phase

Cloud Type

Cloud Top Height

Cloud Top Temperature

Cloud Top Pressure

Temperature(500hPa)

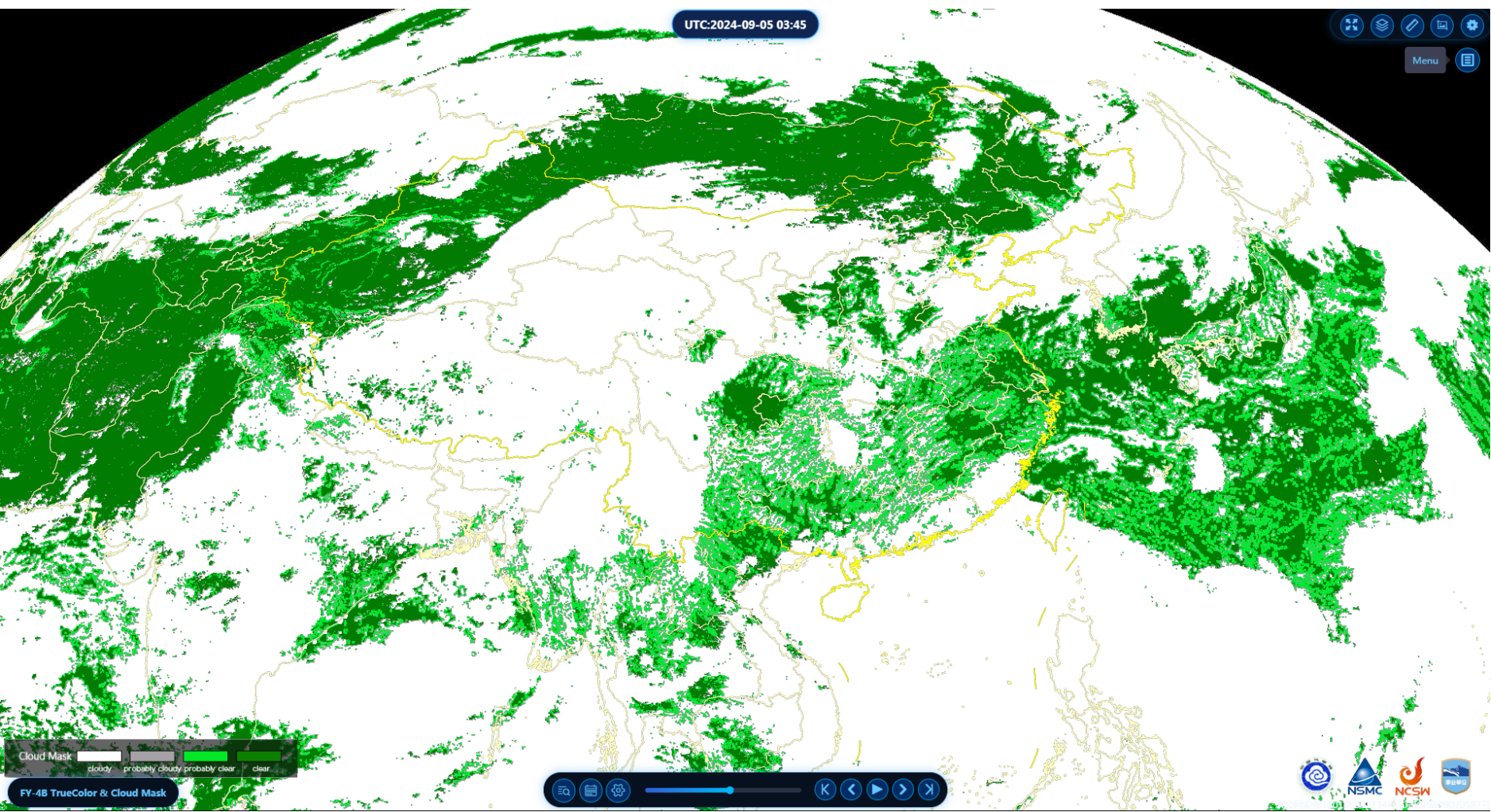
Temperature(700hPa)

Temperature(850hPa)

Temperature(1000hPa)

Platforms: SWAP

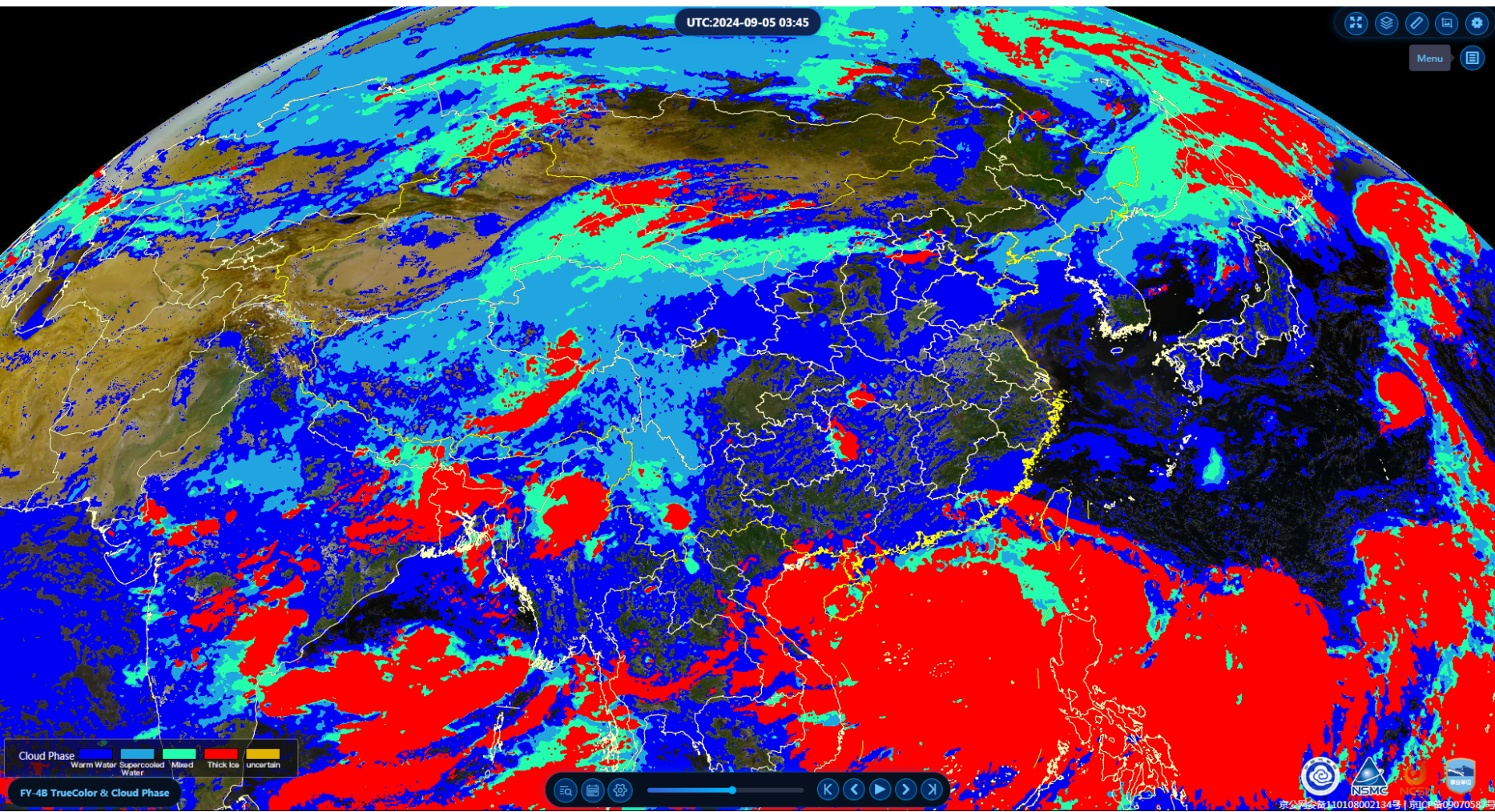
Feature: Satellite product overlay



SWAP Support 14 Products
Quantitative Precipitation Estimate
Upper-Level Water Vapor Atmospheric Motion Vectors
Lower-Level Water Vapor Atmospheric Motion Vectors
Infrared Atmospheric Motion Vectors
Cloud Mask
Cloud Phase
Cloud Type
Cloud Top Height
Cloud Top Temperature
Cloud Top Pressure
Temperature(500hPa)
Temperature(700hPa)
Temperature(850hPa)
Temperature(1000hPa)

Platforms: SWAP

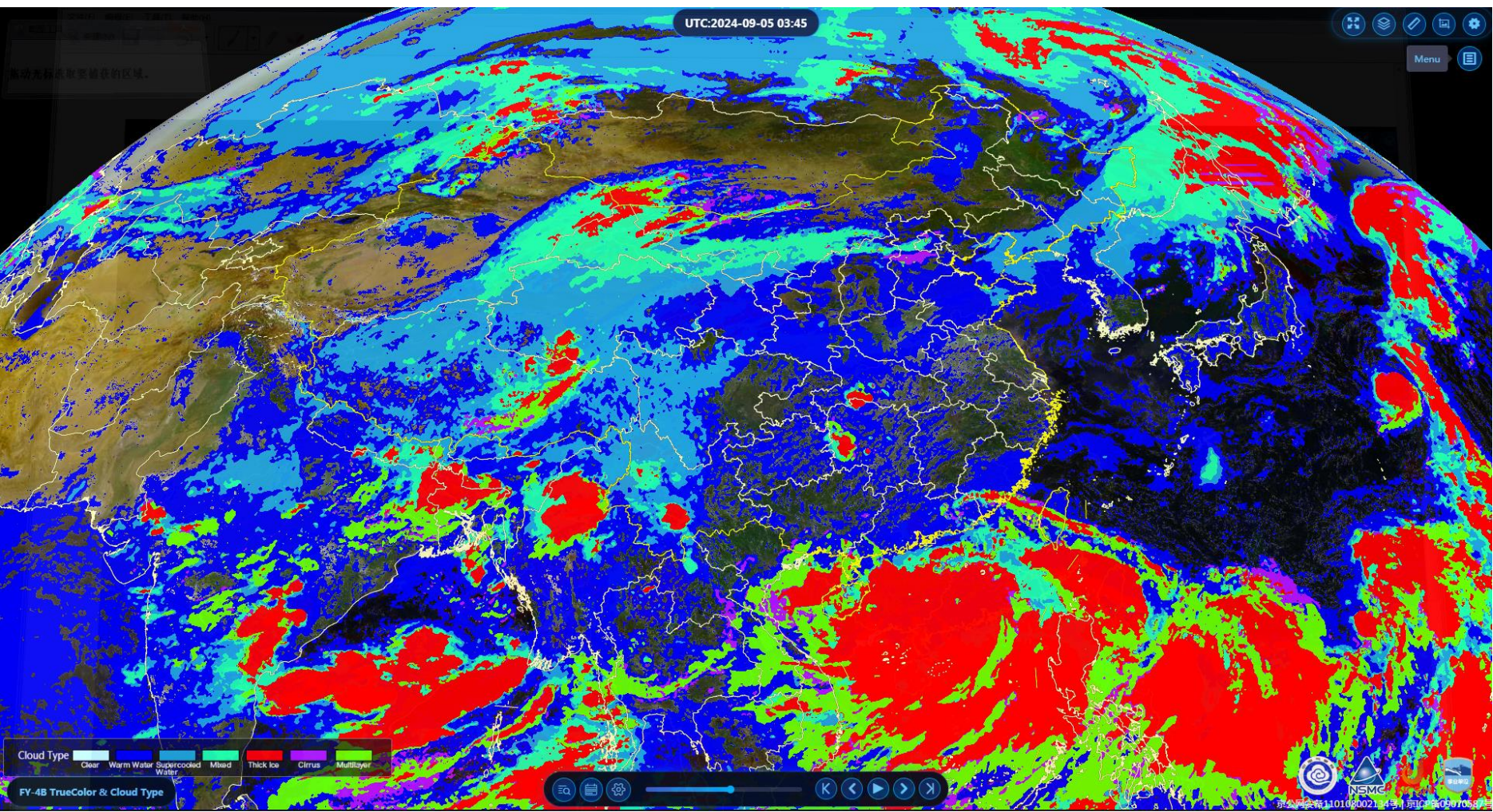
Feature: Satellite product overlay



SWAP Support 14 Products
Quantitative Precipitation Estimate
Upper-Level Water Vapor Atmospheric Motion Vectors
Lower-Level Water Vapor Atmospheric Motion Vectors
Infrared Atmospheric Motion Vectors
Cloud Mask
Cloud Phase
Cloud Type
Cloud Top Height
Cloud Top Temperature
Cloud Top Pressure
Temperature(500hPa)
Temperature(700hPa)
Temperature(850hPa)
Temperature(1000hPa)

Platforms: SWAP

Feature: Satellite product overlay

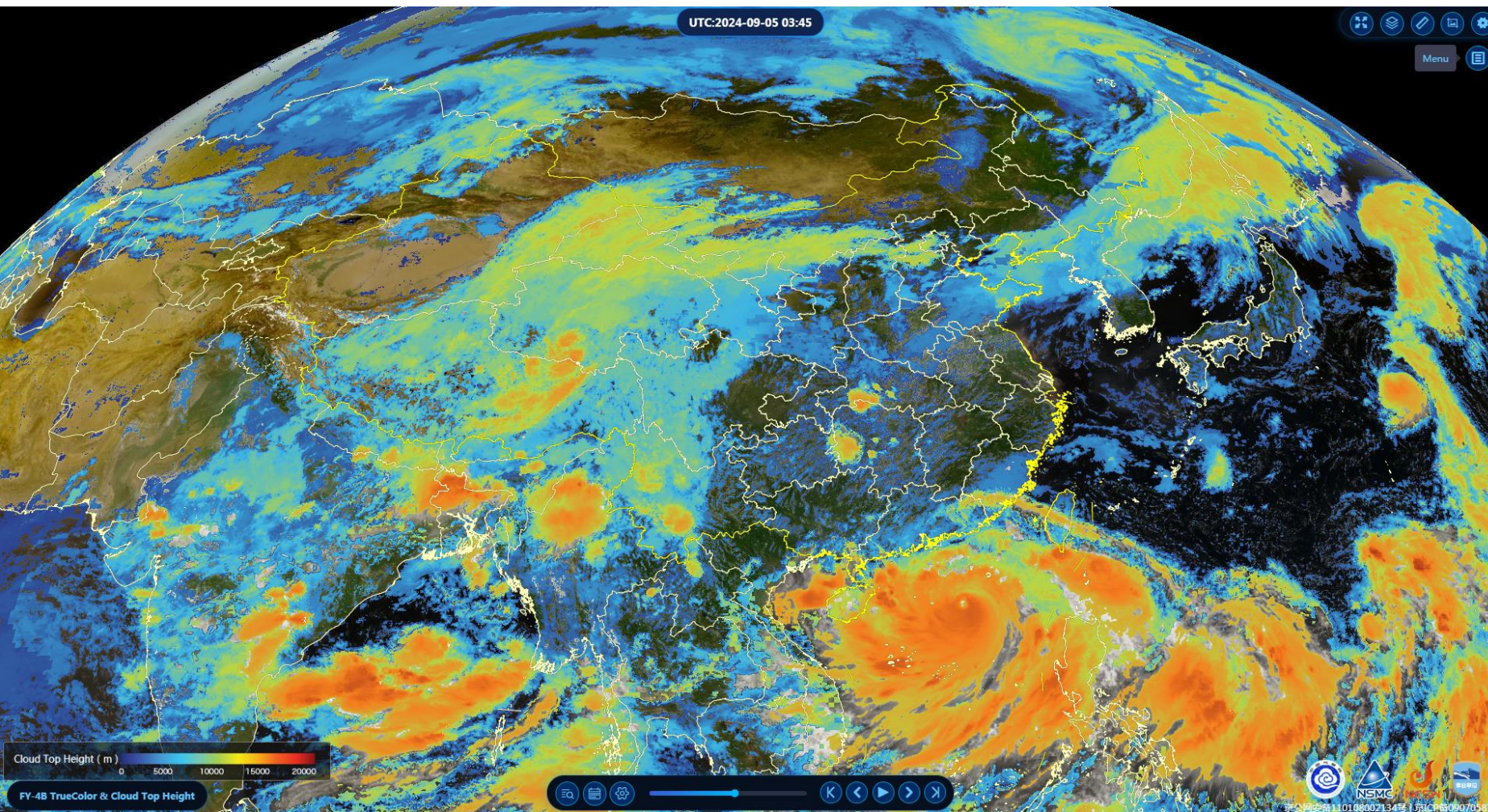


SWAP Support 14 Products

- Quantitative Precipitation Estimate
- Upper-Level Water Vapor Atmospheric Motion Vectors
- Lower-Level Water Vapor Atmospheric Motion Vectors
- Infrared Atmospheric Motion Vectors
- Cloud Mask
- Cloud Phase
- Cloud Type
- Cloud Top Height
- Cloud Top Temperature
- Cloud Top Pressure
- Temperature(500hPa)
- Temperature(700hPa)
- Temperature(850hPa)
- Temperature(1000hPa)

Platforms: SWAP

Feature: Satellite product overlay



SWAP Support 14 Products

Quantitative Precipitation Estimate

Upper-Level Water Vapor Atmospheric Motion Vectors

Lower-Level Water Vapor Atmospheric Motion Vectors

Infrared Atmospheric Motion Vectors

Cloud Mask

Cloud Phase

Cloud Type

Cloud Top Height

Cloud Top Temperature

Cloud Top Pressure

Temperature(500hPa)

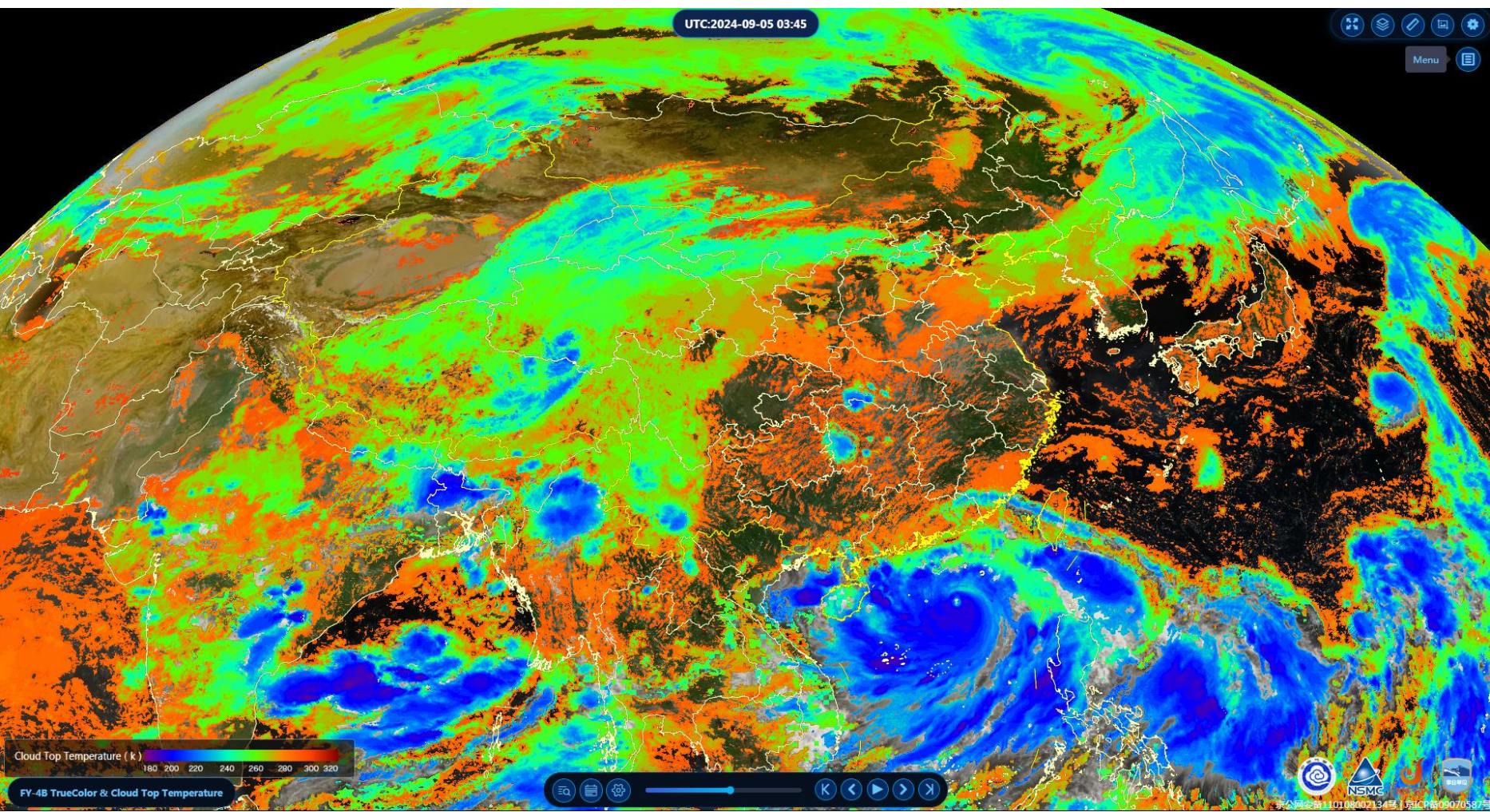
Temperature(700hPa)

Temperature(850hPa)

Temperature(1000hPa)

Platforms: SWAP

Feature: Satellite product overlay

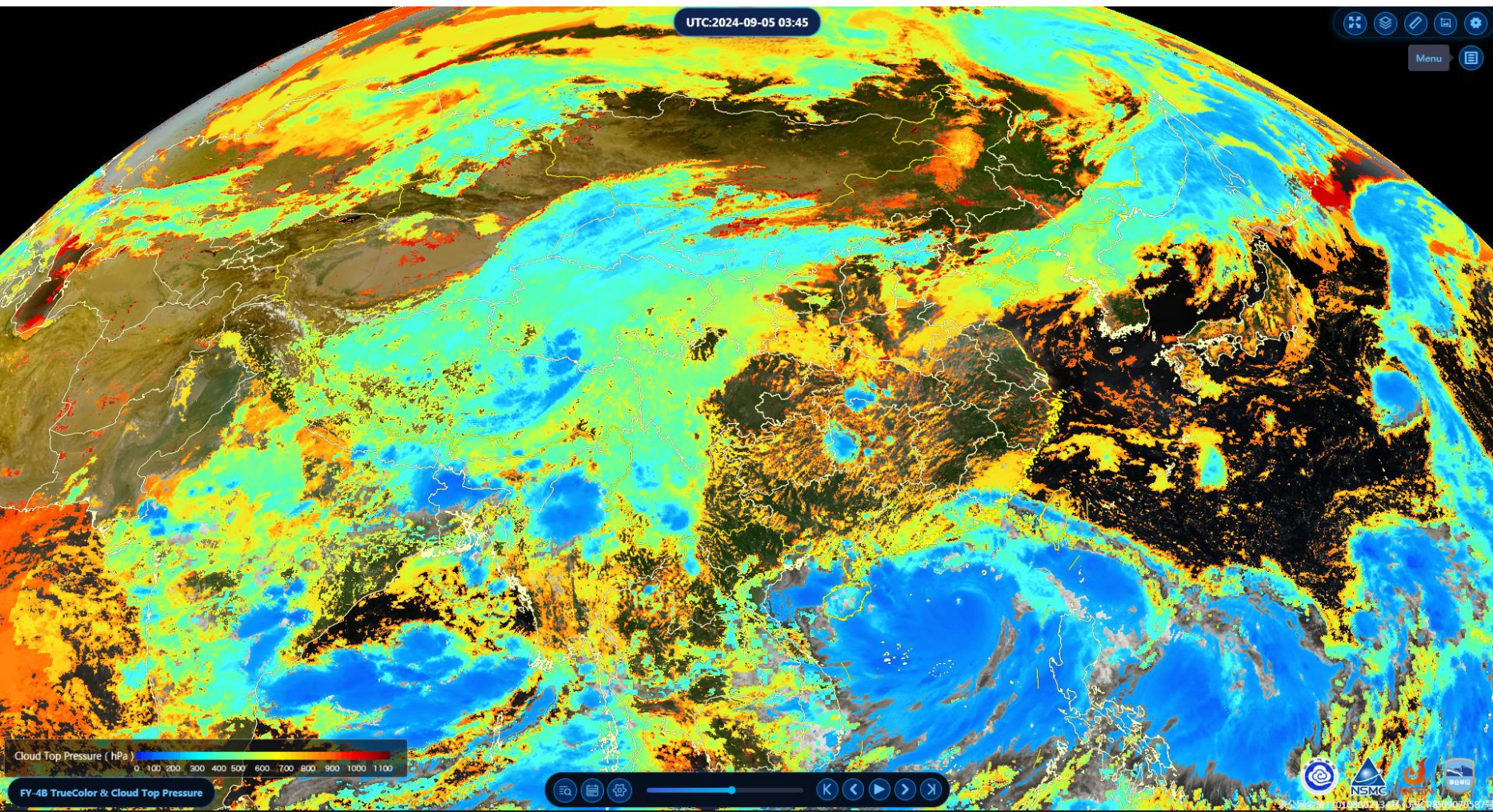


SWAP Support 14 Products

- Quantitative Precipitation Estimate
- Upper-Level Water Vapor Atmospheric Motion Vectors
- Lower-Level Water Vapor Atmospheric Motion Vectors
- Infrared Atmospheric Motion Vectors
- Cloud Mask
- Cloud Phase
- Cloud Type
- Cloud Top Height
- Cloud Top Temperature
- Cloud Top Pressure
- Temperature(500hPa)
- Temperature(700hPa)
- Temperature(850hPa)
- Temperature(1000hPa)

Platforms: SWAP

Feature: Satellite product overlay



SWAP Support 14 Products

Quantitative Precipitation Estimate

Upper-Level Water Vapor Atmospheric Motion Vectors

Lower-Level Water Vapor Atmospheric Motion Vectors

Infrared Atmospheric Motion Vectors

Cloud Mask

Cloud Phase

Cloud Type

Cloud Top Height

Cloud Top Temperature

Cloud Top Pressure

Temperature(500hPa)

Temperature(700hPa)

Temperature(850hPa)

Temperature(1000hPa)

Platforms: SWAP

UTC:2024-09-05 05:30

date and time for current frame (UTC)

① Playlist
② Archived data search
③ Play Setting

- Time step
- Image number
- Speed control

① Full screen
② Satellite selection
③ Projection selection
④ Band selection
⑤ Scheme selection
⑥ Products selection

Satellite Observation

Satellite: FY-4B Projection: Nomin

CHI AGRI

Observation Area Asia Region Full disk

Band Scheme Products

- TrueColor
- Natural Color RGB Composite (From
- Dust RGB Composite (From WMO)
- AirMass RGB Composite (From WV
- Fog/Snow RGB Composite (From V
- Severe Storms RGB Composite (Fro
- CloudsConvection RGB Composite
- Volcanic Ash RGB Composite (From
- Day Convective Storms RGB Comp
- Day Microphysics RGB Composite (
- Night Microphysics RGB Composite
- Dust RGB Composite (From CMA)

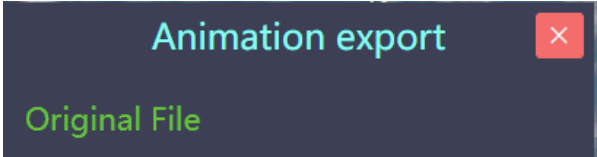
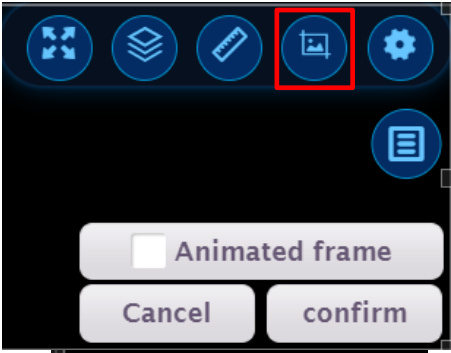
GIIRS: LMI:

FY-4B TrueColor

京公网安备110108002134号 | 京ICP备09070587号

Platforms: SWAP

Feature : Animation export



Platforms: SWAP

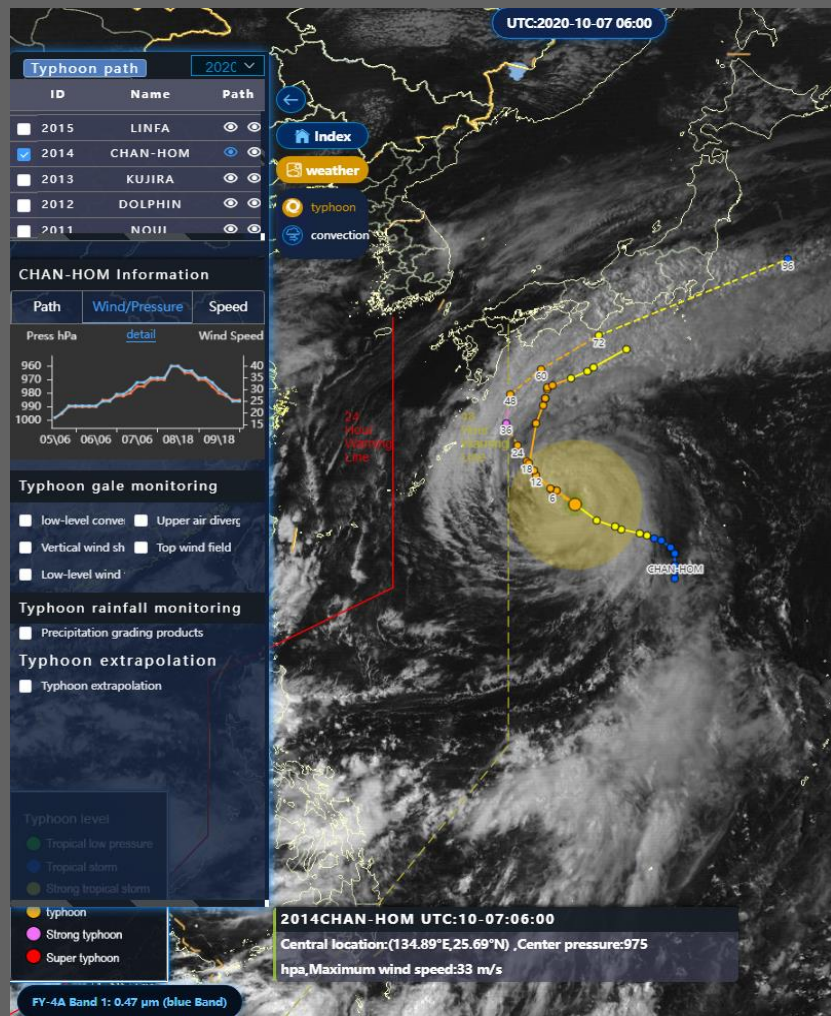


weather

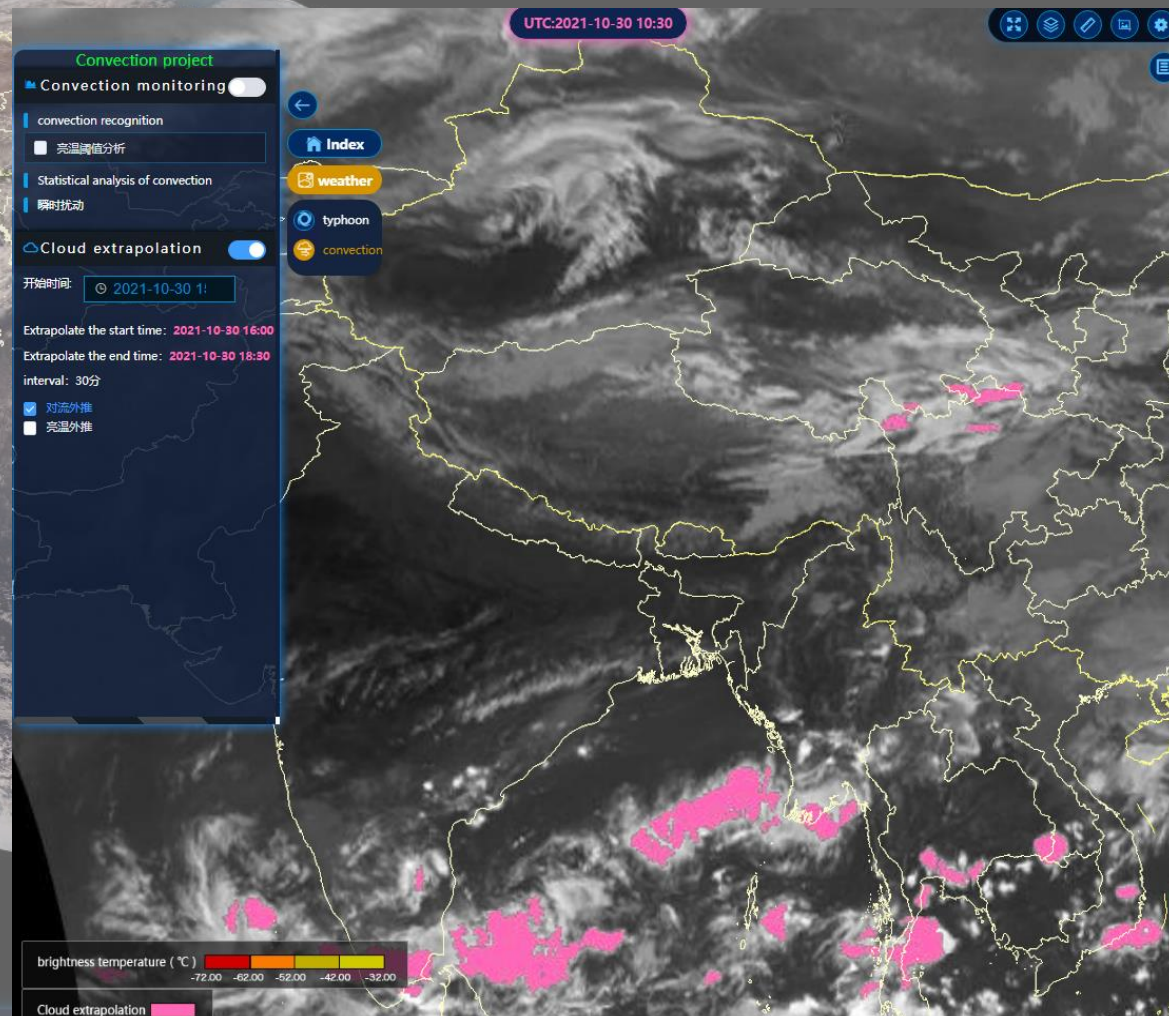
typhoon

convection

Typhoon analysis



Convective analysis and forecast



Outline



Platforms

- **SWAP stand-alone version**
- **SWAP web version**

Application

- **FengYun EARTH**
- **FY_ESM**
- **Data Sharing**
- **User Conference**

FengYun Earth Platform Facilitates User-targeted International Service

Web-based Platform | Comprehensive Cloud Platform

Main User: **Forecaster**

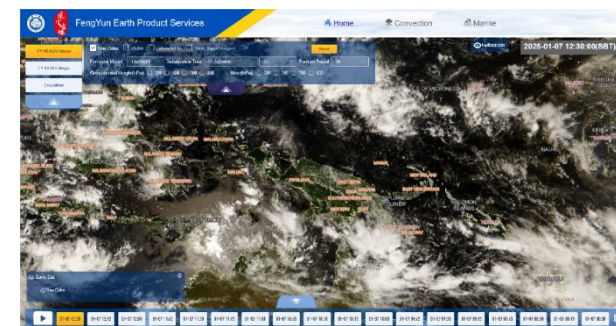
Typical Applications: Weather Monitoring and Analyzing

Realize multi-source, multi-scale, multi-element, multi-form data access;

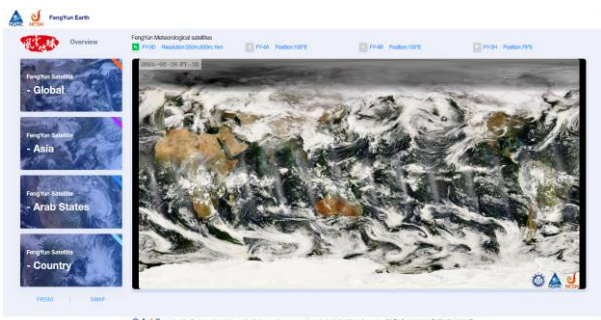
Offer over **100** quantitative products across 5 categories, including satellite images, meteorological elements, disaster events, climate, and model verification.

More than **90** countries accessed FengYun Earth platform.

Website: <http://fyearth.nsmc.org.cn/>



FengYun Earth supported the Solomon Islands in hosting the **Pacific Games**



Global version



ASEAN version



Arabic Version

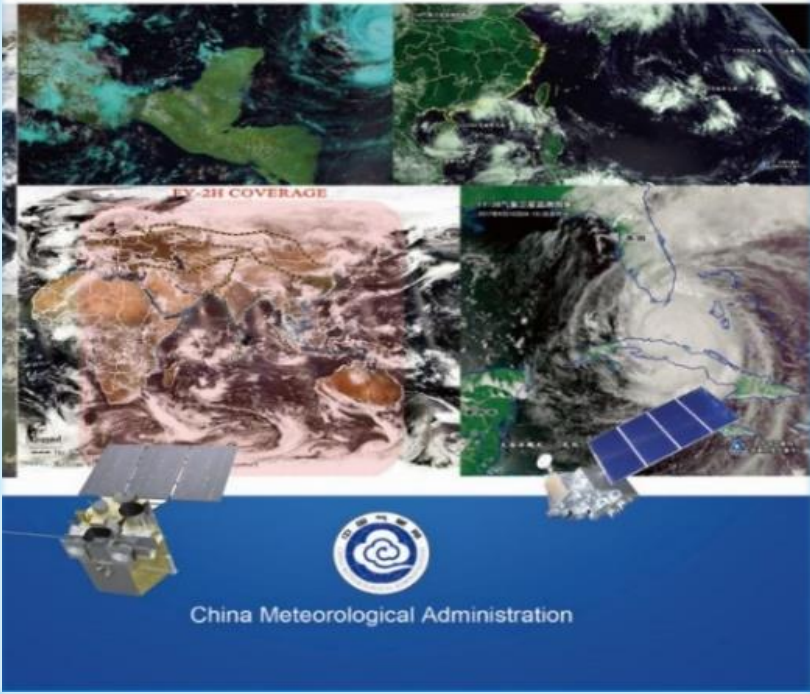


Sri Lanka Version

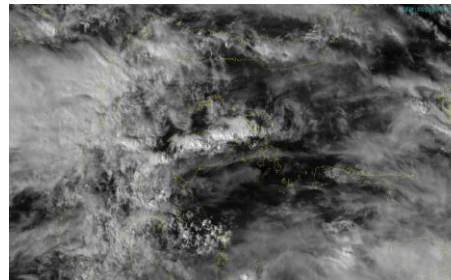
Emergency Support Mechanism for International Users of FengYun Satellites (FY-ESM)

<http://data.nsmc.org.cn/FYESM/en/emergency/index.html>

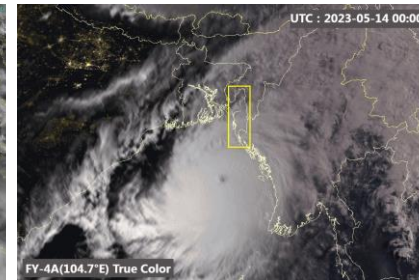
Description of Services under the Emergency Support Mechanism of FENGYUN Satellite (FY ESM)



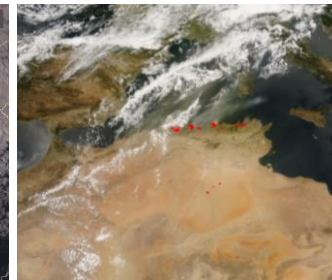
- China Meteorological Administration (CMA) established the Emergency Support Mechanism of FENGYUN Satellite (**FY_ESM**) for international users on April, 2018.
- Once FY_ESM is activated, highly frequent observation of a given area at an interval of up to **1 minutes** will be provided to users.
- So far, **37** countries have registered FY_ESM.
- Since 2018, more than **170** emergency support services have been provided to **85** countries worldwide through the FY-ESM and CHARTER mechanisms.



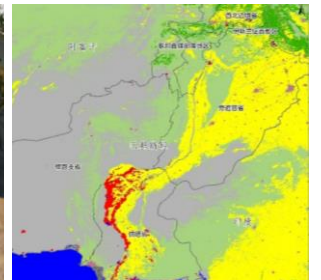
Convection in Indonesia



Tropical Cyclone in Myanmar



Fire in Tunisia



Flood in Pakistan

Data Services

<http://satellite.nsmc.org.cn/DataPortal/en/home/index.html>

How to get an account:

Please send an E-Mail to:
iusc_nsmc@cma.gov.cn



Main data services

- For Common Users
 - Data service website
 - Data download toolkit
- For Real-time Users
 - Direct broadcasting system
 - CMACast
 - FY-3 software packages
 - WIS/GTS
- For Emergency Users
 - Emergency Support Mechanism of FENGYUN Satellite (FY_ESM)

- **133 countries and regions** used FengYun meteorological satellite data.
- From 2017 to 2024, the **overall satisfaction** of international remote sensing services **was 82%**.

FengYun International User Conference

**Warmly Welcome to the 2025
FengYun International User
Conference in Qingdao !**

2025 FengYun Satellite International User Conference

15th Asia Oceania Meteorological Satellite User Conference

Venue:

Qingdao International Conference Center

Preliminary Schedule:

Training event on satellite data and product utilization (2 days): October 26-27

AOMSUC-15 & FY user conference (3 days): October 28-30

Joint RAI-RAV Coordination Meeting (1 day) : October 31

Contact:

fysat701@126.com

website: <http://www.nsmc.org.cn/conference/fysuc/2025/>

The purpose of the conference is to **establish a platform for international users of FengYun satellites**, facilitating in-depth discussions regarding their applications and requirements, promoting the global integrated application of FengYun satellites to achieve maximum benefits across various application areas, and mitigating the impacts of hazardous weather, water, or climate events.



成功举办了3次风云卫星国际用户大会

Three Successful FengYun International User Conference Have been held



Thank you for your attention !

Email:
jiax@cma.gov.cn