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Agenda Item 3.2
Discussed at WG IV

Subject	**THE UPDATE OF FENGYUN SATELLITE DATA AND APPLICATION SERVICES**
In response to CGMS action/recommendation	
HLPP reference	
Executive Summary	**This document describes the data policy of FENGYUN satellite data, the status and future plan of the FENGYUN satellite data distribution and services. FY-3G and FY-4B data distribution information is updated. FENGYUN satellite data are open to NMSs and other international organizations and users for free charge via many ways. For real-time users, FENGYUN satellite data can be accessed via direct broadcasting station, CMA data broadcasting system (CMACast), GTS, and WIS. For non-real-time users, FENGYUN satellite data can be accessed from the FENGYUN satellite data center website, downloading toolkits and offline data services. For emergency users, FENGYUN satellite emergency support mechanism （FY_ESM） is useful to The National Meteorological Services (NMSs). The software platform of FENGYUN Earth still provides to the international user for enhancing FENGYUN satellite data application this year.**
Action/Recommendation proposed	

1 INTRODUCTION

This document describes the status and the ways to share data of the FENGYUN satellites. Since the first FENGYUN satellite (FY-1A) was successfully launched in 1988, four series of FENGYUN satellites have been used, and more are on schedule.

FY-2 is the first generation geostationary meteorological satellite of China, which has successfully launched seven satellites. Two of them are still operating observation at 79°E, 99.2°E above the equator. FY-4 is the second generation of China's geostationary meteorological satellite series to replace the first generation FY-2 series. FY-4A is the first of its series as a scientific experiment satellite. It was launched on December 11th, 2016. FY-4B, the second of its series, was launched on June 3rd, 2021.FY-4 satellite provide dozens of quantitative products for weather forecast and climatic predictions, including clouds and atmospheric products, surface products, weather products and radiation products. FY-4B has drifted from 133°E to 105°E, replacing FY-4A as the primary operational satellite. The transition period was from February 1st to March 5th. After that, FY-4A has drifted to 86.5°E.

FY-1 and FY-3 are two series of polar orbit meteorological satellites of China. FY-1 has only two on board instruments compared with FY-3 which has much more on board instruments and higher spacial resolution. FY-3E, which was launched on July 5, 2021, is the world's first meteorological satellite in early morning orbit for civil service, filling in the observing gap in early morning. FY-3E . FY-3G launched on April 16, 2023 is the first precipitation measurement satellite of the FY-3 series, operates in a non sun-synchromous orbit at a 50° inclination angle. FY-3F was launched on August 3, 2023.

2 DATA POLICY OF FENGYUN SATELLITE DATA

China Meteorological Administration (CMA) has rolled out Management Measures (trial) for FY Meteorological Satellite Data (hereafter referred to as the Measures) and FY Meteorological Satellite Basic Data Catalog (2018), further clarifying and normalizing data management and strengthening open and sharing application. According to the Measures and Catalog, international and domestic users can have free access to observation data and quantitative products of FY-2, FY-3, and FY-4 operational satellites.

2.1 Data classification

FENGYUN meteorological satellite data can be divided into 4 levels, namely level 0, level 1, level 2 and lever 3. Level 1, level 2 and level 3 data automatically generated by FY meteorological satellite ground system are basic data, which will be provided to all users free of charge. Users can also apply to harness data.

2.2 Basic data

The basic data of FENGYUN satellite is defined as all available data from operational instruments on FENGYUN satellites except raw data

Table 1, FY Meteorological Satellite Basic Data Catalog

Satellite	Instrument	Data and products

FY-2	VISSR	L1, L2 and L3
	SEM	L1
FY-3	MERSI	L1, L2 and L3
	VIRR	L1, L2 and L3
	IRAS	L1, L2 and L3
	MWRI	L1, L2 and L3
	MWTS	L1 and L2
	MWHS	L1, L2 and L3
	HIRAS	L1, L2 and L3
	TOU	L1,and L2
	SBUS	L1
	GNOS	L1 and L2
	IPM	L1
	XEUVI	L1
	ERM	L1
	SEM	L1 and L2
	SIM	L1
	ERBM	L2 and L3
	WindRAD	L1 and L2
	VASS	L2
	TRIPM	L1 and L2
	PMR	L1 and L2
FY-4	AGRI	L1 , L2 and L3
	LMI	L2
	GIIRS	L1, L2
	GHI	L1

2.3 Data policy

The National Meteorological Services ("NMSs") of the WMO Members States will receive all basic FENGYUN satellite data, products and services for their Official Duty use at no cost based on the related WMO resolutions. Other international organization and regional groups will receive all basic FENGYUN satellite data based on the agreement under the peer-to-peer mutual benefit with CMA. Regarding their commercial activities, the NMSs and other organizations shall be treated in an equivalent way to Service Providers by NSMC/CMA. Public users can access most of FENGYUN satellite data from NSMC website for free charge under the conditions defined by CMA. Detail information can be found from the Management Measures (trial) for FY Meteorological Satellite Data (hereafter referred to as the Measures).

3 STATUS OF FENGYUN SATELLITE DATA DISTRIBUTION AND SERVICES

CMA has built up a space-land integrated data distribution system for domestic and international users. For real-time and non-real-time users, CMA has different ways to help users to access data.

3.1 For real-time users

3.1.1 FENGYUN satellite data direct broadcasting system (DB)

Both FENGYUN geostationary and FENGYUN polar-orbiting satellite system provide Direct Readout Service. User equipped with proper data acquisition facilities can directly receive data from the satellite broadcast.

3.1.2 CMA data broadcasting system (CMACast)

CMA's Broadcast System for Meteorological Data offers all services within the framework of GEONETCast and provide services to users in Asia Pacific Region. It serves users by disseminating meteorological data and satellite sensing data in near real-time and providing 'one-stop' application platform to users, which called Integrated CMACast System (ICS) including CMACast reception for data receiving, MICAPS and SWAP for data processing and weather forecasting. CMA donated ICS to international users by free of charge, hoped that it could plays a great role in local meteorological services and disaster prevention and mitigation.

3.1.3 FY-3 preprocessing software packages

FY-3 preprocessing software package is a software system for preprocessing direct broadcast (DB) data from FY-3 series satellites. It has been developed by the Nation Satellite Meteorological Centre (NSMC) and released to users since 2014. It is including two software packages, FY-3 MPT/HRPT Level-0 data generation software package and FY-3 MPT/HRPT Level-1 data preprocessing software package.

To establish a DB station Users who want to use a DB station to receive FY-3 data can find an introduction document FY-3 Satellites to Ground Interface Control Document via this link http://data.nsmc.org.cn/PortalSite/StaticContent/DocumentDownload.aspx?TypeID=14.

To access FY-3 preprocessing software package Users who want to access the newest one need to apply a requisition to NSMC. The application form can be found via this link http://data.nsmc.org.cn/PortalSite/StaticContent/DocumentDownload.aspx?TypeID=8. This application form must be signed and emailed to iusc_nsmc@cma.gov.cn. After the conformation, users will receive an email including an account to access ftp server of NSMC. The update information will announce via email.

3.1.4 Data push service

For users who have stringent demands for real-time operational applications, NSMC will push the real-time satellite data and products it received and processed to the dedicated servers through its FTP according to user's requirements.

3.1.5 WIS/DCPC and GTS

NSMC became one of the DCPCs in June 2012. By now, products out of the NSMC production list have been internationally disseminated through WIS. Users can find our DCPC products at a wherever located GlSC (Global Information System Center), or they can get access to them at our DCPC Service. Several datasets are also transmitted via GTS. FY-3E and FY-4B related data are also transmitted via GTS.

3.2 For non real-time users

3.2.1 FENGYUN satellite data center website

Most FENGYUN satellite data available on this website can be searched without login, except for a few data. Prior to data subscription and download, it is required to register on the website as a legal user and go through the login verification. All data subscriptions have to be made by submitting a subscription form. Various data can be listed in each subscription form. Users can visit the website of http://data.nsmc.org.cn to access data for free charge.

3.2.2 Offline data services

The users who need to get large amounts of data can apply for manual data services.

3.2.3 Data download by client toolkit

In order to improve the facilitate of users to order and download data, NSMC provides the client of satellite data download software which supports Windows operating systems and can provide special ordering services such as satellite data customization and reservation since July 2019. Data download toolkit can be found on the FENGYUN satellite data center website (https://satellite.nsmc.org.cn/portalsite/default.aspx?currentculture=en-US).

3.2.4 Reprocessing long-term dataset

A project called Retrospective Calibration of Historical Chinese Earth Observation Satellite Data, is headed by Dr. Peng ZHANG from NSMC/CMA and funded by the National Key R&D Program of China, is reprocessing the historical Chinese meteorological satellite data since 1988 till now. The dataset is released on the project website (http://www.richceos.cn).

3.3 For emergency users

3.3.1 Emergency Support Mechanism of FENGYUN Satellite (FY_ESM)

China Meteorological Administration (CMA) introduced the Emergency Support Mechanism of FENGYUN (FY) Satellite (FY ESM) in 2018, open to international users who made a request once visited by such extreme events as typhoon, heavy rain, severe convection, forest or grassland fire and sand and dust storm.

The eligibility of a user is open to Members of World Meteorological Organization (WMO). A Permanent Representative with WMO presents a written application to the Permanent Representative of China with WMO and designates a focal point as an authorized user contact. CMA opens an authorized account for an applicant for activation of FY_ESM. The data, images and quantitative products derived from the intensive observation of an area by the FY geostationary satellite are provided to international users through such channels as CMACast, NSMC portal, satellite broadcasting and FTP. More information please visit the website of http://fy4.nsmc.org.cn/service/en/emergency/index.html to learn more. It should be noticed that they will also become a member of CMA-FY cloud once a NMS registered FY_ESM.

3.3.2 Charter and other emergency routes

CMA is also cooperating with CHARTER, GEOSS, UN-SPIDER and other disaster management organizations. The members of these organizations can also request FENGYUN satellite for emergency purpose via the representative of China in those organizations.

4 APPLICATIONS

4.1 FENGYUN Earth

FENGYUN Earth can access and collect FENGYUN geostationary satellite data, polar-orbiting satellite data, numerical forecast data, and other multi-source data, focusing on the needs of the international users, provide real-time and regular production of cloud maps, elements, disaster events, and climate service products. The system can provide customizable, automatic, convenient products.

4.2 Satellite Weather Application Platform 2.0 (SWAP 2.0)

SWAP 2.0 is a comprehensive operational platform focusing on geostationary meteorological satellites, realizing comprehensive display of FY-4B and FY-2 series satellite data, interactive typhoon positioning / intensity estimation, and strong convective system analysis. SWAP has the ability of displaying L1 data, compositing multiple channel data, playing animation, rendering L2 data, etc.

4.3 Satellite Monitoring and Remote-sensing Toolkit 2.0 (SMART 2.0)

SMART 2.0 is a comprehensive application platform for remote sensing monitoring and application using FY-3 and other meteorological satellite Data. It offers the special application tools for professionals engaged in remote sensing of natural hazards and ecological environment monitoring. SMART 2.0 plays great role in many aspects, such as uniform operation management, multi-source data displaying, universal tools of image processing and remote sensing, thematic information deriving, geographical information overlaying, and thematic product generation and Dissemination.

5 FUTURE PLAN

NSMC will provide more versions of the client of satellite data download software to support multiple operating systems such as Linux and Mac. Some of the data will be stored in the cloud to improve the download speed for the users.

6 CONCLUSION

Data service helpdesk: iusc_nsmc@cma.gov.cn, nsmc_fy@126.com
FY_ESM helpdesk: fyemergency@cma.gov.cn
CMACast helpdesk: cmacast@cma.gov.cn
Websites related FENGYUN satellite data services:
Nation Satellite Meteorological Center: http://www.nsmc.org.cn/en
FENGYUN satellite data center: http://data.nsmc.org.cn
Long-term dataset reprocessing project website: http://www.richceos.cn

SWAP2.0 (English): http://rsapp.nsmc.org.cn/geofy/en
FENGYUN Earth： http://fyearth.nsmc.org.cn/