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Progress of Fengyun Meteorological Satellites Since 2020*

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Abstract China's efforts to develop Fengyun meteorological satellites have made major strides over the past 50 years, with the polar and geostationary meteorological satellite series achieving continuously stable operation to persistently provide data and product services globally. By the end of 2021, 19 Chinese self-developed Fengyun meteorological satellites have been launched successfully. Seven of them are in operation at present, the data and products are widely applied to weather analysis, numerical weather forecasting and climate prediction, as well as environment and disaster monitoring. Since the last COSPAR report, FY-4B, the first new-generation operational geostationary satellite, and FY-3E, the first early-morning orbit satellite in China's polar-orbiting meteorological satellite family have been launched in 2021. The characteristics of the two latest satellites and the instruments on-board are addressed in this report. The status of current Fengyun Satellites, product and data service and international cooperation and supporting activities has been introduced as well.

Key words Fengyun meteorological satellite, Early morning orbit, Product and data service, International co-operation and supporting

Classified index P715.6

1 Introduction

After half a century's development, China has become one of the few countries that maintain both polar and geostationary meteorological satellites operationally in the world. Currently, there are 7 Fengyun Meteorological Satellites in orbit, include 3 polar-orbit satellites and 4 geostationary satellites. Fig.1 shows the present operational Fengyun satellites in space[1,2].

In 2021, two satellites have been added to Fengyun Meteorological Satellites family. FY-4B, the first operational geostationary satellite in FY-4 series, was launched on 3 June 2021, and positioned over the equator at 133° east longitude on 12 April 2022. FY-3E, which is the world's first early-morning-orbit meteorological satellite for civil use was launched successfully on 5 July 2021[3]. FY-3B was out of service in 2021 after more than ten years' service. The details of them will be introduced in Chapter 2.

The status of current Fengyun polar orbiting or Low Earth Observation (FY-LEO), and Fengyun Geostationary (FY-GEO) meteorological satellites are updat-

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ed in Chapter 3. The data service performance and international cooperation activities of Fengyun satellites will be introduced in Chapter 4 and Chapter 5.

2 Update on Fengyun Satellite Program

2.1 FY-3E

FY-3E, which is the first early-morning orbit satellite in China's polar-orbiting meteorological satellite family, was launched on 5 July 2021. It is the first satellite of the third batch of Chinese second-generation polar-orbiting meteorological satellite series FY-3, and it is also the world's first civilian early-morning orbiting meteorological satellite. The design life of FY-3E is 8 years. It is equipped with 11 sets of remote sensing instruments (Table 1), including: MERSI (Medium-Resolution Spectral Imager), HIRAS (Hyper-Spectral Infrared Atmospheric Sounder), MWTS (Micro-Wave Temperature Sounder), MWHS (Micro-Wave Humidity Sounder), GNOS (GNSS Occultation Sounder), WindRad (Wind Radar), SIM (Solar Irradiance Monitor), SSIM (Solar Spectral Irradiance Monitor), XEUVI (Solar X-ray and Extreme Ultraviolet Imager), IPM (Triple-angle Ionospheric PhotoMeter), and SEM (Space Environment Monitor), among which WindRad, SSIM and XEUVI are new instruments, the MWHS is an inherited payload, and the performances of 7 instruments including HIRAS have been improved[4].

Table 1 Instruments onboard FY-3E

No.	Instruments	Statues
1	Dual-frequency wind radar (WindRAD)	New
2	Solar spectral irradiance monitor (SSIM)	
3	Solar X-EUV Imagers (XEUVI)	
4	MERSI-L	Improved
5	MWTS-III	
6	HIRAS-II	
7	GNOS-II	
8	SIM-II	
9	SEM	
10	Tri-IPM	
11	MWHS-II	Inherited

Fig. 1 Operating Fengyun satellites in space

There are 4 capacities in the FY-3E series, including: high-precision optical and microwave combined atmospheric temperature and humidity sounding capability; active microwave wind field accurate remote sensing capability; high-efficiency global optical imaging capability in the low light condition with 250 m spatial resolution; comprehensive detection capability of the sun and space environment. Fig.2 showed a Solar EUV image observed by FY-3E X-EUVI.

With the global imaging and atmospheric sounding observation on the polar-orbiting meteorological satellites, the FY-3E focuses to meet the requirement of numerical weather forecasting as the first priority. And FY-3E has unique advantages in weather forecasting, meteorological disaster warning, climate monitoring, as well as solar and space weather observation in the early-morning orbit. After FY-3E was successfully launched and operated in orbit, it has been completed to construct

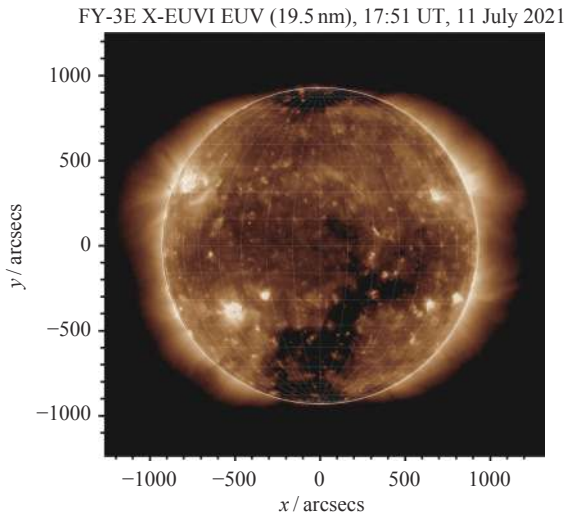

Fig. 2 Solar EUV image observed by FY-3E X-EUVI

the three orbital polar constellation of Fengyun, *i.e.*, early-morning, mid-morning and afternoon orbits. The global observation frequency of FY-3 can reach every 4 h. The number of instruments assimilated in the national NWP model GRAPES has increased from 11 to 18, the amount of assimilated FY-3 satellite data has increased by 50%, and the forecast period has been extended by about 12 h.

2.2 FY-4B

FY-4B, which is the first operational geostationary satellite in FY-4 series, was successfully launched from the Xichang Satellite Launch Center at 00:17 LT on 3 June 2021, and was successfully positioned over the equator at 123.5° east longitude at 17:07 LT on 10 June 2021, repositioned to the equator at 133° east longitude on 12 April 2022. There are 4 instruments on the FY-4B (Table 2), Advanced Geostationary Radiation Imager (AGRI), Geostationary Interferometric Infrared Sounder (GIIRS), Geostationary High Speed Imager (GHI), and Space Environment Package (SEP)[5].

The main observation capabilities are similar to those of FY-4A, with significant improvement in the on-orbit performances. The main application objectives of FY-4B are: to monitor high-impacted weather systems such as typhoons and strong convection (see Fig.3), and provide services for meteorological and disaster prediction; to obtain regional atmospheric temperature and humidity profiles through high-frequency monitoring of the atmosphere and clouds; to monitor Earth radiation, ice and snow cover, sea surface temperature, aerosol and ozone, *etc*., and provide services for short-term climate prediction and climate change prediction; to provide information services for ecological and environmental monitoring through real-time monitoring of floods, high temperatures, cold waves, droughts, snow cover, vegetation, and sandstorms; to obtain space weather monitoring data and apply it to space weather forecasting to ensure satellite security, communication, navigation and space activities; to generate various atmospheric physical parameters and products to provide services for ecological environment, transportation, agriculture, forestry, ocean, energy and other industries, as well as national emergency and national defense security.

Table 2 Instruments onboard FY-4B

No.	Instruments	Statues
1	Advanced Geostationary Radiation Imager (AGRI)	Inherited
2	Geostationary Interferometric Infrared Sounder (GIIRS)	Inherited
3	Geostationary High Speed Imager (GHI)	New
4	Space Environment Package (SEP)	Inherited

3 Status of Operational Fengyun Satellites

At present, FY-3 LEO (Low Earth observation) meteorological satellites have realized early-morning, morning and afternoon three orbital observations to obtain global data four times a day. The operational LEO satellites in orbit contain FY-3C since 2013, FY-3D since 2017 and FY-3E since 2021.

FY-2 and FY-4 geostationary meteorological satellites are positioned over the Equator and can carry out continuous minute-scale high frequency observation of the fixed area covering one third of the Earth. The operational GEO (Geostationary) satellites in orbit contain FY-2G, FY-2H, FY-4A and FY-4B.

Among them, FY-4B and FY-3E have completed the on-orbit commission testing, and are scheduled for operational service in June 2022.

3.1 Status of Current LEO

FY-3B stopped operation on 9 December 2021. There are two LEO satellites for operational use by 1 May 2022, which are FY-3C and FY-3D. FY-3C is in partial operation with 5 payloads. FY-3D is in normal operations with 9 payloads[6]. Satellites and payloads information are shown in Table 3.

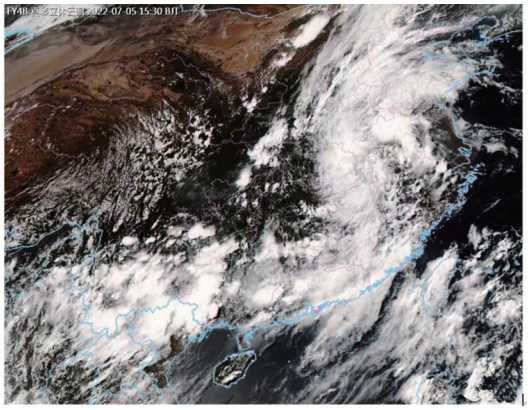

Fig. 3 FY-4B cloud image (Visible band composite, 15:00 BJT, 5 July 2022)

Table 3 Current operational Fengyun LEO satellites (as of 1 May 2022)

Orbit type (Local time of descending node/ascending node)	Satellites currently in orbit	Equatorial crossing time (design specifications)	Equatorial crossing time (present)	Launch date	Status	Main instruments
Morning orbit (07:00–12:00 LT)/ (19:00–24:00 LT)	FY-3C	10:00 LT	07:39 LT	23 Sept. 2013	Primary operation	VIRR(O) MERSI(S) IRAS(S) MWRI(S) MWTS-2(S) MWHS-2(O) TOU(O) SIM(S) ERM(O) GNOS(O) SEM(S)
Afternoon orbit (12:00–17:00 LT)/ (00:00–05:00 LT)	FY-3D	14:00 LT	13:45 LT	15 Nov. 2017	Primary operation	MERSI-II(O) HIRAS(O) MWTS-II(O) MWHS-II(O) MWRI(O) GAS(T) GNOS(O) WAI(O) IPM(O) SEM(O)

Note (O) means the instruments working operationally, (T) means the instruments are working for testing, (S) means the instruments are shut down

Information about the main instruments carried on Fengyun LEO satellite.

VIRR (Visible and Infra-Red Radiometer), flying on FY-3A/B/C, 10-channel VIS/IR radiometer for multi-purpose imagery, resolution 1.1 km, swath 2800 km.

MERSI (Medium Resolution Spectral Imager), flying on FY-3A/B/C, 20-channel radiometer (19 in VIS/NIR/SWIR and one in TIR at 10.0–12.5 μm) for ocean color and vegetation indexes. Resolution 250 m for 4 VIS/NIR and one TIR channel, 1 km for other channels; swath 2800 km. Since FY-3D, the MERSI is evolved to MERSI-2, which has 25 channels (19 in VIS/NIR/SWIR and 6 in TIR from 3.7–12.5 μm).

MWRI (Micro-Wave Radiation Imager), flying on FY-3A/B/C/D, 5-frequencies/10 channels (all frequencies in double polarization) for multi-purpose MW imagery. Conical-scanning radiometer, resolution 9.5 km×15 km at 90 GHz, 30 km×50 km at 19 GHz, swath 1400 km.

IRAS (Infra-Red Atmospheric Sounder), flying on FY-3A/B/C, 26-channel IR radiometer (including one VIS) for temperature/humidity sounding, resolution 17 km, swathe 2250 km.

MWTS (Micro-Wave Temperature Sounder), flying on FY-3A/B, 4-channel MW radiometer for nearly-all-weather temperature sounding, 54 GHz band, resolution 70 km, cross-track scanning, swath 2200 km.

MWTS-2 (Micro-Wave Temperature Sounder), flying on FY-3C/D, 13-channel MW radiometer for nearly-all-weather temperature sounding, 54 GHz band, resolution 70 km, cross-track scanning, swath 2200 km.

MWHS (Micro-Wave Humidity Sounder), flying on FY-3A/B, 4-frequency/5-channel (one frequency in double polarization) MW radiometer for nearly-all-weather humidity sounding. 183 GHz band, resolution 15 km, cross-track scanning, swath 2700 km.

MWHS-2 (Micro-Wave Humidity Sounder), flying on FY-3C/D, 15-channel MW radiometer for nearly-all-weather humidity sounding. 183 GHz band, resolution 15 km, cross-track scanning, swath 2700 km.

TOU/SBUS (Total Ozone Unit and Solar Backscatter Ultraviolet Sounder), flying on FY-3A/B/C, a suite of two UV spectro-radiometers, one (TOU) with 6 channels in the 308–360 nm range, resolution 50 km, swath 3000 km, for total ozone; the other one (SBUS) with 12 channels in the range 252–340 nm, resolution 200 km, nadir viewing, for ozone profile.

ERM (Earth Radiation Measurement), flying on

FY-3A/B/C, 2 broad-band channels radiometer for Earth reflected solar flux and Earth emitted thermal flux over total (0.2–50 μm) and short (0.2–4.3 μm) waveband; resolution 28 km, cross-track scanning with 2° NFOV, swath 2300 km, nadir viewing with 120° WFOV.

SIM (Solar Irradiance Monitor), flying on FY-3A/B/C, 3-channel radiometer over 0.2–50 μm waveband for the total incident solar flux; viewing the Sun near the north pole area.

GNOS (GNSS Occultation Sounder), flying on FY-3C/D, receives the signal from GPS or China Beidou satellites; observing over 1000 occultation events per day.

GAS (Greenhouse gases Absorption Spectrometer), flying on FY-3D, has four narrow bands with center wavelength located at 0.76 μm, 1.6 μm, 2.1 μm and 2.3 μm, which observes infrared light reflected from the Earth's surface and the atmosphere. Column abundances of CO_2 and CH_4 are calculated from the observational data.

SEM (Space Environment Monitor), flying on FY-3A/B/C/D, for in-situ observation of charged particles in the proximity of satellite.

WAI (Wide-field Auroral Imager), flying on FY-3D, for remote sensing imaging the N_2 Lyman-Birge-Hopfield (LBH) auroral bands.

IPM (Ionospheric PhotoMeter), flying on FY-3D, for nadir remote sensing the airglow intensity of the OI 135.6 nm and N_2 Lyman-Birge-Hopfield (LBH) bands.

HIRAS-1 (Hyperspectral Infrared Atmospheric Sounder-I), flying on FY-3D, 1370 channels, for temperature/humidity sounding, spatial resolution 16 km.

3.2 Status of Current GEO

There are three GEO satellites for operational use by 1 May 2022, which are FY-2G, FY-2H, and FY-4A. Satellites and payloads information are shown in Table 4. As planned, FY-2F stopped service on 1 April 2022.

The information about the main instruments carried on Fengyun GEO satellites[7] is listed as follows.

VISSR (Visible and Infrared Spin Scan Radiometer): The version for FY-2A/B had three VIS/IR channels (0.55–1.05 μm, 6.2–7.6 μm, and 10.5–12.5 μm), the improved version for FY-2C/D/E/F/G/H splits the IR channels into two and adds a 3.5–4.0 μm channels. The spatial-resolution is slightly improved from 5.76 km (IR) and 1.44 km (VIS), to 5.0 km (IR) and 1.25 (VIS). The image cycle is 30 min.

SEM (Space Environment Monitor): A space particle monitor and an X-ray monitor are mounted on FY-2 to detect the space environment in the proximity of the satellite, the solar activities, and relevant space phenomena. The SEM data is transmitted *via* telemetry to the ground system.

AGRI (Advanced Geosynchronous Radiation Imager): to fly on FY-4A, multispectral imager with two independent mirrors scanning in north-south and east-west directions respectively; 216 sensors in 14 bands from visible to long-wave infrared (0.45–13.8 μm); onboard calibration for all bands, full optic length of radiation considered in calibration. Spatial resolutions: 1 channel in 1 km, 2 channels in 500 m, 4 channels in 2 km, 8 channels in 4 km. Sensitivity: S/N 90–200, NE ΔT 0.2–0.7 K at 300 K. Full-disk scanning time: 15 min.

GIIRS (Geo. Interferometric Infrared Sounder): to fly on FY-4A, two independent mirrors scanning in north-south and east-west directions respectively; 32×4 plane arrays for mid-wave (375 S/MIR channels) and long-wave infrared bands (538 LWIR channels). Spatial resolution 16 km; active and radiant coolers; radiometric calibration accuracy 1.5 K. Temporal resolution: mesoscale area 35 min (1000 km×1000 km); China area

Table 4 Current operational Fengyun GEO satellites (as of 1 May 2022)

Satellites currently in orbit	Location	Launch date	Status	Main instruments
FY-2G	99.5°E	31 Dec. 2014	Primary operation for full disk scan	VISSR(O) SEM(O)
FY-4A	104.7°E	11 Dec. 2016	Primary operation for full disk scan	AGRI(O) GIIRS(O) LMI(O) SEP(O)
FY-2H	79°E	5 Jun. 2018	Primary operation for full disk scan since 1 Jan. 2019	VISSR(O) SEM(O)

Note (O) means the instruments working operationally, and (S) means the instruments are shut down

67 min (5000 km×5000 km).

LMI (Lightning Mapping Imager): to fly on FY-4A, two tubes for observation to achieve more spatial coverage. Central wave-length 777.4 nm; sensitivity $S/N \geqslant 6$; spatial resolution 7.8 km; temporal resolution 2 ms.

SEP (Space Environment Package): to fly on FY-4A, a suite that contains a magnetometer for magnetic field vector, an energetic particle detector detecting high-energy electron storms (1–165 MeV, and >165 MeV) and proton events (0.4–4 MeV), and space weather effect detectors for the impact of space weather on the spacecraft.

4 Product and Data Service

4.1 Data Resources

NSMC Data Service Center is responsible for Fengyun series satellite data management and long-term storage. NSMC is also one of three national satellite data centers as the Atmospheric Remote Sensing Satellite Data Center. By the end of 2021, NSMC has stored data volume up to near 25 PB from 50 satellites, 92% of the archive is Fengyun series satellite data. The cumulative annual archive data volume from 1988 to 2021 in NSMC are shown in Fig.4. Data and products specification and details can be found on NSMC web portal*.

4.2 Data Service

Fengyun Meteorological Satellites data are shared globally in real-time and open to global users. There exist several ways for global community to get Fengyun meteorological satellite data. Direct broadcasting users can directly receive real-time data with appropriate receiving antenna and pre-processing software package. The CMACast users can receive data and product with DVB-S equipment near real-time. The full Fengyun meteorological satellite dataset, both real-time and historical data are available on NSMC satellite data service website in Chinese and English version**. Users can search and download data after registration[8].

By the end of 2021, more than 120 thousand users registered at NSMC satellite data service website. Near 9 PB satellite data have been delivered to the domestic and international users in 2021. NSMC satellite data service website has processed near 140 thousand orders and retrieved 501 TB satellite data for users.

World Meteorological Organization (WMO) released a publication "RA II and RA V Survey on the Use of Satellite Data" in 2020. The purpose of the survey is to collect up-to-date information on WMO Members' capabilities and needs regarding the use of satellite data in meteorological, climate, water and related environmental applications. Fig.5 shows a survey result for general-purpose polar-orbiting satellite products, includ-

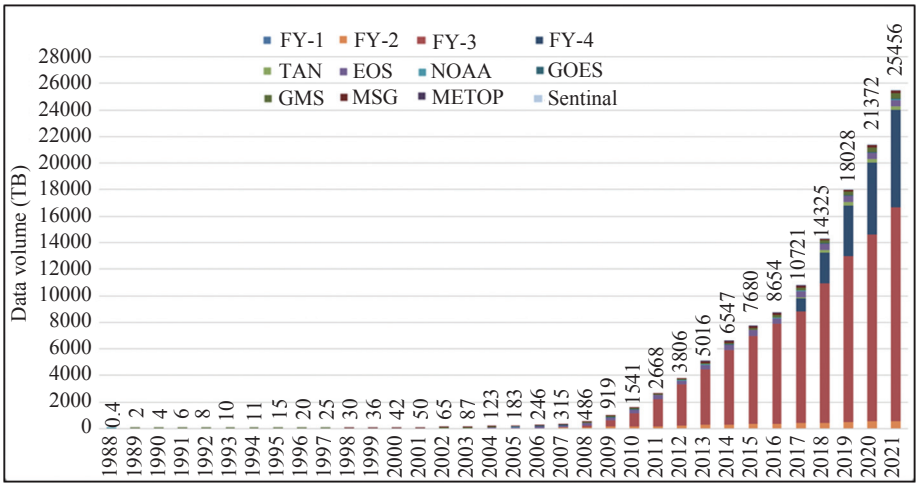

Fig. 4 Cumulative annual archive data volume in NSMC

*http://www.nsmc.org.cn
**http://data.nsmc.org.cn

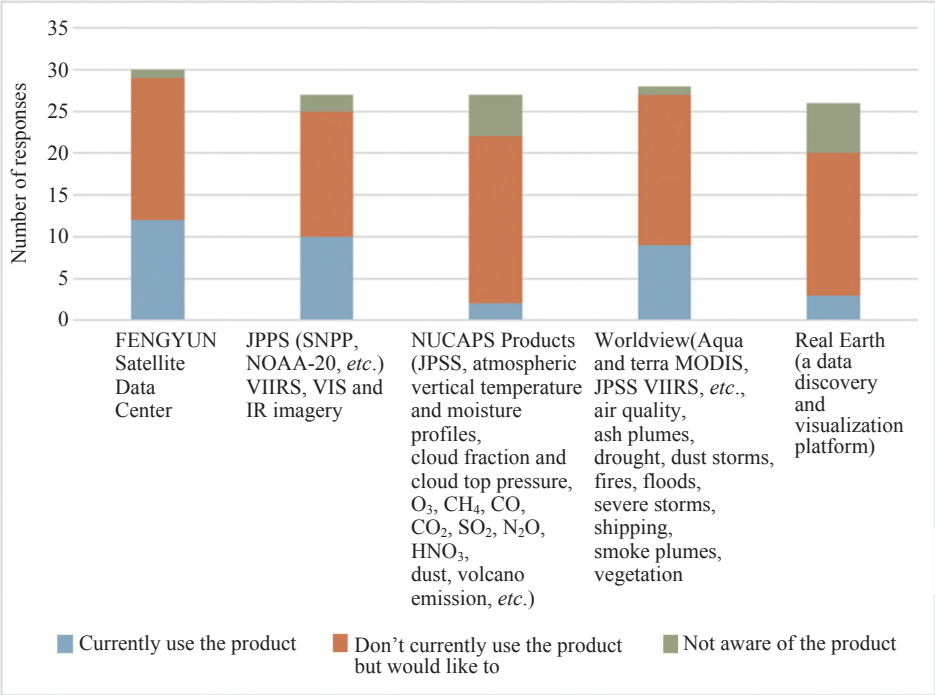

Fig. 5 WMO Survey Result: General-purpose polar-orbiting satellite products

ing the well-known and widely used Fengyun Satellite Data Center[9].

5 International Co-operation and Supporting

5.1 International and Regional Cooperation

Fengyun meteorological satellites play important roles in the global space programs of World Meteorological Organization (WMO). NSMC keeps close cooperation with WMO, CGMS, CEOS, GEO, APSCO and other international organizations and EUMETSAT, NOAA and other satellite providers on instrument development, remote sensing application, data exchange and applications related to weather monitoring and forecasting. From 1 to 5 November 2021, the 11th Asia-Oceania Meteorological Satellite User Conference (AOMSUC-11) hosted by the China Meteorological Administration (CMA) was held in Beijing *via* the internet. In order to further strengthen exchanges and cooperation with international users of Fengyun Meteorological Satellites in remote sensing applications, improve the international service capabilities of Fengyun Meteorological Satellites, and also to further promote the sharing and application of Fengyun Meteorological Satellites in countries and regions along the "Belt and Road", The 2021 Fengyun Meteorological Satellite International User Conference (FYSUC-2021) co-hosted by CMA and CNSA was held concurrently with AOMSUC-11. This conference attracted representatives from more than 50 countries, regions and international organizations, with a total of 80 oral presentations and 1386 participants. The themes of the conference include the status and future development of global meteorological satellites, satellite data and products, numerical weather forecast and now weather forecasting, land-ocean-atmosphere products, space weather, climate, and the application and service of Fengyun meteorological satellites.

Meanwhile, CMA is deepening bilateral cooperation with international organizations and "Belt and Road" countries on Fengyun meteorological satellite application. Several online workshops were held to enhance remote sensing capabilities and data exchange. EUMETSAT and NSMC have built a long-term mechanism on remote sensing technologies. On 16 November 2021, China-Russia Consortium Global Space Weather Center (CRC) was inaugurated. CRC is co-built by China Meteorological Administration (CMA), Civil Aviation Administration of China (CAAC), and the Russian Federal Service for Hydrometeorology and Environmental Mon-

itoring (Roshydromet). It is the first global center in China's civil aviation meteorology field that is approved by International Civil Aviation Organization (ICAO). This center is the fourth global space weather center.

5.2 Disaster Mitigation

Since CMA introduced the Emer-gency Support Mechanism of Fengyun satellite (FY_ESM) in 2018, there are 29 countries registered for this mechanism. FY-3D, FY-4A and FY-2H have officially become on-duty satellites of International Charter "Space and Major Disasters". They have already provided relevant data service and monitoring service products for countries and territories like Madagascar, Mozambique and Malawi. In recent years, as on-duty satellites of CHARTER, Fengyun satellites have played increasingly significant roles in global meteorological disaster readiness, and serving "Belt and Road" construction.

NSMC has provided 19 international emergency support services in 2021 (Table 5). The international emergency responses involve meteorological disasters such as dam break, volcanic eruption, heavy rainfall, tropical cyclone, and flood and oil spill.

5.3 "Belt and Road" Services

Several kinds of services have been implemented by NSMC to support "Belt and Road" users. NSMC has provided FY-2, FY-3 and FY-4 data for the "Belt and Road" countries and regions including Eswatini, India, Philippines, Indonesia, East Timor, Saint Vincent, Congo, Sri Lanka, Russia, Togo, Arabia, United Arab Emirates, Oman and Micronesia during 2021. The monitoring service products provided to international users include satellite remote sensing monitoring map, monitoring thematic map, change monitoring map, dynamic map, quantitative statistical data and satellite remote sensing monitoring service report. At the same time, NSMC has strengthened the construction of a remote sensing application service platform. We have completed the testing of global fire monitoring system and atmospheric environment monitoring platform, upgraded the "cloud + client" international remote sensing application platform, and had SWAP and SMART platform ready to support the newly launched FY-3E and FY-4B. The cloud data acquisition software, which also has been upgraded with 33 products in total, is providing cloud services for the new data and products of Fengyun satellites. The online version of SWAP has 94 international users in 2021.

NSMC has continued to provide technical support including CMACAST, FY-3 satellite software package, Fengyun satellite data cloud client, green channel FTP,

Table 5 List of Fengyun satellite international disaster support cases in 2021

No.	Date	Country	Disaster
1	28 Jan. 2021	Swaziland	Tropical cyclone and flood
2	8 Feb. 2021	India	Flash flood
3	23 Feb. 2021	Philippines	Tropical cyclone and flood
4	7 Apr. 2021	Indonesia	Flash flood
5	8 Apr. 2021	East Timor	Tropical cyclone
6	13 Apr. 2021	St Vincent	Volcano eruption
7	24 May 2021	Congo	Volcano eruption
8	7 Jun. 2021	Sri Lanka	Sea oil spill
9	7 Jun. 2021	Sri Lanka	Flash flood
10	22 Jul. 2021	Russia	Wildfire
11	29 Jul. 2021	Tunisia and Algeria	Wildfire
12	9 Aug. 2021	Russia	Flash flood
13	15 Aug. 2021	Russia	Wildfire
14	9 Sept. 2021	Republic of Togo	Flash flood
15	3 Oct. 2021	United Arab Emirates	Tropical cyclone
16	4 Oct. 2021	Oman	Tropical cyclone
17	13 Nov. 2021	Sri Lanka	Flash flood
18	7 Dec. 2021	Indonesia	Volcano eruption
19	9 Dec. 2021	Micronesia	Flash flood

SMART, SWAP and other Fengyun satellite remote sensing application platforms in 2021 according to the requirements of international users. FY-3 meteorological satellite software package has 55 users from 29 countries, the green channel FTP has 106 users in 42 countries, and the international users of swap platform have reached 94 countries. NSMC provided 12 technical support services for Fengyun satellite data and various application software platforms to 8 countries including Laos, Iran, Maldives, Belarus, Bangladesh, Seychelles, Papua New Guinea and Singapore, and remotely guided and assisted in remote application fault resolution of swap platform in 2021. At the meantime, NSMC has provided Fengyun satellite preprocessing software support services for Britain, Australia, Norway, Germany and Belarus for 5 times, and assisted users in upgrading FY-3 preprocessing software package, updating calibration coefficient, user login, data acquisition and processing *etc*.

6 Summary

At present, FY-3 polar-orbiting meteorological satellites have completed the early-morning, morning and afternoon three orbital constellation observations to obtain the global observation data four times a day which have been used in a number of the global Numerical Weather Prediction (NWP) models worldwidely. FY-2 and FY-4 geostationary meteorological satellites are positioned over the Equator and can carry out continuous minute-scale high frequency observations of the fixed area covering one third of the Earth. FY satellites have made a positive contribution to improving the accuracy of global weather forecasting.

FY meteorological satellite system become one of the major components in the World Meteorological Organization (WMO)'s Space-based Observing System as well as the International Charter on Space and Major Disaster. CMA will continue to implement the open sharing data policy. Global users can obtain FY meteorological satellite data through several service channels.

China plans to launch five more meteorological satellites during the country's 14th Five-Year Plan period (2021–2025) and upgrade the third generation Fengyun satellite observation system by 2035, to better serve users around the world.

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