



中国气象局



The FengYun Rainfall Mission FY3G: Scientific Products and Validation Progress

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FY3G product technology team

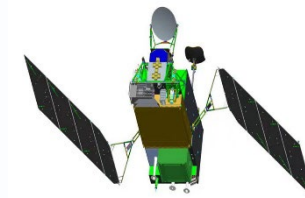
(Zhang P. Gu SY. Shou YX. Wu Q. Li XQ, Li R., Wang Y., Wang G., Zheng ZJ,
Liao M, Xu RH, Wang SJ, Zhai XC,)

NSMC/CMA



国家卫星气象中心
(空间天气监测预警中心)

11th Workshop of International Precipitation Working Group (IPWG-11), 2024.07



- 01. Brief Introduction of FY-3G Platform and Instruments**
- 02. Brief Introduction of FY-3G Products**
- 03. Products Validation Progress**
- 04. Products Delivery and Service**

Fengyun constellation

9 Satellites in orbit

- 5 LEO (FY-3C, FY-3D, FY-3E, FY-3F, FY-3G)
- 4 GEO (79E, 86.5E, 99.5E, 105E)

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

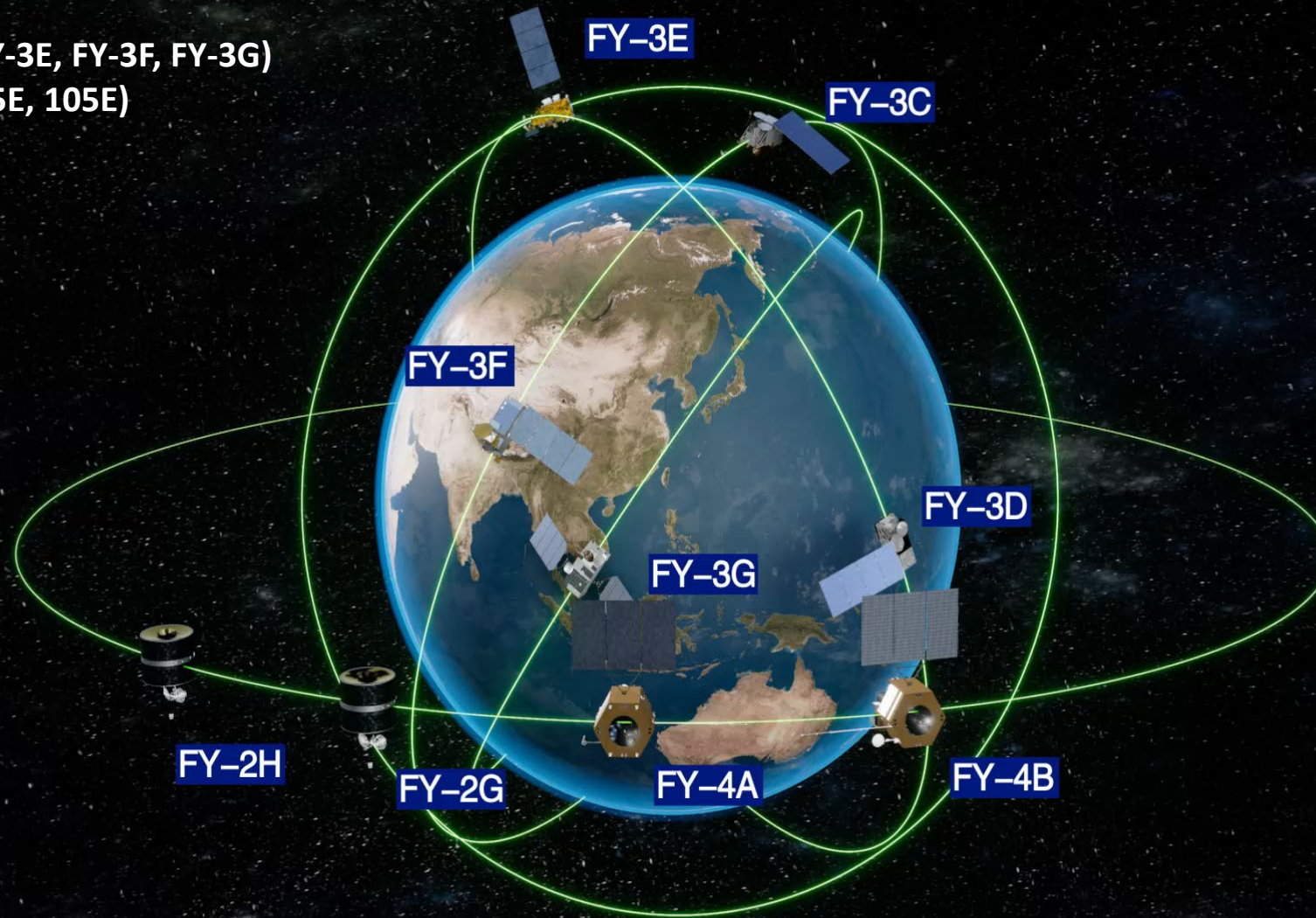
First of China's second-generation
GEO meteorological satellites.

FY-4A (86.5°E), Full disk every 15
min.

FY-4B

FY-4B (104.7°E), Full disk every 15
min, partial areas rapid scanning at 1
min.

**Operational since 1st December
2022**



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
local time
11 EO instruments
Operational since 1 Dec. 2022

FY-3F

Mid-morning orbit
10 EO instruments
Launched 3 Aug. 2023

FY-3G

Incline orbit
6 EO instruments
Launched 16 Apr. 2023
In-orbit testing data released

FY-3G Launched



Distinguishing Feature

- ❑ The 20th satellite of the Fengyun satellite family
- ❑ China's first dedicated precipitation measurement satellite

Scientific Goal

- ❑ 3D structure of precipitation in high accuracy
- ❑ Global distribution characteristics of precipitation, especially over the ocean and in the mountain areas
- ❑ Enhance understanding on extreme precipitation, energy and water cycle, etc.

FY-3G, was successfully launched on 16 April 2023 , in Jiuquan Satellite Launch Centre

March 24, 2024 12:52(UTC)

CCTV 13
新闻

CCTV 央视网
com

200km

10km

Liquid Precipitation Data (mm/h)



新闻直播间
LIVE NEWS

中国气象局

风云三号G星正式投入业务运行

On CCTV News

星期三 11:47

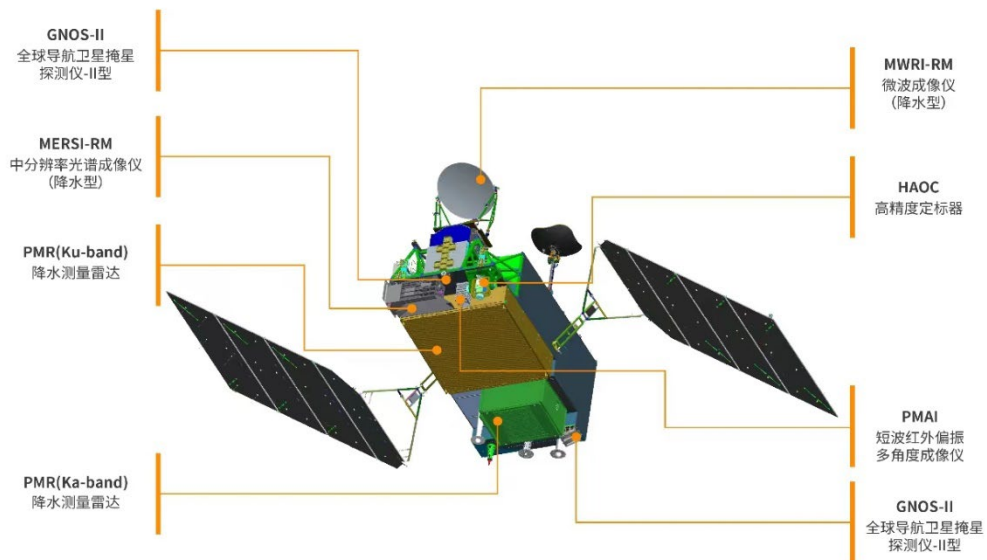
航行试验。

CCTV 新闻

这次海试主要检测验证福建舰动力、电力等系统的可靠性和稳定

On May 1st, FY-3G satellite officially run into operational service.

Payloads Configuration

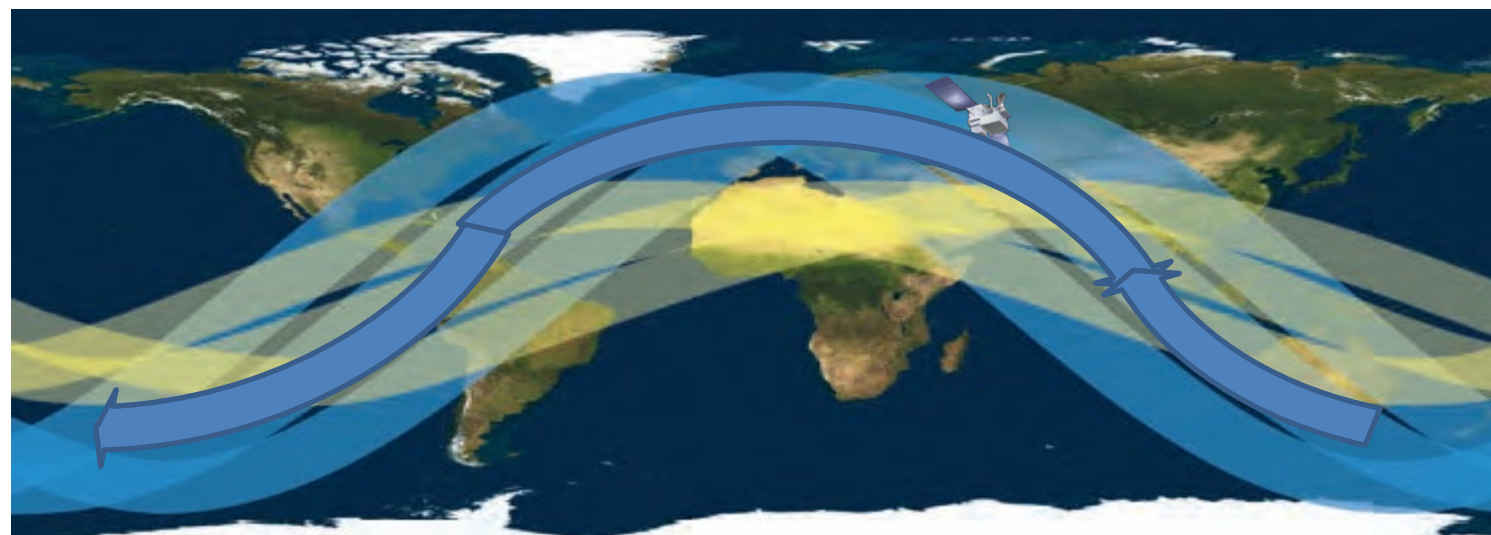


Insturment	Abbr.	Chan No.	Swath Width (km)
Precipitation Measurement Radar	PMR	2	300
Microwave Radiation Imager	MWRI-RM	26	800
Medium Resolution Spectral Imager	MERSI-RM	8	1000
Global Navigation Satellite System Occultation Sounder	GNOS-R	4	--
High Accuracy On-board Calibrator	HAOC	440/220	50
Short-wave Infrared Polarized Multi-Angle Imager	PMAR	12	700

Inclination

TRMM
GPM
FY-3G

35°
65°
50°



□ Operation

□ R & D

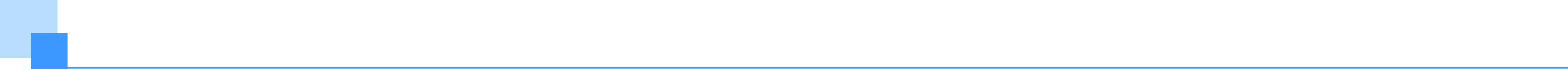
Parameters of FY-3G PMR, TRMM PR and GPM DPR



Comparison of the main parameters of PMR with TRMM PR and GPM DPR

Radar Systems	FY-3G PMR	TRMM PR	GPM DPR
Frequency band	dual-frequency (Ku, Ka)	single-frequency (Ku)	dual-frequency (Ku, Ka)
Swath width(km)	>300	215 (@350 km orbit altitude)	245(Ku), 125(Ka)
Horizontal resolution (km)(Naidr)	5	4.3(@350 km orbit altitude)	5.2
Range resolution(m)	250	250	250(Ku), 250/500(Ka)
Observation range(km)	18~—5 ASL	15~—5ASL	18~—5ASL(Ku) 18~—3ASL(Ka)
Minimum detectable precipitation rate(mm/h)	0.5(18 dBZ, Ku), 0.2(12 dBZ, Ka)	0.7(@350 km orbit altitude)	0.5(Ku), 0.2(Ka)
Dynamic range(dB)	≥70	≥70	≥70
Measurement accuracy(dB)	≤ ±1	≤ ±1	≤ ±1
Beam-matching accuracy(°)	≤0.1	/	≤0.14
Antenna peak sidelobe(dB)	≤ 30	≤ 25	≤ 25

Zhang, P., et al., 2023: FY-3G satellite instruments and precipitation products: first report of China’s Fengyun rainfall mission in-orbit. Journal of Remote Sensing, Article ID: 0097. DOI: 10.34133/remotesensing.0097



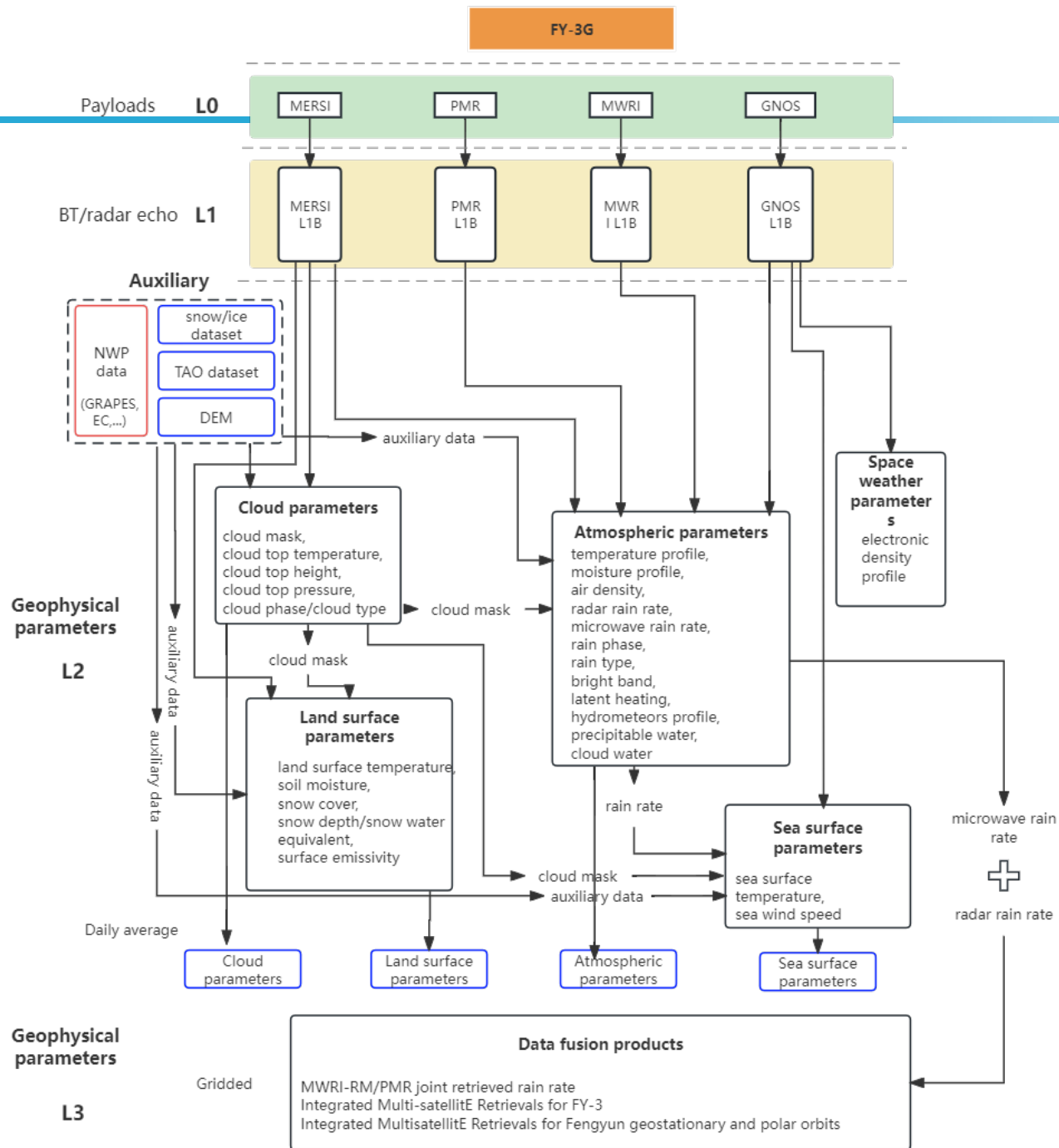
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Brief Introduction of FY-3G Products

FY-3G Satellite Designed Products

- Totally 28 products, 34 geophysical parameters, including Cloud (3)、Land (7)、Ocean (3)、Atmosphere (9)、Space weather (1)、Data assimilation support (2)、Data fusion (3).

No.	Group	Products	Parameters	Payloads
1	Cloud & Radiation	cloud mask	clouds, clear sky mask	MERSI-RM
2		cloud amounts	total cloud amounts, effective cloud amounts	
3		cloud phase	cloud phase, cloud classification	
4	Land	land surface temperature	land surface temperature	MERSI-RM
5		snow cover	snow cover	MERSI-RM
6		snow depth/snow water equivalent	snow depth, snow water equivalent	MWRI-RM
7/8		soil moisture	soil moisture	MWRI-RM, GNOS-II
9		soil freeze thaw	soil freeze thaw	MWRI-RM
10		surface emissivity	surface emissivity	MWRI-RM
11	Ocean	sea surface temperature	sea surface temperature	MWRI-RM MERSI-RM
12/13		sea wind speed	sea wind speed	MWRI-RM, GNOS-II
14	Atmosphere	rain rate	rain rate	MWRI-RM
15		hydrometeor profile	cloud water profile, cloud ice profile, rain water profile, temperature, moisture, rain rate, cloud water contents, cloud ice contents	MWRI-RM
16		precipitable water	precipitable water over sea	MWRI-RM
17		dry atmospheric profile	refractivity, density, pressure profiles	GNOS-II
18		moist atmospheric profile	banding angle, temperature, moisture, pressure profiles	GNOS-II
19		Ku-band radar product	bright band, precipitation type, precipitation phase, rain rate	PMR
20		Ka-band radar product	bright band, precipitation type, precipitation phase, rain rate	PMR
21		Dual-band radar product	bright band, precipitation type, precipitation phase, rain rate	PMR
22		latent heating	latent heating	PMR
23	Space weather	electric density profile	electric density profile	GNOS-II
24	Data assimilation support	MWRI-RM data assimilation support	MWRI-RM data assimilation support	MWRI-RM
25		GNOS-II data assimilation support	banding angle, refractivity (thinning)	GNOS-II
26	Data fusion (scientific experimental products)	MWRI-RM/PMR joint retrieved rain rate	rain rate	PMR+MWRI-RM
27		Integrated Multi-satellite Retrievals for FY-3	rain rate	FY-3D,G,F MWRI
28		Integrated Multi-satellite Retrievals for Fengyun geostationary and polar orbits	rain rate	FY-3+FY-4

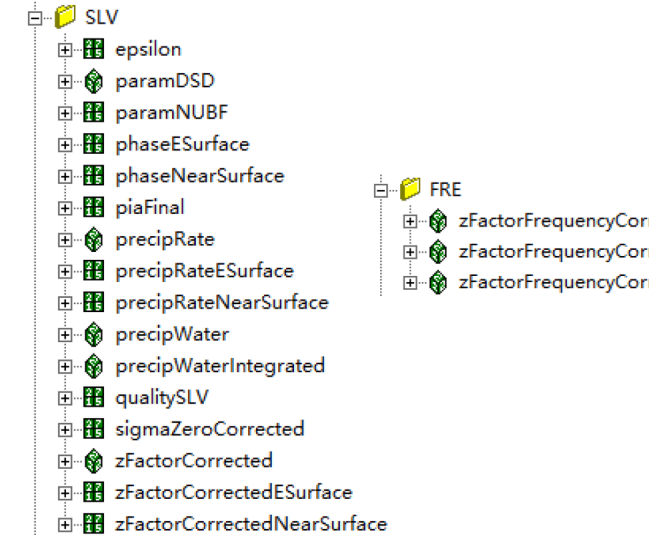
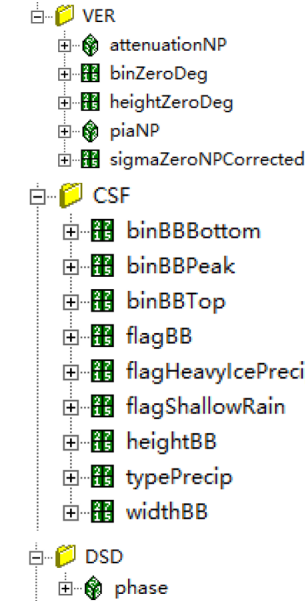


This Figure gives an overview of all data products and their processing chain.

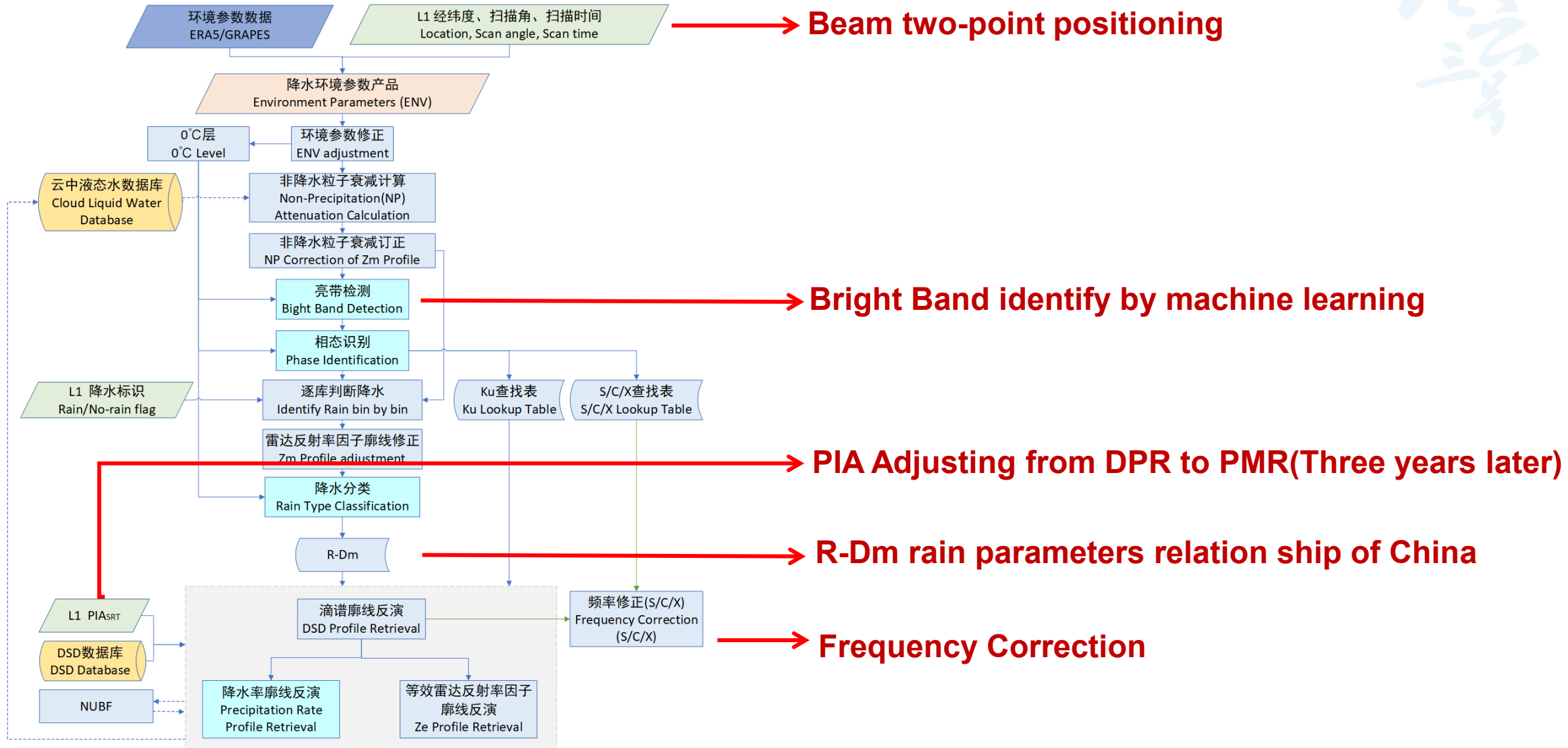
It includes level 0, level 1 and level 2 data products, as well as auxiliary and supporting data which help to generate the scientific products.

PMR Ku-Band Radar Product

No.	Group	DPR V06	PMR
1	VER	attenuationNP	attenuationNP
		binZeroDeg	binZeroDeg
		heightZeroDeg	heightZeroDeg
		piaNP	piaNP
		sigmaZeroNPCorrected	sigmaZeroNPCorrected
2	CSF	binBBBottom	binBBBottom
		binBBPeak	binBBPeak
		binBBTop	binBBTop
		flagAnvil	
		flagBB	flagBB
		flagHeavyIcePrecip	flagHeavyIcePrecip
		flagShallowRain	flagShallowRain
		heightBB	heightBB
		qualityBB	
		qualitytypePrecip	
		typePrecip	typePrecip
		widthBB	widthBB
3	DSD	phase	phase
		binNode	
4	SLV	epsilon	epsilon
		flagSLV	
		paramDSD	paramDSD
		paramNUBF	paramNUBF
			phaseESurface
		phaseNearSurface	phaseNearSurface
		piaFinal	piaFinal
		preciprate	preciprate
		preciprateAve24	
		precipRateESurface	precipRateESurface
		precipRateNearSurface	precipRateNearSurface
		precipWater	precipWater
		precipWaterIntergated	precipWaterIntergated
		qualitySLV	qualitySLV
		sigmaZeroCorrected	sigmaZeroCorrected
		zFactorCorrected	zFactorCorrected
		zFactorCorrectedESurface	zFactorCorrectedESurface
		zFactorCorrectedNearSurface	zFactorCorrectedNearSurface
			zFactorFrequencyCorrectionC
			zFactorFrequencyCorrectionS
			zFactorFrequencyCorrectionX
5	FRE		



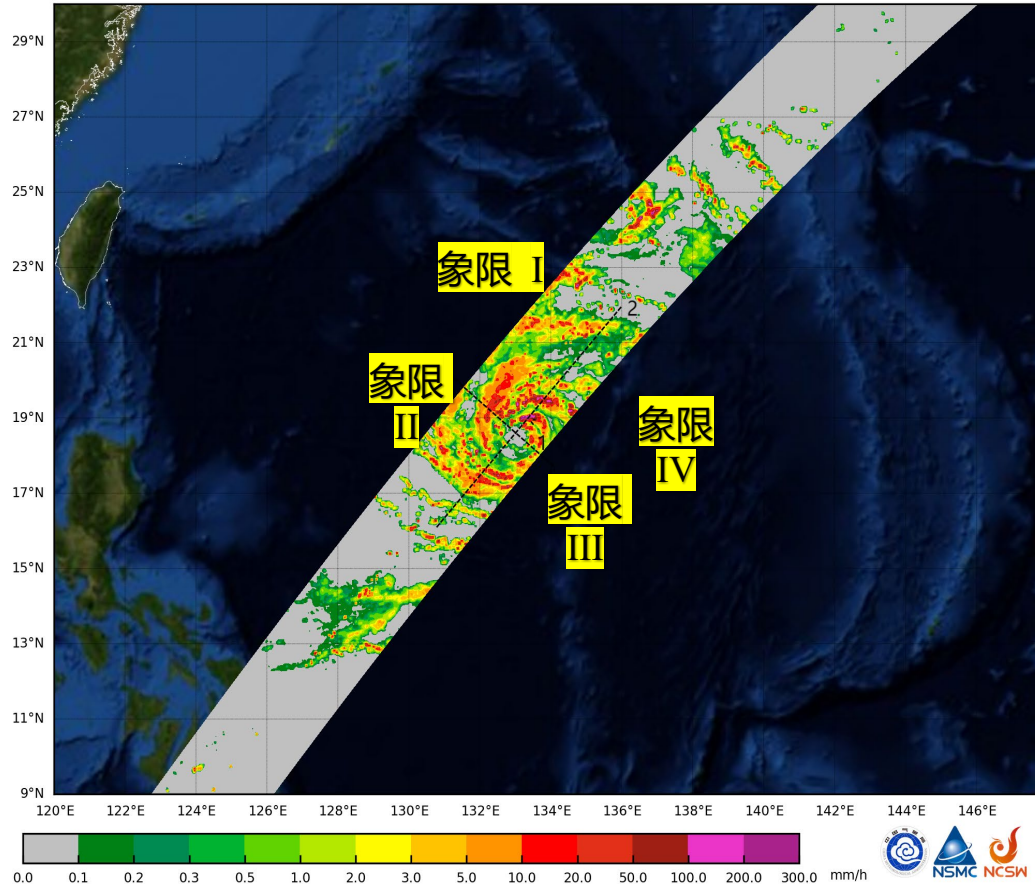
PMR Ku-Band Radar Product



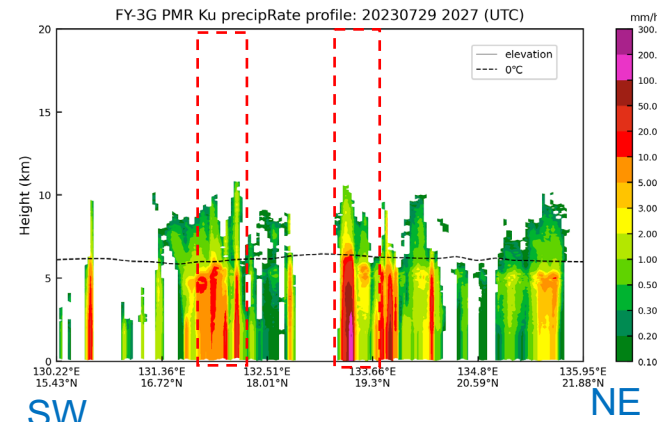
Processing Algorithm Flowchart

PMR Ku-Band Radar Product

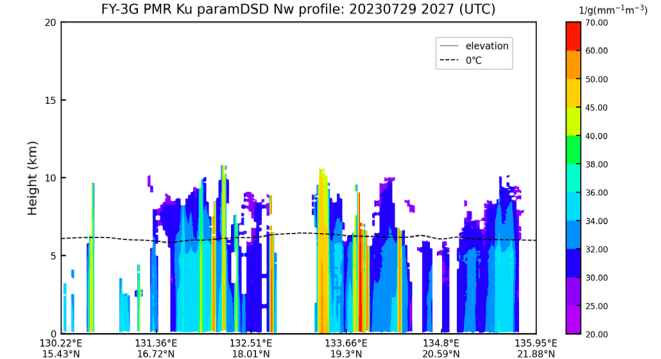
FY-3G PMR Ku NearSurface rainfall on 20230729 2027 (UTC)



Rain Rate



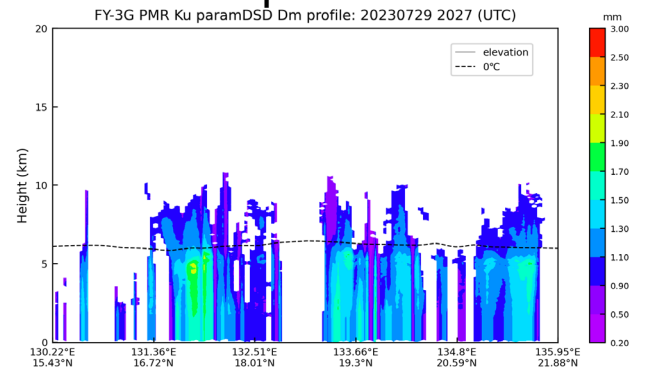
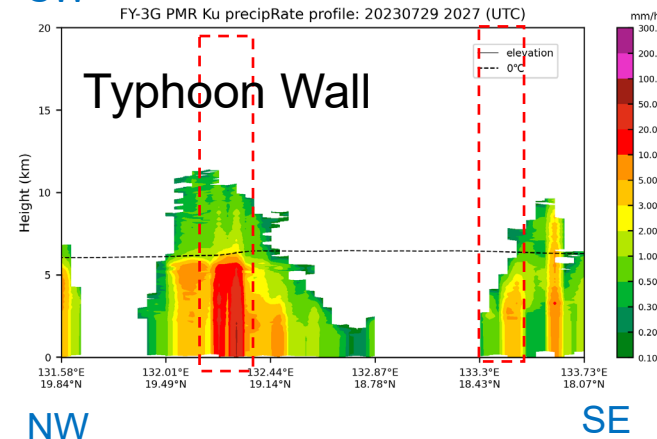
Number Concentration



SW

NE

Raindrop Diameter

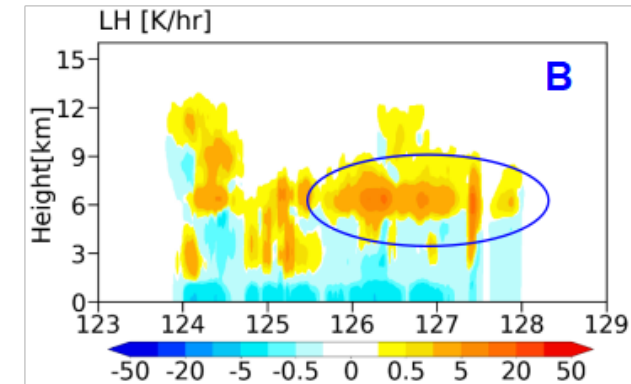
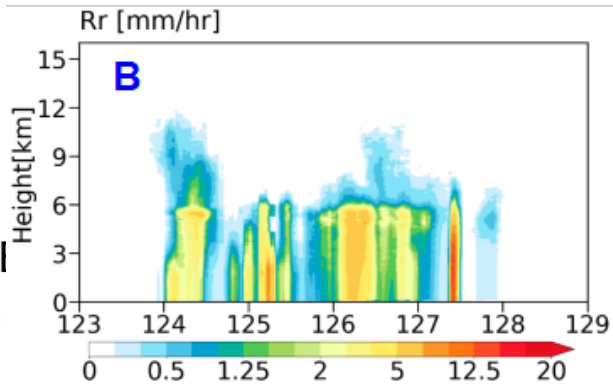
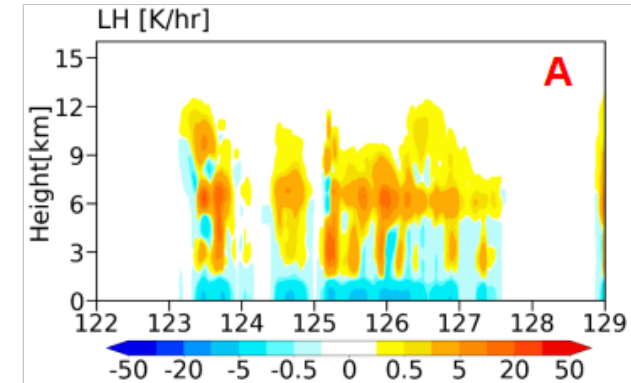
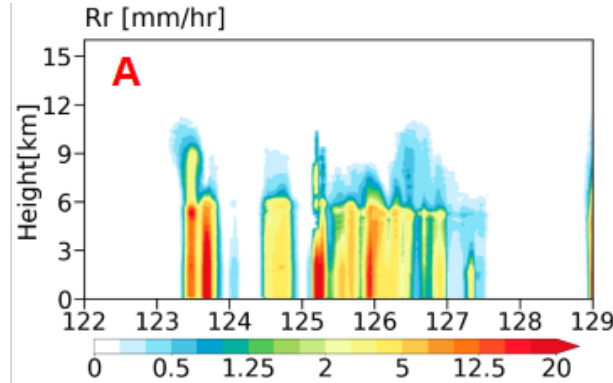
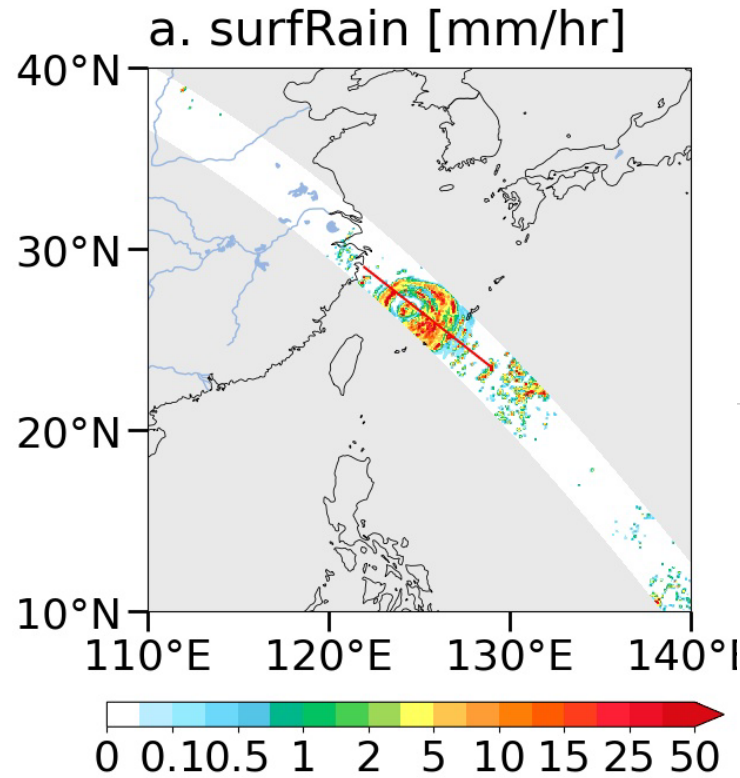


NW

SE

Product	Spatial Resolution (highest)	Coverage	Precision
Ku-band radar product	5 Km(horizontal) 250m (vertical)	55S-55N	Bias<40% (as compared to surface rain observations)

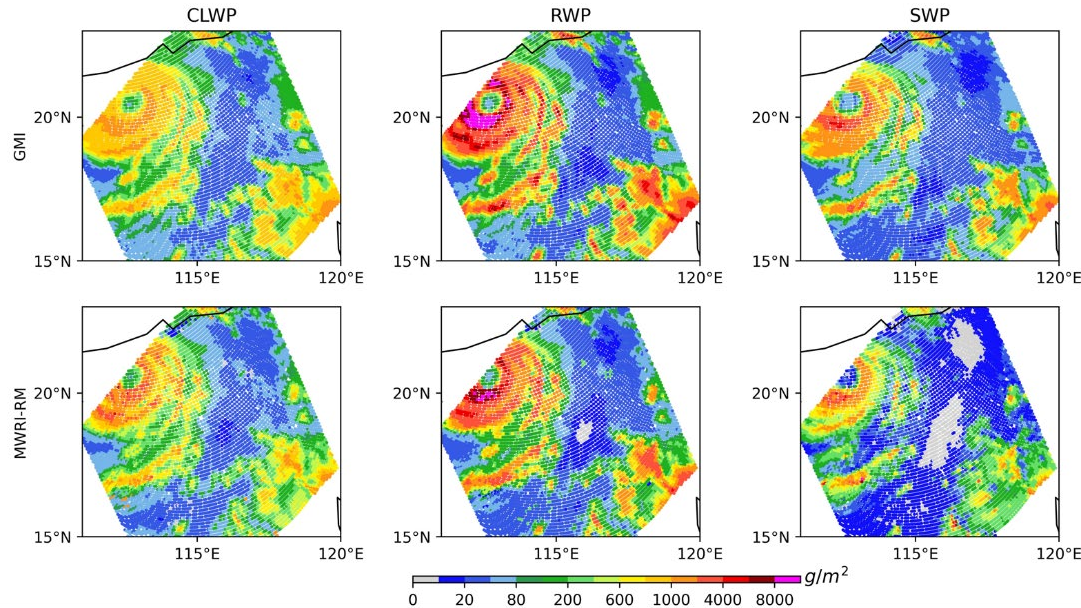
PMR Latent Heating



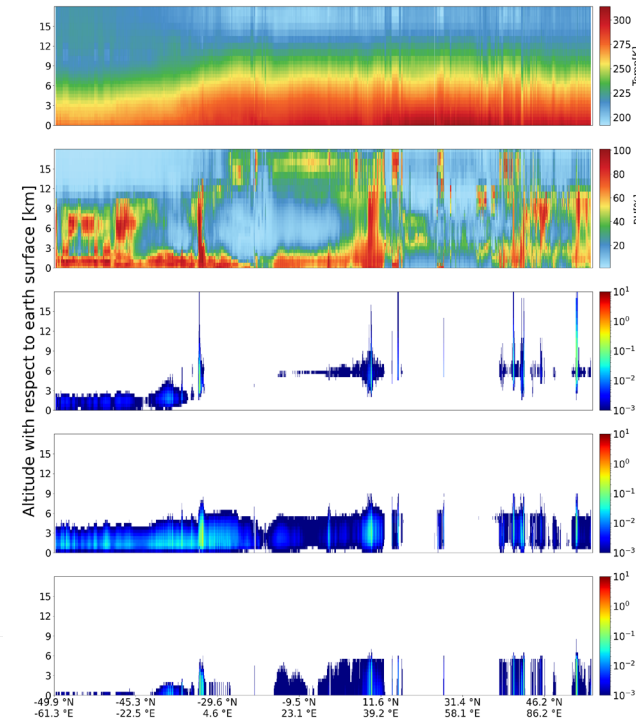
FY-3G PMR Ku band retrieved latent heating for the Super Typhoon Khanun in 2023

Product	Spatial Resolution (highest)	Coverage	Precision
latent heating	5 Km(horizontal) 250m (vertical)	55S-55N	bias: -0.06K/hr

MWRI-RM Hydrometeor Profile



FY-3G microwave-retrieved hydrometeor contents (surface rain, ice water, cloud water ,liquid water) for the Super Typhoon Khanun in 2023



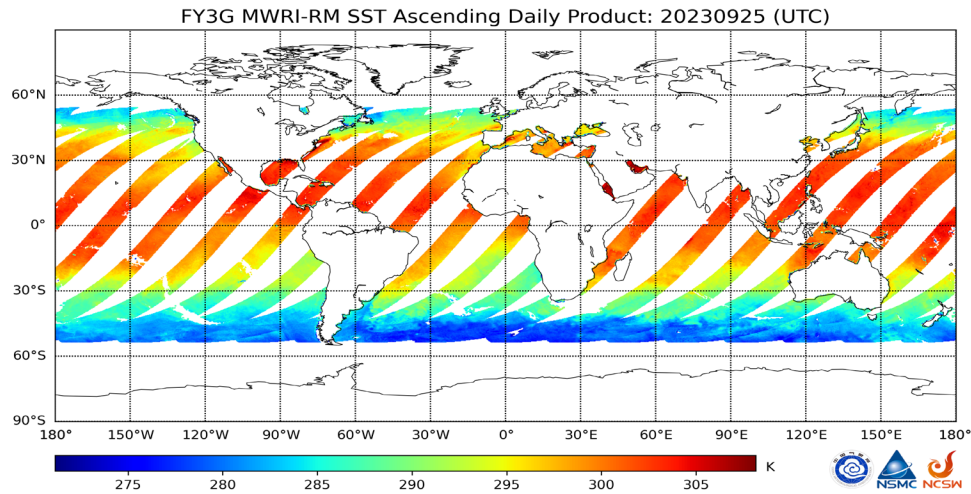
FY-3G microwave hydrometeor profiles (surface rain, ice water, cloud water ,liquid water)

□ The microwave imager (MWRI-RM) onboard the FY3G satellite has 17 channels ranging from 10.65GHz to 183.31 GHz, which can be used to retrieve multiple hydrometeors including ice water, cloud water , liquid water, temperature and moisture profile as well as the hydrometeors contents.

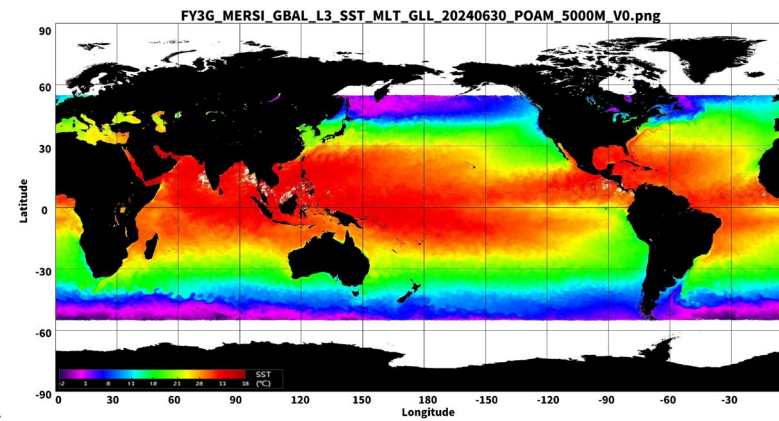
□ The hydrometeor profiles can be applied in understanding the radiative properties and forcing effects of clouds.

Product	Spatial Resolution (highest)	Coverage	Precision
Hydrometeor profile	7 Km(horizontal) 0.5-1km (vertical)	55S-55N	<10%

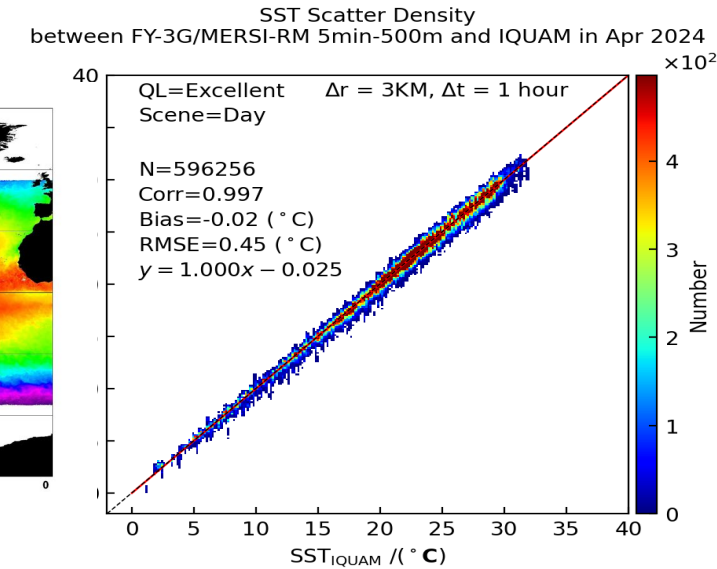
FY-3G Sea Surface Temperature



MWRI SST



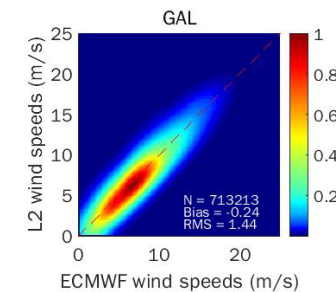
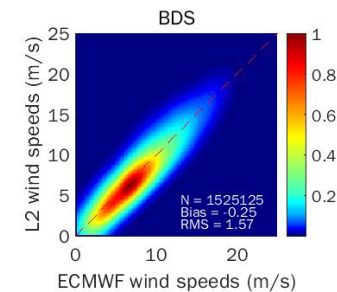
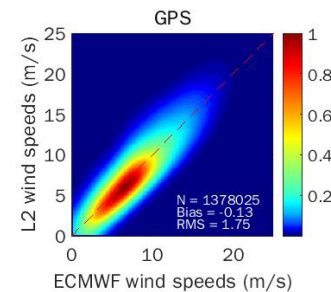
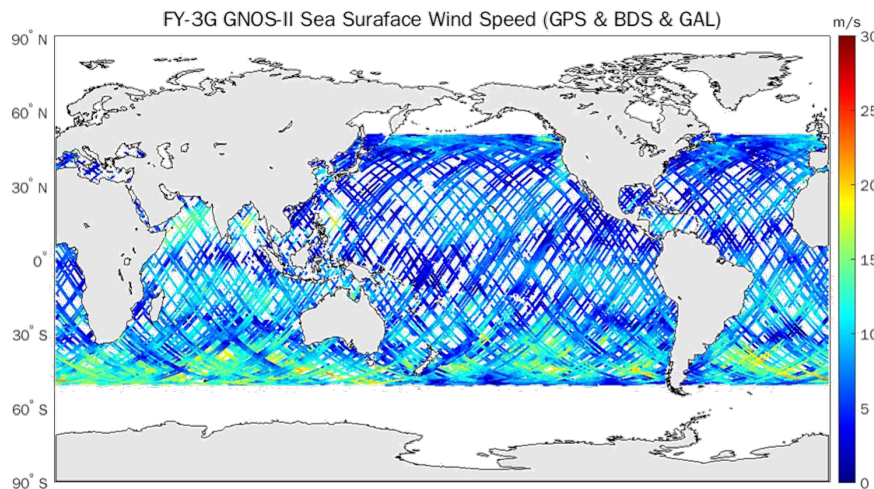
MERSI SST



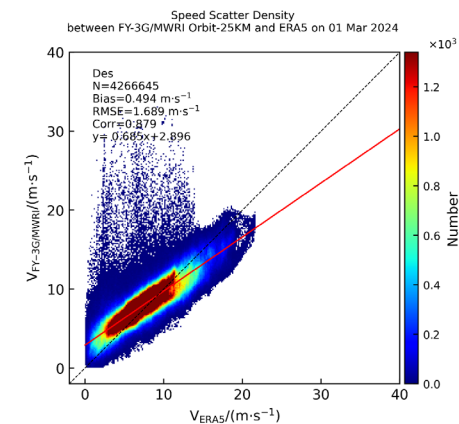
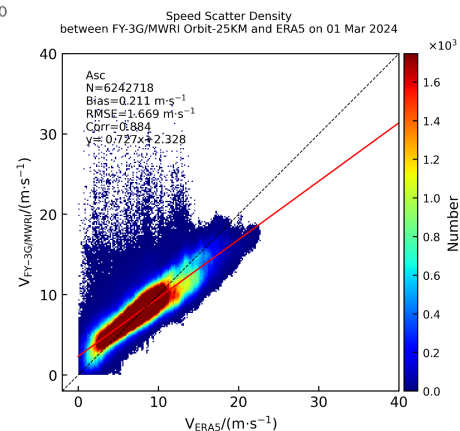
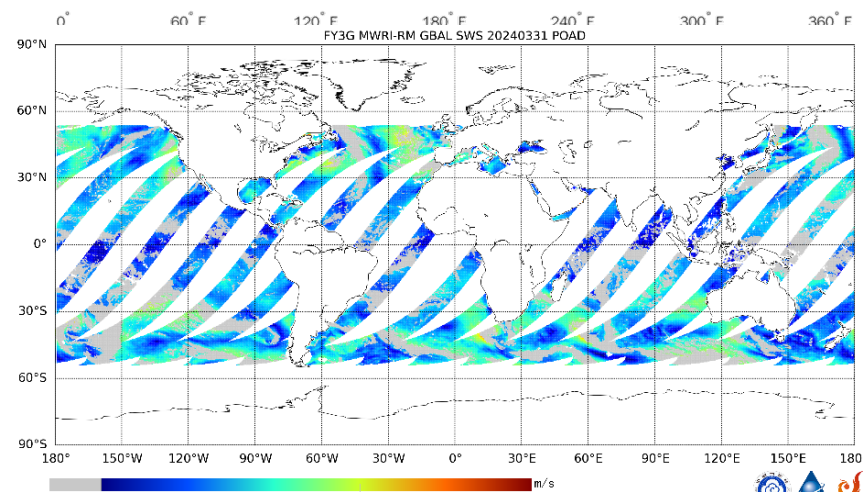
Product	Payloads	Spatial Resolution	Coverage	Precision
SST	MWRI-RM	21×35km	55S-55N	0.8K
	MERSI-RM	500m	55S-55N	0.5K

FY-3G Sea Surface Wind Speed

GNOS SSW



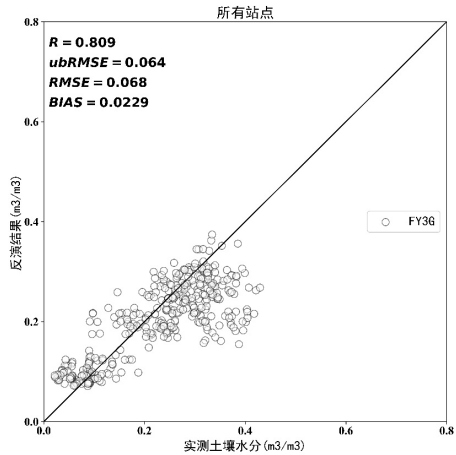
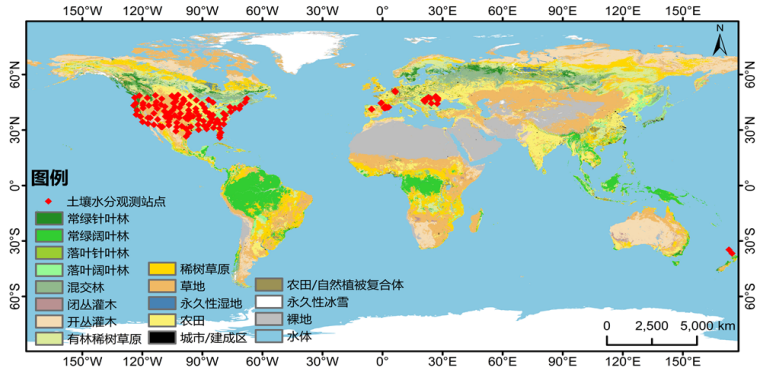
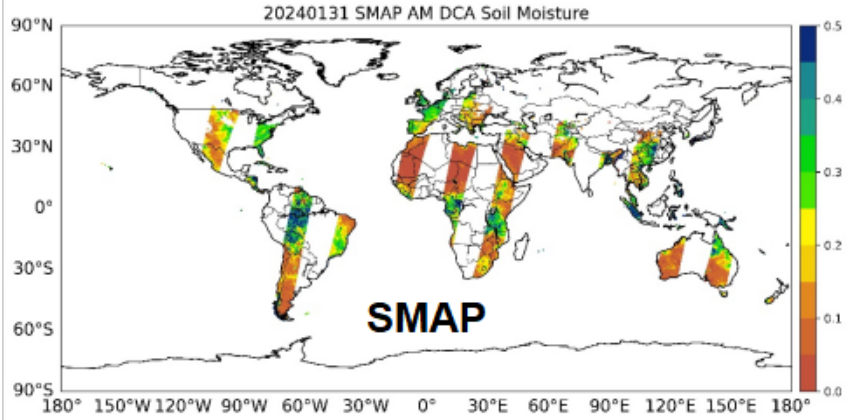
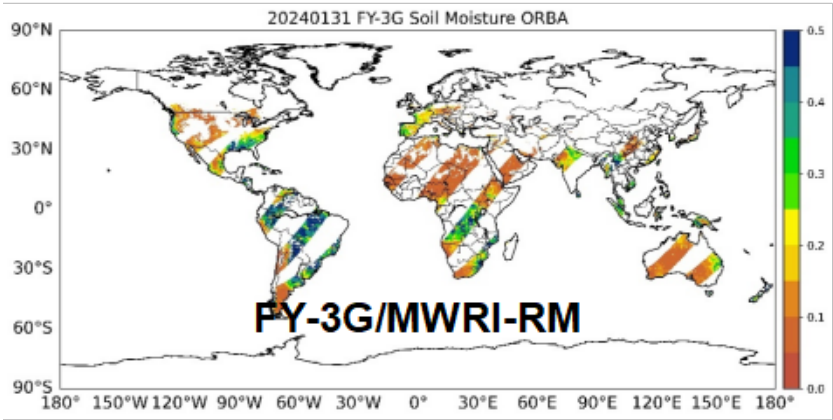
MWRI SSW



Product	Payloads	Spatial Resolution (highest)	Coverage	Precision
sea surface wind speed	GNOS-II	25km	55S-55N	GPS : 1.71m/s BDS : 1.91m/s GAL : 1.46m/s
	MWRI-RM	25km	55S-55N	Ascend: 1.832m/s Descend: 1.704m/s

FY-3G Soil Moisture

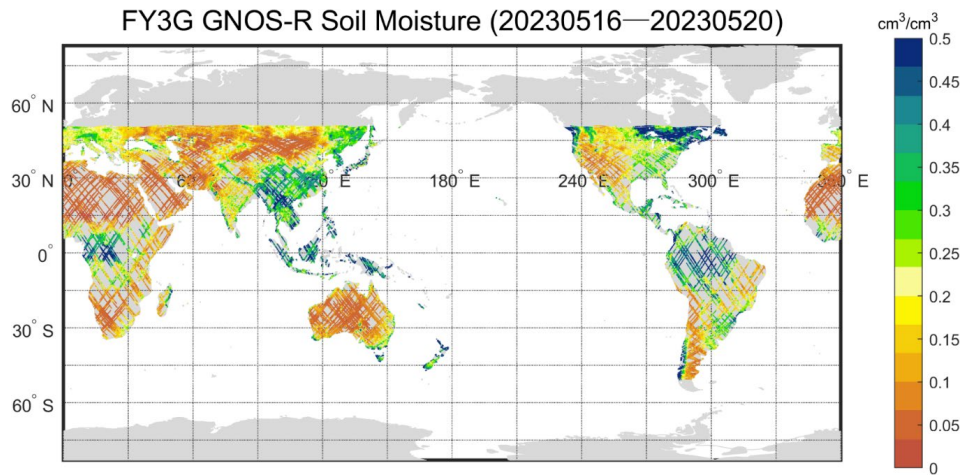
MWRI SVM



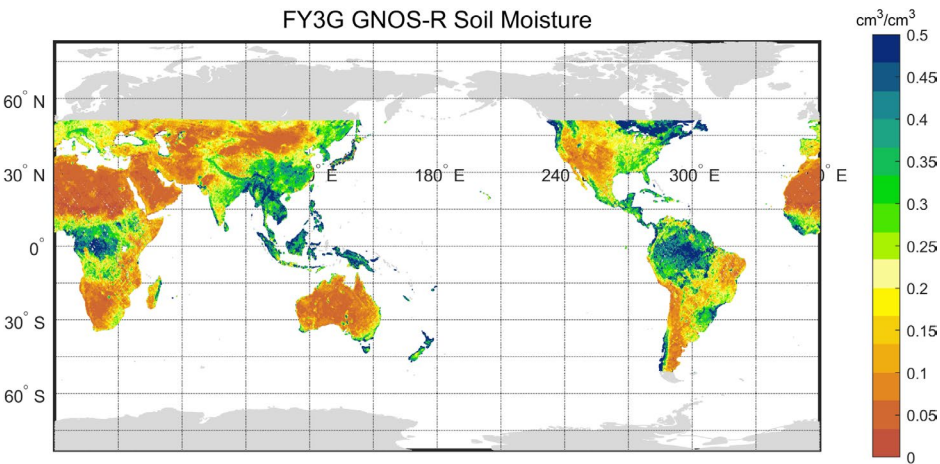
Product	Payloads	Spatial Resolution (highest)	Coverage	Precision
soil moisture	MWRI-RM	25km	55S-55N	0.06cm³/cm³
	GNOS	6km	55S-55N	0.05cm³/cm³



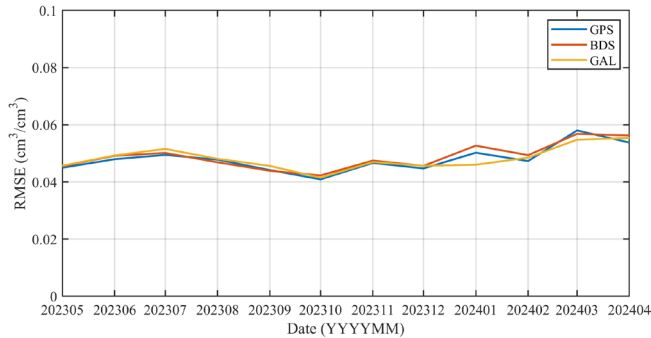
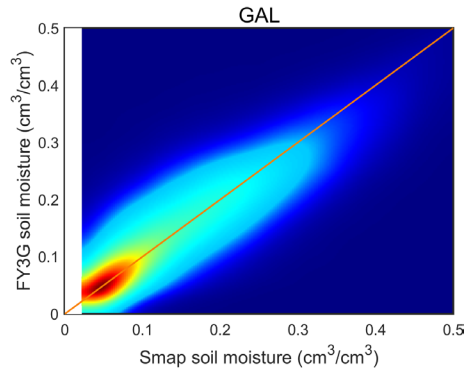
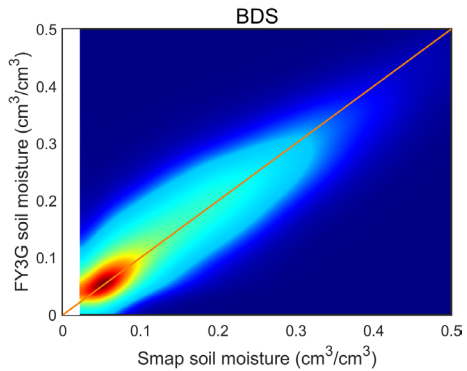
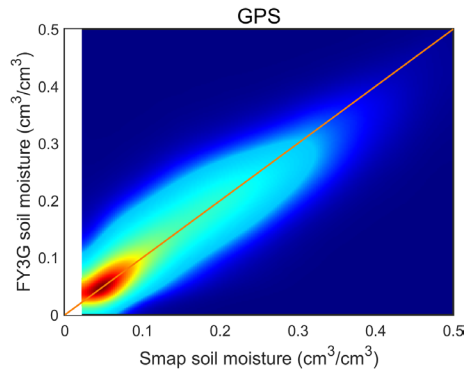
FY-3G Soil Moisture



5-days averaged GNOS VSM



Monthly GNOS VSM



	GPS	BDS	GAL
RMSE(cm³/cm³)	0.049	0.049	0.048
Corr_Coeff	0.86	0.86	0.87

3

PMR Product Validation

3、PMR Product Validation Progres

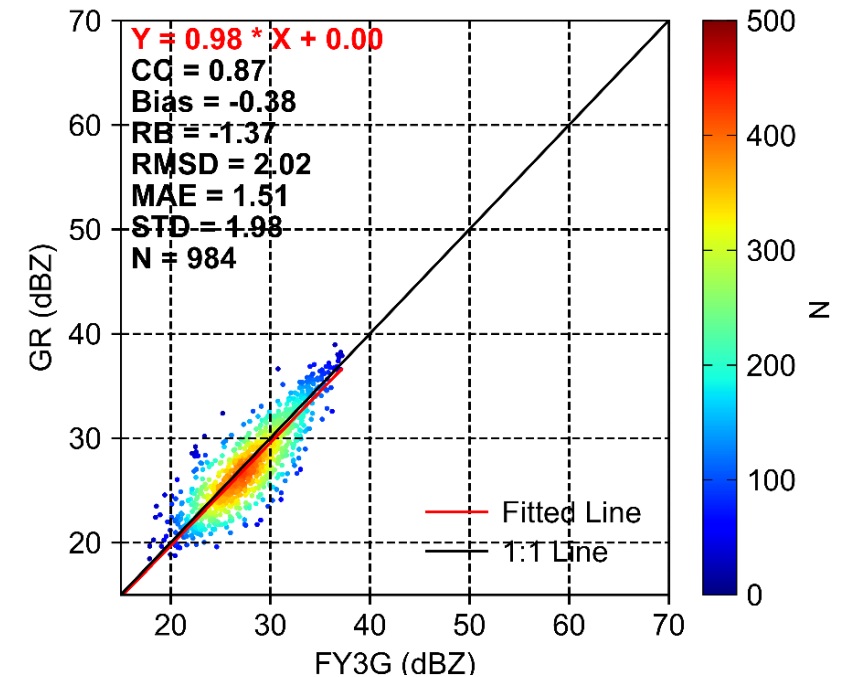
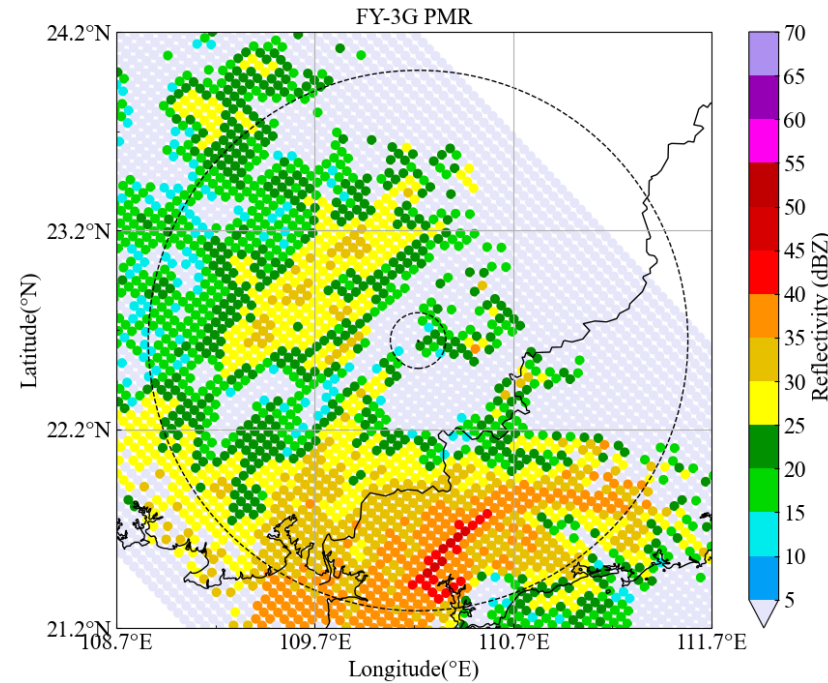
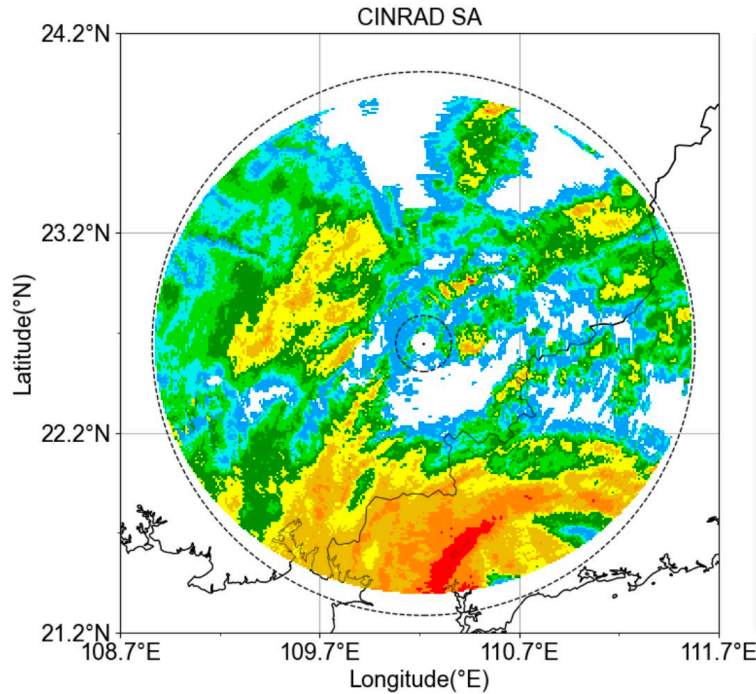


- ❑ Comparison of the Equivalent Reflectivity Factor derived from the PMR L2 product and Ground Radar;
- ❑ Validation of the Precipitation Rate derived from the PMR L2 product.

Consistency comparison of Satellite and Ground Radar

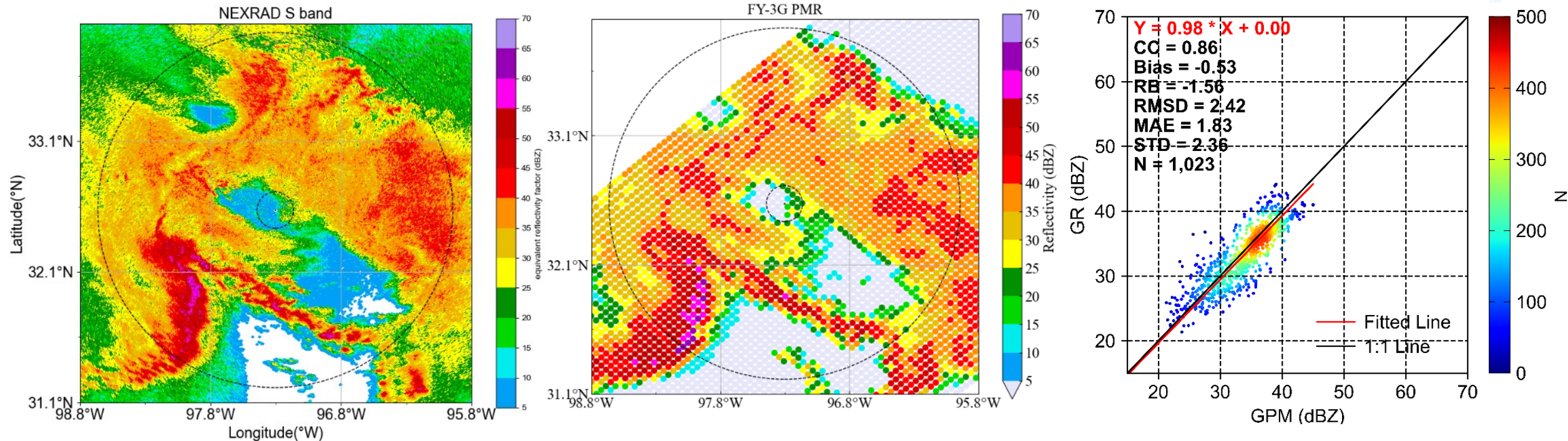
Evaluation of the consistency of the FY-3G satellite with Ground Radar:

- Radar frequency correction for all phases and precipitation types;
- Pixel level matching within the effective volume of satellite and ground radar;
- Impact of 3D field of view error correction, radar beam congestion factor and precipitation phase



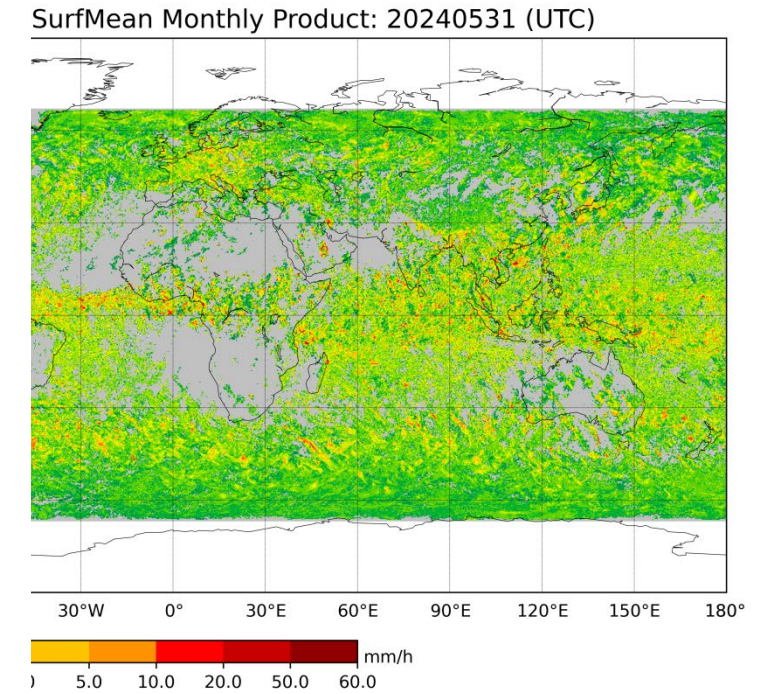
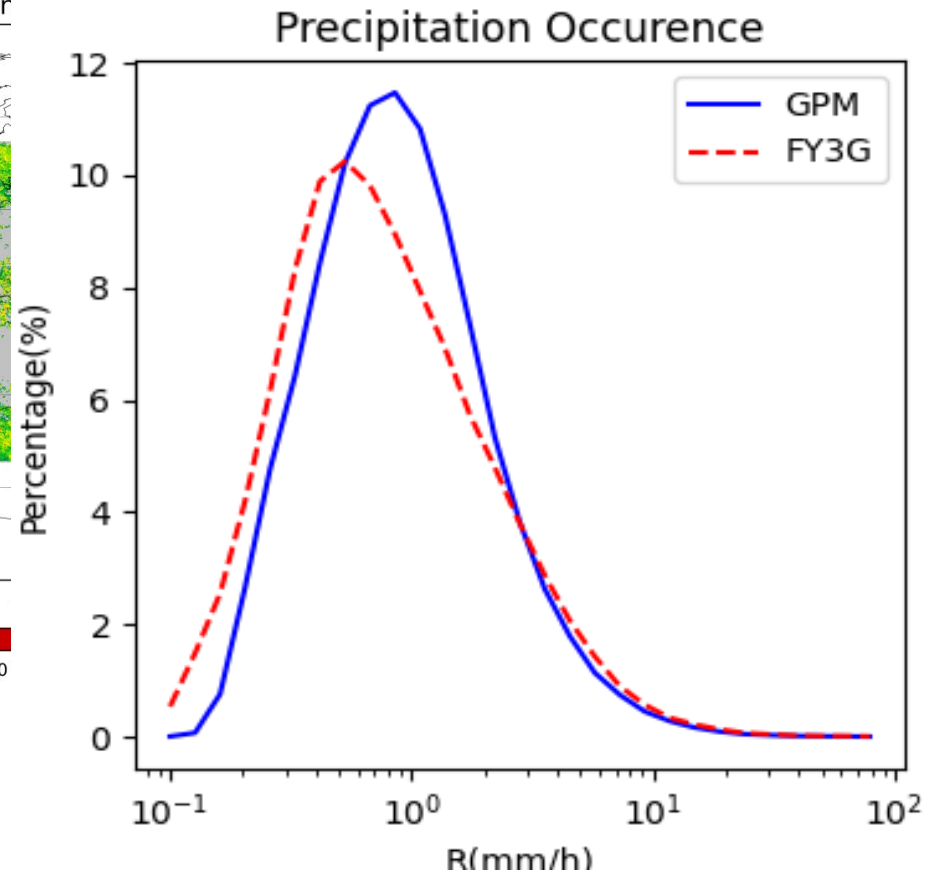
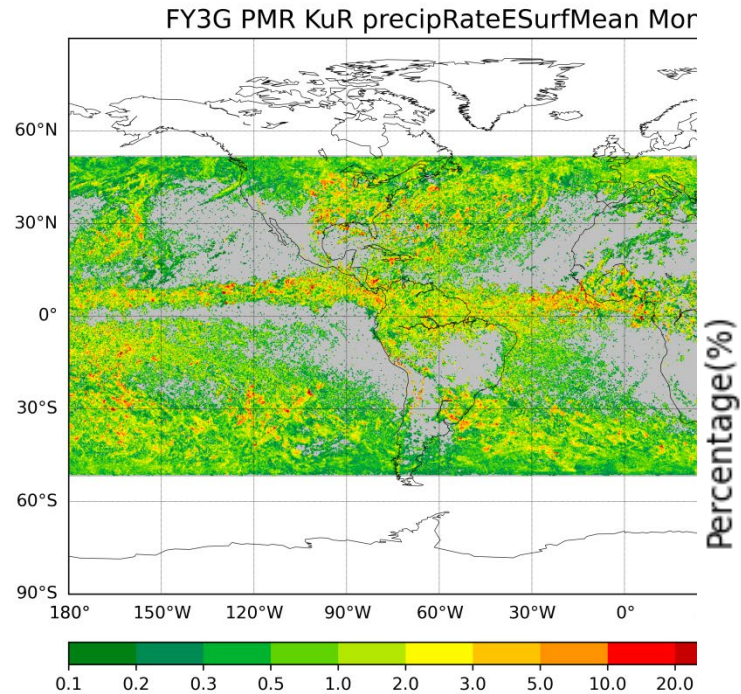
Consistency comparison of Satellite and Ground Radar

□ 31,May,2024, 07:47; NexRad KFWS



The deviation between FY-3G precipitation radar and ground radar (S band) is 1dB, with uncertainty within 2.5dB on average

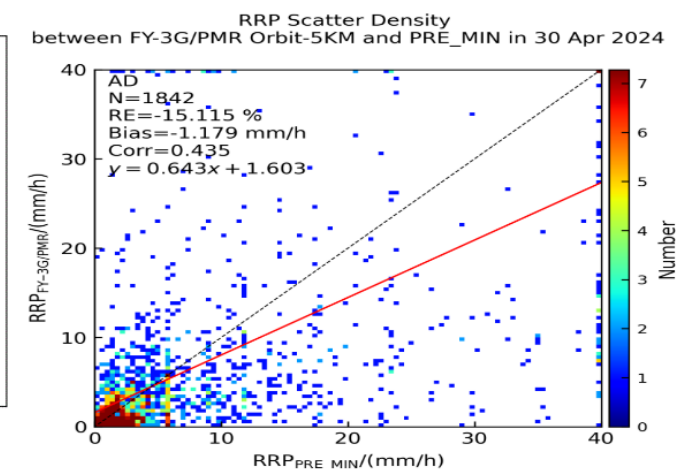
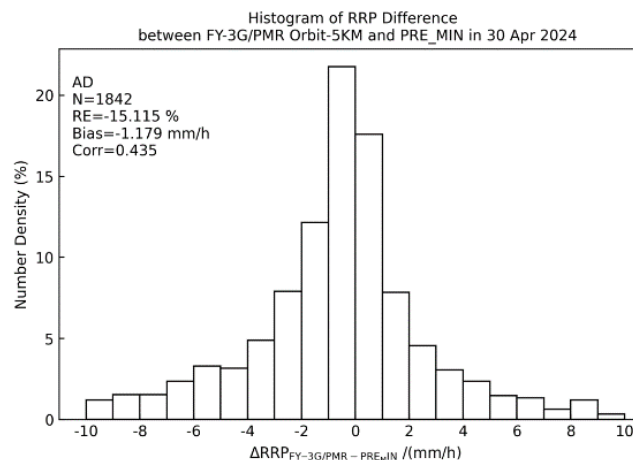
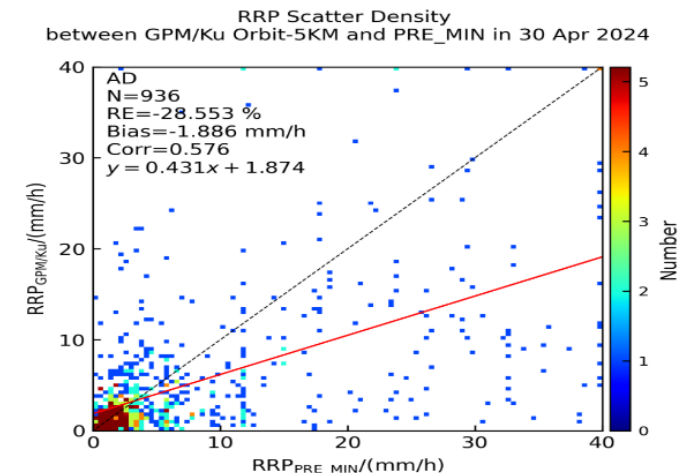
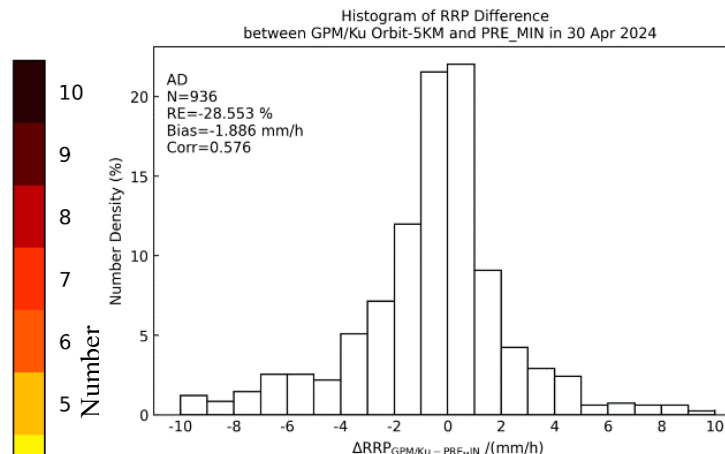
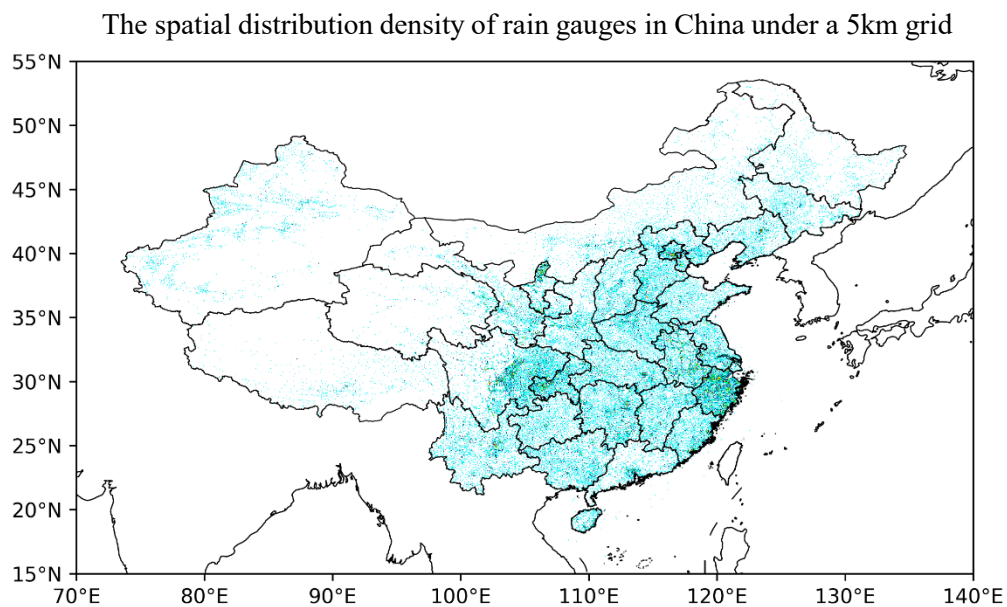
PMR & DPR Monthly Product Comparison



- 1、 The minimum GPM Ze is around 12dBZ, and the minimum PMR Ze is around 10dBZ. The improvement in radar sensitivity results in PMR seeing more weak precipitation.
- 2、 The near surface layer of PMR is about 500 meters higher than that of GPM, and there is more extrapolation of the profile.

PMR Ground Validation(Rain gauge)

China boasts a vast network of over 70,000 rain gauges. This extensive network ensures numerous precipitation measurements for each satellite pixel. Furthermore, these gauges capture precipitation data at a remarkably fine time interval (1 minute).



Due to the spatio-temporal inhomogeneous of precipitation, it is difficult to perform ground validation on instantaneous precipitation rate of PMR



Installed the raindrop distrometers at the South China precipitation verification stations: 18 KT-P2 and 8 JD-2DVD

4

Products Delivery and Service

4、Products Release Progress

□ FY-3G Released Products

Instrument	Type	Name
PMR	L1	FY-3G PMR L1 Data
	KuR	PMR Ku-band Rainfall Rate
	VPH	PMR Vapour Latent Heating
MERSI	L1	FY-3G MERSI-RM L1 Data
	CLM	MERSI Cloud Mask
	CPT	MERSI Cloud Phase and Type
MWRI	L1	FY-3G MWRI-RM L1 Data
	SST	MWRI Sea Surface Temperature
	TPW	MWRI Total Precipitation Water
GNOS	L1	FY-3G GNOS L1 Data
	ATP	GNOS Atmospheric Temperature Profile
	WAP	GNOS Wet Atmospheric Profile
	SWS	GNOS Sea Surface Wind Speed
	EDP	GNOS Electron Density Profile

4、Products Delivery and Service

□ FY-3G ready to Release Products (10)

Instrument	Type	Name
MERSI	LST	MERSI Land surface temperature
	SNC	MERSI Snow cover
	SST	MERSI Sea surface temperature
MWRI	SVM	MWRI Soil moisture
	SSW	MWRI Sea surface wind speed
	DAS	MWRI Data assimilation surport L1C
	PPR	MWRI Precipitation Rate
	HYP	MWRI Hydrometeor profile
	EMT	MWRI surface emissivity
GNOS	SVW	GNOS Soil moisture

□ FY-3G products in construction (6)

Instrument	Type	Name
MERSI	CLA	MERSI Cloud amount
PMR	KaR	PMR Ka-band radar product
	DPR	PMR combined radar product
MULSS		MWRI-RM/PMR joint retrieved rate
		Integrated Multi-satellitE Retrievals for FY-3
		Integrated Multi-satellitE Retrievals for Fengyun geostationary and polar orbits

4、Products Delivery and Service

风云卫星遥感数据服务网

国家卫星气象中心
(国家空间天气监测预警中心)

卫星 数据 影像 产品

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风云四号 碳卫星 风云三号 风云二号 风云一号 EOS/MODIS

FY-3G FY-3E FY-3D FY-3C FY-3B FY-3A

仪器选择

PMR MWRI MERSI GNOS

产品分类

1级

产品

Ku波段降水率(KuR) 潜热(VPH)

产品名称	格式	分辨率	开始日期
☐ PMR降水率轨道产品 (降轨)	HDF	5000M	2024-01-
☐ PMR降水率轨道产品 (升轨)	HDF	5000M	2024-01-

时间选择

风云卫星遥感数据服务网

国家卫星气象中心
(国家空间天气监测预警中心)

卫星 数据 影像

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风云四号 碳卫星 风云三号 风云二号

FY-3G FY-3E FY-3D FY-3C

仪器选择

PMR MWRI MERSI

产品分类

1级

产品

海表温度(SST) 晴空大气

产品名称	格式
☐ MWRI海面温度轨道产品(降轨)	HDF
☐ MWRI海面温度轨道产品(升轨)	HDF

时间选择

风云卫星遥感数据服务网

国家卫星气象中心
(国家空间天气监测预警中心)

卫星 数据 影像 产品 文档 工具

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风云四号 碳卫星 风云三号 风云二号 风云一号 EOS/MODIS NOAA MTSAT 其他静止卫星

FY-3G FY-3E FY-3D FY-3C FY-3B FY-3A

仪器选择

PMR MWRI MERSI GNOS

产品分类

1级

产品

卫星介绍

全球导航卫星掩星探测仪-II型(GNOS)

■ 全球导航卫星掩星探测仪-II型 (GNOS-II) 可为数值天气预报和气候监测提供高精度、高垂直分辨率的对流层、平流层大气弯曲廓线测量。从弯曲角可以反演大气折射率、大气温度、大气湿度廓线。此外，全球导航卫星掩星探测仪还可为空间天气监测提供电离层电子密度信息。风云三号(03批)卫星全球导航卫星掩星探测仪 (GNOS) 在继承02批卫星仪器基础上，重点增加掩星通道数，新增反射探测功能。

数据概况

全球导航卫星掩星探测仪-II型(GNOS)

■ 数据起止日期: 2023-10-23—Today

■ 文件数: 143.5万个

■ 数据量: 1970.2GB

产品名称	格式	分辨率	开始日期	最新日期	文件数	数据量(GB)	连续性	相关文档
☐ FY-3G全球导航卫星掩星探测仪II型L1数据(GNSS反射)	HDF	--	2023-10-23	2024-06-15	54925	1365.1	查看	格式
☐ FY-3G全球导航卫星掩星探测仪II型L1数据(大气附加相位-外部星历)	NC	--	2023-10-23	2024-06-15	132836	186	查看	格式
☐ FY-3G全球导航卫星掩星探测仪II型L1数据(大气附加相位/BDS自主星历)	NC	--	2023-10-23	2024-06-15	120288	159.7	查看	格式
☐ FY-3G全球导航卫星掩星探测仪II型L1数据(大气附加相位/GPS自主星历)	NC	--	2023-10-23	2024-06-15	124018	173.8	查看	格式
☐ FY-3G全球导航卫星掩星探测仪II型L1数据(电离层附加相位/BDS自主星历)	NC	--	2023-10-23	2024-06-15	190621	16.8	查看	格式
☐ FY-3G全球导航卫星掩星探测仪II型L1数据(电离层附加相位/GPS自主星历)	NC	--	2023-10-23	2024-06-15	174614	16.4	查看	格式
☐ FY-3G全球导航卫星掩星探测仪II型L1数据(电离层附加相位/外部星历)	NC	--	2023-10-23	2024-06-15	182754	17.2	查看	格式

时间选择

<https://satellite.nsmc.org.cn>

4、Products Delivery and Service

How to get FY-3G Products

You should sign up to the web site first.

<https://satellite.nsmc.org.cn/PortalSite/Data/Satellite.aspx?SatelliteCode=FY3G&SeriesCode=FY3X¤tculture=en-US>

FENGYUN Satellite Data Center
National Satellite Meteorological Center
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TANSAT FY-4 FY-3 FY-2 FY-1 EOS/MODIS NOAA MTSAT MSG SWGO JPSS GSICS OBS/NWP XIBU

OtherData METOP

FY-3G FY-3E FY-3D FY-3C FY-3B FY-3A

Instrument
PMR MWRI MERSI GNOS

Product
L1 Data
Product

Data Overview
FY-3G
File Count: 160,510,000
Volume: 22,578

Data Level	File Count	Volume(GB)
L1	1108614	18612
L2	496688	4424

Product

Product	Format	Resolution	Start Date	Last Date	File count	Volume(GB)	Availability	Quality Report
☒ FY-3G PMR L1 Data (Descend)	HDF	5000M	2023-10-23	2024-06-11	3658	4693.5	View	
☐ FY-3G PMR L1 Data (Ascend)	HDF	5000M	2023-10-23	2024-06-11	3653	4736.8	View	

Time Range
Last 3 days Last Week Last Month
Start Date: 2024-06-11 Start Time: 00:00:00
End Date: 2024-06-12 End Time: 23:59:59
Time range: ☐ Each Day
☒ Availability

Spatial Selection Whole Area

Coverage Type:
☒ Intersect ☐ Entirely Within

Search scope:
North 53° 31' West 73° 27' 135° 3' East 3° 47' South

Preset range:
☐ Beijing ☐ Shanghai ☐ Tianjin ☐ Chongqing
☐ Anhui ☐ Fujian ☐ Gansu ☐ Guangdong
☐ Guizhou ☐ Hainan ☐ Hebei

China Meteorological Administration National Satellite Meteorological Center
For questions in English: iusc_nsmc@cma.gov.cn
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FENGYUN Satellite Data Center
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☒	FY3G_PMR--_ORBD_L1_20240611_2155_5000M_V1.HDF		L1	FY-3G PMR L1 Data (Descend)	5000M	--	2024/6/11 21:55:26	1.30GB	Download
☐	FY3G_PMR--_ORBD_L1_20240611_2022_5000M_V1.HDF		L1	FY-3G PMR L1 Data (Descend)	5000M	--	2024/6/11 20:22:49	1.31GB	Download
☐	FY3G_PMR--_ORBD_L1_20240611_1850_5000M_V1.HDF		L1	FY-3G PMR L1 Data (Descend)	5000M	--	2024/6/11 18:50:12	1.31GB	Download
☐	FY3G_PMR--_ORBD_L1_20240611_1717_5000M_V1.HDF		L1	FY-3G PMR L1 Data (Descend)	5000M	--	2024/6/11 17:17:35	1.31GB	Download
☐	FY3G_PMR--_ORBD_L1_20240611_1544_5000M_V1.HDF		L1	FY-3G PMR L1 Data (Descend)	5000M	--	2024/6/11 15:44:57	1.31GB	Download
☐	FY3G_PMR--_ORBD_L1_20240611_0151_5000M_V1.HDF		L1	FY-3G PMR L1 Data (Descend)	5000M	--	2024/6/11 1:51:22	1.30GB	Download
☐	FY3G_PMR--_ORBD_L1_20240611_0018_5000M_V1.HDF		L1	FY-3G PMR L1 Data (Descend)	5000M	--	2024/6/11 0:18:44	1.17GB	Download

Total: 7, Page: 1/1, Page Size: 30

☒ All ☐ None

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风云卫星布局 2025

静止卫星

FY-4B [光学]

FY-4B 星是我国新一代静止气象卫星的首发业务星，它在继承 A 星的基础上性能进一步提升。FY-4B 星计划于 2021 年发射，接续静止气象卫星的业务。

FY-4C [光学]

FY-4C 星在前两颗星的基础上性能要全面达到和超过国际先进水平。FY-4C 星计划于 2022 年发射，定点位置将视当时的技术状态等因素来确定。

FY-4M [微波 1]

风云四号微波卫星 FY-4M 星在静止轨道上对大气温度和湿度进行微波探测，50GHz 以上空间分辨率优于 50km。

FY-4B [光学]

FY-4M [微波 1]

FY-4C [光学]

FY-3E [晨昏]

FY-3G [降水]

FY-3F [上午]

FY-3H [下午]

极轨卫星

FY-3E [晨昏]

FY-3E 星是晨昏轨道卫星，交点地方时为 5:30，计划于 2021 年发射。FY-3E 星侧重数值天气预报的应用目标，对天气会商、热带气旋和其它极端气象灾害预警、气候监测、空气质量监测、太阳和空间天气观测具有独特优势。

FY-3F [上午]

FY-3F 星是上午轨道卫星，交点地方时为 10:00，计划于 2022 年发射。它在确保极轨气象卫星全球成像和大气垂直探测观测业务的基础上，侧重地球表面成像观测，主要应用于天气预报、生态、环境、灾害监测业务及研究。

FY-3G [降水]

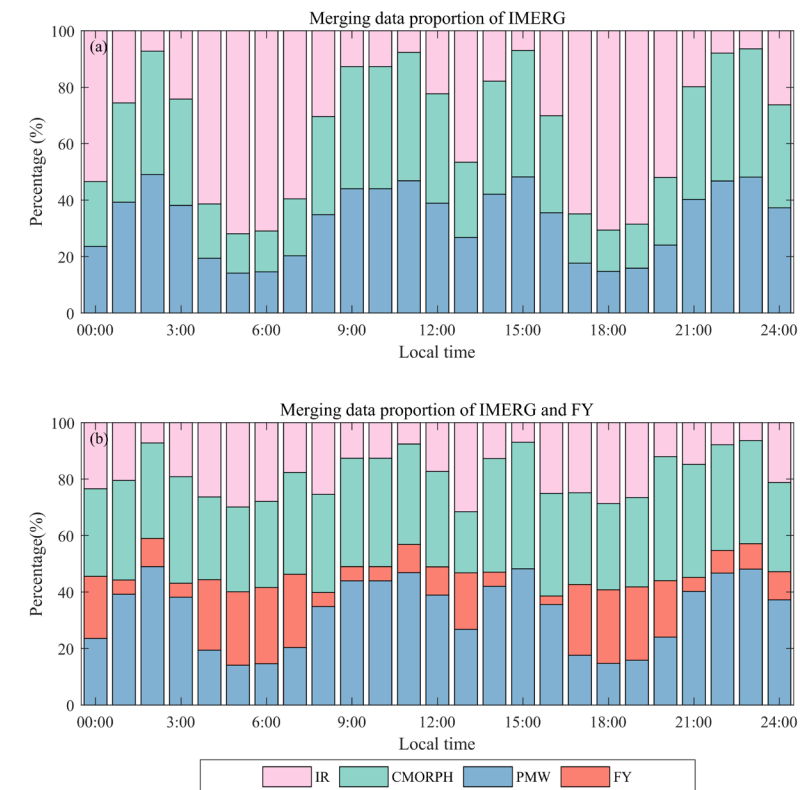
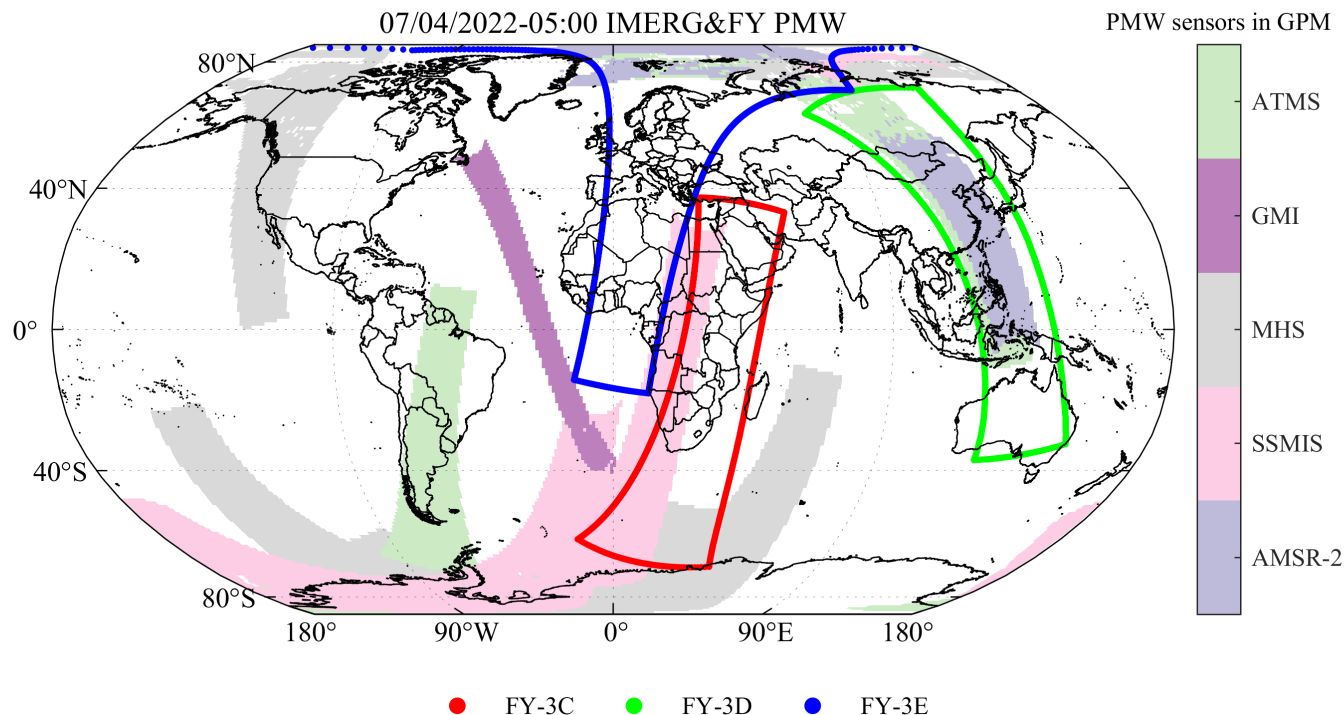
FY-3G 星为倾斜轨道卫星，主要用于降水测量，计划于 2022 年发射。FY-3G 星主要用于灾害性天气系统强降水监测，提供全球中低纬度地区降水三维结构信息，对提高降水气象预报准确率提供支持。

FY-3H [下午]

FY-3H 星是下午轨道卫星，交点地方时为 14:00，计划于 2023 年发射。FY-3H 星侧重大气成份定量探测和气候变化监测，探测数据可用于天气预报、大气化学和气候变化监测业务及研究等方面。

FY-3I [Rainfall] in 2028

Global Precipitation MERGED FY-3 and IMERGE



Constellation of FY-3 and Passive Microwave Sensors used in IMERGE

Improve the proportion of PMW in merged rain product especially in early morning and noon



THANKS

感谢倾听