



STATUS OF AMVs FROM FENGYUN GEO. SATELLITES

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TOPIC

- Status of FY-2 and FY-4 Satellites
- Operational AMV System and Products
 - AMV System Architectures
 - AMV Products, and Distribution
- Historical dataset reprocessing progress
- Future work

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Launched Satellites

Since Jan. 1969, China began to develop his own meteorological Satellite				
Leo	Launch Data		Geo	Launch Data
FY-1A	Sept. 7, 1988		FY-2A	Jun. 10, 1997
FY-1B	Sept. 3, 1990		FY-2B	Jun. 25, 2000
FY-1C	May 10, 1999		FY-2C	Oct. 18, 2004
FY-1D	May 15, 2002		FY-2D	Dec. 8, 2006
FY-3A	May 27, 2008		FY-2E	Dec. 23, 2008
FY-3B	Nov 5, 2010		FY-2F	Jan. 13, 2012
FY-3C	Sept. 23, 2013		FY-2G	Dec. 31, 2014
FY-3D	Nov. 15, 2017		FY-4A	Dec. 11, 2016

Before 2000: emphasizing to develop the satellite

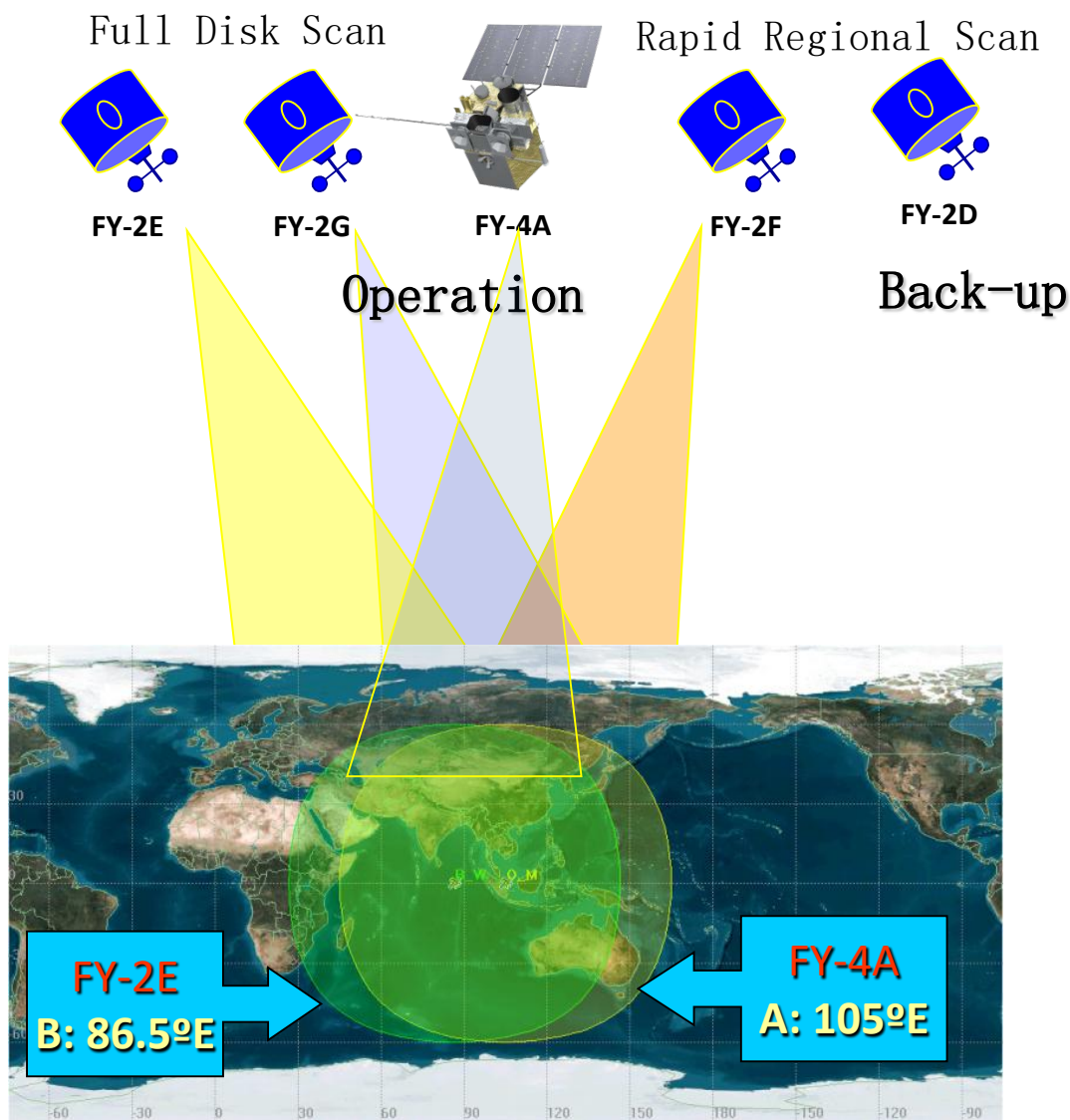
2000 – 2010: emphasizing the transition from the R&D to the operational satellite

After 2010: emphasizing the calibration and validation for the operational satellite

Fengyun GEO Constellation in 2018

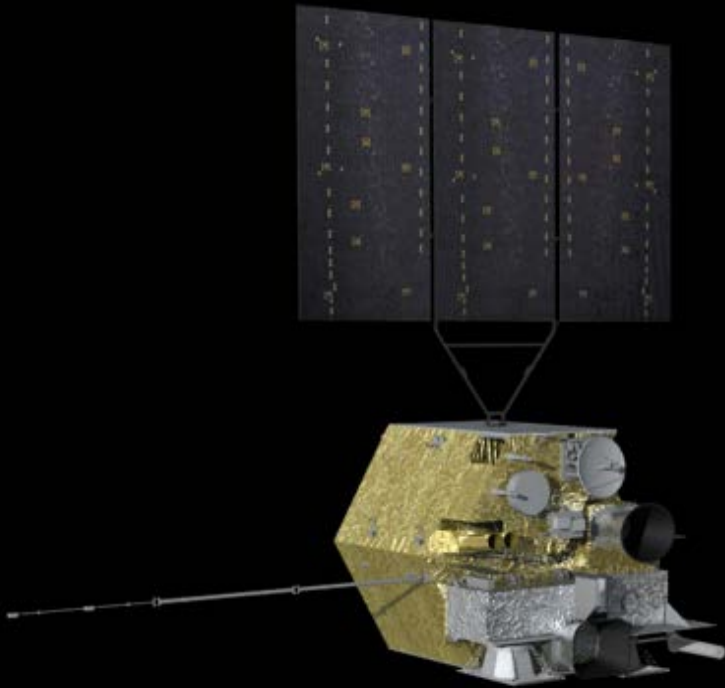
- In operation
 - FY-2G: Full Disk (99.5° E)
 - FY-2E: Full Disk (86.5°E)
 - FY-2F: Regional (112°E)
- In trial operation
 - FY-4A: (105°E)
- In back-up
 - FY-2D: (123.5°E)

From April 16, 2018 FY-4A replaced FY-2G at 105°E, FY-2G drifted to 99.5°E.



China's new generation geostationary meteorological satellite FY-4

FY-4A



Spacecraft:

1. Launch Weight: approx 5300kg
2. Stabilization: Three-axis
3. Attitude accuracy: 3"
4. Bus: 1553B+Spacewire
5. Raw data transmission : X band
6. Output power: $\geq 3200W$
7. Design life: over 7 years

GIIRS: Geo. Interferometric Infrared Sounder

AGRI: Advanced Geosynchronous Radiation Imager

LMI: Lightning Mapping Imager

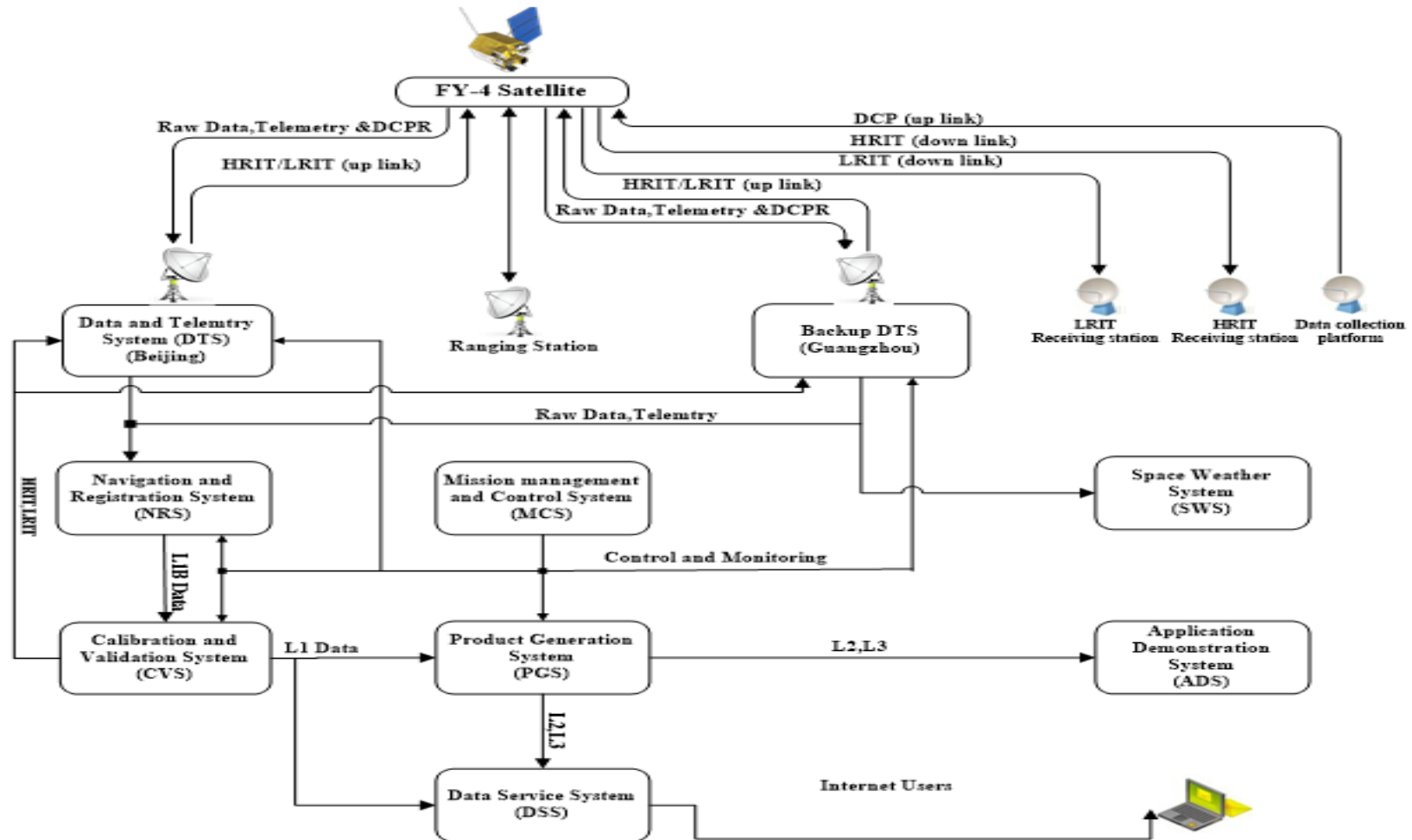
SEP: Space Environment Package

Advancement of FY-4A compared with FY-2

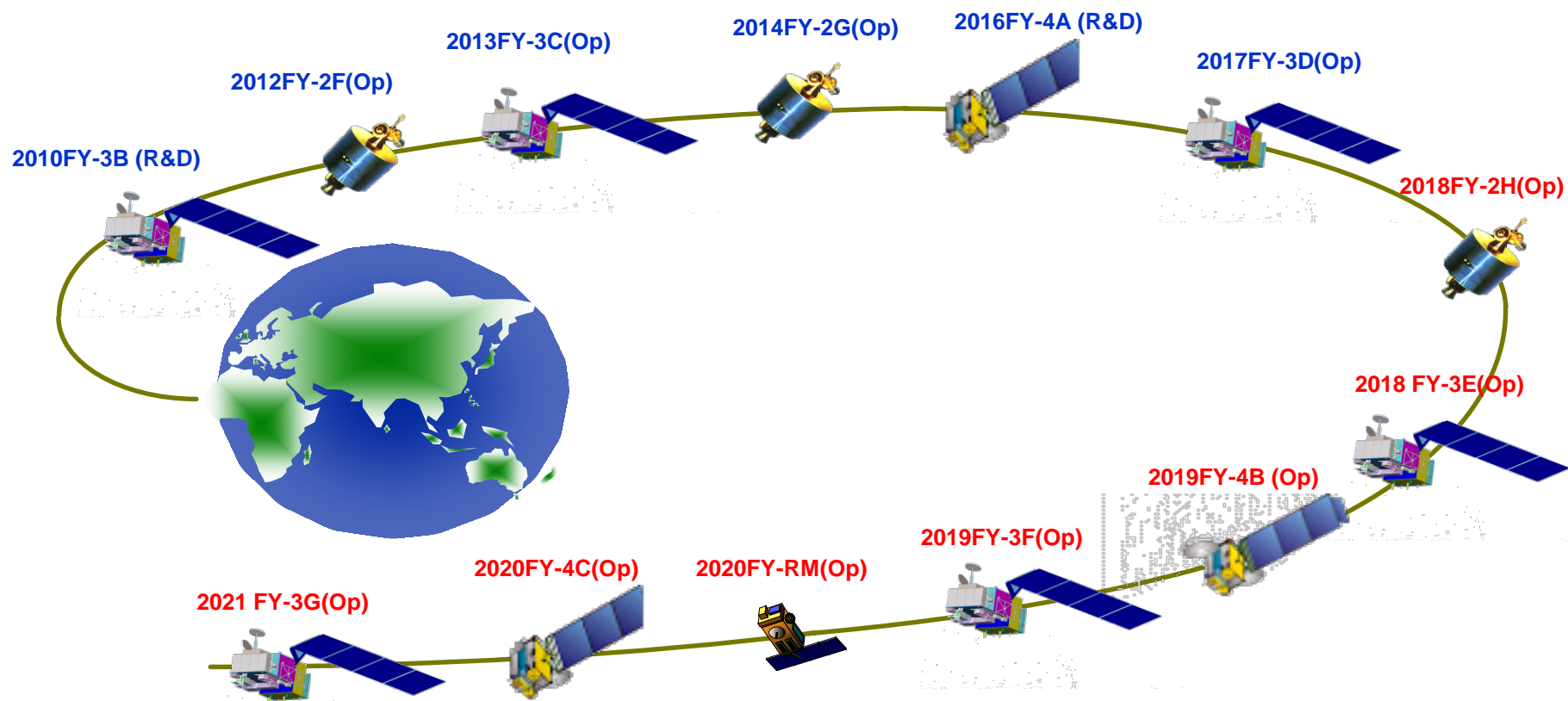


	FY-4A(EXP)	FY-2(OP)
Stabilization	Three-axis	Spin
Designed Life	5~7 Years	4 Years
Observation Efficiency	85%	5%
Observation Mode	Imaging +Sounding + Lightning Mapping	Imaging Only
Main Instruments	AGRI :14 channels SSP Resolution: 0.5~4Km Global imaging: 15min Flexible imaging : 2D	VISSR: 5 channels SSP Resolution: 1.25~5Km Global imaging: 30min Flexible imaging : 1D
	GIIRS:913 channels Spectral Resolution: 0.8,1.6cm ⁻¹ SSP Resolution:16Km	N/A
	LMI SSP Resolution:7.8Km	N/A
	SEMS High energy particles Magnetic field	SEM High energy particles Solar X ray fluxes

The flow chart of FY-4A ground segment

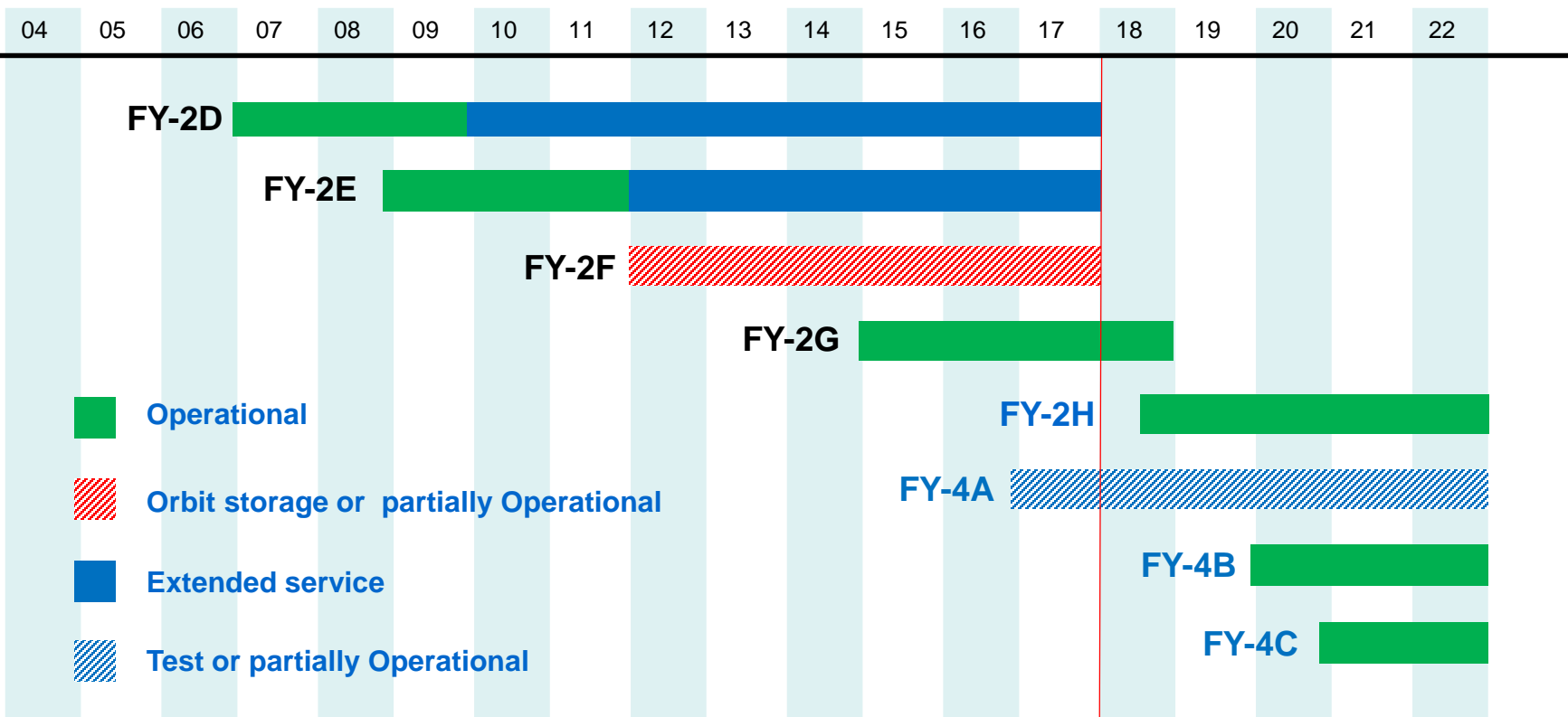


National Program for Fengyun Meteorological Satellite from 2011-2020



■ 6 satellites will be launched within this decade

FY-2 to FY-4 Transition



FY-4A was launched on December 10, 2016, FY-2H will be launched to mitigate the gap between the FY-2 and FY-4 in operation.

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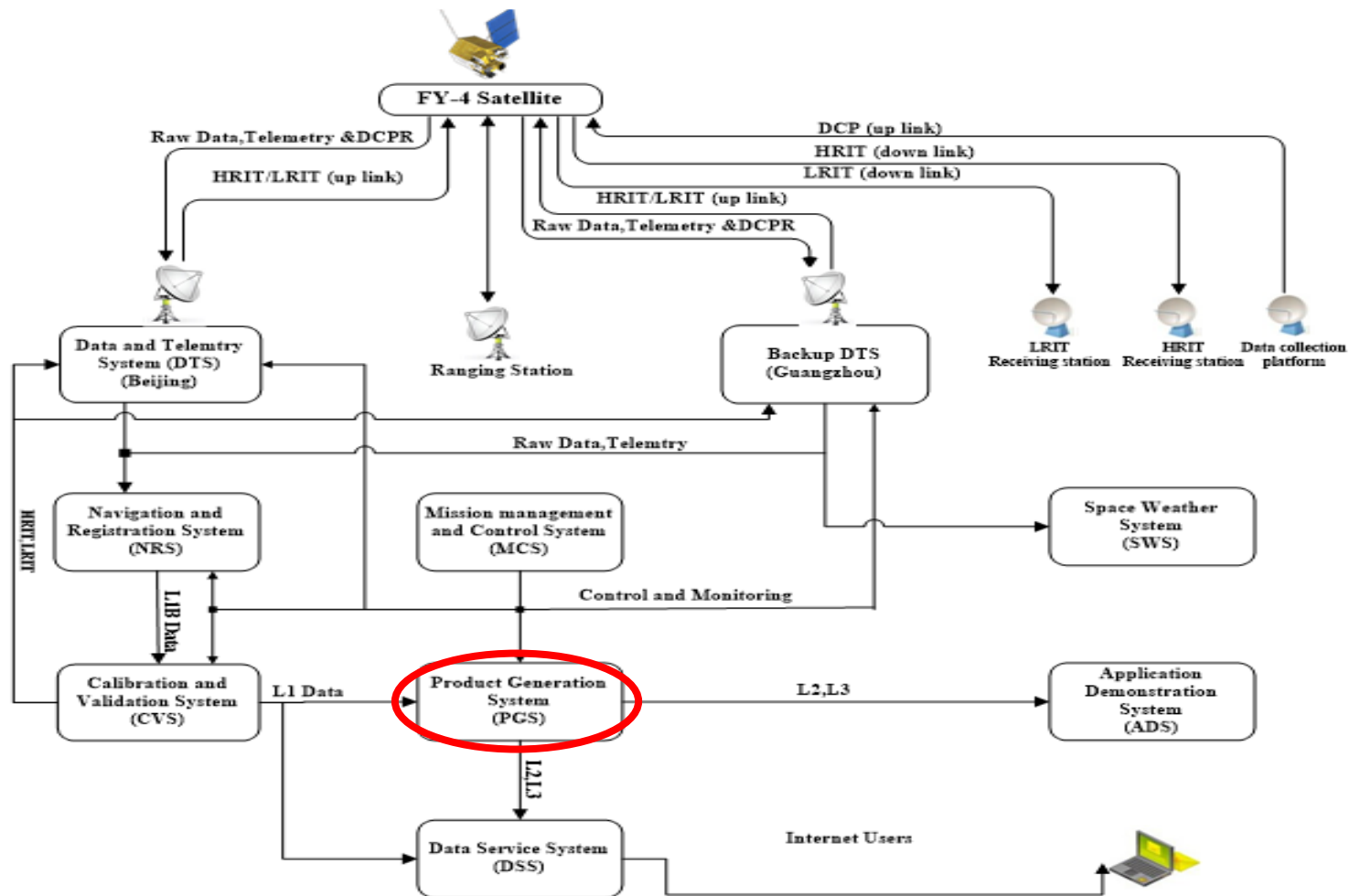
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Operational AMV Systems

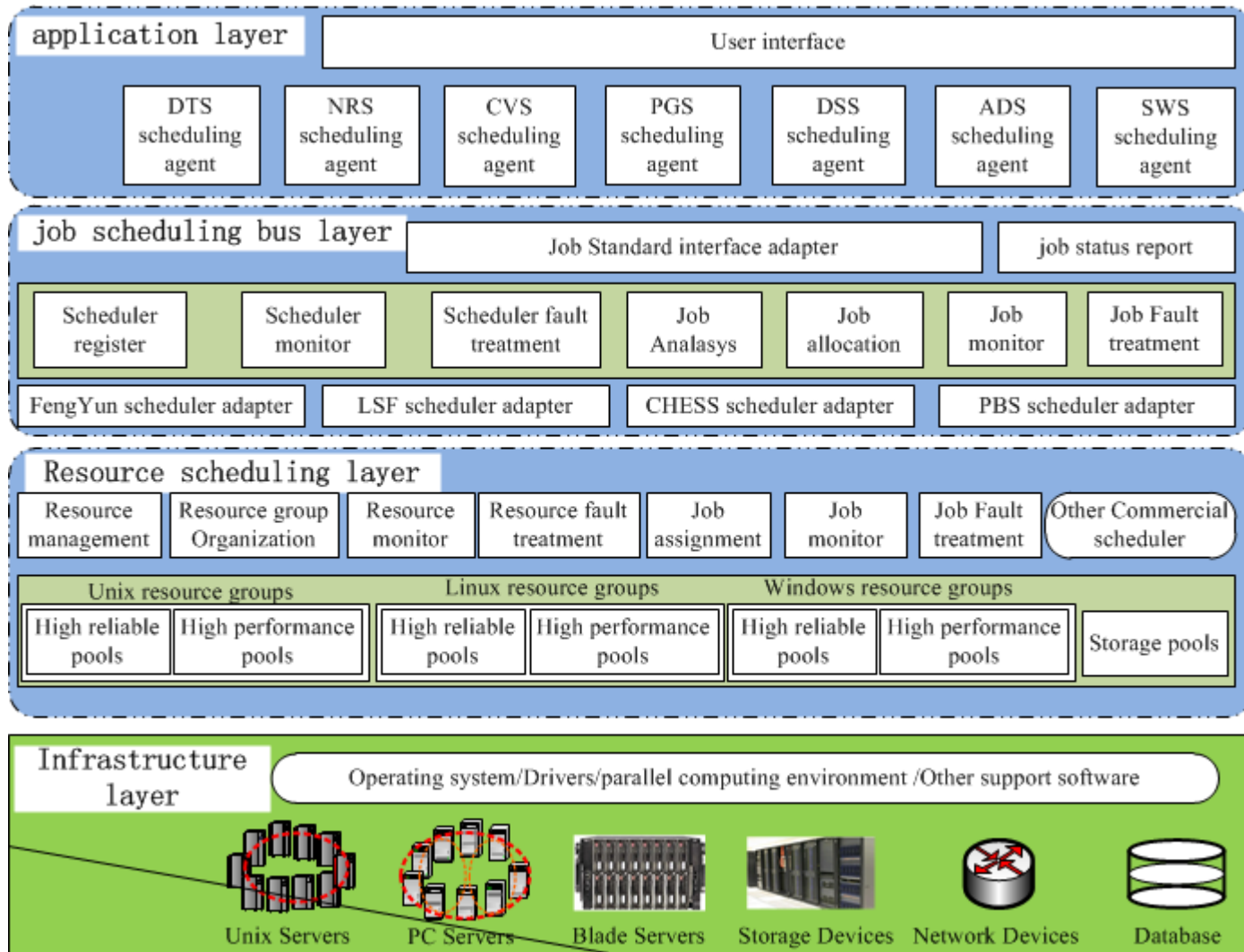
- FY-2 AMV System
 - Generate FY-2E/FY2G AMV products
 - Run on PC Workstation
- FY-4A AMV System
 - Generate FY-4A AMV products
 - Based on the cloud platform architecture

FY-4A AMV System

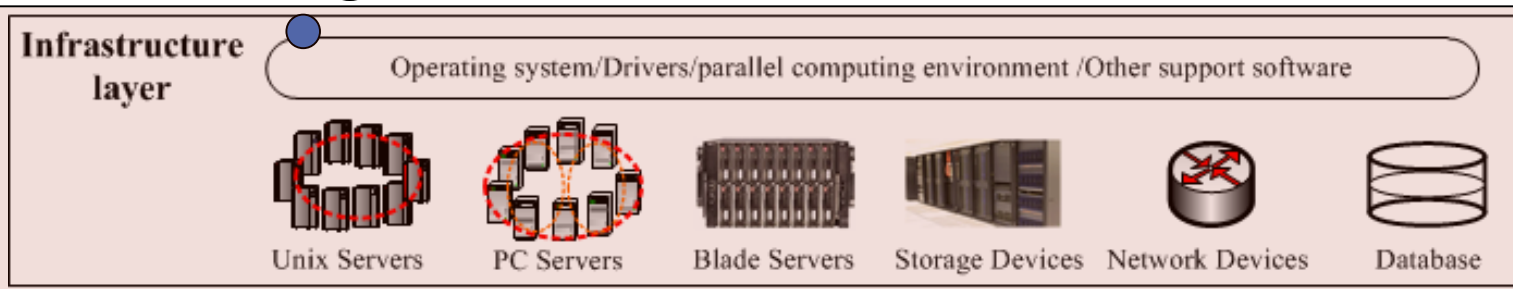
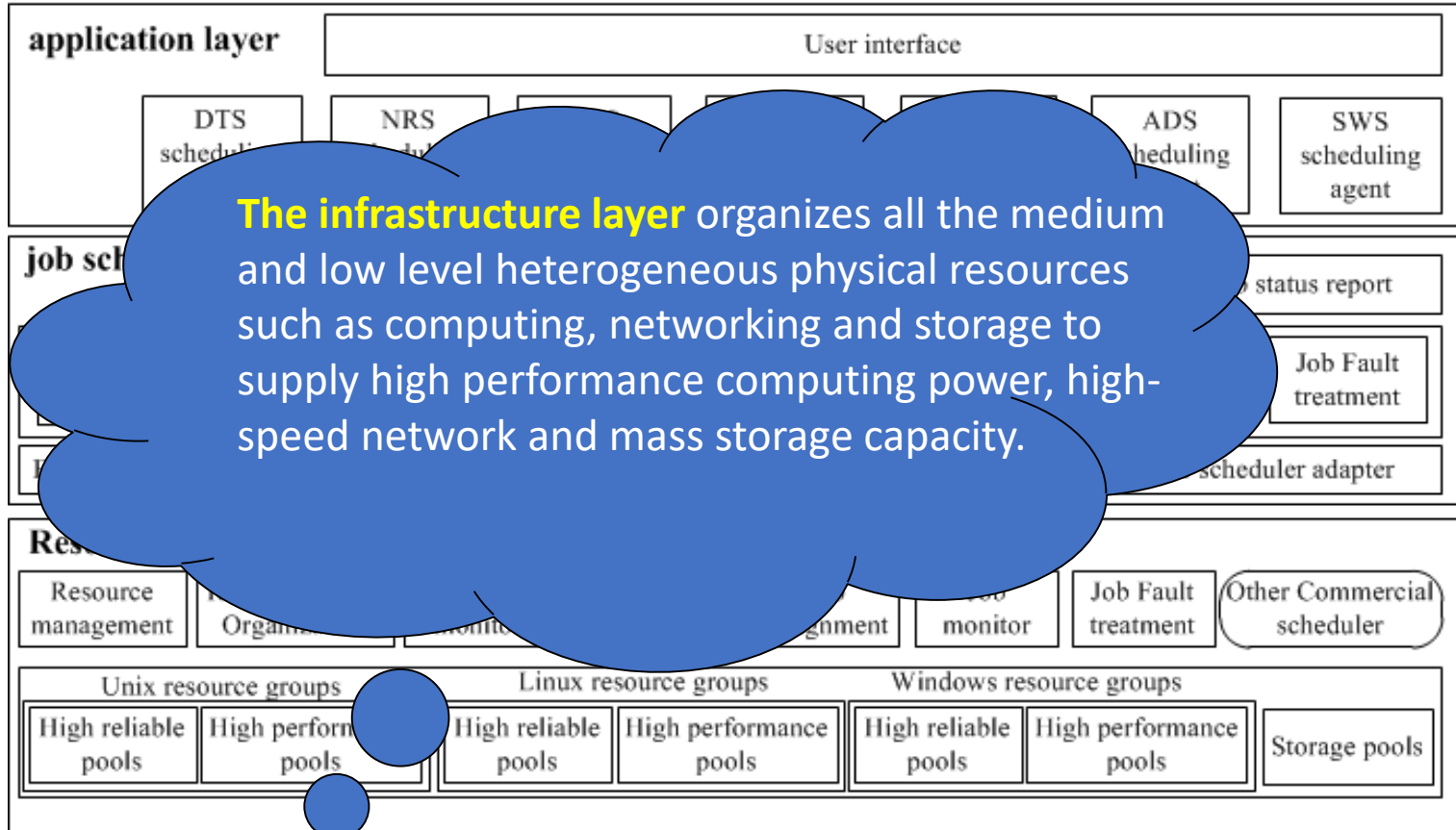
- FY-4A AMV System is a subsystem of PGS



The cloud platform architecture of FY-4

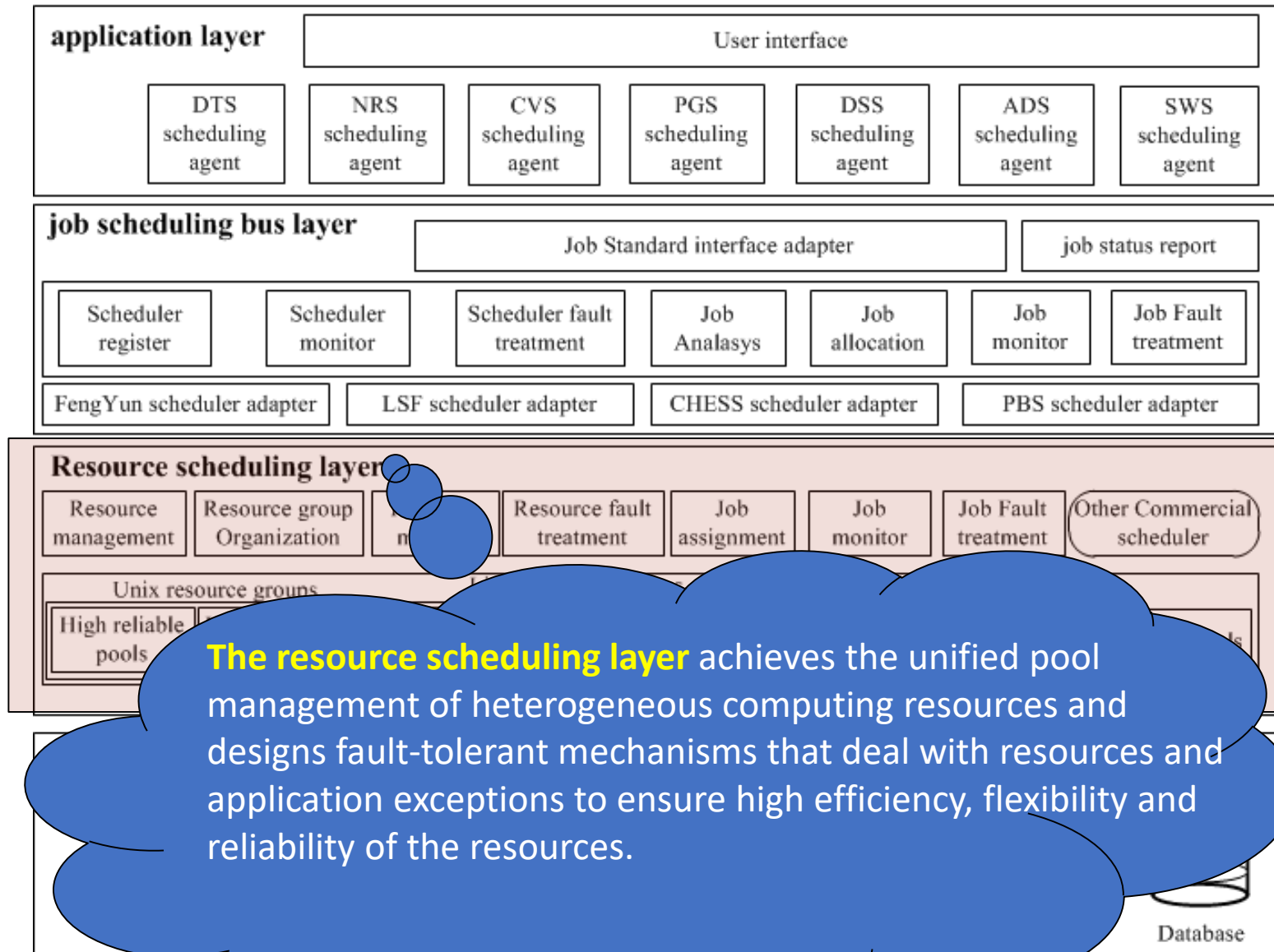


Architecture description

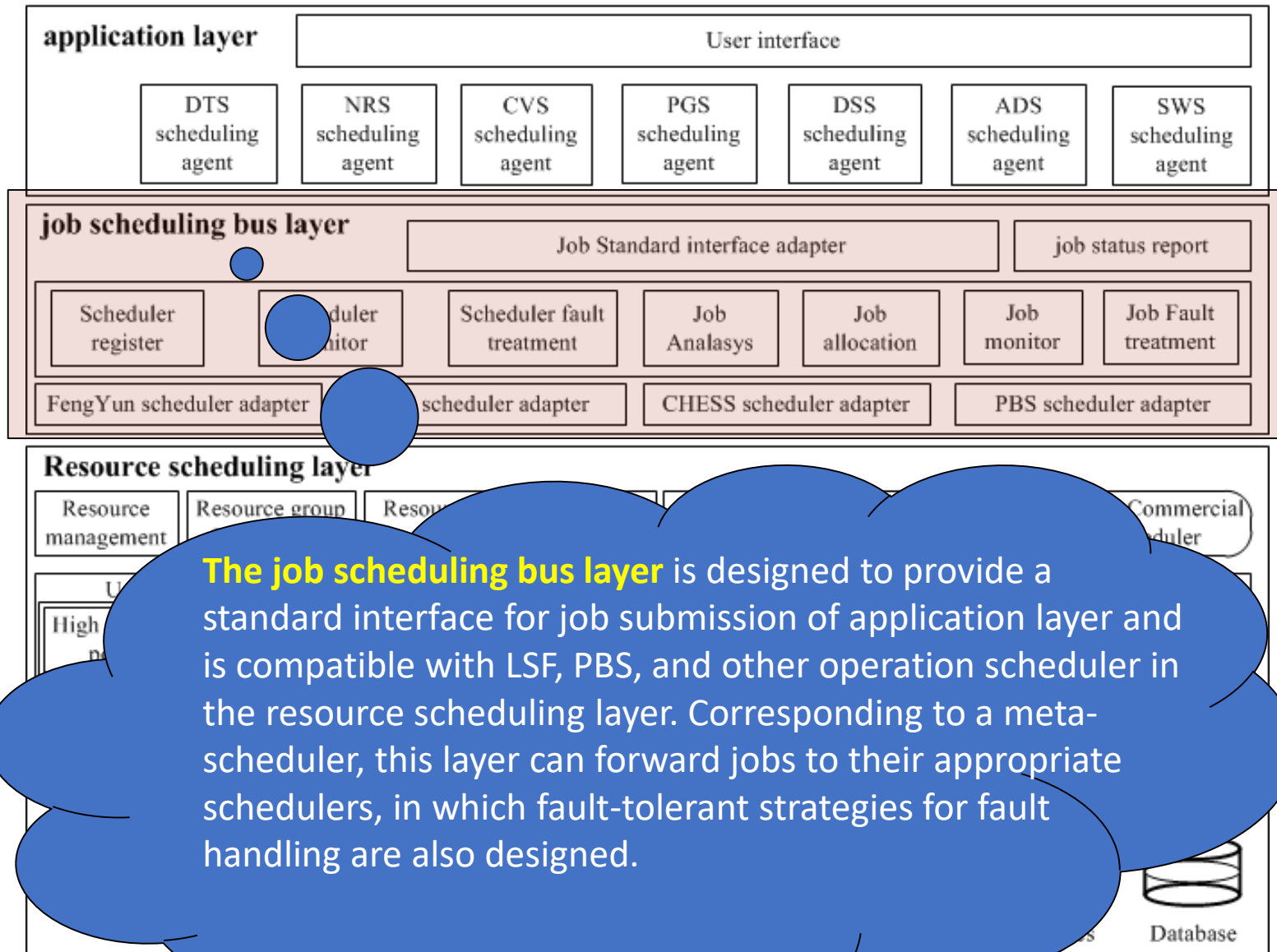


The infrastructure layer organizes all the medium and low level heterogeneous physical resources such as computing, networking and storage to supply high performance computing power, high-speed network and mass storage capacity.

Architecture description

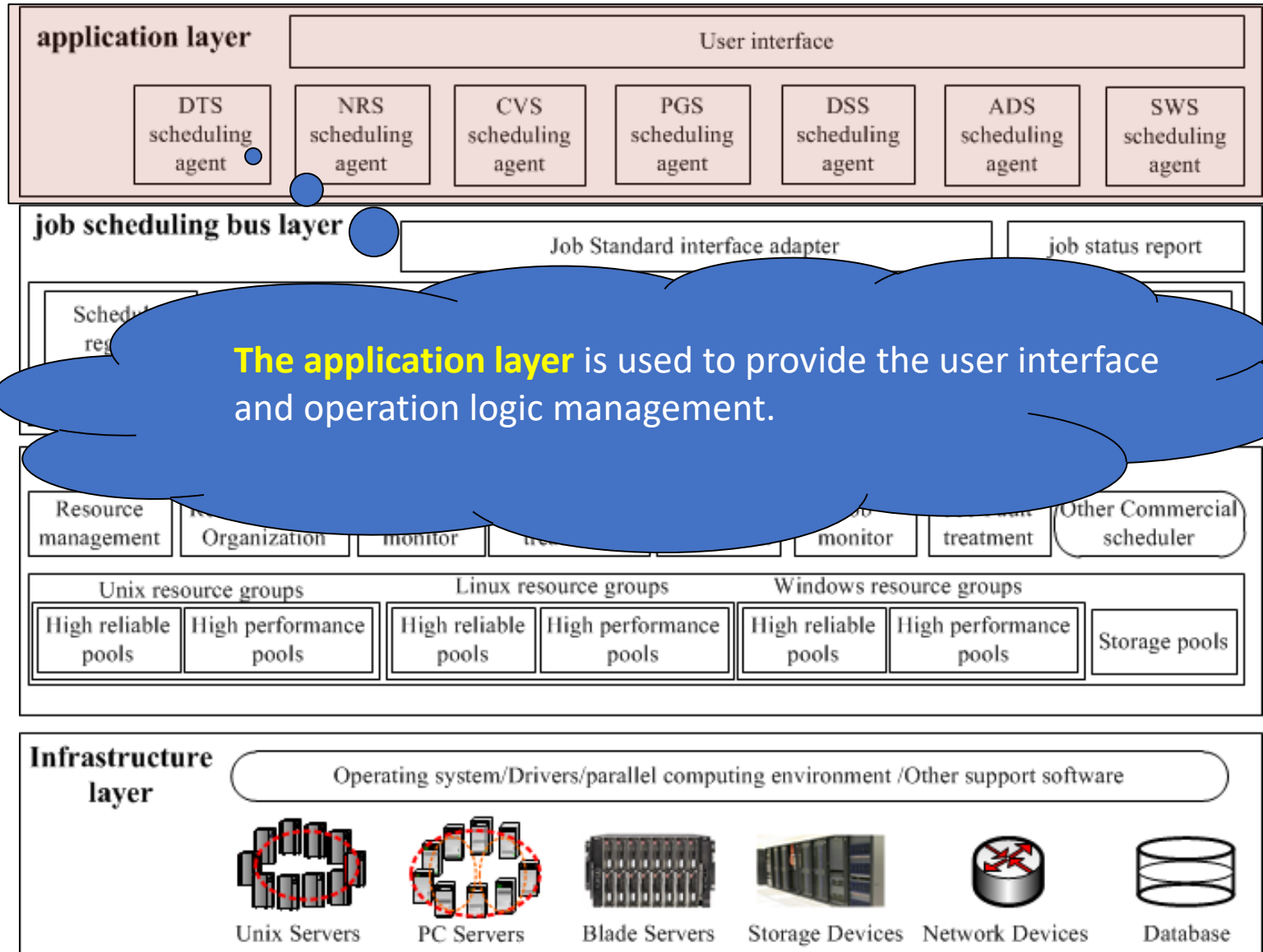


Architecture description



The job scheduling bus layer is designed to provide a standard interface for job submission of application layer and is compatible with LSF, PBS, and other operation scheduler in the resource scheduling layer. Corresponding to a meta-scheduler, this layer can forward jobs to their appropriate schedulers, in which fault-tolerant strategies for fault handling are also designed.

Architecture description



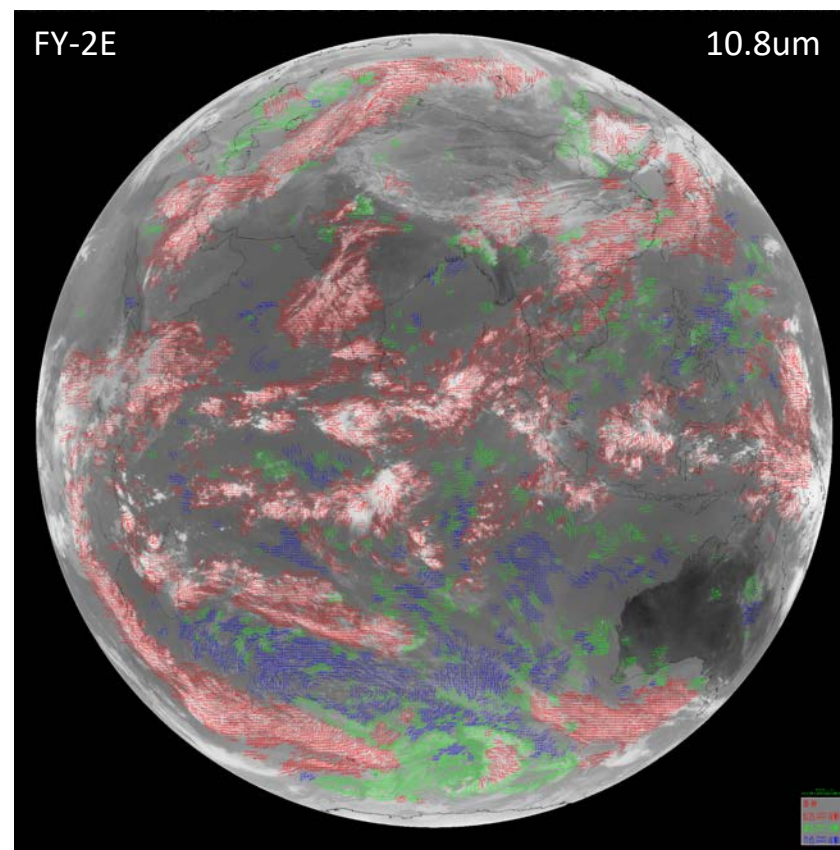
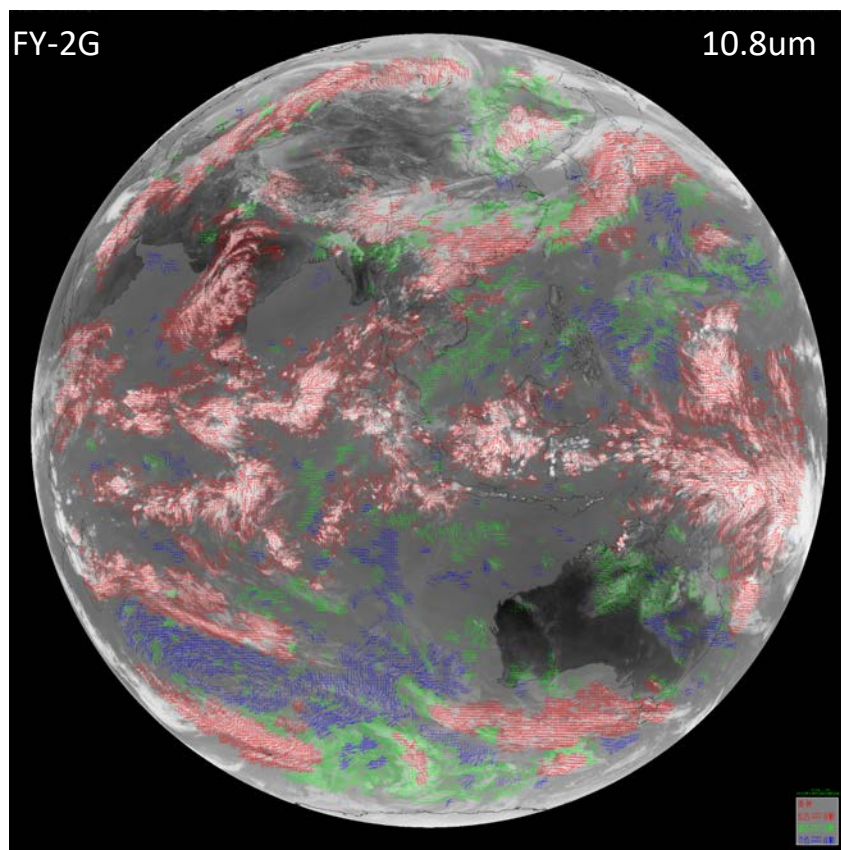
The application layer is used to provide the user interface and operation logic management.

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AMV products in operation

- FY-2E, FY2G Winds

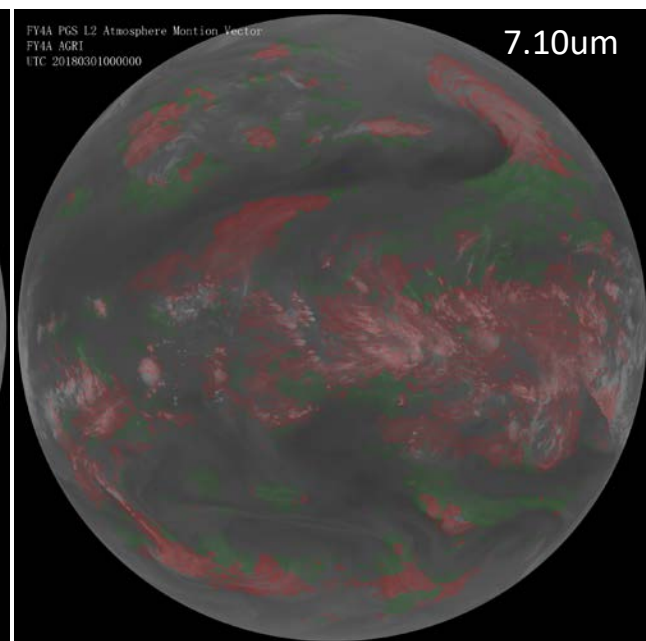
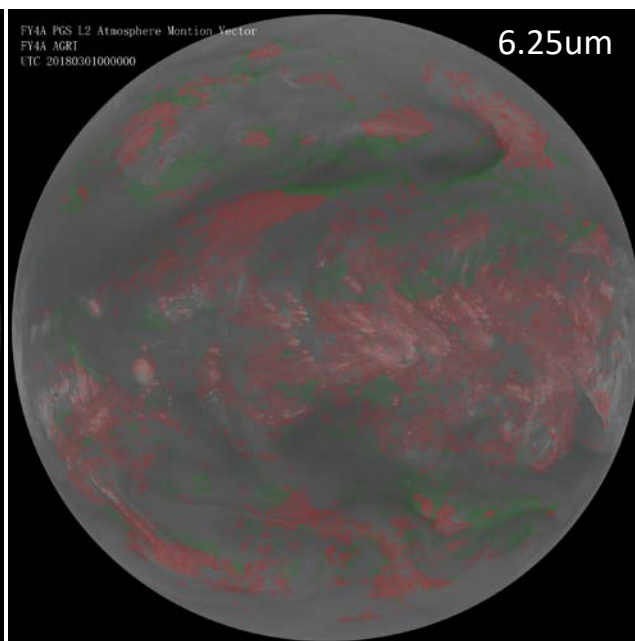
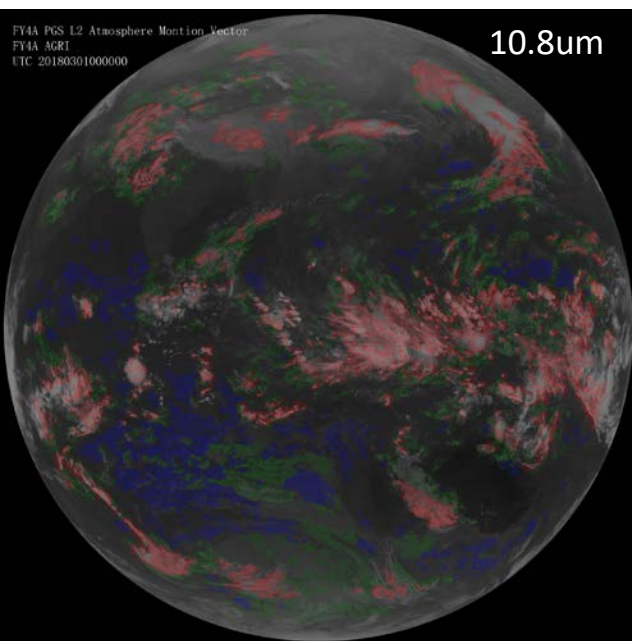


Current status of FY-2 winds

- In FY-2 AMV operational schedule:
 - FY-2G generates AMV every 6 hours from 00UTC(00,06,12,18)
 - FY-2E generates AMV every 6 hours from 03UTC (03,09,15,21)

AMV Products	Frequency (hours)	Image Interval (min)	Format
FY-2G			
LWIR (10.8um) AMV	6	30	Native & BUFR
Water Vapor (6.7um) AMV	6	30	Native & BUFR
FY-2E			
LWIR (10.8um) AMV	6	30	Native & BUFR
Water Vapor (6.7um) AMV	6	30	Native & BUFR

FY-4A AMV products in trial operation



■ 0-5m/s ■ 5-10m/s ■ 10-15m/s

■ 0-5m/s ■ 5-10m/s ■ 10-15m/s

■ 0-5m/s ■ 5-10m/s ■ 10-15m/s

Current status of FY-4A winds

- Every 3 hours from 00UTC

AMV Products	Frequency (hours)	Image Interval (min)	Format
LWIR (10.8um) AMV	3	15	NETCDF4 & BUFR
Water Vapor (6.25um) AMV	3	15	NETCDF4 & BUFR
Water Vapor (7.10um) AMV	3	15	NETCDF4 & BUFR

AMV Products Distribution

- FY-2E and FY-2G AMV products are in operation and distributed via FTP server or network share disk for intranet users and via GTS, CMACast or website for international users.
- FY-4A AMV products are in trial operation and distributed via FTP server or network share disk for intranet users. In the near future they will be distributed via GTS, CMACast or website for international users.

Data Service

- Integrated Space/Ground Based Data Service System

- ❖ Real time Data:

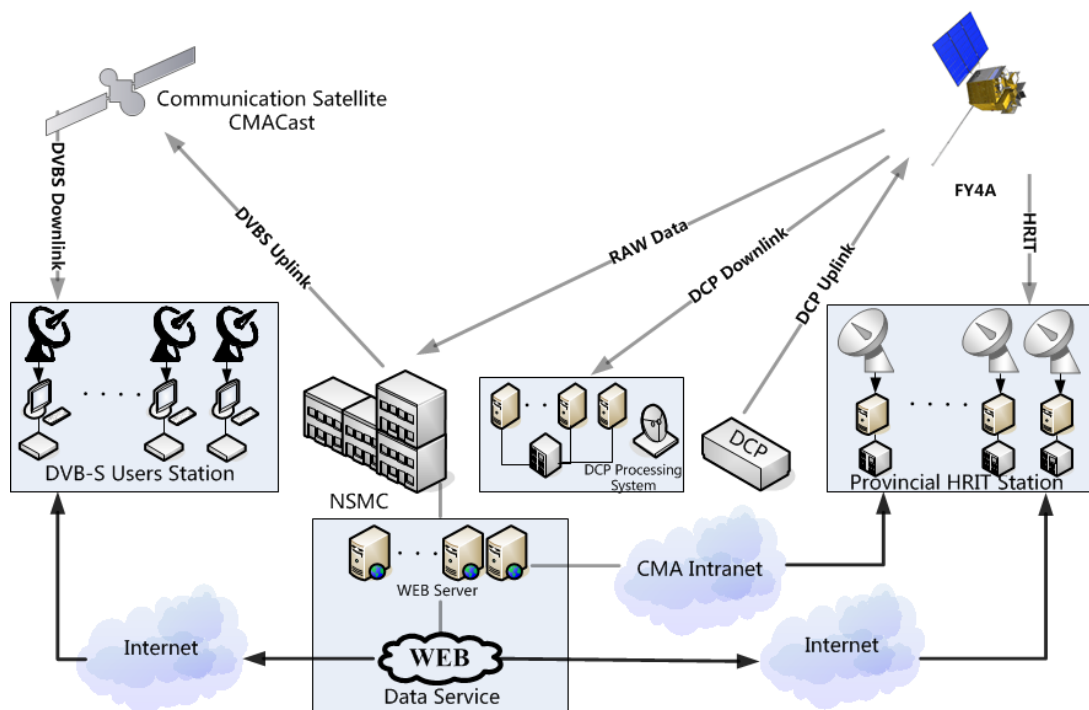
- DB (L1)
- CMACast (L2)

- ❖ Non Real Time

- Website
- Manual Service

- ❖ In addition:

- Cloud Service



Data Service Web Portal

Welcome to FENGYUN Satellite Data Center Please login NSMC Contact us Help 中文

FENGYUN Satellite Data Center

NATIONAL SATELLITE METEOROLOGICAL CENTER

SATELLITES DATA IMAGES PRODUCTS DOCUMENTS TOOLS

Archive

Satellites	File count	Volume(TB)
FY-3C	2530024	199.8
FY-3B	17406207	1079.7
FY-3A	22940414	1394.6
FY-2F	1277199	17.2
FY-2E	3223676	32.7
FY-2D	4146815	49.7
FY-2C	2455767	29.9
FY-1D	269820	6.5

Data Overview>>

Statistics

DOWNLOAD SINCE 2005 (MB)

2,188,279,043 MB

Satellites: 23
Products: 92
Data: 3084.4 TB
Users: 31,164
Download(24h): 1793 GB

SATELLITE TRACK

ALL FY-3C FY-3B FY-3A FY-2F FY-2E FY-2D FY-2C

Orbit Parameters

TBUS FY-3C FY-3B FY-3A
Two Line FY-3C FY-3B FY-3A
One Line FY-3C FY-3B FY-3A
Time Table FY-3C FY-3B FY-3A
FY-2D FY-2E FY-2F
CAL FY-3C

DCPC/NSMC

FY-2 Images
FY-3 Images
Microwave
Regional Rapid Scan

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京公网安备110108002134号
京ICP备09070587号

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

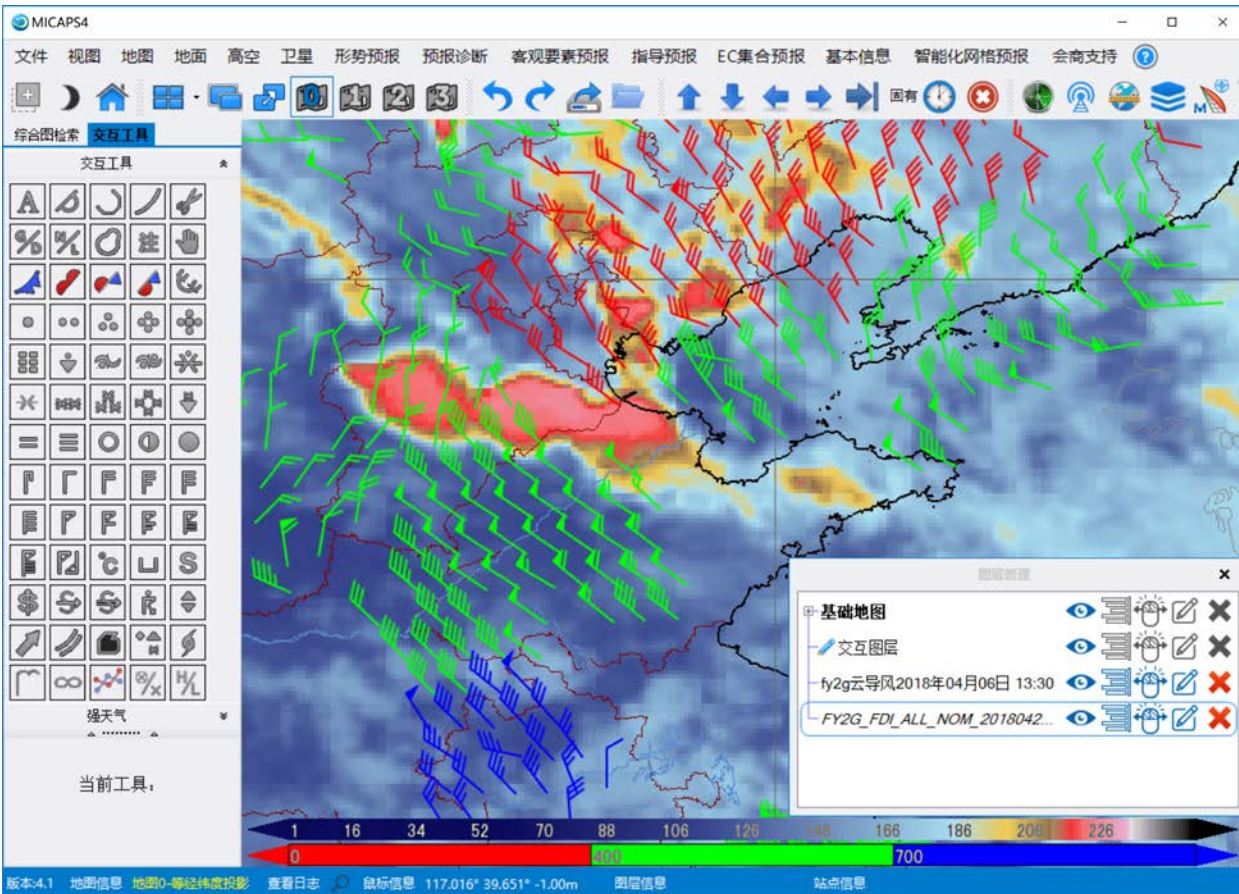
- All 8PB archived data (real time)
- Satellites' information
- Satellite images browse
- Documents and tools

User: freely register,
update need authorize

- ❖ Normal: 500MB/day
- ❖ Junior: 3GB/day
- ❖ Senior: 10GB/day

Day to Day Uses of AMV at MICAPS

MICAPS (Meteorology Information Comprehensive Analysis Process System)



- MICAPS gives the field forecasters access to a multitude of digital data to help them in daily forecast preparation
- MICAPS display software allows for easy integration of AMVs with a multitude of other data sources like model analyses/forecasts, observations from other observation systems

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Historical dataset reprocessing progress

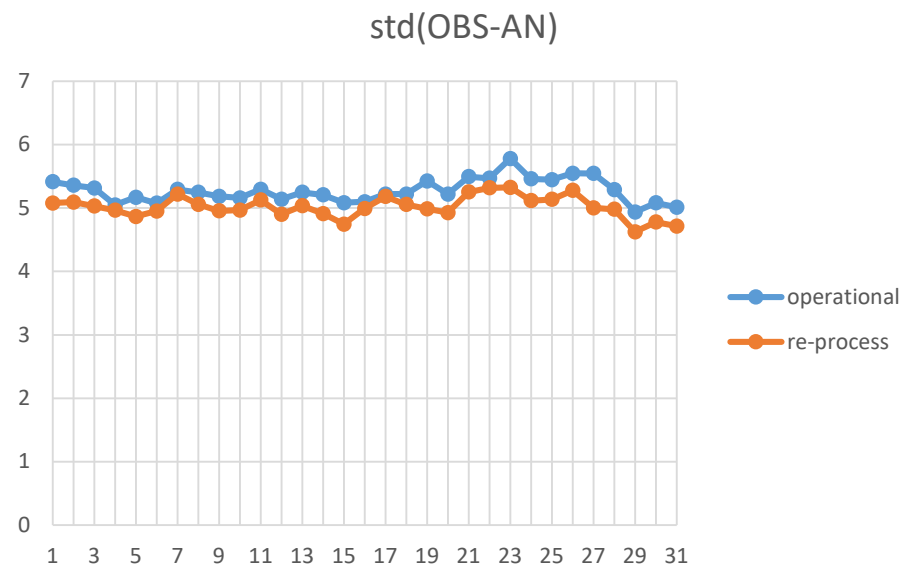
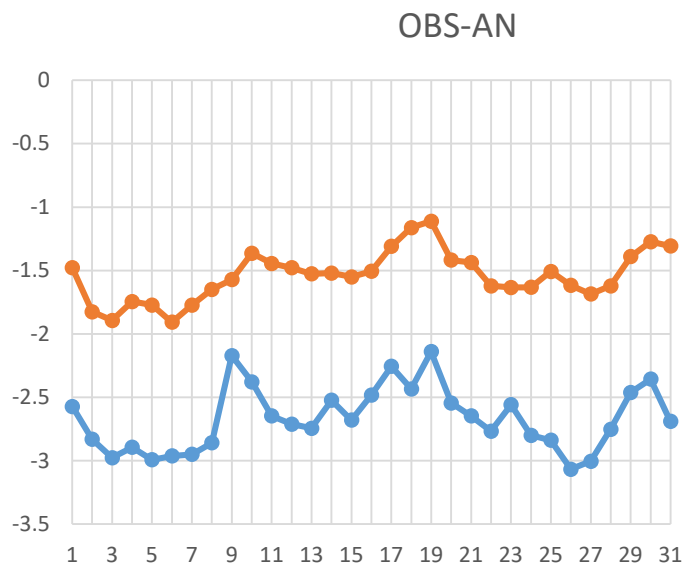
- CMA started an project to reprocess the historical AMVs dataset in 2013.
- Reprocess all historical AMVs data with latest AMVs algorithm(CMA Version 2014)
- The project was finished by the end of 2017

Historical dataset:

SATELLITE	NADIR LONGITUDE	DATE	AMVs TIME (UTC)
FY-2C	105°	Jan 1 st , 2006 – Nov 24 th , 2009	00/06/12/18
FY-2D	86.5°	Feb 14 th , 2007 – Dec 31 st , 2013	03/09/15/21
FY-2E	105°	Nov 23 rd , 2009 – Dec 31 st , 2013	00/06/12/18

Result of reprocessing FY-2E AMV

- The comparison of quality of reprocessed AMV and operational AMV of in **August 2013**. (compared with ECMWF global atmospheric reanalysis data)
- IR winds validation result:
 - The bias reduce by **1.303** m/s. (-2.855 to -1.552)
 - The STD reduce by **0.013** m/s. (5.031 to 5.018)



Aug.2013 FY-2E 0-400hPa (QI>80)

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Future work

- Continue to improve AMV products quality
- Complete the test of FY-4A AMV products
- FY-3 polar winds (in R&D status)

Thank you !