CGMS-XXXIII
PRC-WP-04
Prepared by CMA
Agenda Item: B. 2

CURRENT STATUS OF FY-2C GEOSTATIONARY SATELLITE

Summary and purpose of paper

China launched geo-stationary satellite FY-2C on October 19, 2004. It replaces FY-2B providing routine operational GEO observations at 105^{o}E. FY-2C carries VISSR and SEM instruments and transmits 24 full-disc and 4 wind images per day

CURRENT STATUS OF FY-2C GEOSTATIONARY SATELLITE

1 Launch And Mission of FY-2C

The geo-stationary meteorological satellite FY-2C was launched on October 19, 2005 and stationed at 105^0E. It replaces FY-2B in providing routine operational GEO observations. The FY-2B is moved to 105^0E as backup.

The mission of FY-2C:

- Acquiring visible, infrared and water vapor cloud images;
- Transmitting S-VISSR images and low resolution images;
- Data collection;
- Space environment monitoring.

2. Satellite Parameters

FY-2C is 2.1 meters in diameter and 1.6 meters in height, weighs 1.38 tons (launching weight). It s spin-stabilized, the design lifetime is 3 years. The nominal position of the satellite is 105^o E over the Equator. The orbit-keeping range < $\pm 1^o$ north-south, and < $\pm 0.5^o$ east –west.

Table 1. Satellite Attitude Parameters

Attitude Control	Spin stabilization; error of spin axis perpendicular to the orbital plane < 0.5°
Spin rate	98 ± 1 rpm
Precision of attitude control	≤ $\pm 0.5^o$
Precision of attitude measurement	≤ $\pm 0.07^o$
Attitude stability	Short run: ≤3.5mrad/0.6sec Long run: ≤3.5mrad/30sec
S-band antenna pointing error	≤ $\pm 0.4^\circ$

3. Instruments

1. Multi-channel Visible and Infrared Spin Scan Radiometer(VISSR)

The 5 channel radiometer is the primary observational instrument. Compared with FY-2A/2B, the long wave infrared window channel (10.5～12.5μm) is split into tgwo channels (10.3～11.3 μm and 11.5～12.5 μm) in order to improve sea surface temperature retrieval. A medium wave infrared channel (3.5～4.0μm) is added for detecting clouds, and to reinforce grass and forest fire monitoring. The spectrum band of visible channel is changed from 0.5～1.05μm to 0.55～0.90μm with a view to reducing

the influence of water vapor absorption.

Table 2. The spectral channels of VISSR

Channel	Wavelength(μm)
IR1	10.3～11.3
IR2	11.5～12.5
IR3	6.3～7.6
IR4	3.5～4.0
VIS	0.55～0.99

Table 3. The characteristics of VIS channels of VISSR

Channel	VIS
Wavelength (μm)	0.55～0.99
IFOV(μr)	35
Space resolution (km)	1.25
Dynamic range	0～98%
S/N	1.5 @ 0.5% albedo 50 @ 95%
Number of detectors	4 (primary) + 4 (backup)
Quantization level	64
Calibration	Solar calibration

Table 4. The characteristics of IR channels of VISSR

Channel	IR1	IR2	IR3	IR4
Wavelength(μm)	10.3～11.3	11.5～12.5	6.3～7.6	3.5～4.0
IFOV (μr)	140	140	140	140
Space resolution(km)	5	5	5	5
Dynamic range	180～330K		190～300K	180～340K
Temperature resolution	0.4～0.2K	0.4～0.2k	0.5～0.3K	0.6～0.5K
Number of detectors	1(primary)+1 (backup)	1(primary)+1 (backup)	1(primary)+1 (backup)	1(primary)+1 (backup)
Quantization level	1024	1024	1024	256
Calibration	Blackbody calibration			

2. Space Environment Monitor (SEM)

A space particle monitor and an x-ray monitor are mounted on FY-2C to detect the space EM) environment in proximity of the satellite, the solar activities and relevant space phenomenon. The SEM information is transmitted via telemetry to the ground system.

4. Data Transmission Characteristics

S-VISSR transmission characteristics:

- Transmission frequency: 1687.5 MHz
- EIRP: 57.5 dbm
- Polarization: linear
- Data rate: 660 Kbps
- Bandwidth: 2 MHz

- Modulation: PCM/BPSK
- Data coverage: S-VISSR (5 channels)

LRIT transmission characteristics:

- Transmission frequency: 1691 MHz
- EIRP: 57.5 dbm
- Polarization: linear
- Data rate: 150 Kbps
- Bandwidth: 260 KHz
- Modulation: PCM/NRZ-M/BPSK
- Data coverage:
  Full earth disc of normalized geo-projection (2200 lines * 2200 pixels, 5 km resolution)
  China sector area
  Geo satellite products: SST, winds, and precipitation

FY-2C implements two modes for S-VISSR broadcast. The Regular Schedule provides 24 full disc images every day plus 4 images for deriving wind products. Flood Season Schedule transmits full disc images in the early half hour; for the late half hour, a certain number of sector images in northern hemisphere is expected to be transmitted in total size of 1400 scan lines, taking 15 minutes time to scan.

5. Data Products and Dissemination

1. Image Products

Product	Coverage	Time/day
S-VISSR full disc earth image	Actual observation coverage to be centered at the satellite sub-point	28
Nominal image	Nominal full disc earth image to be centered at 105°E, 0°N	24
S-VISSR hemispheric image	Half disc earth image of the northern hemisphere	20
Nominal hemispheric	Nominal half disc earth image of the northern hemisphere	20
Quadrant image	Four quadrant images with extension of 10 degree longitude and latitude from 105°E, 0°N	24
China area image	China area and proximity	24
Lambert projection	70° –140°E, 5°-55°N	24
Mercator projection	45°-165°E, 45°N-45°S	24
Sea area image	105°-150°E, 0°-45°N	24

Note: 28 times/day – observation starts at each hour, and at the half-hour dedicated for the AMV detection.
24 times/day – observation starts at each hour.
20 times/day – observation starts at each half-hour exclusive of those on the 28 times/day category.

2. Quantitative Products

Product	Coverage	Times/day
AMV	50°N-50°S, 55°E-155°E	4
SST	50°N-50°S, 55°E-155°E	8
UTH	50°N-50°S, 55°E-155°E	8
ISCCP Dataset, Precipitation index	50°N-50°S, 55°E-155°E	8
Rainfall estimate	70°E-140°E, 5°N-55° N	4

Cloud detection	50°N-50°S, 55°E-155°E	8
Cloud parameters(cloud top temperature, top height, cloud amount)	50°N-50°S, 55°E-155°E	8
Humidity profile by cloud analysis	50°N-50°S, 55°E-155°E	8
Outgoing long-wave radiation	50°N-50°S, 55°E-155°E	8
Downward solar radiation	50°N-50°S, 55°E-155°E	1
Snow coverage	Whole disc	1
Sea ice	Whole disc	1
Flood monitoring	China area	1
Drought monitoring	China area	1
Fire monitoring	China area	24
Tropical cyclone positioning	West pacific to 150°E, the Indian Ocean	24
Dust storm monitoring	China area	8
Fog monitoring product	China area	24
Brightness temperature	50°N-50°S, 55°E-155°E	8

Note: 4 times/day – observation starts at 00, 06, 12, 18 (UTC)
8 times/day- observation starts at 00, 03, 06, 09, 12, 15, 18 ,21 (UTC)
1 time/day-average of all the image data received a day.