

The Status of FY-1C Satellite

Summary and purpose of paper

FY-1 C was launched on May 10, 1999. This paper describes the status, specification , orbit , instrument and transmission characteristics of satellite.

The Status of FY-1C Satellite

FY-1C is the third polar orbiting meteorological satellite of China. The former two experimental satellites FY-1A and FY-1B were launched respectively in September 1988 and September 1990. Because of the altitude defects, both satellites could not reach their design lifetime.

As the successor of FY-1A and FY-1B, FY-1C was successfully launched from Taiyuan Satellite Launch Center by Long March-4 rocket on May 10 1999. On the same day, 7 channels (including 4 visible channels, 3 near infrared channels) of its radiometer were turned on and the first cloud image was well received with high quality. On June 13, the remained 3 Infrared channels of the radiometer was started, and the first IR image was also successfully gotten. From June 25 1999 to July 5, the satellite was under in-orbit checkout. The results of test showed that most technical specifications of the satellite had met the design requirements. So far, more than 1700 passes of data have been received, the satellite is in very good working conditions. Comparing with the previous satellites, the most notable change of FY-1C is that the number of channels of scan radiometer is increased from 5 to 10, in addition, the reliability of the satellite has been improved. It is expected that the lifetime of FY-1C is 2 years. In 2001, when FY-1C reaches its lifetime, FY-1D will be launched, which will have the same characteristics as FY-1C's.

The High Resolution Picture Transmission of FY-1C with 1.1km resolution at sub-point is named CHRPT, which can be shared by other countries without any restriction. Besides CHRPT, FY-1C also has Global Delayed Picture Transmission (GDPT) to acquire 4 channels global image data with 4 Km resolution. With the finish of the satellite checkout, FY-1C CHRPT data has been fully available for all users.

1. Satellite Specifications

- Weight: 950 Kg
- Average power: 256 watts
- Height: 2.115 meters (solar sailboard included)
- Total length: 10.556 meters
- Body size: 1.42x1.42x1.20m, hexahedral cylinder
- Attitude: three-axle stability
- Expectant lifetime: 2 years

2. Orbital Parameters

- Orbit altitude: 863 Km (specification: 870Km)
- Inclination: 98.79 (specification: 98.80)
- Eccentricity: 0.00188 (specification:<0.05)
- Orbital period: 102.3 minutes
- Orbit return period: 10.61 days

3. Remote Sensing Instrument

Multi-channel Visible and IR Scan Radiometer (MVISR) is the major sensor of FY-1. The

total number of channels of MVISR is 10, including 4 visible channels, 3 near IR channels, 1 short wave IR channel and 2 long wave IR channels. The wavelengths of the channels are shown in Table 1.

Table 1 The Wavelengths of MVISR of FY-1C

Channel No.	Wavelength (μm)	Primary use
1	0.58-0.68	Daytime cloud, ice and snow cover
2	0.84-0.89	Daytime cloud, vegetation, water
3	3.55-3.93	Heat source, night cloud
4	10.3-11.3	SST, day/night cloud
5	11.5-12.5	SST, day/night cloud
6	1.58-1.64	Soil humidity, ice/snow distinguishing
7	0.43-0.48	Ocean color
8	0.48-0.53	Ocean color
9	0.53-0.58	Ocean color
10	0.90-0.965	Water vapor

The characteristics of MVISR are as follows:

- Instantaneous field of view (IFOV): 2 mrad
- Resolution at sub-point: 1.1 Km
- Scan rate: 6 lines/second
- Quantization: 10 bits/word
- Pixels per channel: 2048
- Words per scan line: 22180
- Calibration accuracy: 10% reflectance (Visible), 1k at 300k (Infrared)

4. Transmission Characteristics

- The transmission frequency of CHRPT: 1700.5 MHz
- EIRP: 39.4 dBm
- Polarization: right hand circular
- Modulation: PCM-PSK
- Modulation index: $67.5^\circ \pm 7.5^\circ$
- Bit rate: 1.3308 Mbps
- Bandwidth : 5.5 MHz

5. CHRPT Data Format

CHRPT data format is very similar to the NOAA HRPT data format.