

Current Status of FY-1D Polar Orbiting Satellite

Summary and purpose of paper

Currently, NSMC/CMA operates FY-1D polar-orbiting meteorological satellite which was launched in May 2002. The observational instrument is the Multi-Channel Visible and Infrared Scan Radiometer for the earth environment monitoring and the Space Environment Monitor to detect charged particles in solar winds. Direct readout service of HRPT data is available at S-band 1700.4MHz.

Current Status of FY-1D Polar Orbiting Satellite

(As of 25 August 2006)

Launch Date and Current Status

FY-1D was launched on 15 May 2002. It is three-axis stabilized with 2-year design lifetime. Currently, FY-1D is operational.

Orbit Characteristics

Table-1 gives the orbital characteristics of FY-1D.

Table 1. Orbit Parameters of FY-1D Satellite

Satellite	Orbit	Altitude	Inclination	Eccentricity	Descending Node LST
FY-1D	Sun-synchronous	866 Km	98.80°	<0.005	6:50 am

Instrument Payload

MVISR (Multi-channel Visible and Infrared Scan Radiometer): a VIS/IR radiometer with 10 channels, resolution 1.1Km, and swath 2800Km. The wavelength of each channel and primary usage is shown in Table-2.

Table 2. MVISR Channels and Primary Use

Channel	Wavelength (μm)	Primary Use
1	0.58-0.68	Daytime cloud, ice and snow, vegetation
2	0.84-0.89	Daytime cloud, vegetation, water vapor
3	3.55-3.95	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 moisture, 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

SEM (Space Environment Monitor) for in situ observation of charged particles in solar wind.

Data Transmission

High Resolution Picture Transmission(HRPT): direct read-out for the whole information at full resolution in digital form at S-band frequencies. Main features:

- frequencies: 1700.4MHz; bandwidth: 5MHz; polarization: right-hand circular

- antenna diameter~ 2m, G/T~ 6.0dB/K, data rate ~ 1.33 Kbps

Delayed Picture Transmission(DPT): MVISR imagery is stored on board and transmitted to ground station in S-band. Main features:

- frequency 1708.5MHz; bandwidth: 3 MHz; data rate~ 1.33Mbps.
- DPT is capable of two forms of data format:
 - GDPT format: global data of 4 channels (0.58-0.68 μ m, 0.84-89 μ m,10.3-11.3 μ m,11.5-12.5 μ m) with resolution reduced to 3.3 Km;
 - LDPT format: limited-area data of 10 channels with 1.1Km resolution.

MVISR Calibration Coefficients

MVISR calibration coefficients are adjusted every year with field measurements. Table-3 gives the updated calibration coefficients.

Table 3. FY-1D MVISR Calibration Coefficients

Channel	Slope	Intercept
1	8.930 E-02	-1.0719
2	9.980 E-02	-1.1972
6	8.310 E-02	-2.4113
7	4.230 E-02	-0.5498
8	6.310 E-02	-0.757
9	8.170 E-02	-1.0624
10	8.920 E-02	-1.2486

Annex: CMA Update for Table 1

Table 1: Current Polar-Orbiting Satellites Coordinated Within CGMS
(as of 28 August 2006)

Orbit type (equatorial crossing times)	Satellites in orbit (+operation mode) P=Pre-operational Op=operational B=back-up L=limited availability R= R&D	Operator	Crossing Time A=Northw D=Southw +Altitude	Launch date	Status
Sun-synchr. "Morning" (6:00 – 12:00) (18:00 – 24:00)	NOAA-17 (Op)	USA/NOAA	10:20 (D) 812 km	6/02	Functional. AMSU-A1 Failed.
	NOAA-15 (B)	USA/NOAA	06:37 (D) 808 km	05/98	Functional (intermittent problems with AVHRR, AMSU-B & HIRS)
	NOAA-12 (L)	USA/NOAA	04:44 (D) 805 km	05/91	Functional (except sounding).
	DMSP-F15 (Op)	USA/NOAA	21:24 (A) 850 km	12/99	Defense satellite. SSMT2 (microwave water vapor sounder) non-functional. Data available to civilian users through NOAA.
	DMSP-F14 (B)	USA/NOAA	19 :52 (A) 852 km	04/97	Defense satellite. SSMT1 (microwave temperature sounder) non-functional. SSMT2 non-functional. Only 1 functional onboard recorder. Data available to civilian users through NOAA.
	DMSP-F12 (L)	USA/NOAA	18:15 (A) 850 km	8/94	Defense Satellite. SSMI (microwave imager) and SSMT1 non-functional. Non-operational (no onboard recorders).
	Meteor-3M-N1 (P)	Russia	9:15	12/01	Functional (with limited capabilities).
Sun-synchr. "Afternoon" (12:00 – 16:00) (00:00 – 04:00)	NOAA-16 (Op)	USA/NOAA	14:11 (A) 850 km	09/00	Functional, no APT. Intermittent problems with AVHRR.
	NOAA-14 (B)	USA/NOAA	19:30 (A) 845 km	12/94	Functional. AVHRR and SBUV only (degraded mode).
	NOAA-11 (L)	USA/NOAA	23:04 (A) 841 km	09/88	Functional. DCS, SARR

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Sun-synchr. “Early morning” (4:00 - 6:00) (16:00 – 18:00)	Dmsp-F13 (Op)	USA/NOAA	18:24 (A) 850 km	03/95	Defense satellite. On orbit 101 months – estimate 7 months of mission life remaining. Data available to civilian users through NOAA.
	FY-1D (Op)	China/CMA	06:50 (D) 866 km	5/02	Functional. CHRPT