

EO Satellite Systems and Initiatives in China

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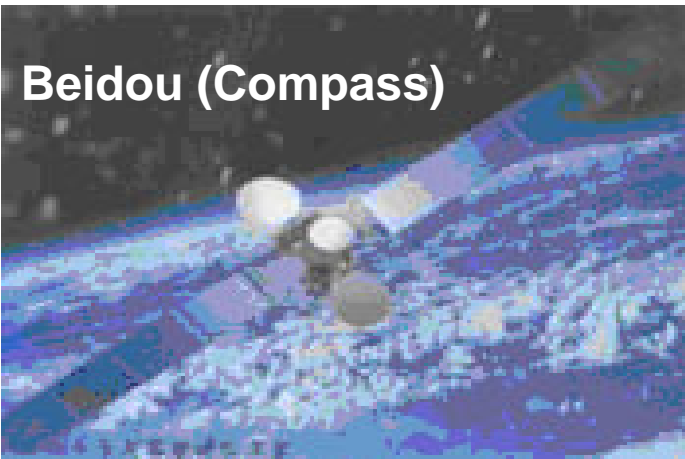
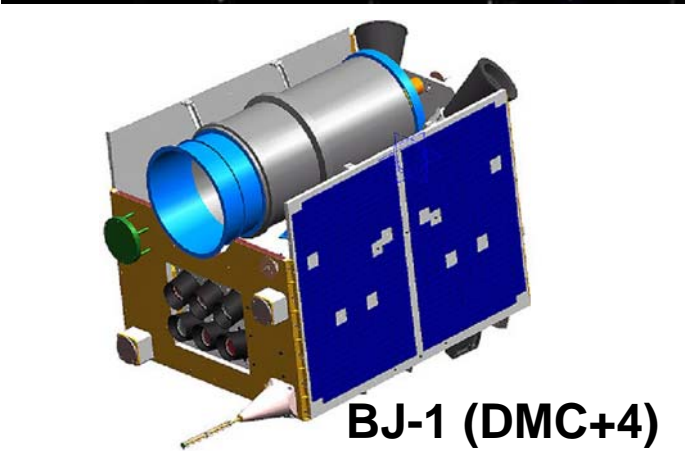
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The EO Satellite Systems in China

- Earth Resources Satellites
 - CBERS-1/2
- Meteorological Satellites
 - FY1A/B/C/D
 - FY 2A/B/C/D
- Oceanographic Satellites
 - HY 1A/B
- Micro and Small Satellite and Constellation
 - BJ-1
 - HJ-1 A/B/C (to be launched)
- Navigation Satellite
 - Beidou (Compass)

The Main EO Satellites in China



CBERS

- CBERS----China-Brazil Earth Resources Satellite.
- Jointly developed by China and Brazil .
- CBRES-01 launched on Oct 14, 1999.
- CBRES-02 launched on Oct 21, 2003.



CBERS-01/02 spacecraft

- Orbit: sun-synchronous recurrent and frozen orbit
- Mean altitude: 778km
- Inclination angle: 98.5°
- Local time at descending node: 10:30 AM
- Orbital period: 100.26 minutes
- Repeat cycle: 26 days
- Revolution per day: $14 + \frac{9}{26}$
- Inter-track distance: 107.4 km
- Time interval between adjacent track: 3 days

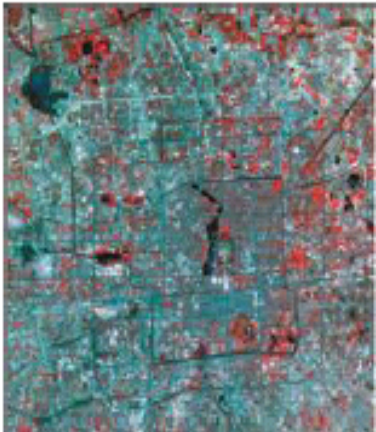
The Payloads of CBERS-01/02

- Three sensors:
 - Charge Coupled Device Camera (CCD)
 - Infrared Multi-Spectral Scanner (IRMSS)
 - Wide Field Imager (WFI)
- High Density Digital Recorder (HDDR)
- Data Collection System (DCS)
- Space Environmental Monitor (SEM)

Specification of Three Sensors onboard CBERS-01/02

Sensor	CCD	IRMSS	WFI
Sensor Type	Push broom	Scanner (Forward and reverse)	Push broom (split camera)
VIS/NIR Bands	1: 0.45~0.52 μ m 2: 0.52~0.59 μ m 3: 0.63~0.69 μ m 4: 0.77~0.89 μ m 5: 0.51~0.73 μ m	6: 0.50~0.90 μ m	10: 0.63~0.69 μ m 11: 0.77~0.89 μ m
SWIR Bands	None	7: 1.55~1.75 μ m 8: 2.08~2.35 μ m	None
Thermal Bands	None	9: 10.4~12.5 μ m	None

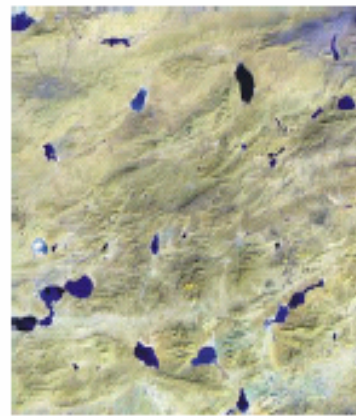
CCD, IRMSS and WFI Images



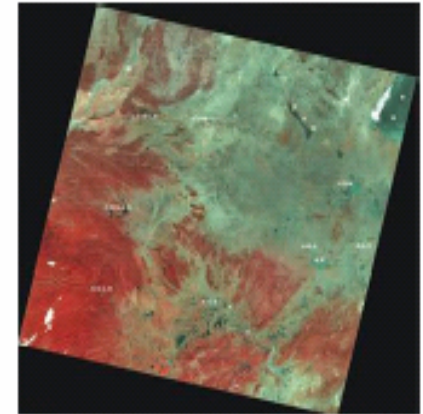
CCD image of
Beijing, R4G3B2
false color
composite



Mosaic image of
Beijing with 5
scenes of CCD
images, R3G4B2
pseudo color
composite



IRMSS image of
Mani, Tibet
R7G6B8 false
color composite



WFI image of
middle-east China,
acquired on Nov.1,
2003.

CBER-2 Mosaic Image of China

中华人民共和国资源卫星影像地图



CBERS Data Distribution

- From Apr. 1, 2006, CBERS-02 data can be freely downloaded for domestic users.
- Now, more than 10,000 scenes of CBERS-02 data are distributed monthly.

Next CBERS

- The next CBERS, named by CBERS-02B, will be launched in 2007.
- The successive CBERS 03/04 are also planned

CBERS-03/04 Payloads

Payload	Band No.	Spectrum (μm)	Resolution (m)	Swath Width (km)	Repeat Cycle (day)
Panchromatic Camera (PAN)	1	0.51~0.85	5	60	52 (Side-looking $\pm 32^\circ$)
	2	0.52~0.59	10		
	3	0.63~0.69	10		
	4	0.77~0.89	10		
Multi Spectral Camera (MUX)	5	0.45~0.52	20	120	26
	6	0.52~0.59	20		
	7	0.63~0.69	20		
	8	0.77~0.89	20		
IRMSS	9	0.50~0.90	40	120	26
	10	1.55~1.75	40		
	11	2.08~2.35	40		
	12	10.4~12.5	80		
Wide Field Image (WFI)	13	0.45~0.52	73	866	5
	14	0.52~0.59	73		
	15	0.63~0.69	73		
	16	0.77~0.89	73		

Chinese Meteorological Satellite: FY Series

Polar System

FY
|
1A
1B
1C
1D



First Generation

FY
|
3A
3B
3C
↓
3H



Second Generation

Geostationary System

FY
|
2A
2B
2C
2D
2E



First Generation

FY
|
4



Second Generation

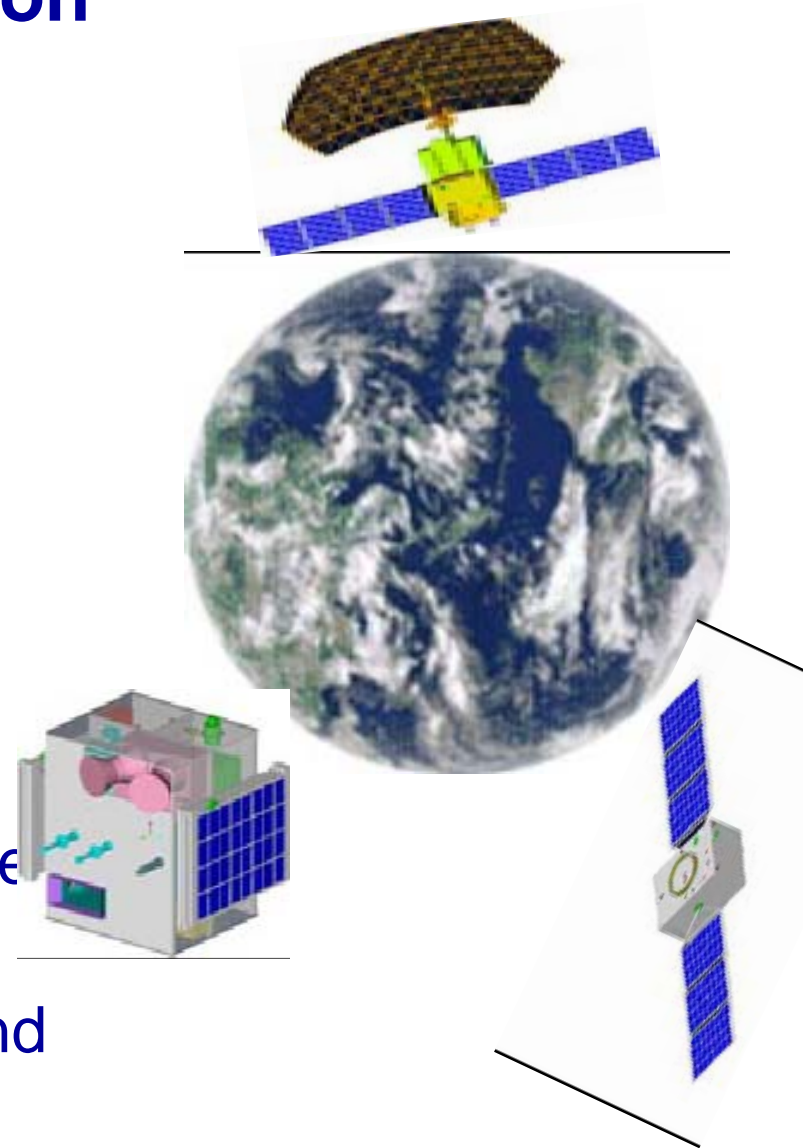
- **FY-1 Series----- China's 1st Generation of Polar Orbit Meteorological Satellites**
 - FY-1A, FY-1B with 5 Channel Visible and Infrared Radiometers
 - FY-1C, FY-1D with 10 Channel Visible and Infrared Radiometers
- **FY-2 Series----- China's 1st Generation of Geostationary Meteorological Satellites**
 - FY-2 A&B with 3-channel VISR
 - FY-2 C&D with the 5-channel VISR
- **FY-1D and FY-2C, 2D are in operation**
 - FY-2D was launched on Dec 8, 2006

Oceanographic Satellite

- HY-1A was launched on May 15, 2002
 - 10-band ocean color scanner –COCTS (1100m)
 - 4-band CCD scanner (250m)
- HY-1B was launched on April 11, 2007
- HY-2 is planned.

Disaster and Environment Monitoring Satellite Constellation

- China plans to launch **two optical satellites** and **one SAR satellite** in 2007, called the “2+1” Project
- Another **4 optical satellites** and **4 SAR satellites** will be launched during 2008-2010 (“4 + 4”).
- The orbit of the constellation is sun synchronous, with revisit time of 48-96 hours. The payload of the satellite includes CCD camera, infrared scanner, hyper-spectrum camera and SAR.



The Payloads of Environment (HJ) Small Satellites

Sat.	Payload	Band No.	Spectrum (μm)	Resolution (m)	Swath Width (km)	Repeat Cycle (day)
HJ-1-A	CCD Camera	1	0.43-0.52	30	720	4
		2	0.52-0.60	30		
		3	0.63-0.69	30		
		4	0.76-0.9	30		
	hyper-spectral Image	—	0.45-0.95 (110-128 bands)	100	50	4-31, (Side-looking $\pm 30^\circ$)
HJ-1-B	CCD Camera	1	0.43-0.52	30	720	4
		2	0.52-0.60	30		
		3	0.63-0.69	30		
		4	0.76-0.9	30		
	IRMSS	5	0.75-1.10	150 (NIR)	720	4
		6	1.55-1.75			
		7	3.50-3.90			
		8	10.5-12.5	300 (10.5-12.5 μm)		
HJ-1-C	SAR	—	S Band	20 (4 Looks) 5 (1 Looks)	100	4-31

A Brief Summary on Updates

- New CBERS-02 Data Distribution Policy
 - Free to domestic users
- Launch of New Satellites
 - FY-2D (Dec 8, 2006)
 - HY-1B (Apr 11, 2007)
- Future satellites
 - CBERS-02B, and 03/04
 - FY-3 and FY-4
 - HJ-1 constellation (DMC)

谢谢
Thanks

