



国家海洋局
第二海洋研究所



卫星海洋环境动力学
国家重点实验室

Brief update on Chinese ocean colour satellite missions since last meeting

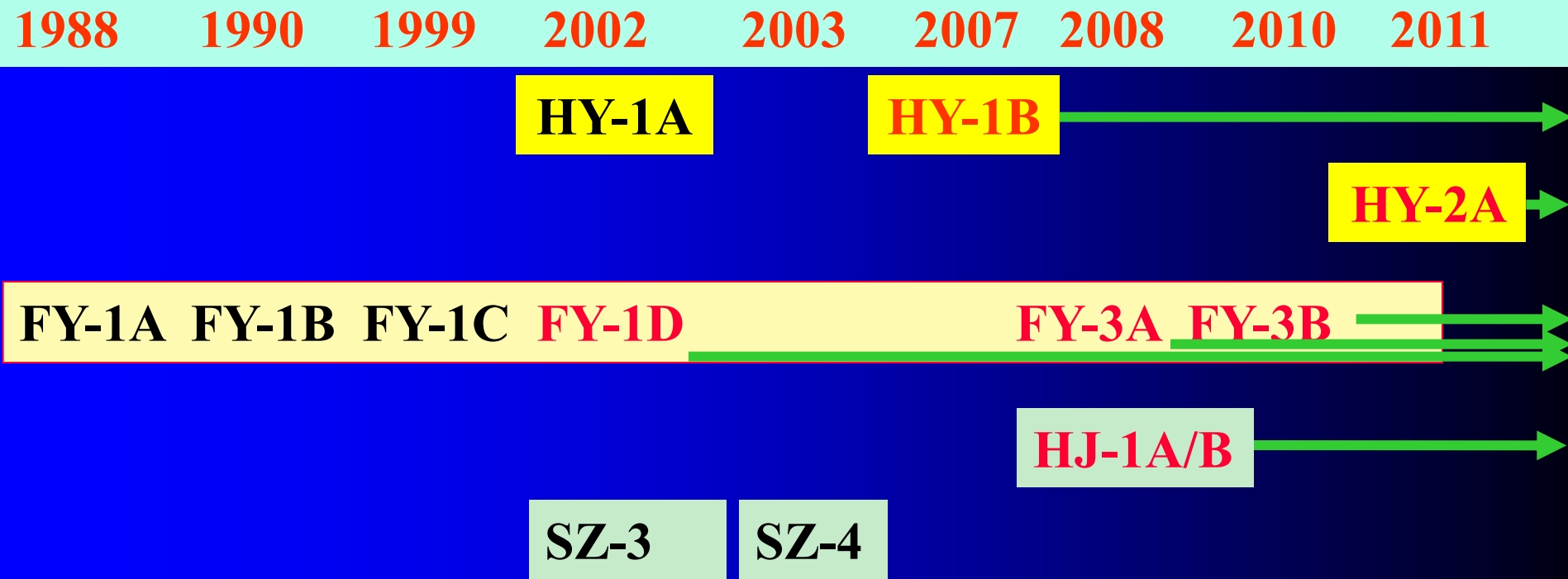
Zhihua Mao, Delu Pan

State Key Laboratory of Satellite Ocean Environment Dynamics,
Second Institute of Oceanography, SOA
卫星海洋环境动力学国家重点实验室
国家海洋局第二海洋研究所

Feb.29, 2012

Four series of satellite for ocean remote sensing in China

- Ocean Observation Satellites (HaiYang, HY series)
- Meteorological Satellites (FengYun, FY series)
- Environment and Disaster Monitoring Satellites (HJ series)
- Spacecraft (SZ series)





HY-1B satellite

Second ocean color satellite of China, **HY-1B** was launched by Long March rocket, in April, 2007.

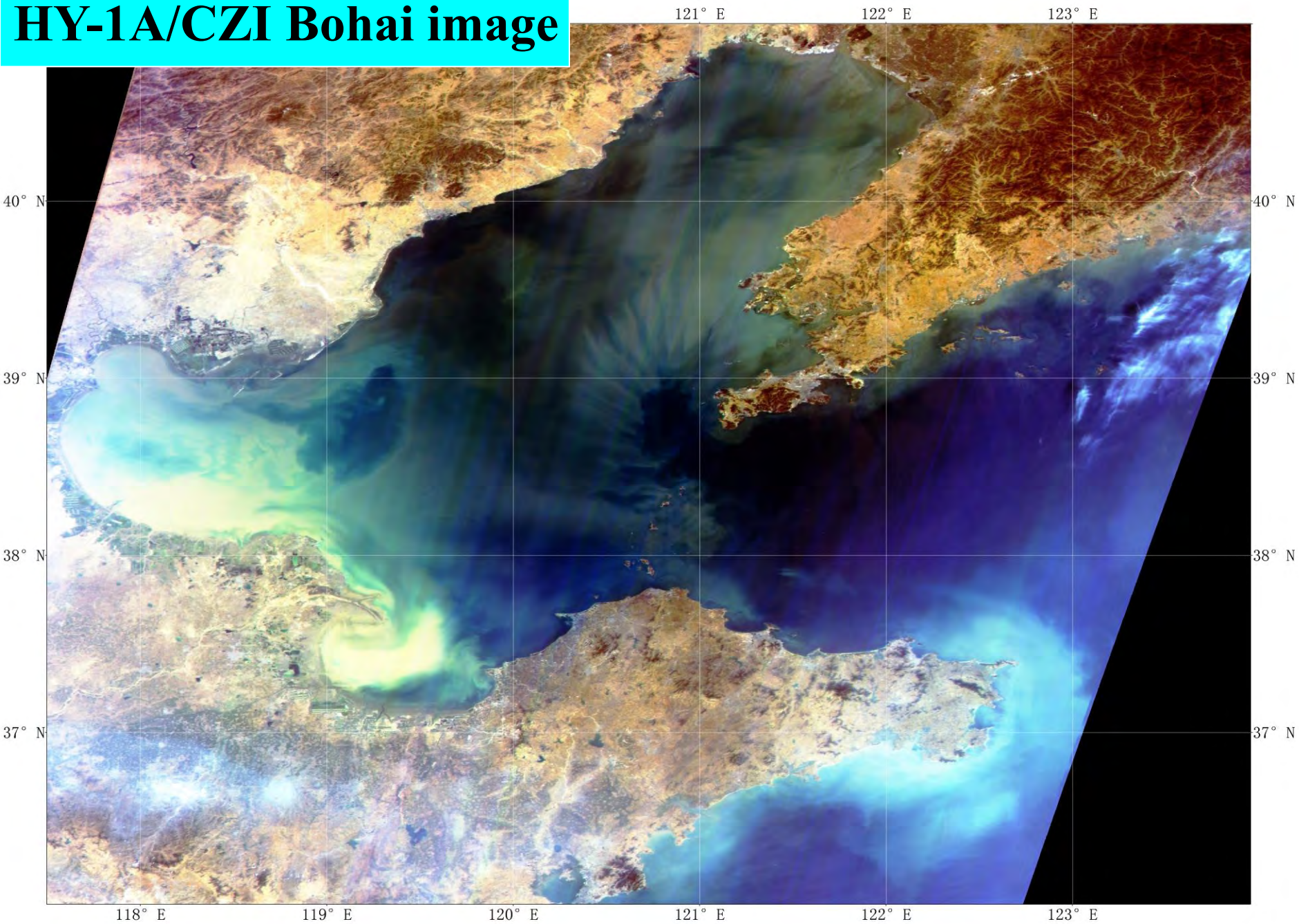


1. **COCTS**- Chinese Ocean Color and Temperature Scanner (Ten bands)
2. **CZI**- Coastal Zone Imager (4 bands CCD Camera)

Major parameters of COCTS and CZI

Parameter	COCTS	CZI
Spatial resolution	1.1km	0.25km
Scan coverage	2400km	500km
Polarization sensitivity	5%	5%
Digitization	10bit/pixel	12bit/pixel
Pixels/Scan Line	1664	2048
Radiometer accuracy	10%	10%

HY-1A/CZI Bohai image



Images courtesy of Dr. Mingsen Lin

Yangtze Δ is a **key** area of Chinese economic development which is about **2.1%** area, and **11%** population , but about **20-23%** GDP、**25%** financial income **33%** oceanic GDP and **47%** out port in China.

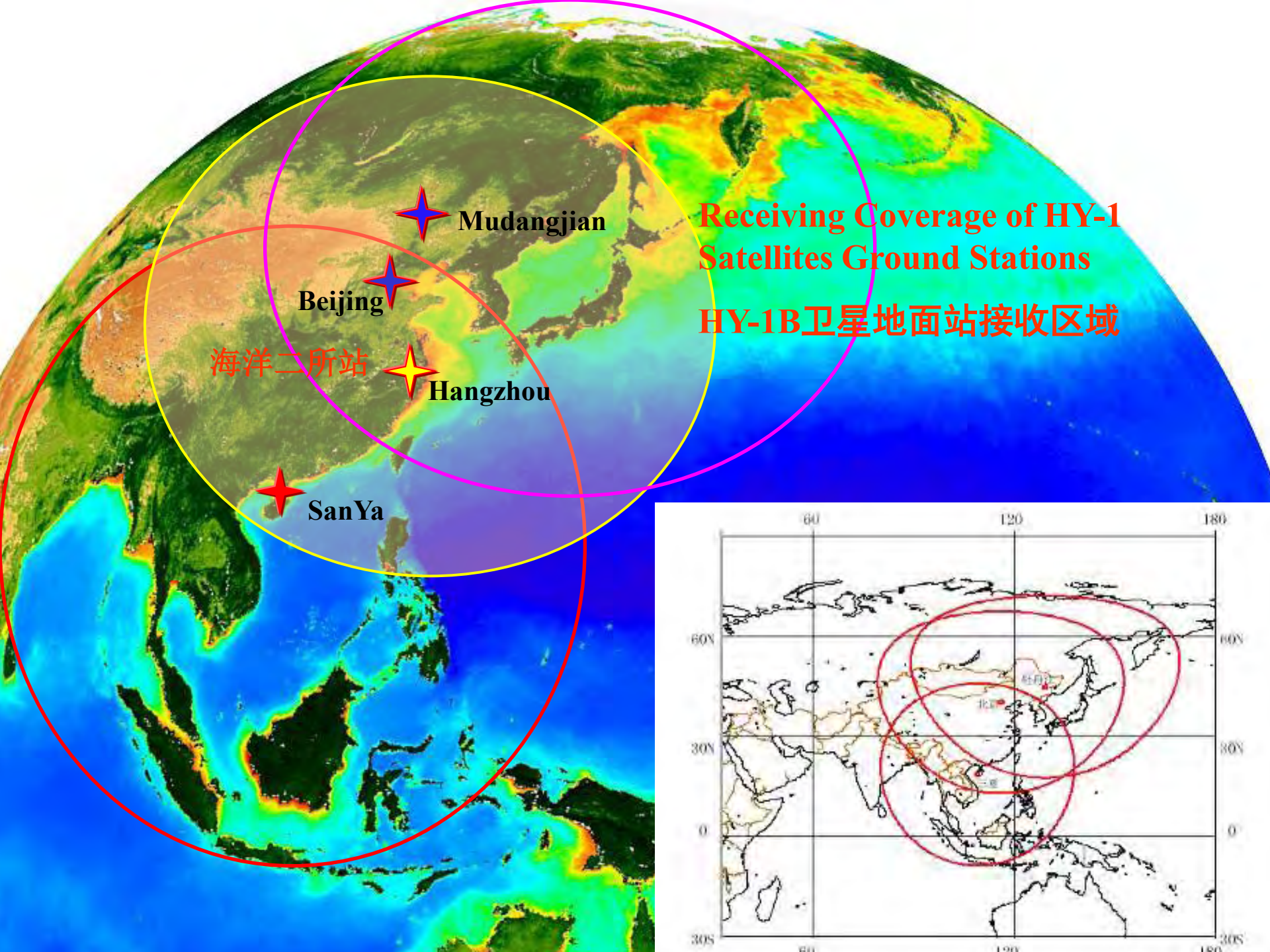
Suzhou

Shanghai

Hangzhou

HY-1B/COCTS

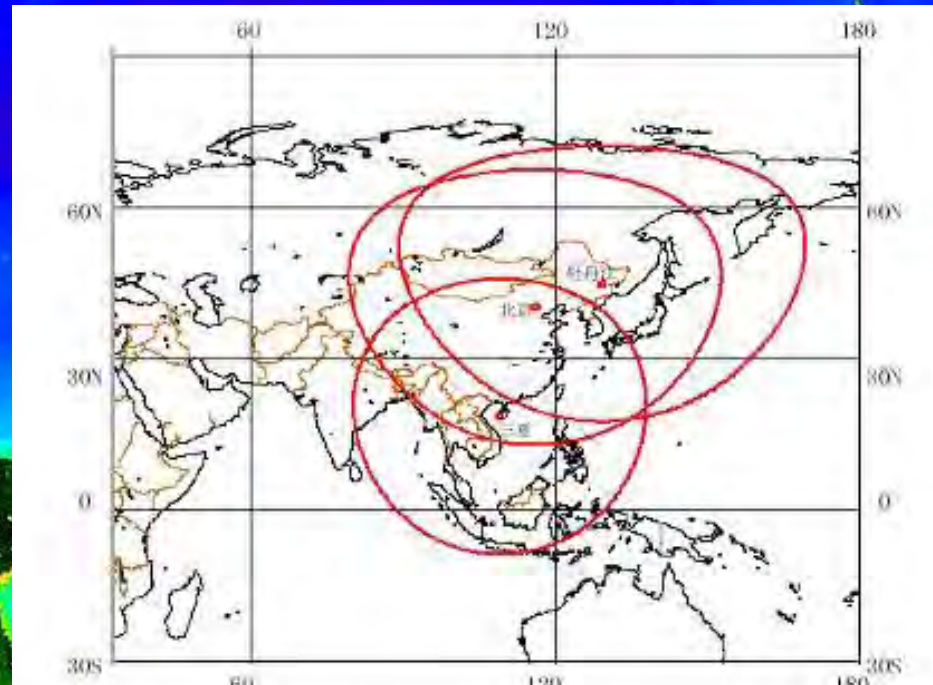
2008-3-1 2:46 GMT



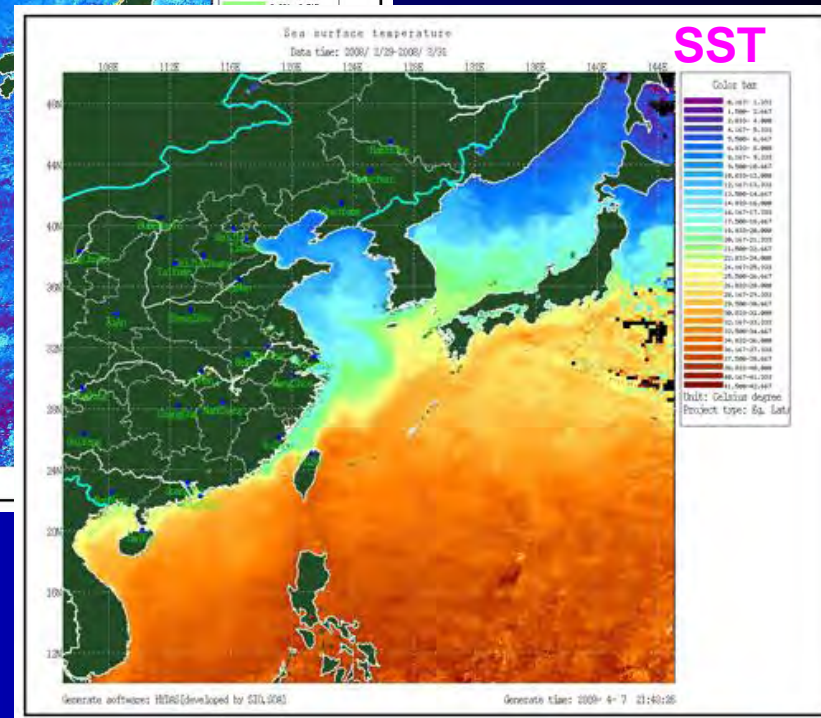
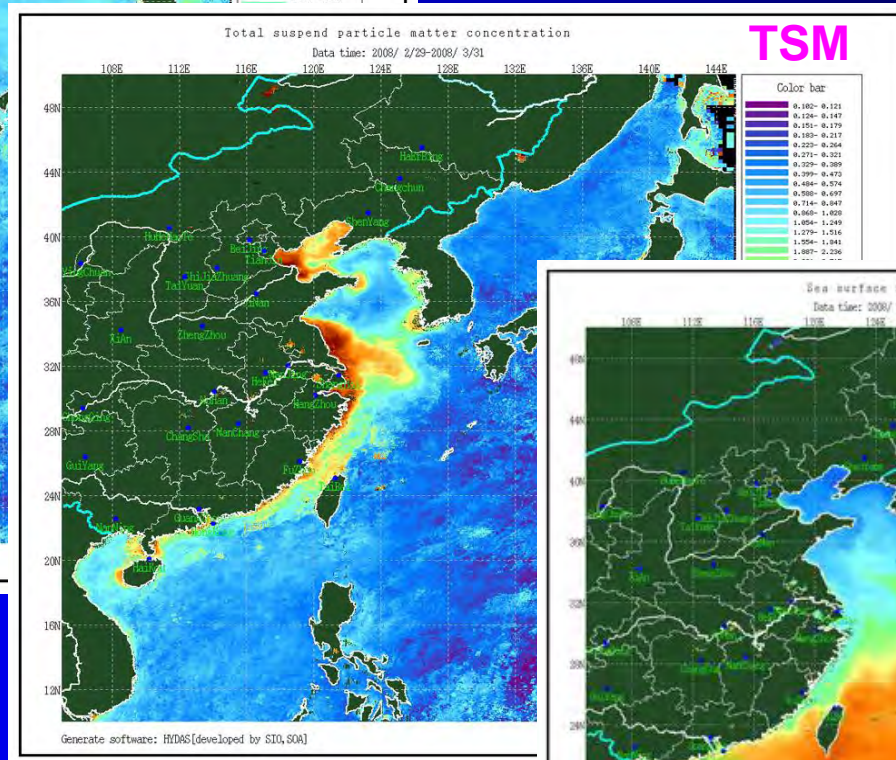
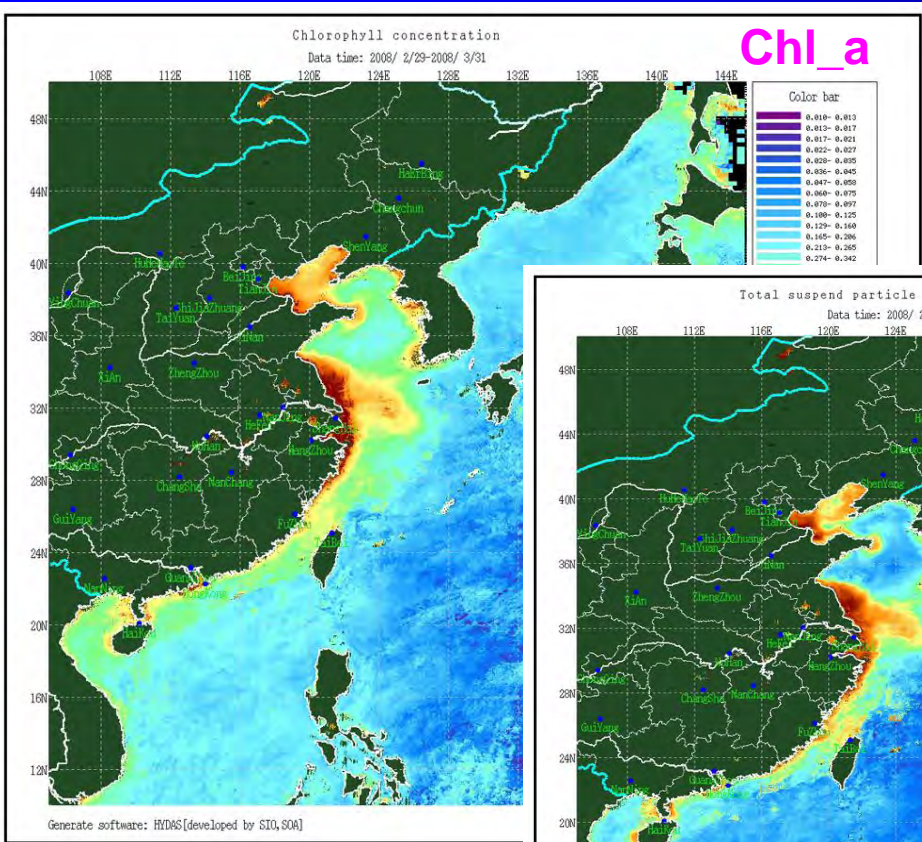
Receiving Coverage of HY-1
Satellites Ground Stations

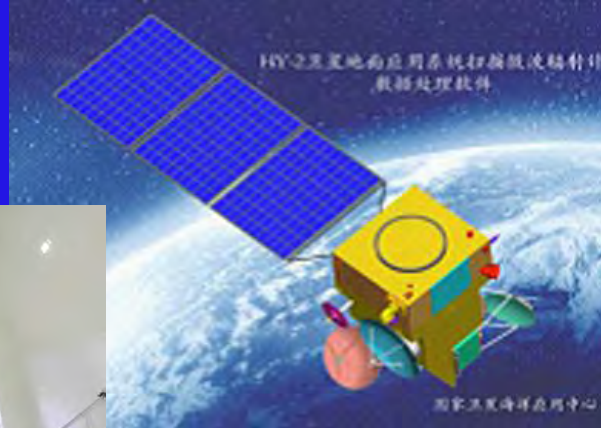
HY-1B卫星地面站接收区域

Mudangjian
Beijing
海洋二所站
Hangzhou
San Ya



HY-1B/COCTS Monthly averaged products(2008-3)





HY-2A Satellite

First ocean dynamics satellite of China, **HY-2A** was launched by Long March rocket, on Aug.16, 2011.

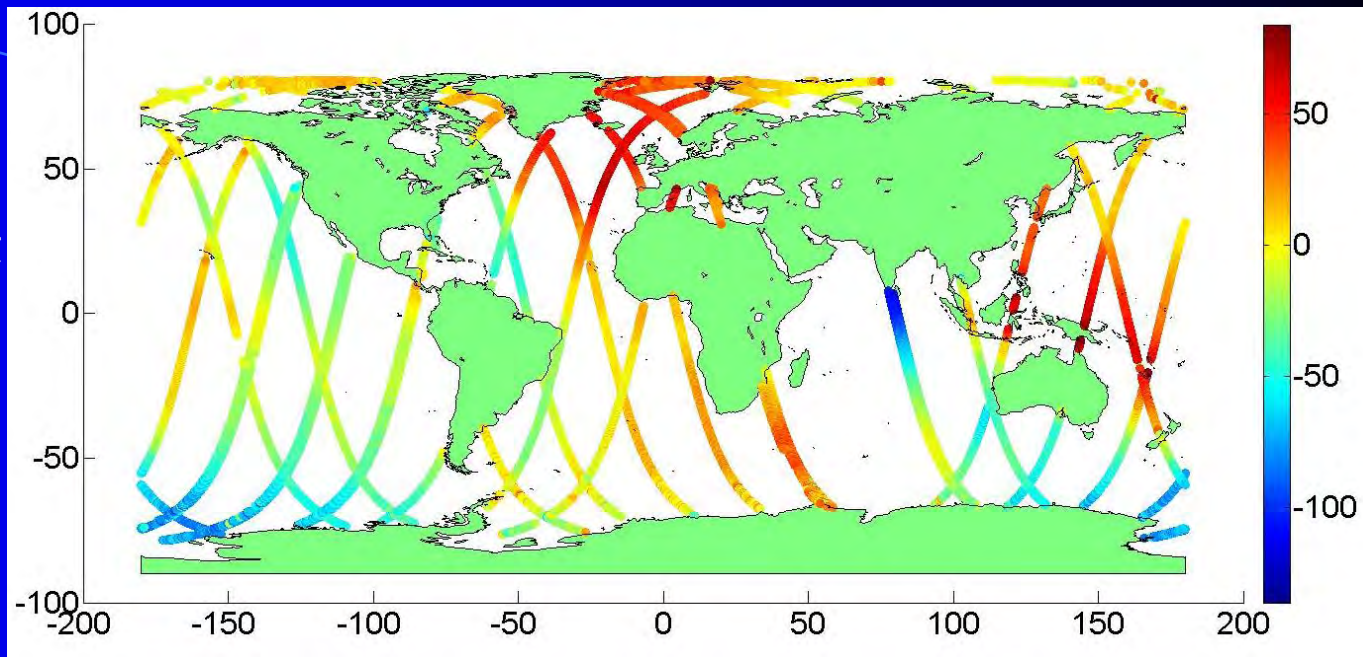
Sponsored by: State Oceanic Administration, (SOA)
Manufacturer: the Chinese Academy of Space Technology (CAST)



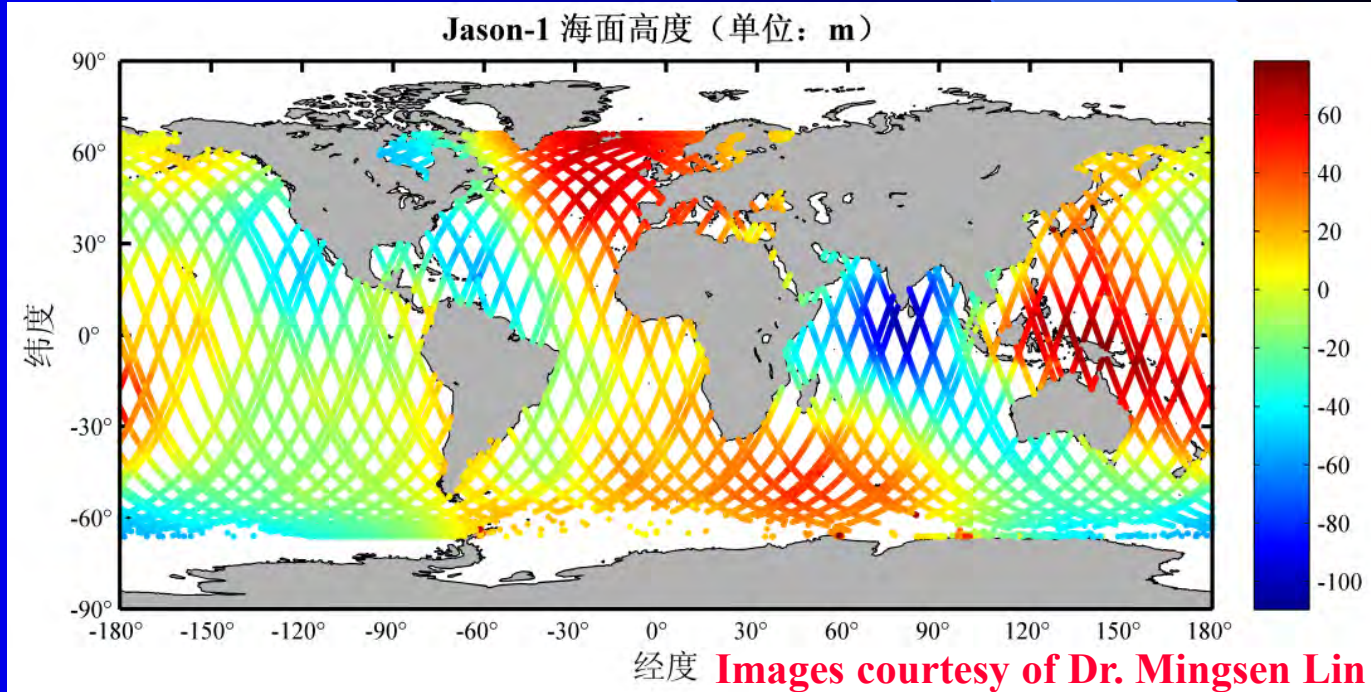
3 sensors and Monitor Parameters

Satellite	Payload	Monitor Para. (Main Parameter)	Object
HY-2A	Scatterometer Altimeter Radiometer	Main Parameter: Sea Surface Wind Sea Surface height, Significant wave height, Gravity field and Ocean Circumfluence Sea Surface Temperature Secondary Parameter: Sea Level, Sea wind speed, Sea Ice and Vapor content	Ocean State Forecast Storm Warn Topography Study Ocean Dynamic Process Median Scale Weather Process and Global Change

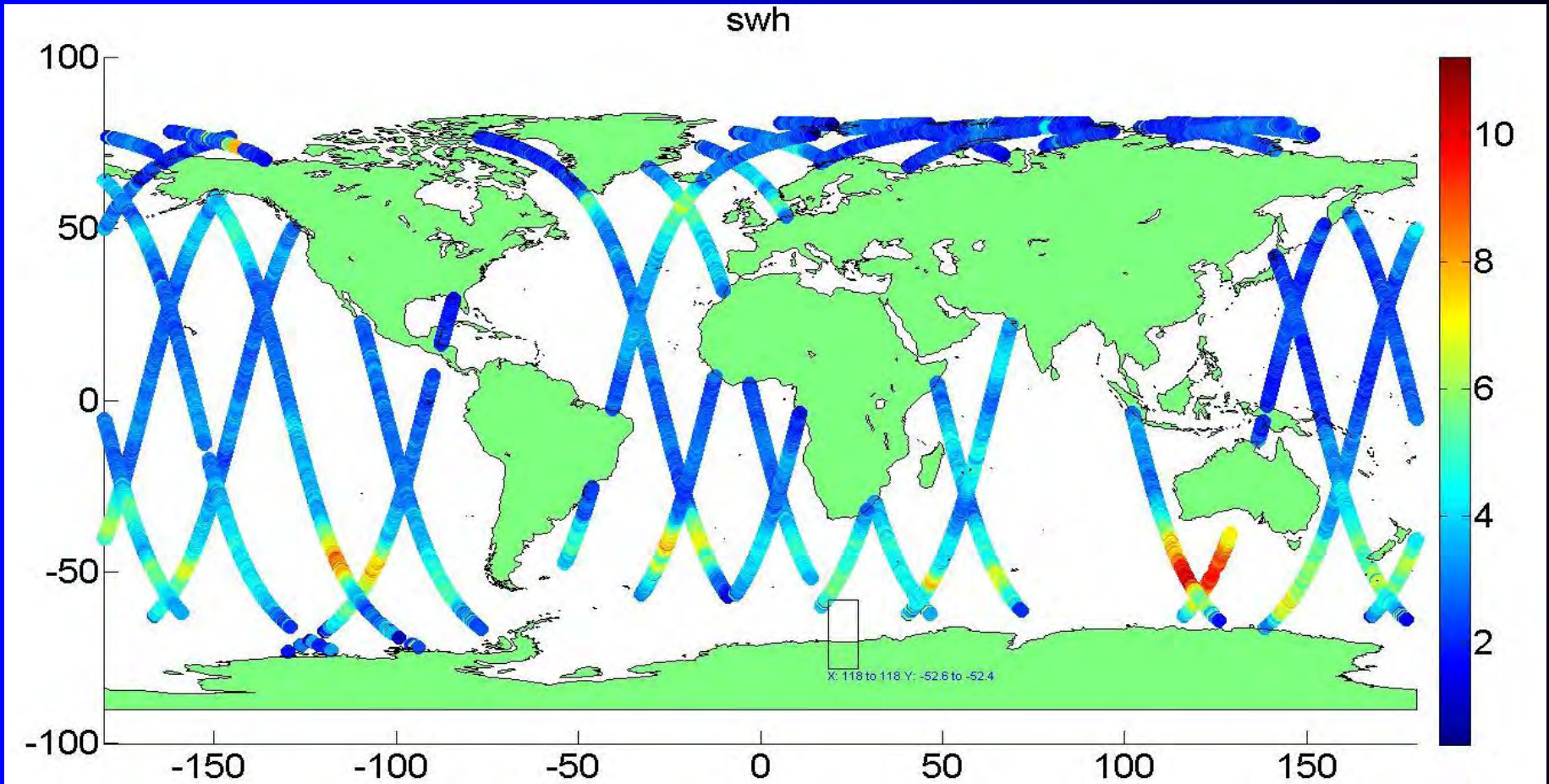
HY-2A/ALT
Sea Surface height
2011.9.30-10.1



JASON-2
Sea Surface height
10 days merged



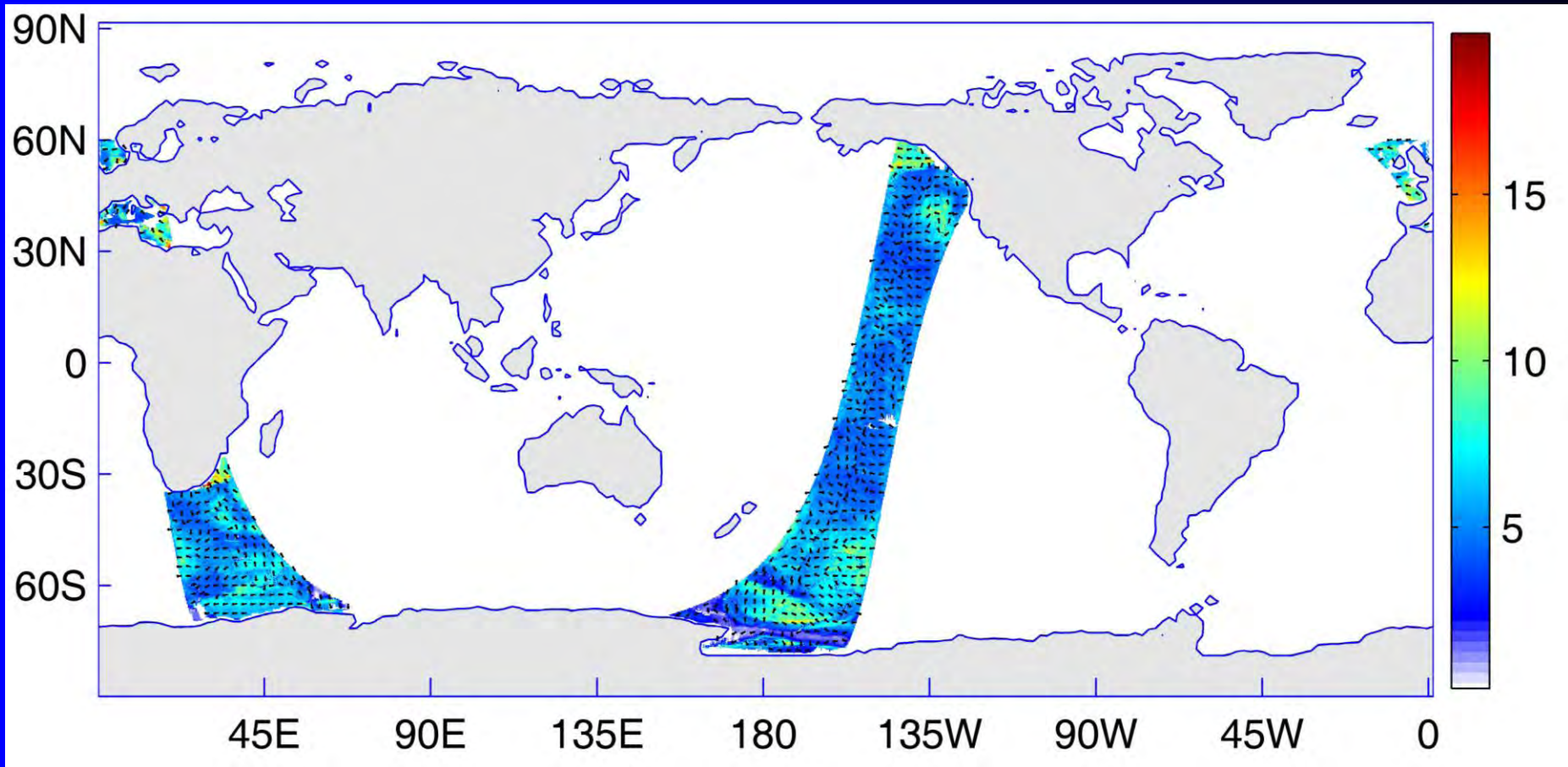
HY-2A/ALT Significant wave height



Images courtesy of Dr. Mingsen Lin

HY-2A/SCA Sea Surface Wind

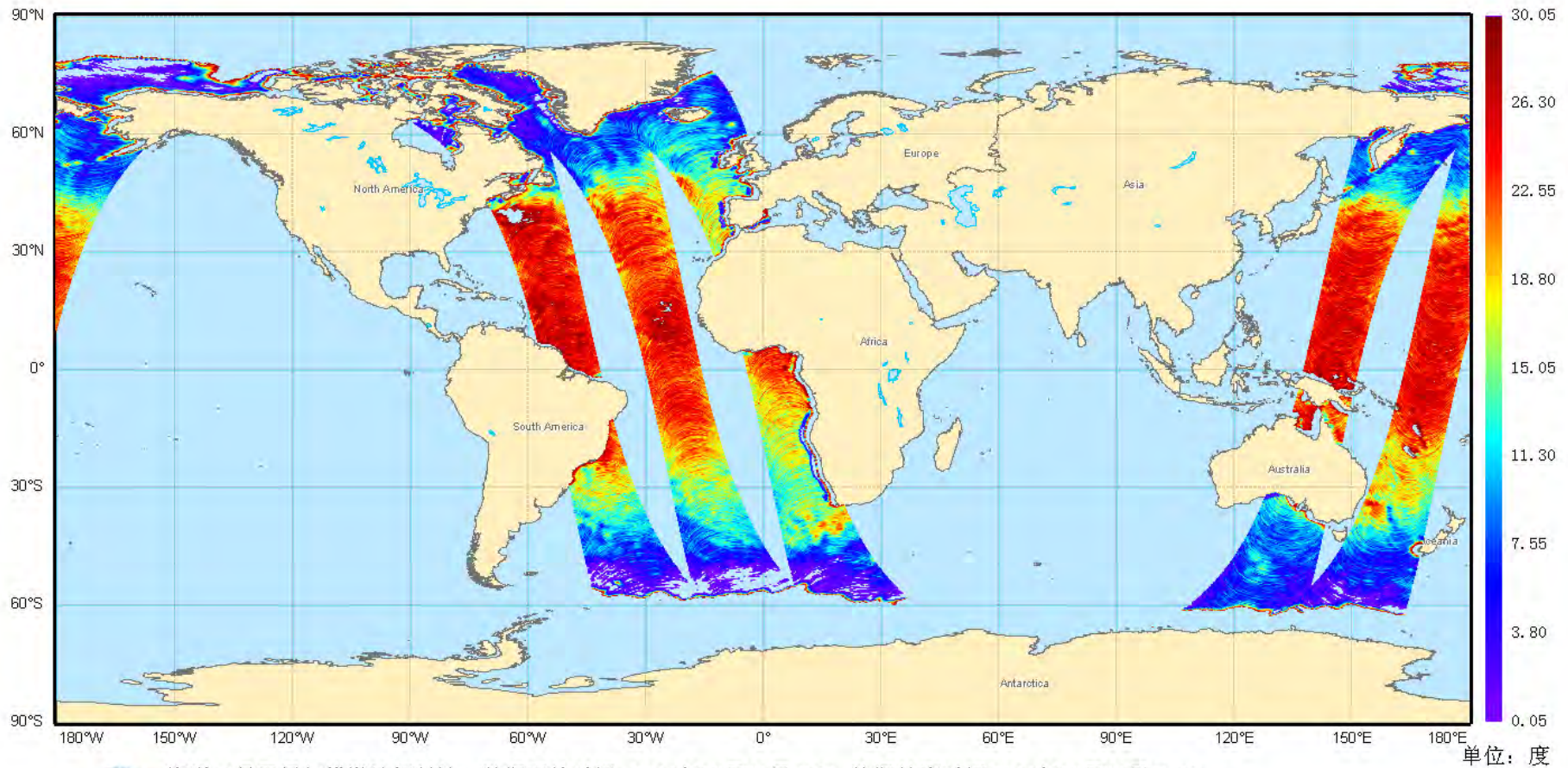
(Sept.28 23:00, 2011, 610 orbit)



Images courtesy of Dr. Mingsen Lin

HY-2A/RAD Sea Surface Temperature

(Sept.9 17:21-21:42, 2011)



海洋二号卫星扫描微波辐射计 数据开始时间 :2011年09月09 日17:21 数据结束时间:2011年09月09 日21:42

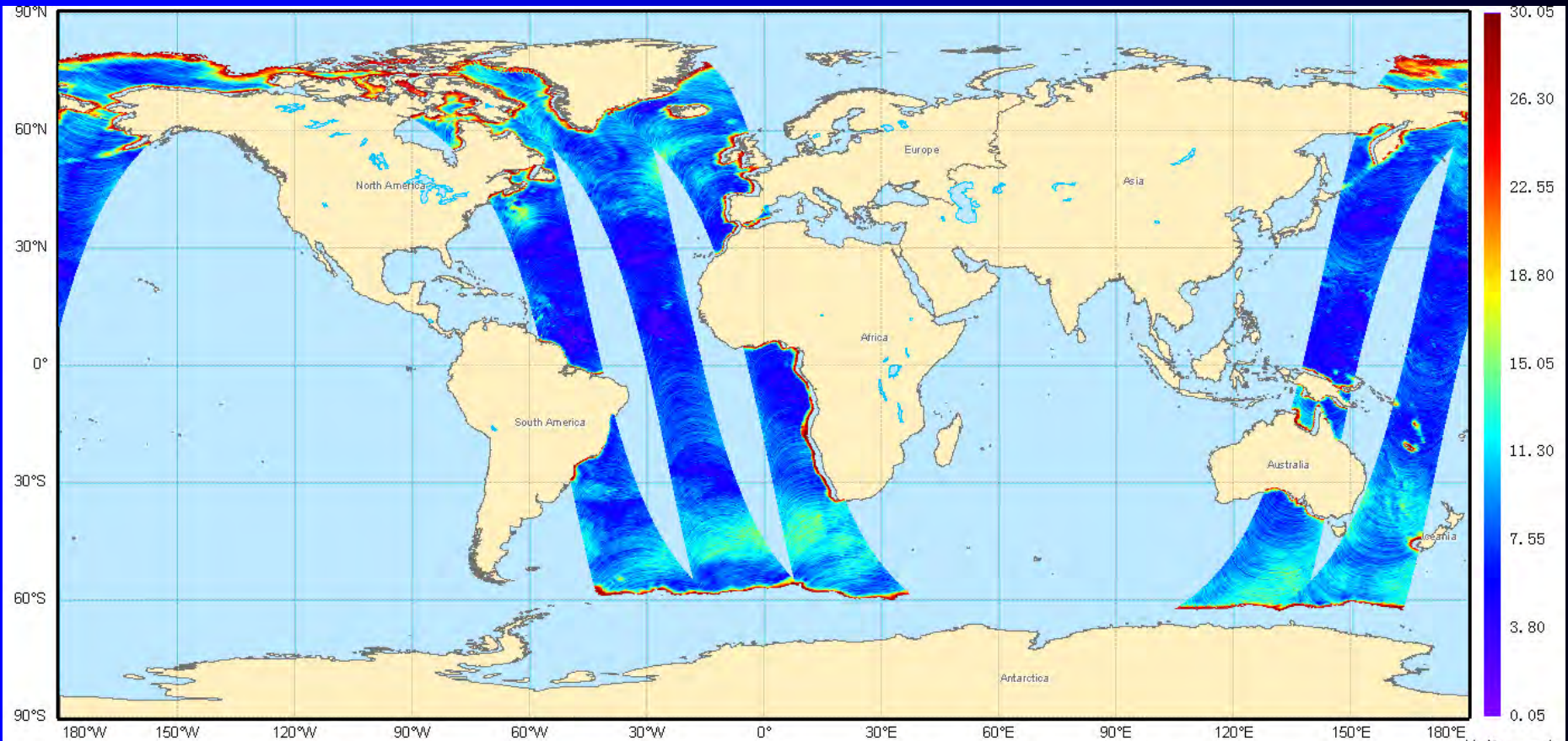
国家卫星海洋应用中心

单位: 度

Images courtesy of Dr. Mingsen Lin

HY-2A/RAD Sea Surface Wind Speed

(Sept.9 17:21-21:42, 2011)



海洋二号卫星扫描微波辐射计 数据开始时间 :2011年09月09 日17:21 数据结束时间:2011年09月09 日21:42

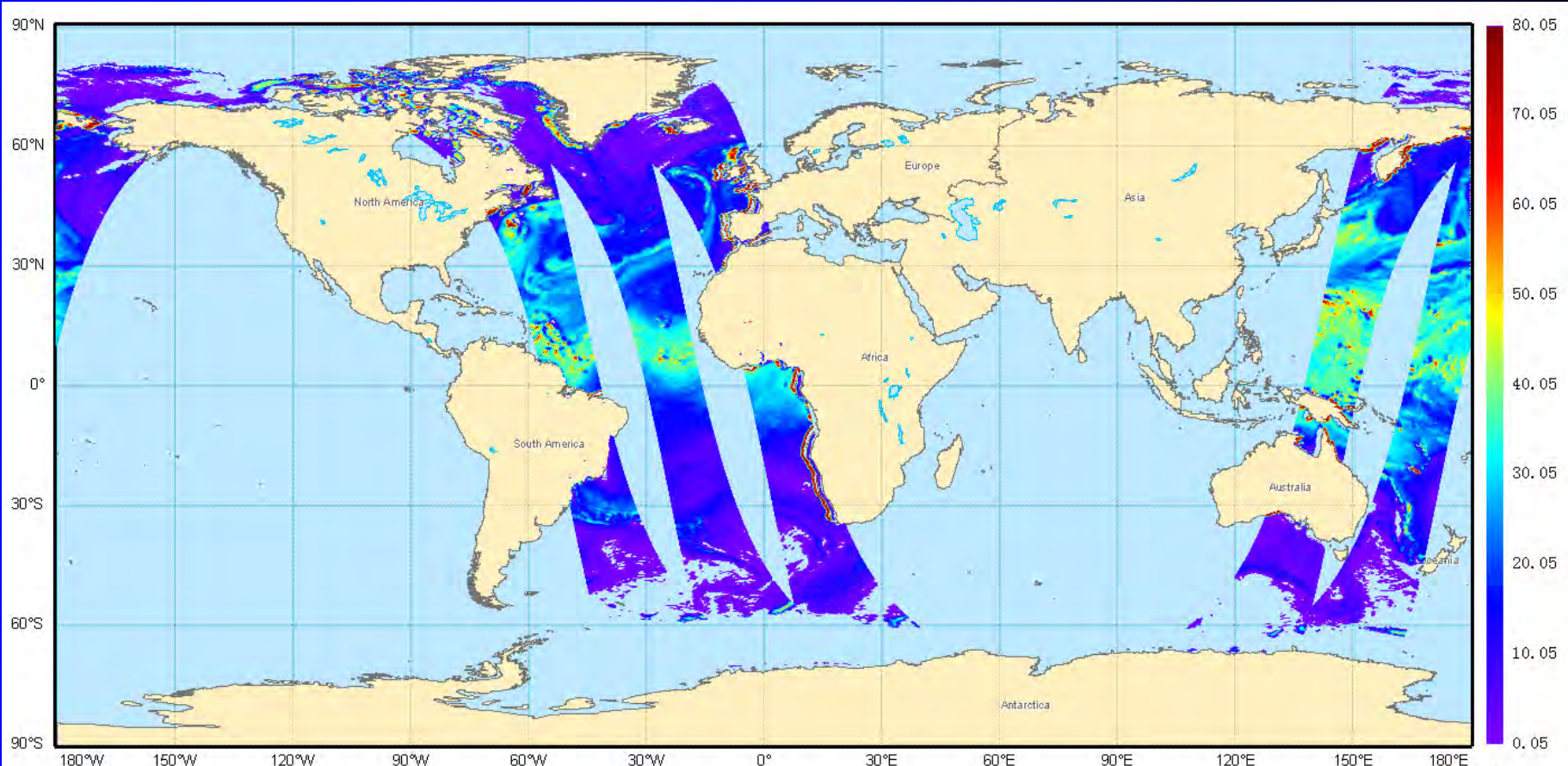
国家卫星海洋应用中心

单位: m/s

Images courtesy of Dr. Mingsen Lin

HY-2A/RAD Atmospheric Vapor content

(Sept.9 17:21-21:42, 2011)



海洋二号卫星扫描微波辐射计
国家卫星海洋应用中心

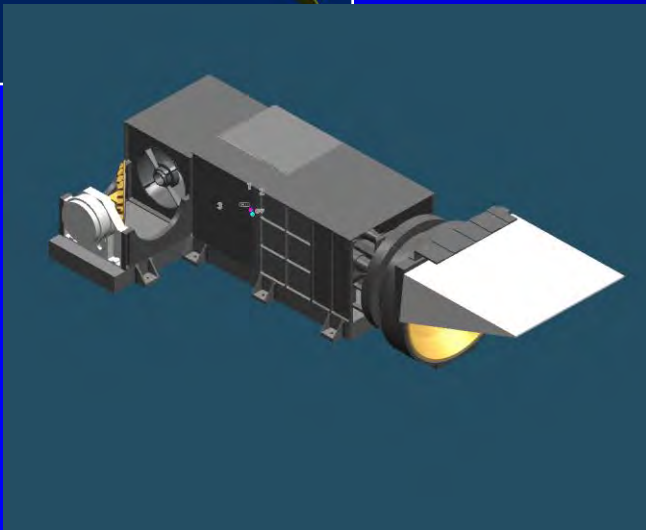
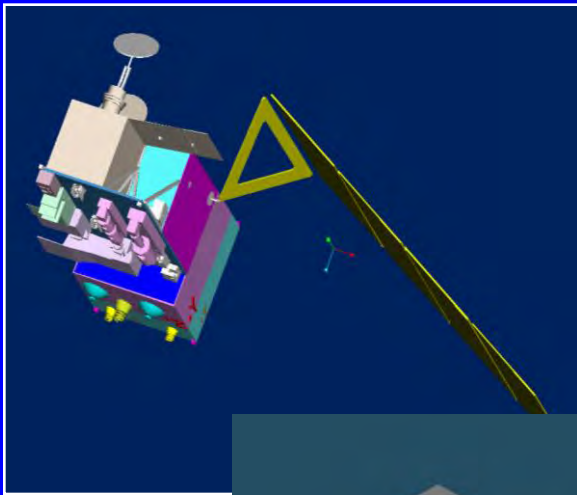
数据开始时间 :2011年09月09 日17:21 数据结束时间:2011年09月09 日21:42

单位:
kg/m²

Images courtesy of Dr. Mingsen Lin

FY-3 series satellite

- Second generation polar orbit Meteorological Satellites.
- FY-3A/B were launched in 2008 and 2010, still on-orbit operation.
- Total 10 sensors on FY-3A/B.
- **MERSI- Medium Resolution Spectral Imager**



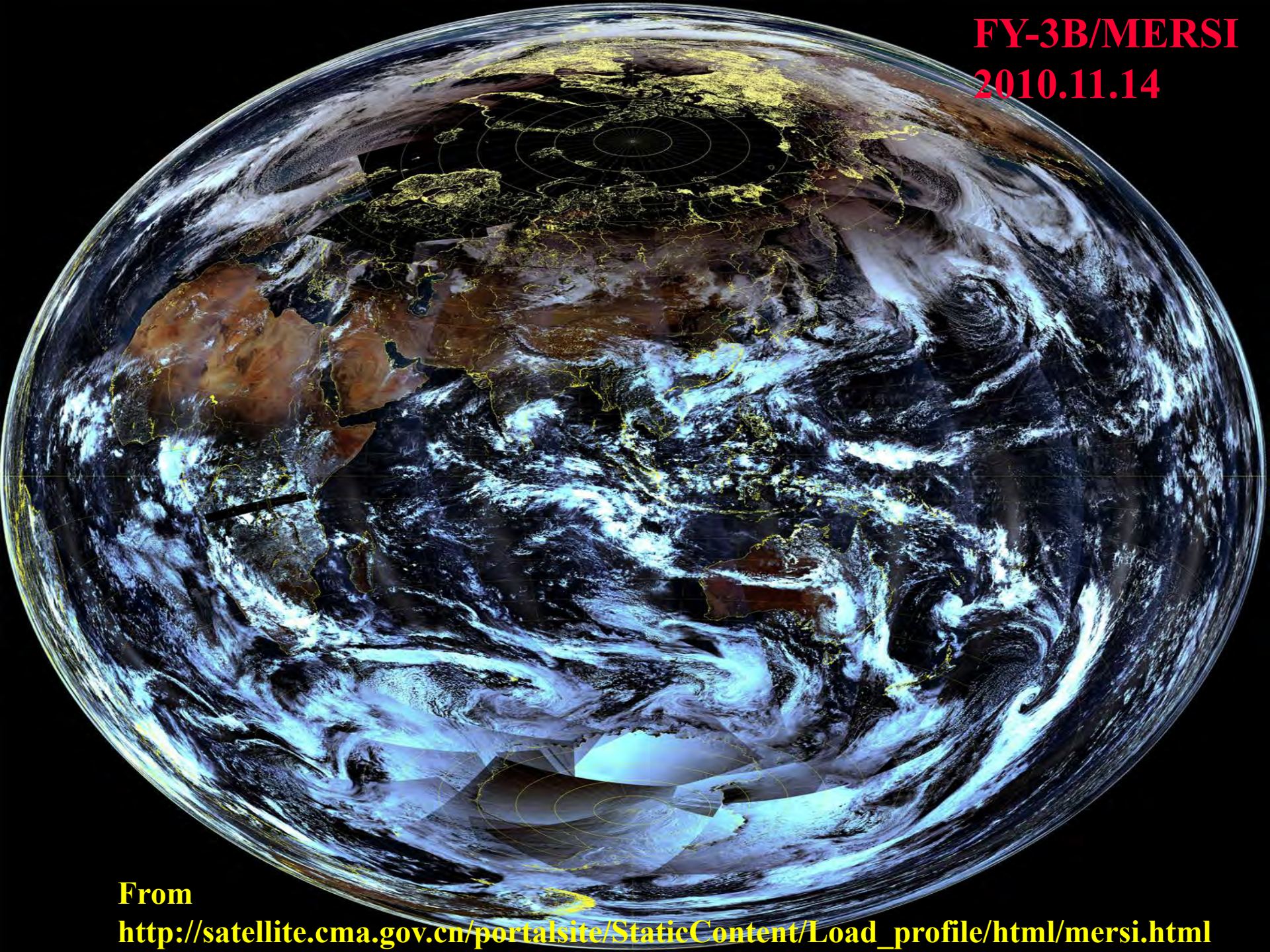
Band	Wavelength (μm)	Resolution
1	0.445-0.495	250m
2	0.525-0.575	250m
3	0.625-0.675	250m
4	0.84-0.89	250m
5	10.25-12.75	250m
6	0.402-0.422	1000m
7	0.433-0.453	1000m
8	0.48-0.5	1000m
9	0.51-0.53	1000m
10	0.555-0.575	1000m
11	0.64-0.66	1000m
12	0.675-0.695	1000m
13	0.755-0.775	1000m
14	0.855-0.875	1000m
15	0.895-0.915	1000m
16	0.93-0.95	1000m
17	0.97-0.99	1000m
18	1.02-1.04	1000m
19	1.615-1.665	1000m
20	2.105-2.155	1000m

FY-3B/MERSI
2010.11.12

From

http://satellite.cma.gov.cn/portalsite/StaticContent/Load_profile/html/mersi.html

FY-3B/MERSI
2010.11.14



From

http://satellite.cma.gov.cn/portalsite/StaticContent/Load_profile/html/mersi.html

Environment and Disaster Monitoring

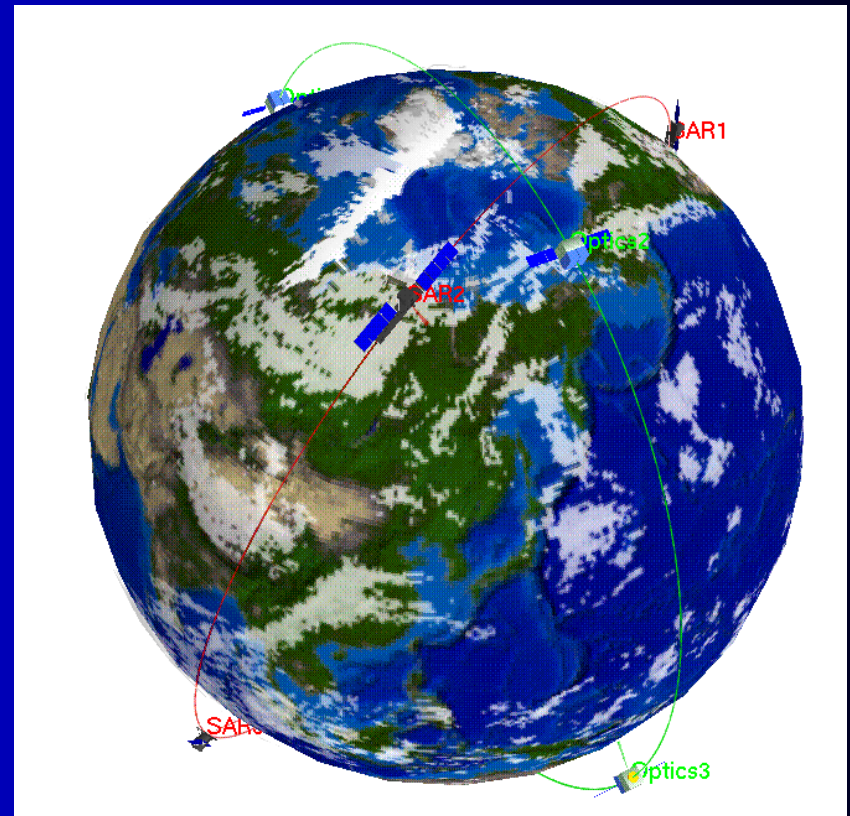
Satellite Constellation

➤ **The Optical Satellite:**

649km sun synchronous orbit . Four satellites are 90° phase distributed in the same orbit plane.

➤ **The SAR Satellites:**

500km sun synchronous orbits . Four satellites are 90° phase distributed in the same orbit plane.



Sensors on optical satellite

❖ Wide field multi-spectrum camera

- four bands
- 30m resolution
- 720km swath

❖ Infrared scanner (on optsat1)

- four IR bands
- 150m~300m resolution
- 720km swath

❖ Hyper-spectrum imager

- 110 to 128 bands with 5nm resolution in average
- 100m spatial resolution
- 50km swath

Sensor	Band no.	Spectral (μm)	Res. (m)	Swath (km)
CCD Camera	1	0.43~0.52	30	700
	2	0.52~0.60	30	
	3	0.63~0.69	30	
	4	0.76~0.9	30	
Infrared Multi-spectral Camera	5	0.75-1.10	150	720
	6	1.55-1.75		
	7	3.50-3.90		
	8	10.5-12.5	300	
Hyper-spectral Imager		0.45~0.95 (110-128 bands)	100	50

Sensors on SAR satellite

❖ Synthetic aperture radar

➤ S-band

➤ 20m resolution

➤ 100km swath with incidence angle 25° to 47°.

Band no.	Spectral range (μm)	Spatial resolution (m)	Swath width (km)
1	S band	20 m(4 looks, scan mode) 5m(single look, strip mode)	100(scan mode) 40(strip mode)

Access the HY-1/HY-2 satellite data



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 - 卫星遥感渔海况
 - 海冰监测

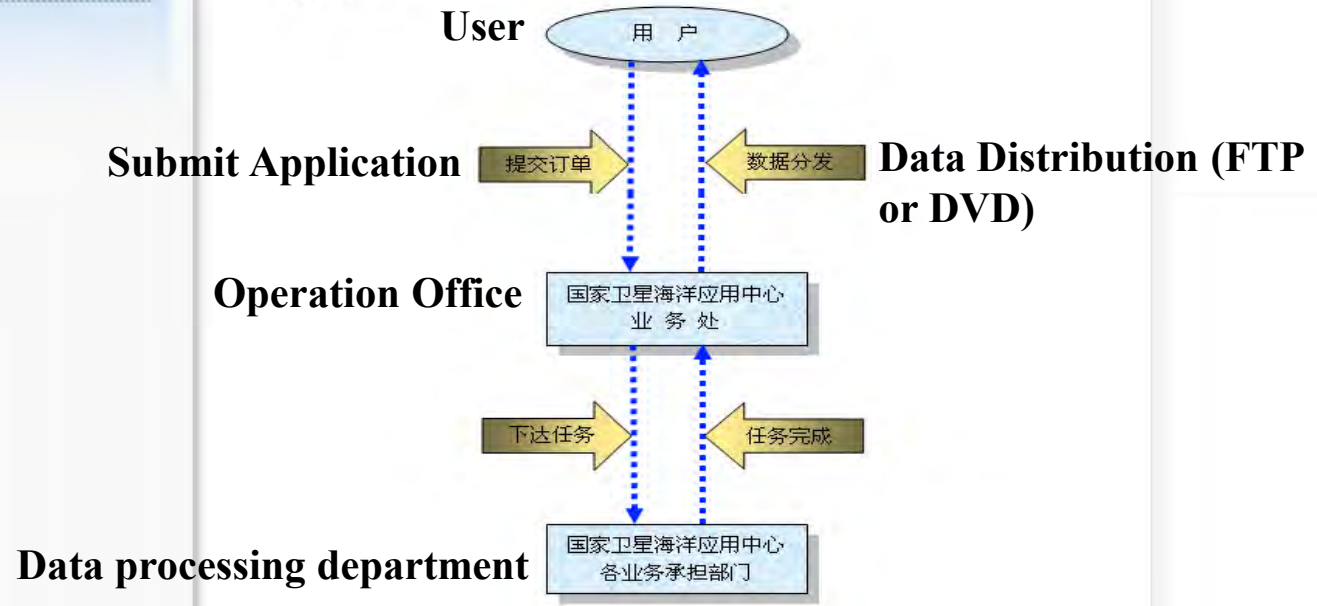
|| 首页 > 定向服务 > 数据分发

<http://www.nsoas.gov.cn>

数据分发流程

国家卫星海洋应用中心业务处负责组织中心对外的卫星数据分发业务。用户根据自己的需求，向业务处提出申请，经业务处审核并报中心领导批准后，与用户签订协议。业务处根据用户的需求向中心各业务部门下达任务单。任务完成后，由业务处通知用户办理取货手续。具体步骤如下：

1. 数据查询。查询方式有两种：第一，用户登录到国家卫星海洋应用中心网站（www.nsoas.gov.cn），查询有关产品数据信息，确定自己的数据需求；第二，用户直接到国家卫星海洋应用中心来查询需求数据。
2. 订单提交。用户根据需求，填写《卫星数据分发申请表》（该表可在中心网站上获取），向中心业务处提出申请，经中心业务处审核并报中心领导批准后办理相关收费手续。
3. 任务下达。中心业务处向各业务部门下达任务。承担任务部门根据订单要求安排人员进行产品制作。
4. 数据分发。承担部门完成任务后即通知业务处，最后由中心业务处与用户联系，将数据交付到用户手中。



Access the FY-3A/3B satellite data

<http://satellite.cms.gov.cn/ArssEn/>

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FENGYUN Satellite Data Center

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2011-10-14 Friday User name: Password: Code: FXDB Sign In New User Forgot Password

FY-3 FY-2 FY-1 NOAA EOS/MODIS MTSAT OtherData

FY3B FY3A

Sensor

VIRR MERSI MWHS MWTS SIM
ERM ERBM IRAS MULSS MWRI
SBUS TOU

Products

L1 Data Cloud Mask
Precipitation Water Vapor Normalized Derived Vegetation Index
Projected Area Dataset Aerosol over Ocean
Ocean Color/Chlorophyll Aerosol over land
Land Surface Reflectivity

Satellite

FY-3A

- Launch Date: 2008-05-27
- Archive start from [2008-05-29] to [So far]
- Information: The second generation of China's polar-orbiting meteorological satellite(FY-3) is with a three-axis stabilization mode, it carries 11 observation sensors and provides the functions of global, all-weather, multi-spectral, three-dimensional and quantitative Earth observations. The first two satellites of the generation is experimental satellites, among which, FY-3A was launched on May 27, 2008.

Product	Data Format	Resolution	Data Level	Ground Receiving Station	Channel	Projection
<input checked="" type="checkbox"/> FY-3A MERSI Level 1 250m Earth View Data...	HDF	250M	L1	MS	MLT	--
<input type="checkbox"/> FY-3A MERSI Level 1 1KM Earth View Data ...	HDF	1000M	L1	MS	MLT	--
<input type="checkbox"/> FY-3A MERSI Level 1 Onboard calibration ...	HDF	--	L1	MS	MLT	--

Time range

Start Date: 2011-10-13 End Date: 2011-10-14 (UTC) 3 days One week One month

Start Time: 00:00:00 End Time: 23:59:59 (UTC)

Specify the range of the times for : The Entire Range of Days (From 2005-01-01 10:20:30 to 2005-01-04 20:25:40)
 Each Day (From 2005-01-01 to 2005-01-04 Each day 10: 20: 30 and 20: 25: 40)

Space Coverage Whole Area


Specific Coverage : Partially coverage Full coverage

Search scope :

North
53 ° 33 '
West 73 ° 29 ' 135 ° 5 'East
3 ° 50 '
South

Preset range :

Beijing Shanghai Tianjin Chongqing
 Anhui Fujian Gansu Guangdong
 Guizhou Hainan Hebei



Access the HJ1A/1B satellite data

<http://Cresda.com/>

China Centre for Resources Satellite Data and Application - Windows Internet Explorer

http://www.cresda.com/n16/n92006/n92066/n98627/index.html

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HJ image of Dongting lake of Hunan province, China

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Satellites

HJ-1A/1B

CBERS-01/02

CBERS-02B

HJ-1A/1B

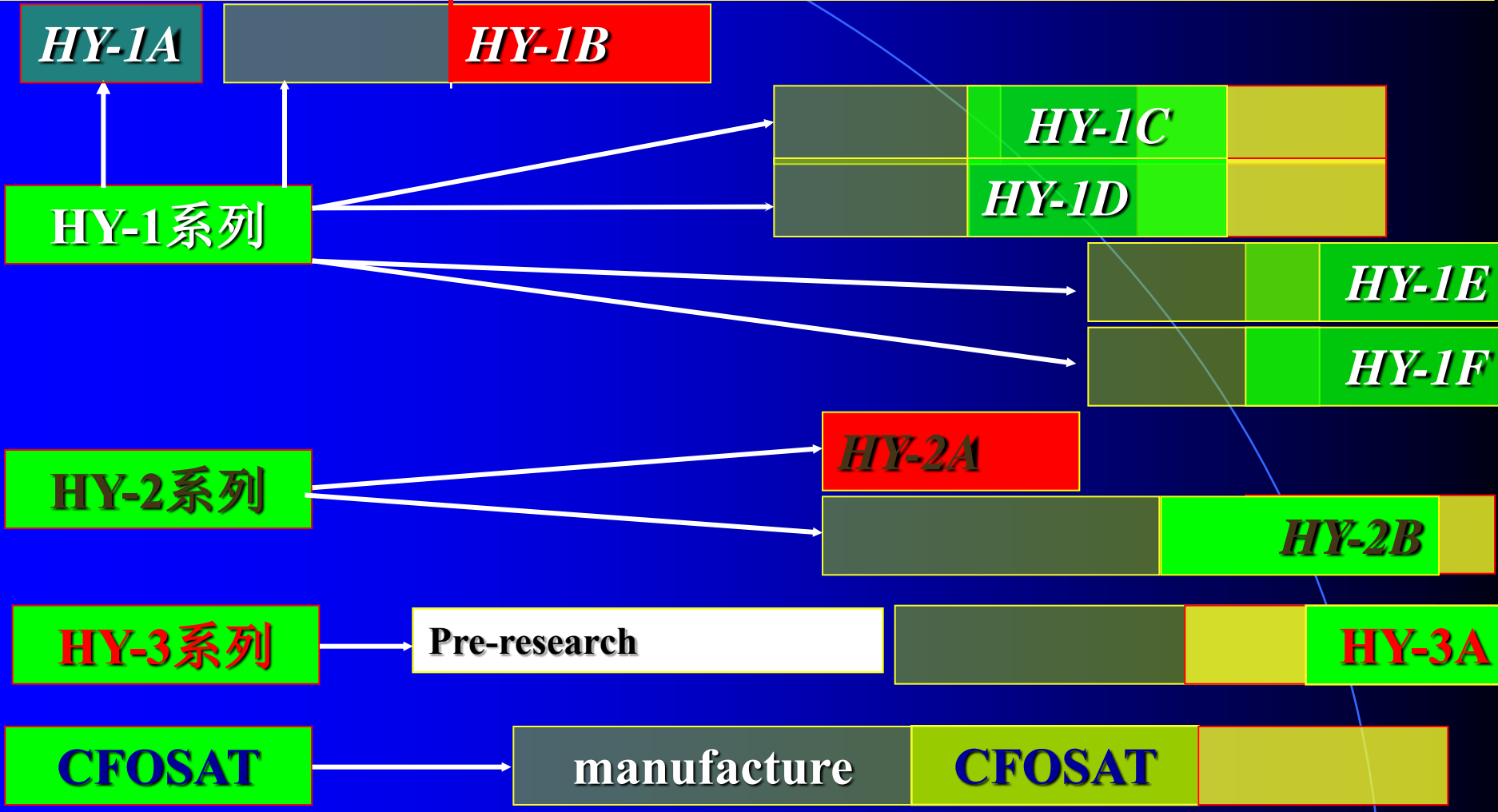
Technical specification of payloads of HJ-1A/1B/1C

Satellite	Payload	Band	Spectral	Spatial resolution	Swath width	Side-looking	Repetition cycle	Data transmission
-----------	---------	------	----------	--------------------	-------------	--------------	------------------	-------------------

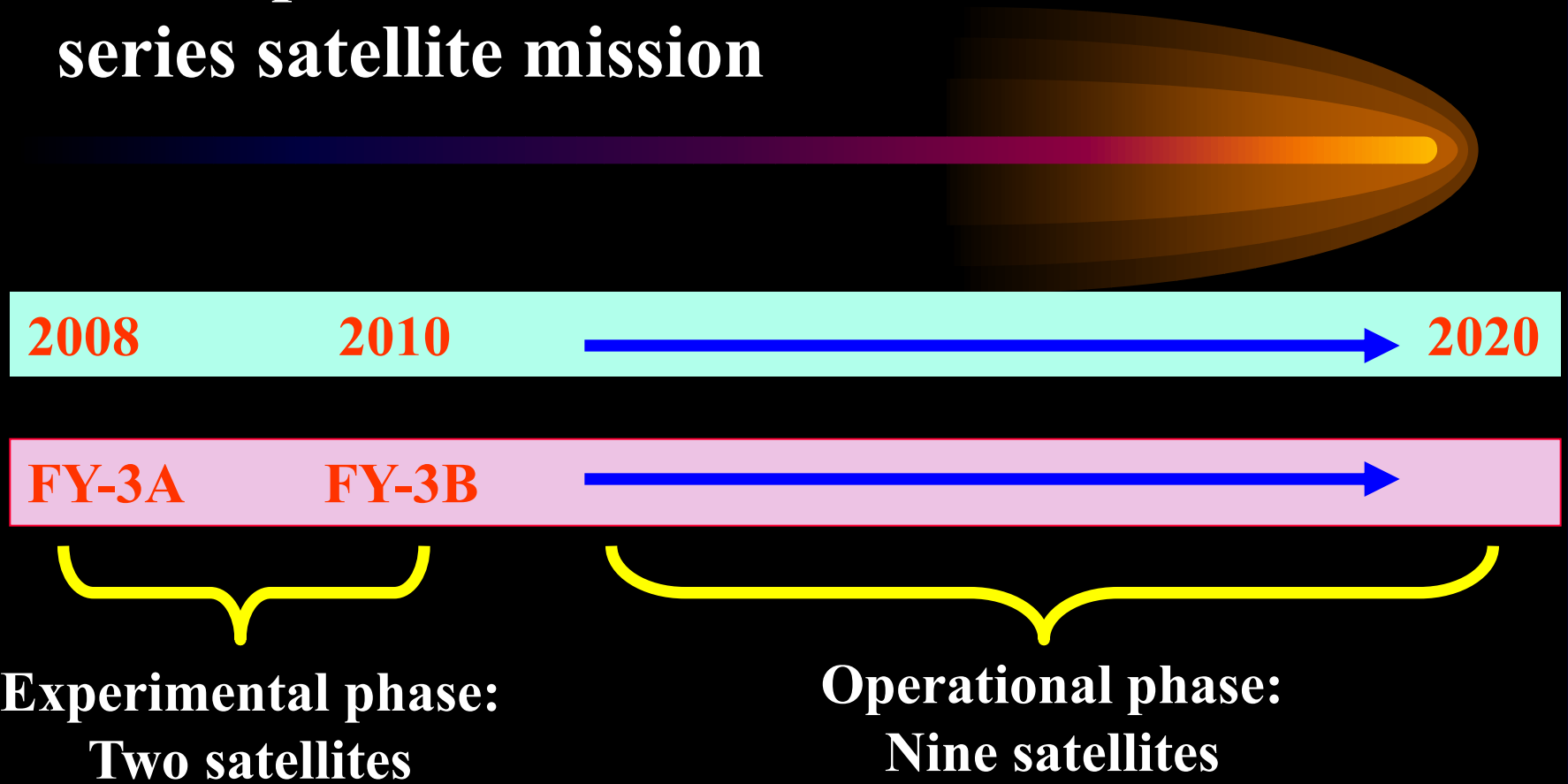
1、 The Present Chinese satellite missions for ocean remote sensing

2、 The **future Chinese satellite missions for ocean remote sensing**

HY ocean satellite missions

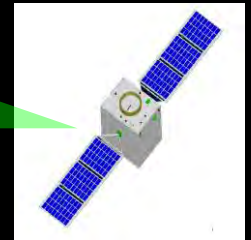
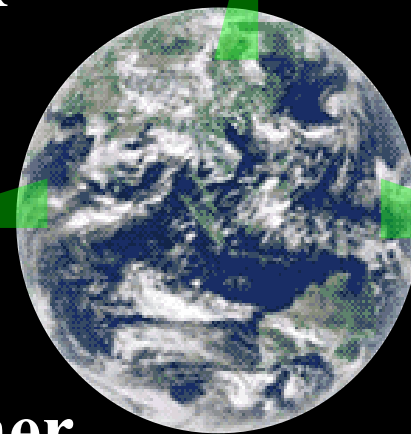
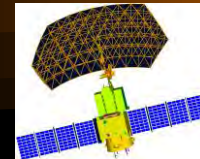
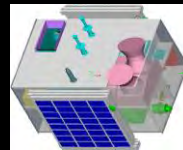


Future plan of the FY-3 series satellite mission



Future plan of the HJ-1 series satellite mission

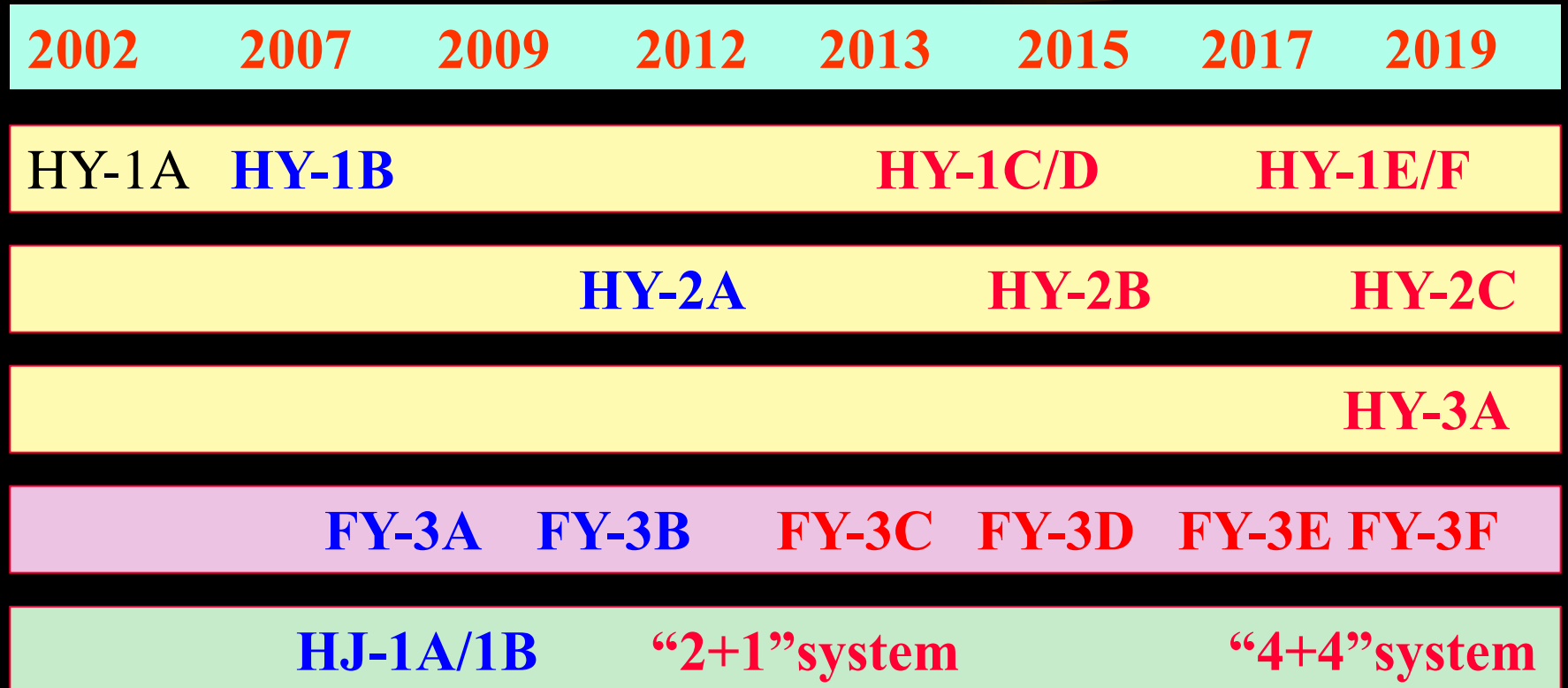
➤ First stage, China had launched two optical satellites (HJ-1A/1B) in 2008, and plan to launch one SAR satellite, form the “2+1” system



➤ Finally, China will launch another 4 optical satellites and 4 SAR satellites, form the “4+4” system.

中国海洋卫星的计划

Future Ocean Observation Satellite mission for ocean remote sensing in China



Summary (1)

- Presently, there are **four satellite missions** can be used for the ocean remote sensing in China, including the Ocean Observation Satellites (HaiYang, HY series), Meteorological Satellites (FengYun, FY series), Environment and Disaster Monitoring Satellites (HJ series), and Spacecraft (SZ series).
- The second ocean color satellite **HY-1B is still operational running**, and the first ocean dynamic satellite **HY-2A is under testing and to be operational running**.
- Two meteorological satellites **FY-3A and FY-3B are operational running with global monitoring capacity**.
- Two environment and disaster monitoring satellites **HJ-1A and HJ-1B are still operational running with high spatial and spectral resolution**.

Summary (2)

- Future, China will launch the **three series Ocean Observation Satellite**, including the HY-1 series for ocean color and temperature, HY-2 series for ocean dynamic, and HY-3 series for ocean watch and monitoring.
- Also, China will launch the meteorological satellites **FY-3 series and environment and disaster monitoring satellites**, which can be used for the ocean remote sensing.

谢谢!

Thanks for your attention!