



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 introduction on Chinese ocean colour satellite missions

Zhihua Mao, Delu Pan

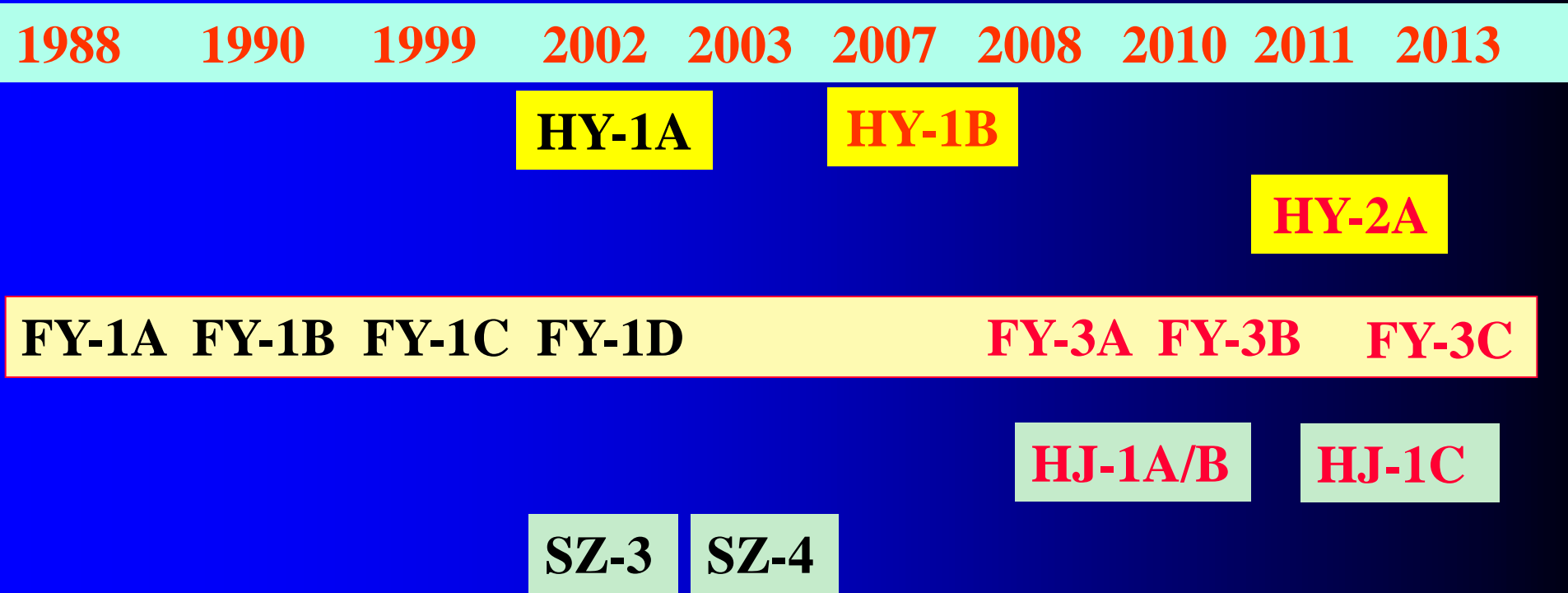
State Key Laboratory of Satellite Ocean Environment Dynamics,  
Second Institute of Oceanography, SOA

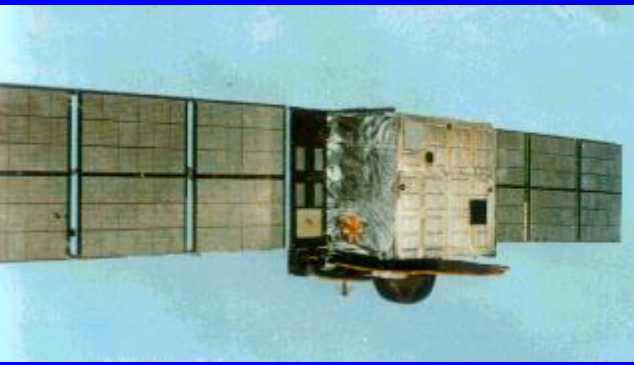
卫星海洋环境动力学国家重点实验室  
国家海洋局第二海洋研究所

June.18, 2015

# Four series of satellites for ocean color remote sensing

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





# HY-1 satellites

**HY-1A** launched on May 15, 2002

**HY-1B** launched April 11, 2007.

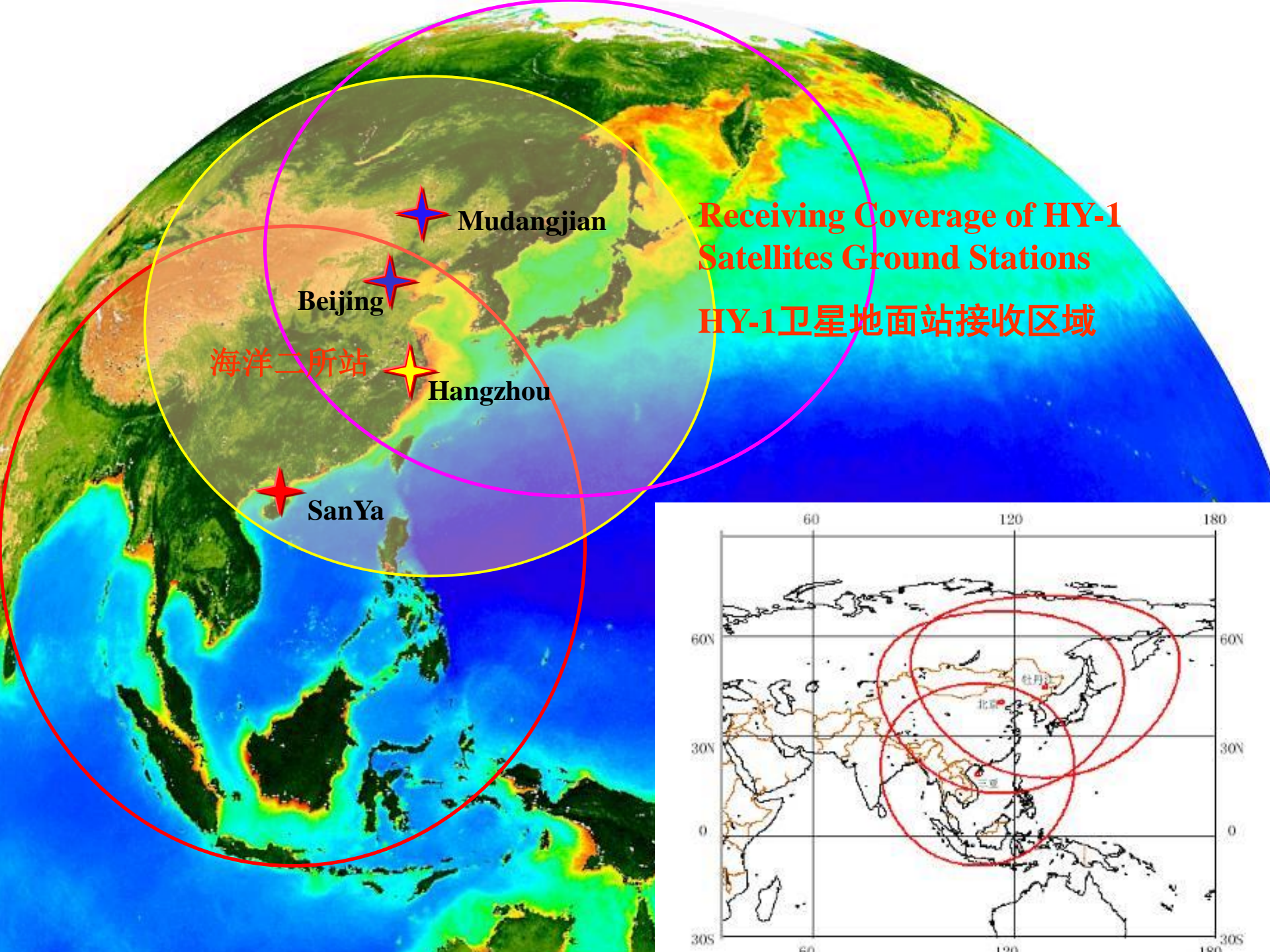
**COCTS**- Chinese Ocean Color and Temperature Scanner (Ten bands)

**CZI**- Coastal Zone Imager (4 bands CCD Camera)



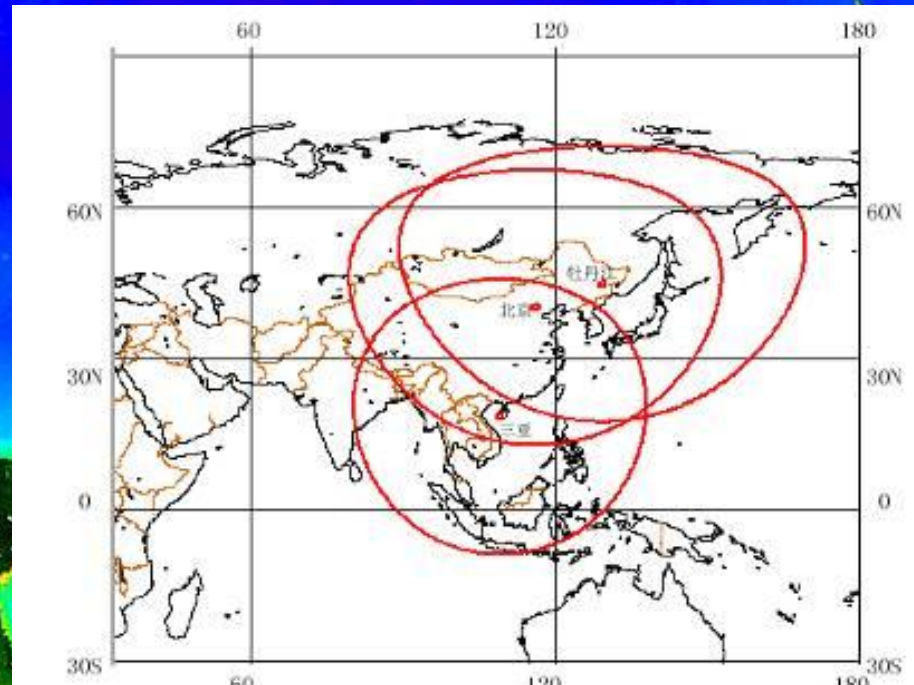
# Major parameters of COCTS and CZI

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%

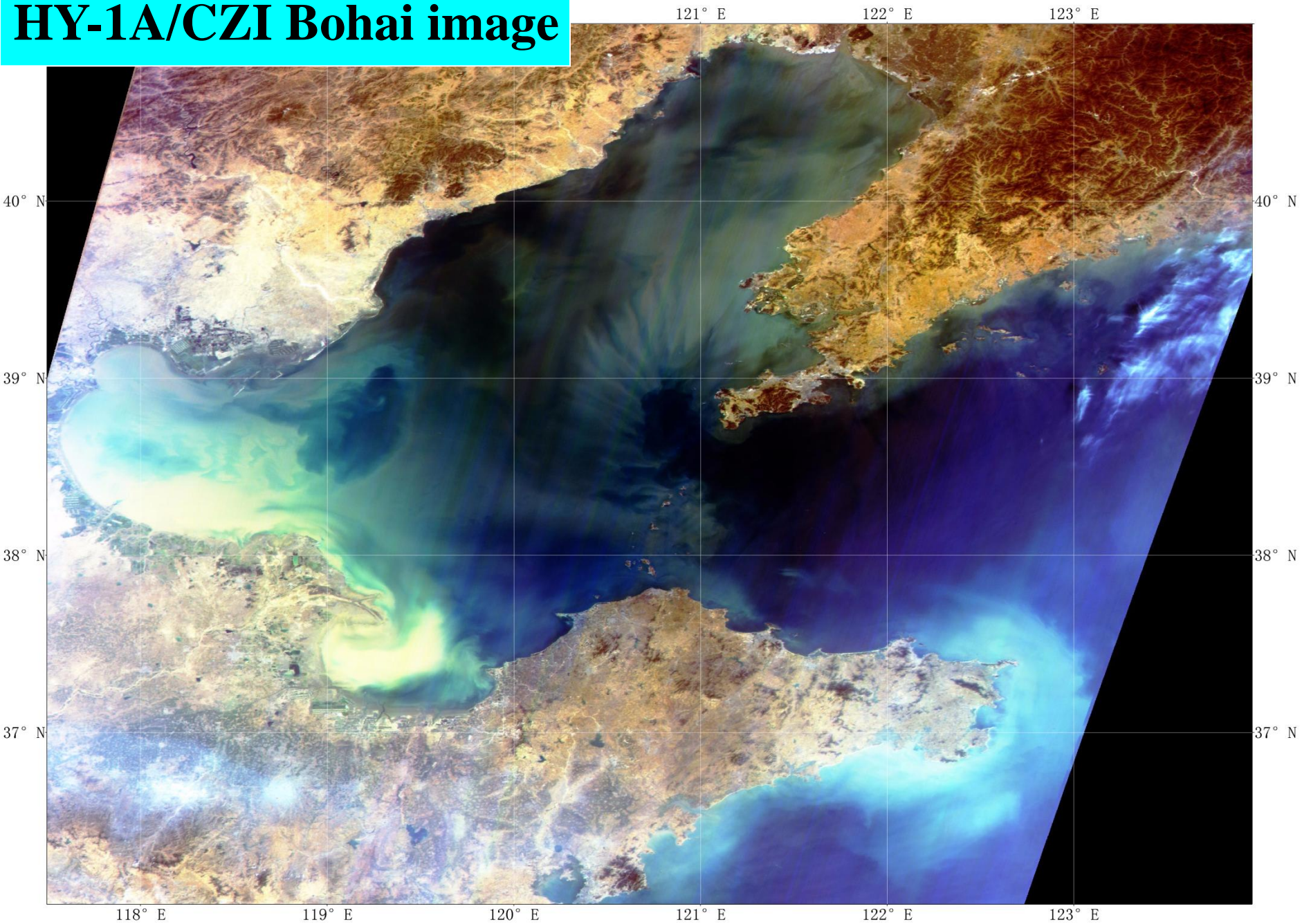


**Receiving Coverage of HY-1  
Satellites Ground Stations**

**HY-1卫星地面站接收区域**



# HY-1A/CZI Bohai image



Images courtesy of Dr. Mingsen Lin

Yangtze  $\Delta$  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

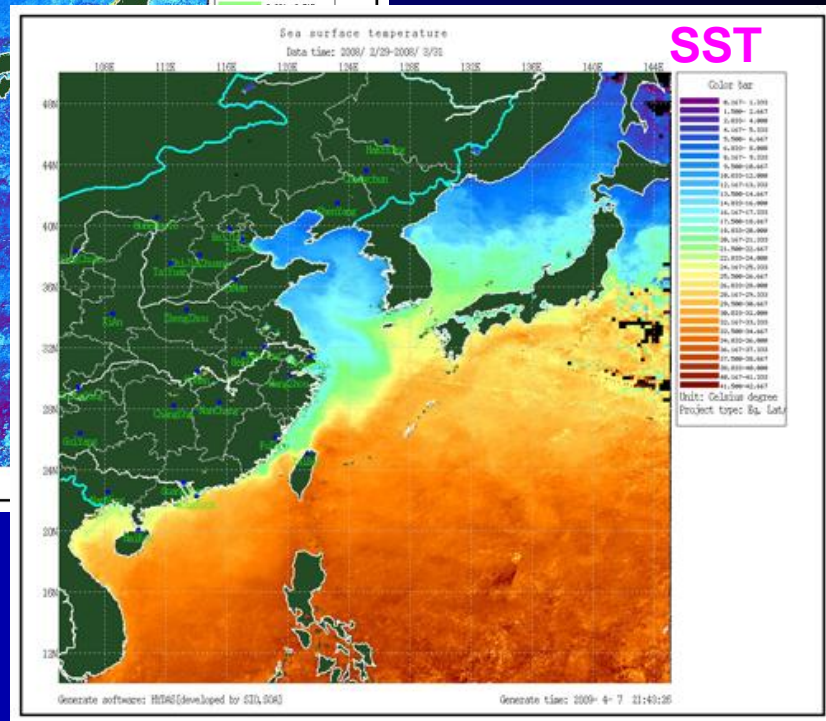
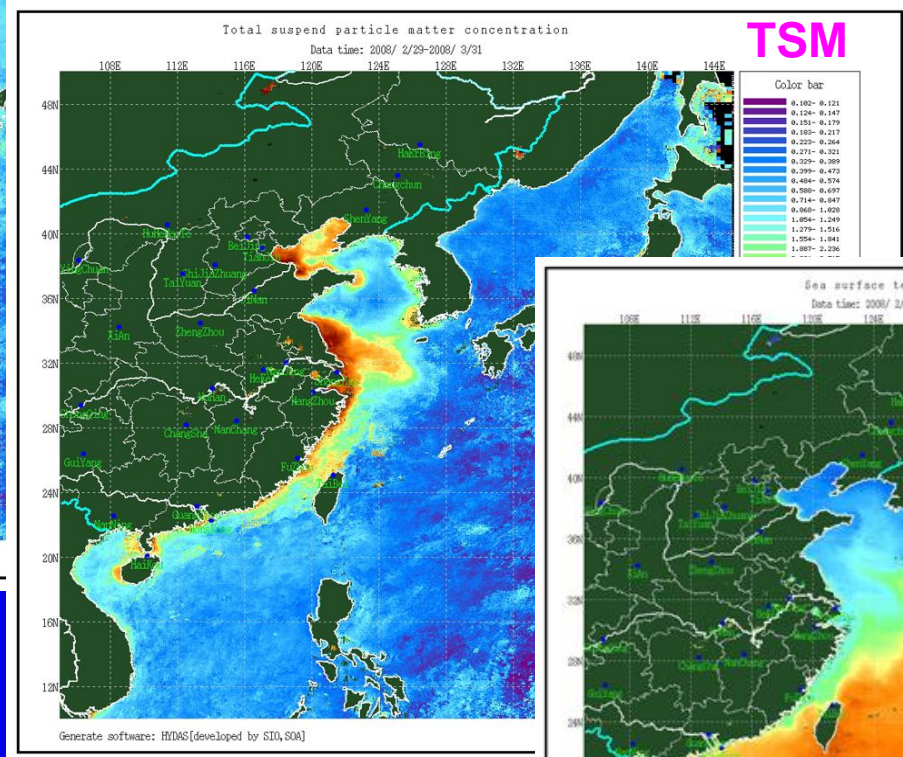
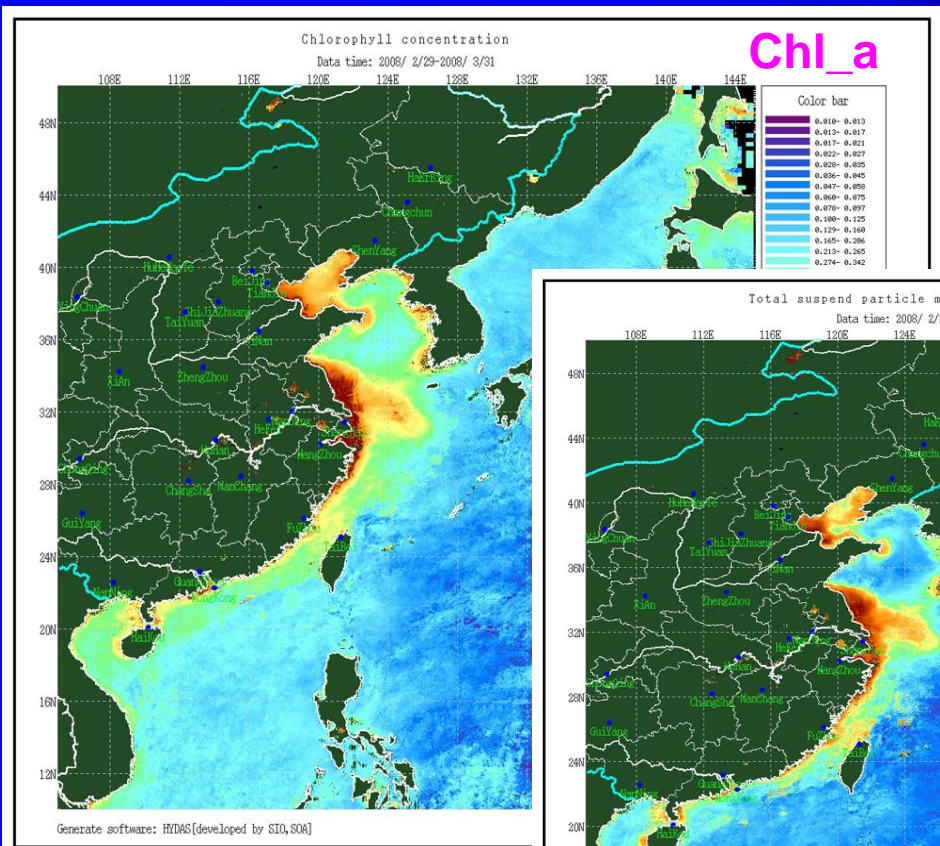
Shanghai

Hangzhou

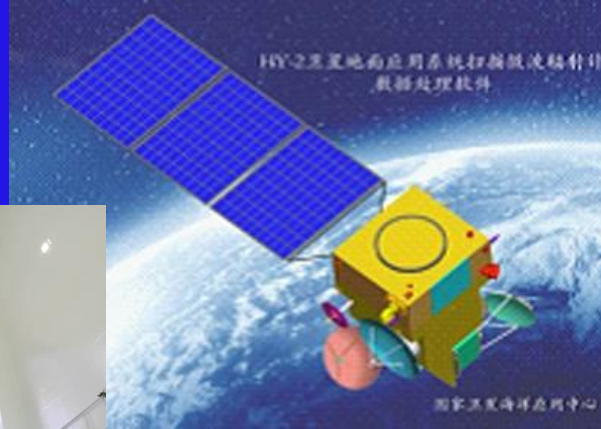
**HY-1B/COCTS**

**2008-3-1 2:46 GMT**

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







# HY-2A Satellite

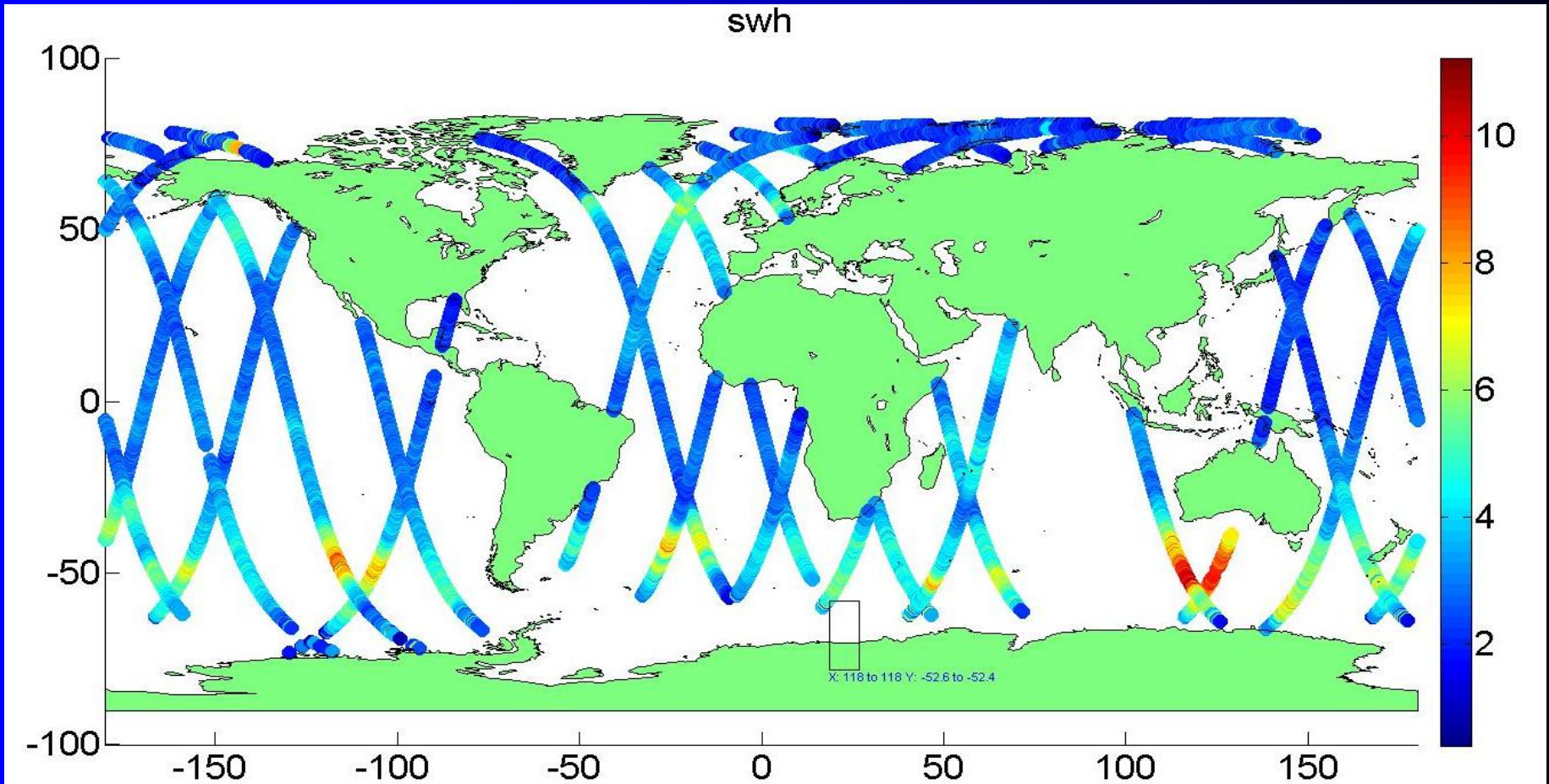
**First** ocean dynamics satellite of China, **HY-2A** was launched by Long March rocket, on Aug.16, 2011.

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	<p><b>Scatterometer</b></p> <p><b>Altimeter</b></p> <p><b>Radiometer</b></p>	<p><i>Main Parameter:</i></p> <p>Sea Surface Wind</p> <p>Sea Surface height, Significant wave height, Gravity field and Ocean Circumfluence</p> <p>Sea Surface Temperature</p> <p><i>Secondary Parameter:</i></p> <p>Sea Level, Sea wind speed, Sea Ice and Vapor content</p>	<p>Ocean State Forecast</p> <p>Storm Warn</p> <p>Topography</p> <p>Study Ocean Dynamic Process</p> <p>Median Scale Weather Process and Global Change</p>

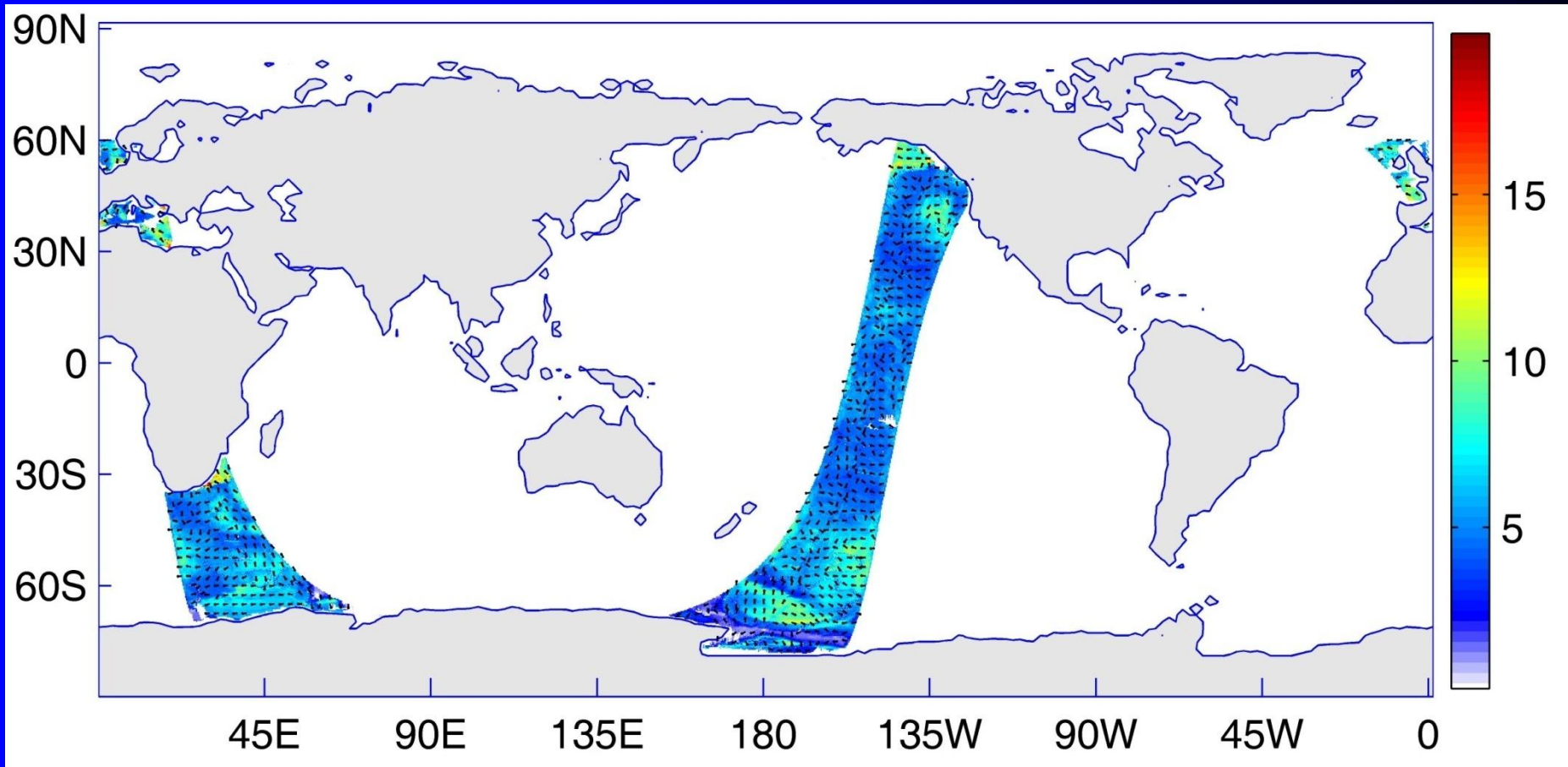
# HY-2A/ALT Significant wave height



Images courtesy of Dr. Mingsen Lin

# HY-2A/SCA Sea Surface Wind

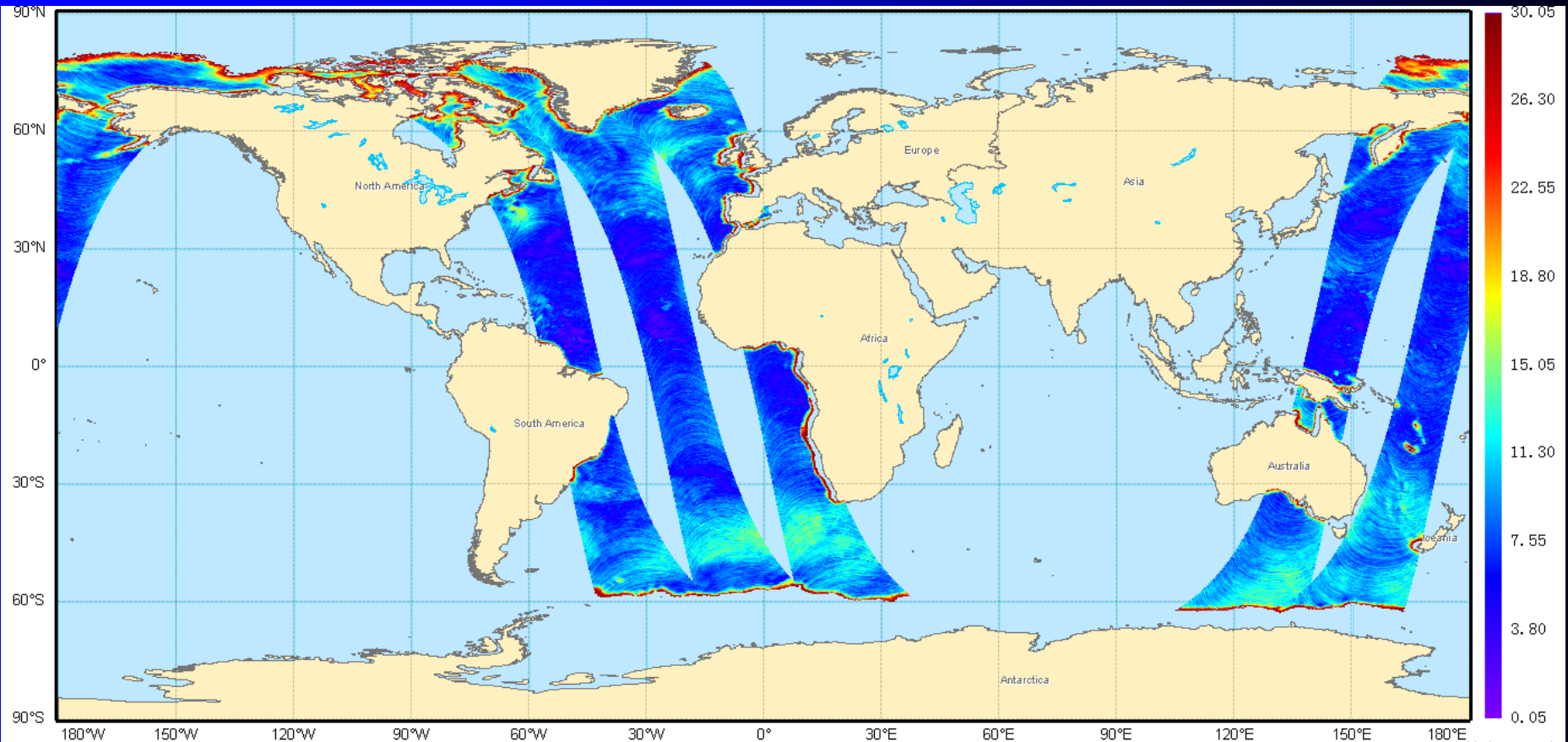
(Sept.28 23:00, 2011, 610 orbit )



Images courtesy of Dr. Mingsen Lin

# HY-2A/RAD Sea Surface Wind Speed

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



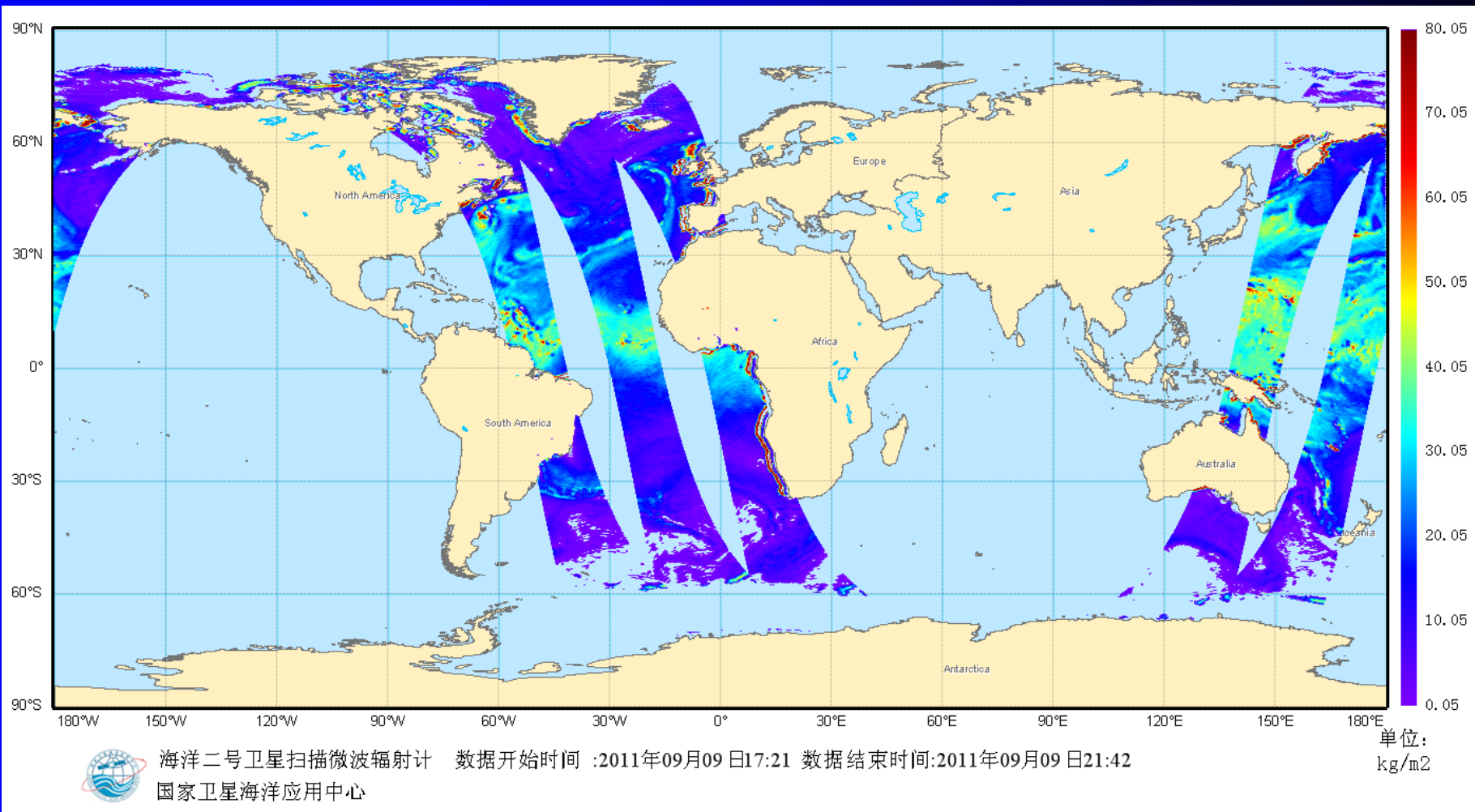
海洋二号卫星扫描微波辐射计 数据开始时间 :2011年09月09 日17:21 数据结束时间:2011年09月09 日21:42  
国家卫星海洋应用中心

单位: m/s

Images courtesy of Dr. Mingsen Lin

# HY-2A/RAD Atmospheric Vapor content

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



Images courtesy of Dr. Mingsen Lin

# FY-3 satellites

**FY-3A** launched  
on May 7, 2008

**FY-3B** launched  
on Nov. 5, 2010

**FY-3C** launched  
on Sep. 23, 2013

**MERSI-**

Medium Resolution  
Spectral Imager

Band	Wavelength ( $\mu\text{m}$ )	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

A satellite image showing a large oil spill in the Red Sea and Gulf of Aden. The spill is visible as a dark, irregular shape in the center of the image, surrounded by a lighter, greenish-brown plume. The surrounding landmasses are brown and tan, and the ocean is dark blue. The text "FY-3B/MERSI 2010.11.12" is in the top right corner.

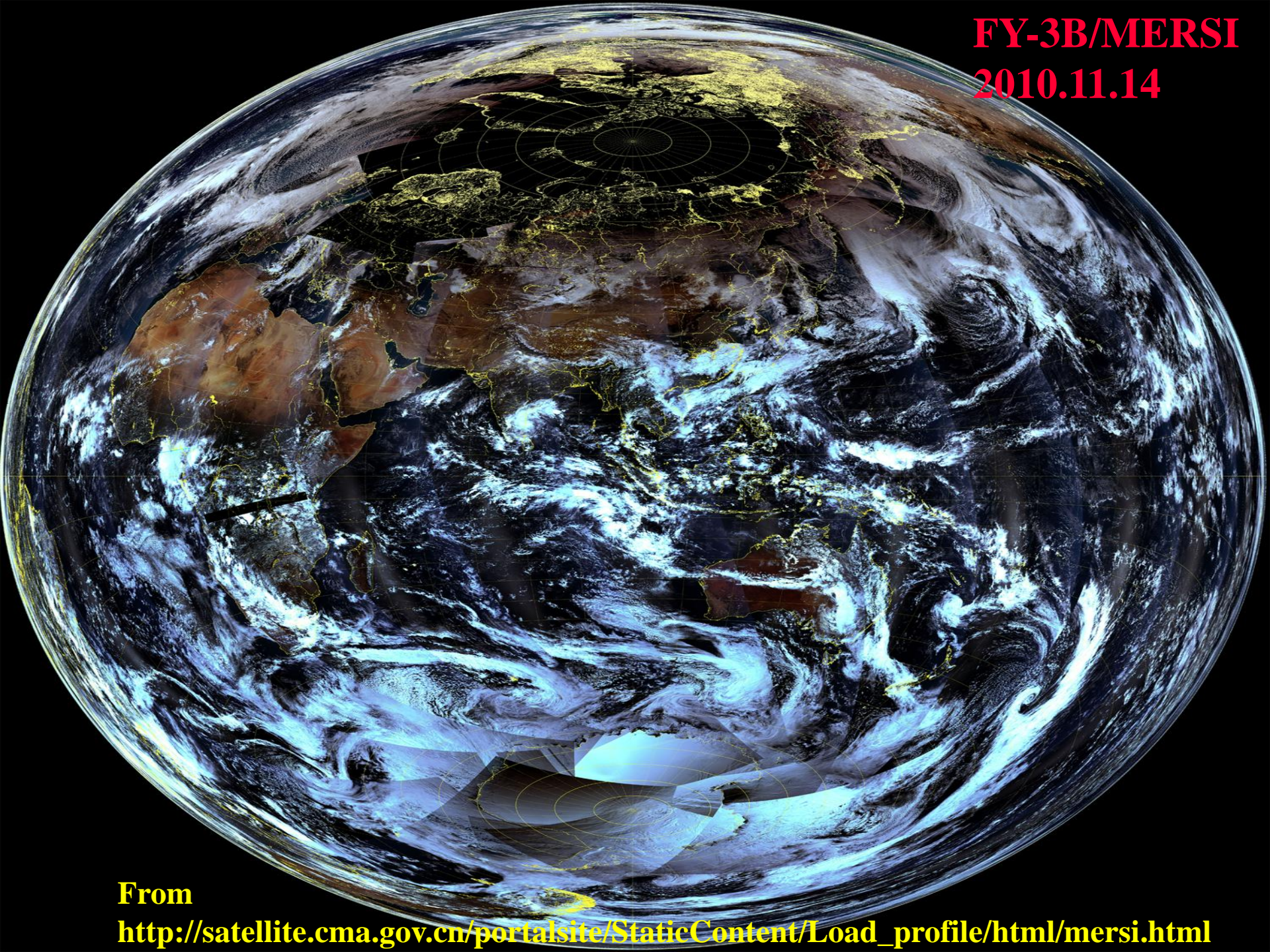
**FY-3B/MERSI**  
**2010.11.12**

**From**

**[http://satellite.cma.gov.cn/portalsite/StaticContent/Load\\_profile/html/mersi.html](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](http://satellite.cma.gov.cn/portalsite/StaticContent/Load_profile/html/mersi.html)**

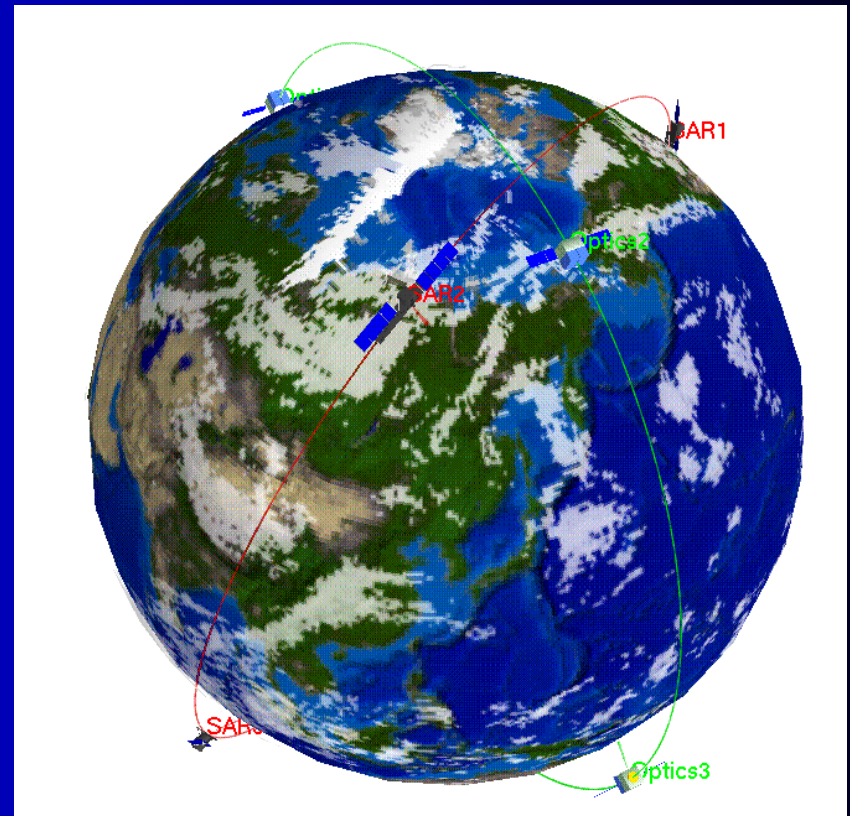
# Environment and Disaster Monitoring Satellite Constellation (HJ)

## ➤ The Optical Satellite:

649km sun synchronous orbit . Four satellites are  $90^\circ$  phase distributed in the same orbit plane.

## ➤ The SAR Satellites:

500km sun synchronous orbits . Four satellites are  $90^\circ$  phase distributed in the same orbit plane.



# HJ satellites

➤ **HJ-1A** launched on Sep. 6, 2008

➤ **HJ-1B** launched on Sep. 6, 2008

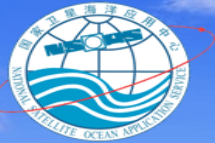
➤ **HJ-1C** launched on Nov. 19, 2012

Sensor	Band no.	Spectral ( $\mu\text{m}$ )	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

# HIS has 115 Bands

band	start	end	width	band	start	end	width
1	459	461.08	2.08	16	492.39	494.79	2.4
2	461.08	463.19	2.1	17	494.79	497.21	2.42
3	463.19	465.31	2.12	18	497.21	499.66	2.45
4	465.31	467.45	2.14	19	499.66	502.13	2.47
5	467.45	469.61	2.16	20	502.13	504.62	2.5
6	469.61	471.8	2.18	21	504.62	507.15	2.52
7	471.8	474	2.2	22	507.15	509.69	2.55
8	474	476.22	2.22	23	509.69	512.26	2.57
9	476.22	478.47	2.24	24	512.26	514.86	2.6
10	478.47	480.73	2.27	25	514.86	517.48	2.62
11	480.73	483.02	2.29	26	517.48	520.14	2.65
12	483.02	485.33	2.31	27	520.14	522.81	2.68
13	485.33	487.66	2.33	28	522.81	525.52	2.71
14	487.66	490.01	2.35	29	525.52	528.25	2.73
15	490.01	492.39	2.38	30	528.25	531.02	2.76

# Access the HY-1/HY-2 satellite data



国家卫星海洋应用中心

National Satellite Ocean Application Service



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首页 > 定向服务 > 数据分发

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

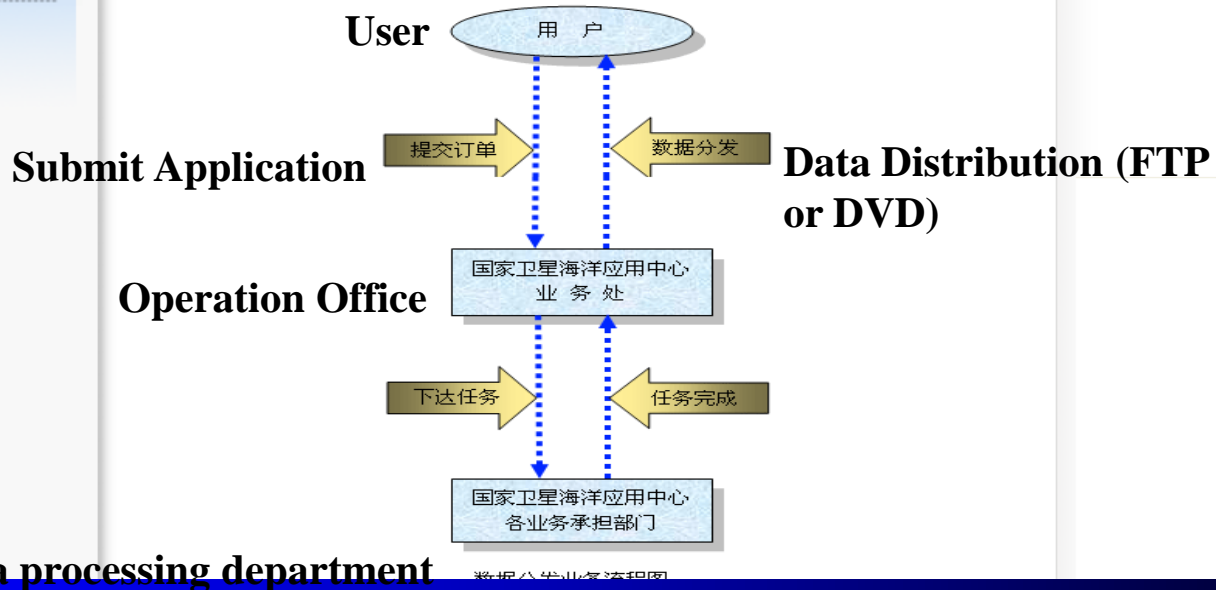
定向服务  
Service

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- 预报中心
- 监测中心
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- 三省一市
- 广东海南
- 卫星遥感渔海况
- 海冰监测

## 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。



数据分发业务流程图

# Access the FY-3A/B/C satellite data

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

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## FENGYUN Satellite Data Center

风云卫星遥感数据中心

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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.

<input type="checkbox"/>	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 **Refresh**

**Preset range :**  
 Beijing  Shanghai  Tianjin  Chongqing  
 Anhui  Fujian  Gansu  Guangdong  
 Guizhou  Hainan  Hebei **More...**



**Next**

Access the  
HJ-1A/B/C  
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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中国航天

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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
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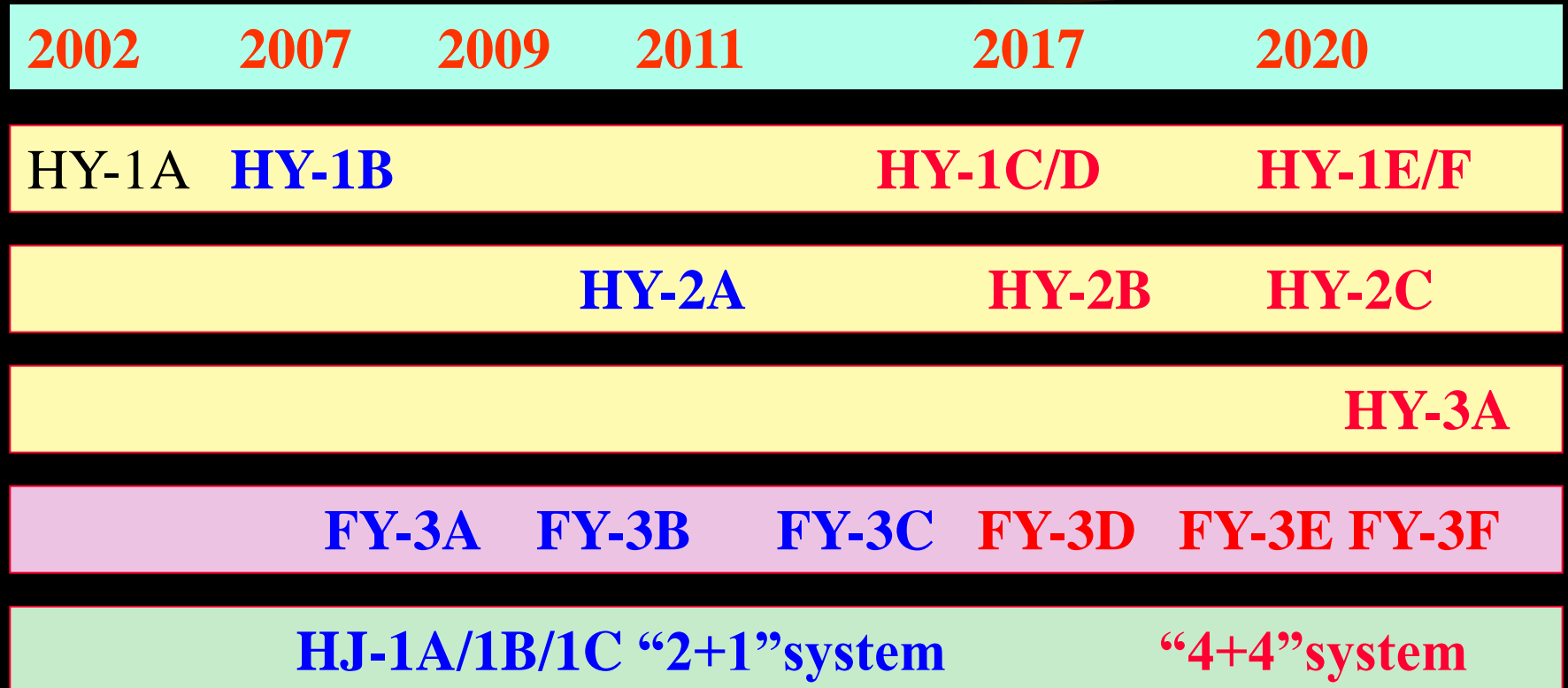
**1、 The Present Chinese satellite missions for ocean remote sensing**

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



# 中国海洋卫星的计划

## Future Ocean Observation Satellite mission for ocean remote sensing in China



# Summary (1)

- **Four satellite missions** can be used for the ocean remote sensing, including the Ocean Observation Satellites (HaiYang, HY), Meteorological Satellites (FengYun, FY), Environment and Disaster Monitoring Satellites (HJ), and Spacecraft (SZ).
- The HY-1B and HY-2A are operational running.
- The three satellites FY-3A/B/C are operational running with global monitoring capacity.
- The three satellites HJ-1A/B/C are operational running with high spatial and spectral resolution.

# Summary (2)

- China will continue to launch more Satellites, including the **HY-1** series for ocean color and temperature, **HY-2** series for ocean dynamic, **HY-3** series for ocean SAR, and **CFOSAT**-satellite cooperation project between China and France.
- China will launch the meteorological satellites, environment and disaster monitoring satellites, which can be used for the ocean remote sensing.
- The data quality of all satellites will be significantly improved. All data can be available with the approval of applications. We expect to make much more contributions in the IOCCG community.

**谢谢!**

***Thanks for your attention!***