The major gaps for marine monitoring capacity building between China and Europe

——EC DRAGONESS Project WP5 Second Annual Report——

（Activity Report, 01/09/2008 — 31/08/2009）

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09/09/2009 Qingdao China

- **(i) 1st report on Chinese and European marine capacity building investigation. It means an investigation of China and Europe marine institutes, centres and organisations. It will focus on existing infrastructure, activity domains and especially major qualified scientists and engineers for each unit. It will be useful for mutual understanding and future cooperation.**
- **(ii) 2nd report on assessment of major gaps between Chinese and European marine capacity building.**
- **(iii) Final report on future Chinese and European marine capacity building design in order to develop more harmonized global systems of marine monitoring and forecasting beyond the 2010 time frame. This, in turn, may contribute to a more harmonized implementation of GMES/GEOSS.**

1. Introduction

This report is to **identify the main gaps of capacity building in Chinese and Europe marine monitoring for environment and security system.**

1) Definition of Europe in this report

It is difficult to compare China with Europe. This is because Europe is one of the world's seven continents. Europe has approximately 50 countries; Russia is the largest by both area and population. Besides Russia, some countries like France, Germany, United Kingdom etc are recognizes as G8 country. But China is only one country, and is a developing country. So how can we make such comparison between Europe and China?

Therefore we have to make a definition that in this report, hereafter we use the name "Europe" but discuss only in the EU area. The EU is a economic and political partnership. The EU is currently made up of 27 countries, In some necessary cases, we will mark "All Europe" instead of Europe.

2) Definition of capacity building

The 1992 United Nations Conference on Environment and Development (UNCED) definition of capacity building: encompasses a country's human, scientific, technological, organizational, and institutional resources and capabilities.

A fundamental goal of capacity building is to enhance the abilities of stakeholders to evaluate and address crucial questions related to policy choices and modes of implementation among different options for development. These choices would be based on an understanding of environmental potential and limits and of the needs perceived by the people of the country concerned.

GEOSS definition of Capacity building:

The most efficient means to improve the geographic coverage of the Earth observing system is to encourage wider participation from all countries. The capacity building envisaged within this context must extend beyond training of qualified technical personnel to operate the observing instruments, to include building of a broader community that will be trained in the development, interpretation and utilization of value-added products from the observations. Capacity building initiatives must therefore target a spectrum of citizens – from the general public, to scientists, to managers, to decision-makers. This is essential to ensure that all countries benefit from GEOSS.

2. Background

Before we study the main gaps in the marine monitoring system, it is necessary to know that most important capacity is for economy, marine industry, marine power and marine environment. .

2.1 history comparison

Europe and ocean

China and ocean

Europe: **very strong ocean spirit: "go out and explore the rest of the world".**
the importance of sea to Europe's emergence from the middle Ages, and the succession of great maritime powers in the 15th through the 17th centuries (Portugal, Spain, the Netherlands, and Britain).

In the Age of Exploration, European competition for overseas colonies begins.

Portugal was first country to launch large-scale voyages of exploration

Portugal and Spain were well suited to kicking off the Age of Exploration.

Then, England: Eastern coast of present-day United States;

France: Canada and Louisiana;

Holland: New York area, South Africa and challenge of Portugal in Indian Ocean and East Indies.

— Columbus

- Christopher Columbus (1451-1506) was an Italian explorer who sailed across the Atlantic Ocean in 1492, hoping to find a route to India (in order to trade for spices).

One of the famous story is about Christopher Columbus (1451-1506). He was an Italian explorer who sailed across the Atlantic Ocean in 1492, hoping to find a route to India (in order to trade for spices). He made a total of four trips to the Caribbean and South America during the years 1492-1504. The motive of Columbus was occupation. He demanded of the Crown that he be named "Viceroy of the Indies" and "Admiral of the Ocean Seas."

China and ocean

Marine concept is relatively weak in China.

China has 18,000 km continental coastline, but the majority of Chinese people is living in the continental area. The emperors have to pay much attention to some serious civil wars between different parts of China, especially for northern conflicts.

the GreatWall

Introduction -

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- Zheng He's remarkable journey began when the

However, China also has a glorious sailing story, Zheng He. His original name was Ma He. He was born around 1371 in China, Kun Yang, a town in southwest Yunan Province. Zheng He's remarkable journey began when the Emperor of the Ming Dynasty ordered him to sail to "the countries beyond the horizon, all the way to the end of the earth". Between 1405 – 1433, Admiral Zheng He sailed the Indian and Western oceans, visiting more than 30 countries from Asia to Africa and as far as the central and eastern coasts of the African nations. The economic motive for these huge ventures may have been important, and many of the ships had large private cabins for merchants.

Unfortunately, after that, China's rulers shut the door to the outside world with Decree(s) Forbidding Seafaring. This societal attitude of closing oneself off runs counter to the openness and global circulation characteristic of the ocean itself. In the process of industrialization, Western Europe states cut across the natural barriers of the oceans and with their heavily armed ships smashed down China's gate.

2.2 Current economy comparison

Rank	Country	GDP (millions of USD)
—	World	60,689,812
—	European Union	18,394,115
1	United States	14,264,600
2	Japan	4,923,761
3	China	4,401,614h
4	Germany	3,667,513
5	France	2,865,737
6	United Kingdom	2,674,085
7	Italy	2,313,893
8	Russia	1,676,586
9	Spain	1,611,767
10	Brazil	1,572,839
11	Canada	1,510,957
12	India	1,209,686
13	Mexico	1,088,128

Foreign Economic Relations

The total value of imports and exports in 2008 reached 2,561.6 billion US dollars, up 17.8 percent over the previous year. Of this total, the value of exports was 1,428.5 billion US dollars, up 17.2 percent, and the value of imports was 1,133.1 billion US dollars, up 18.5 percent. China had a trade surplus (exports minus imports) of 295.5 billion US dollars, an increase of 32.8 billion US dollars over the previous year.

Table 2: Imports and Exports by Major Countries and Regions and the Growth Rates in 2008
Unit: 100 million USD

Country or region	Exports	Increase over 2007 (%)	Imports	Increase over 2007 (%)
European Union	2929	19.5	1327	19.6
United States	2523	8.4	814	17.4
Hong Kong, China	1907	3.4	129	0.9
China mainland	1428	17.2	1133	18.5
Japan	1161	13.8	1507	12.5
ASEAN	1141	20.7	1170	7.9
Republic of Korea	740	31.0	1122	8.1
Russia	330	15.9	238	21.0
India	315	31.2	203	38.7
Taiwan, China	259	10.3	1033	2.3

2.3 China marine industry

the various sea-related industries, including shipbuilding, port, pleasure boat, sea communications and transportation, offshore oil and gas, sea-related chemicals and sea fisheries, etc.

According to Xinhua news agency, (Updated: 2009-07-20 09:09), China's gross ocean product (GOP) increased by 11 percent year on year to hit 2.97 trillion yuan in 2008, accounting for 9.87 percent of the country's GDP, and topped 1.386 trillion yuan ($202.96 billion) in the first half of 2009, according to an initial assessment by the State Oceanic Administration (SOA). The figure represented an increase of 6.9 percent over the same period last year, accounting for 9.91 percent of the country's gross domestic product (GDP). The country's GOP represented a further growth in the first half despite the world financial crisis, and will become one of the new economic engines in the future,

Shipbuilding

Since 1999, the output of China's shipbuilding industry has been ranked number three in the world.

China's shipbuilding output exceeded 12 million deadweight tonnage (DWT) in 2005, accounting for 18 percent of world's total. The output is expected to reach a historical high of 14 million DWT in 2006. Chinese shipyards filled about 20 percent of global orders for ships measured by cargo capacity.

Shanghai Waigaoqiao Shipbuilding Co, the country's top shipbuilder, churned out 3.11 million DWT of ships in 2006, making it the world's eighth-largest shipyard.

China's shipbuilding industry is expected to hit capacity of 17million DWT by 2010 and
would become the No. 1 shipbuilding power in the world by 2015.

Marine Fishing

China is the world's top fishing nation and has vast resources available in her own waters. Bohai Sea, the Yellow Sea, the East China Sea and the South China Sea span from sub-tropical to temperate zones with a total sea waters of 1.03 million square nautical miles, of which 431,000 square nautical miles are continental shelves (within 200 meters deep). The total fishing ground area is about 818,000 square nautical miles

90% of world trade is carried by sea, and both EU and China are major players in maritime affairs. EU shipping companies control more than 40% of the world fleet and China is the EU's second largest trading partner.

2.4 China’s Navy

The China People's Liberation Army (PLA) Navy is responsible for safeguarding China’s maritime security and maintaining the sovereignty of its territorial seas along with its maritime rights and interests. In recent years, China’s Navy has become a powerful Navy.

2009-04-24, China concluded a four-day celebration for the 60th anniversary of the founding of the People's Liberation Army (PLA) Navy Thursday, with an unprecedented parade of PLA Navy warships and an international fleet review.


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Mexican naval soldiers stand on the masts of their military ship upon its arrival at the Qingdao port in east China's Shandong province, April 18, 2009. [Xinhua]

The PLA Navy parade, the fourth staged in China since 1949, but the first on such a large and international scale, displayed 25 of the PLA Navy's vessels, including two nuclear-powered submarines, and 31 naval aircraft. The parade was followed by an international fleet review which saw the participation of 21 foreign vessels from 14 countries, including the United States's destroyer USS Fitzgerald and the Russian cruiser CG-011 Varyag.

Chinese President Hu Jintao reviewed the Chinese-made warships and their foreign counterparts from onboard the PLA Navy destroyer Shijiazhuang in waters off the port city Qingdao.

More than 200 military officers from foreign embassies in China, reporters and Chinese people from various social circles observed the fleet review on the viewing ship Zhenghe. The ship was named after a Chinese maritime explorer who sailed about 600 years ago.

all the Chinese vessels and aircraft paraded were independently designed and made by China,

Since China Navy first arrival at the Gulf of Aden late last year, Chinese warships have escorted hundreds of domestic and foreign vessels and protected merchant ships from the Chinese mainland, Taiwan, Hong Kong and other countries and regions from pirate attacks.

2.5 China's marine environment

(According to Xinhua News Agency January 17, 2009)

About 83 percent of China's sea areas were polluted to some extent, according to a report released Friday by the State Oceanic Administration (SOA).

Last June, algae invaded the eastern coastal city of Qingdao, which hosted sailing events during the 2008 Olympics, blocking proposed sailing routes and affecting preparations for the Games.

marine disasters resulted in 152 people dead or missing in China last year, with direct economic losses of 20.61 billion yuan (3.03 billion US dollars). The figure in 2007 was 8.84 billion yuan.

Above presentation ,
GDP,
marine industry,
Navy,
marine environment
reflect a nation's capacity;
also reflect indirectly the marine monitoring capacity.

In another words, if you have very good marine monitoring system but your economy is very poor, the capacity building is no meaning.

3. The gaps for in-situ observing systems between China and Europe

3.3 The gaps for the in-situ observing systems between China and Europe

Marine observation stations spread all over China's coastline, islands and the governed sea area, south to the Nansha IslandsYong shu reef, north to the mouth of Yalu River, west to the Yongxing Island of the Xisha Islands. It has a total number of more than 100 observation stations, including national stations, local stations and professional stations. For the Europe observation stations, the parameters measured are Chlorophyll-a, oxygen, temperature, sea pressure, salinity, nitrate, PAR, dissolved Carbon Dioxide, POC, wave height, current profile, turbidity. While in China the measured parameters lack dissolved Carbon Dioxide, nitrate, PAR, Chlorophyll-a. **The number of the stations in China is more than that in Europe, but the technique also need to improve, adding the new measurement parameters.**

The number of the Argos deployed by Chinese Argo plan has reached 68, and there are now 35 buoys still working. Most of them were deployed in the northwest of Pacific Ocean. There are 11 mooring buoys which were deployed in china near shore from 2007, with the observation of marine meteorology and hydrology.

In Europe, about 69 Argos were deployed in the Nordic Sea, the Atlantic Ocean, and the Southern Ocean under the financial support of MERSEA.

The number of Chinese survey ship (about 160) and tonnage (about 15 million tons) has reached the marine survey needs. Compared with Europe, Chinese marine survey ship is very similar on the number and tonnage. In the technical performance, the ship's speed, the sea constant, the resistance, the laboratory area has achieved the level which the internationally survey ship approaches. Generally speaking the commonly speed of ship is 13-14kn (Maximum 18 knots). A comprehensive survey of subjects would cause too much waste of the sea voyage, research institutes and universities can be configured to a comprehensive survey ship, the professional department should be in accordance with professional requirements and optimal. Chinese ocean survey ship has experienced 20-30 years of development at present; it faces "renewal" stage (upgrade of ships).

The European research fleet is comprised of about 35 ships longer than 50 m, belonging mostly to national research institutions.

Research submersibles and unmanned vehicles

On a European level, only France has one deep-research submersible (Nautile), capable of 6000 m. Greece operates a COMEX submersible of REMORA 2000 type in the Mediterranean, capable of 600 m depth. A twin submersible is under operation by the manufacturer. Additionally to the small fleet of research submersibles, a (larger) fleet of unmanned vehicles, like remotely operated vehicles (ROVs) and autonomous vehicles (AUVs) serve scientific, as well as commercial purposes. IFREMER's Victor 6000 ROV and the UK's ISIS ROV are both capable of operating at 6000 m depth. Germany operates two ROVs: Quest 5 is capable of 4000 m depth and Cherokee as deep as 1000m. NERC's Autosub is probably Europe's most modern and capable AUV, showing the way that marine research could move in an effort to develop more efficient data collection methods.

In-situ observing systems

(1) China pay much more attention to the regional sea, not the global ocean

Due to the historical reason and the capacity to global exploration (money, equipment and technology, etc.), Chinese marine activities mainly focus on the marginal sea, so now there is limited capacity to the global ocean observation, and consequently, limitation in the Global forecasting system.

(2) Numbers of marine observation station and buoy is far from enough

Comparing to the large marginal sea of China, the numbers of existing marine observation stations and buoy are too small. In particular, the number of tide gauge stations is so small that it is unable to gain enough material to meet demand of marine disaster forecasting, shipping, aquaculture, engineering, etc.

(3) Many room for the improvement of in-situ observation system

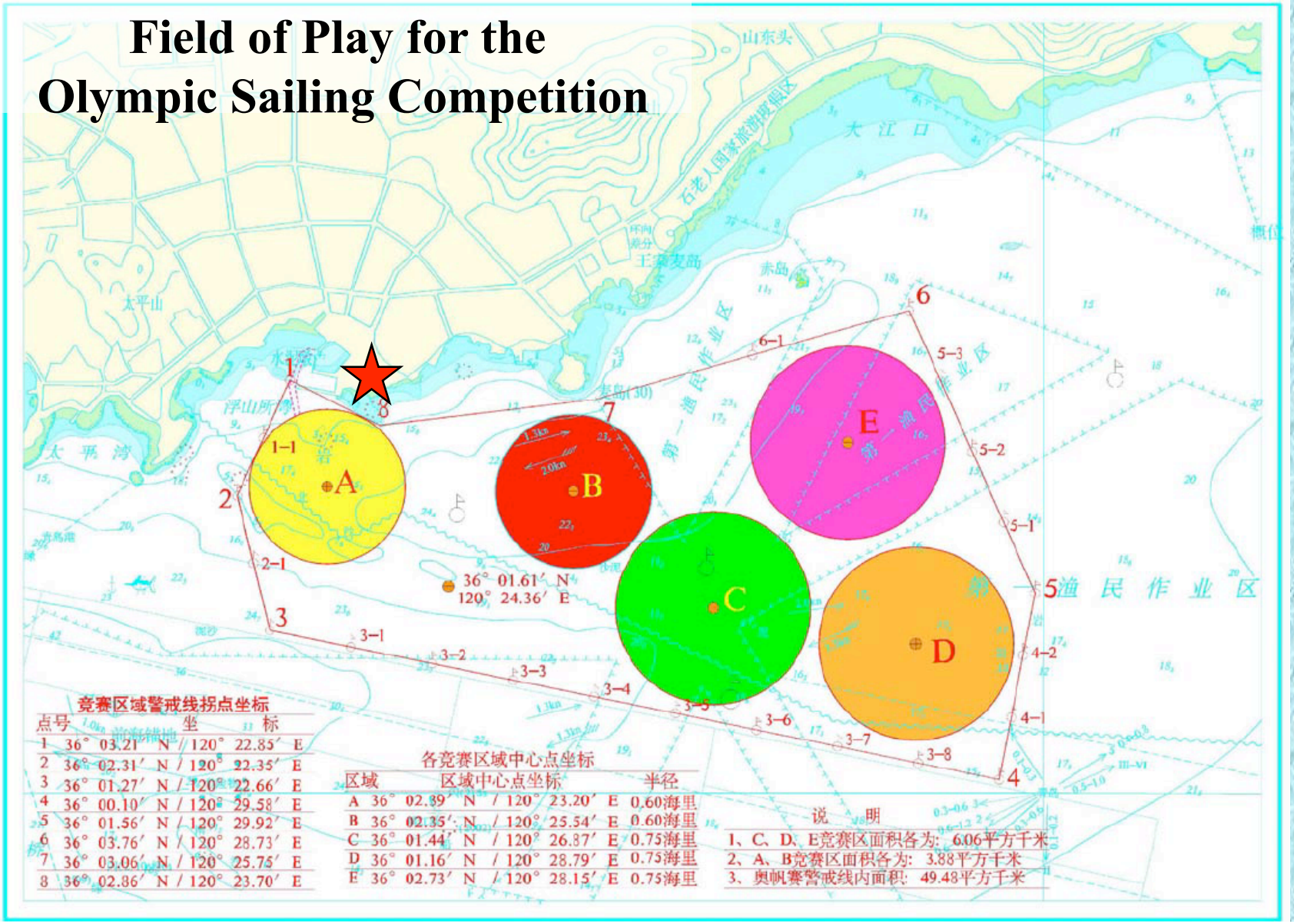
Although China has already established various in-situ observation platforms, including the marine observation station, buoy and survey ship, but China has not yet formed a rational layout and advanced in-situ observation system. Equipments need to be updated, and more importantly, the people who doing the routine measurement should be well trained. The quality of the data is more important to the quantity.

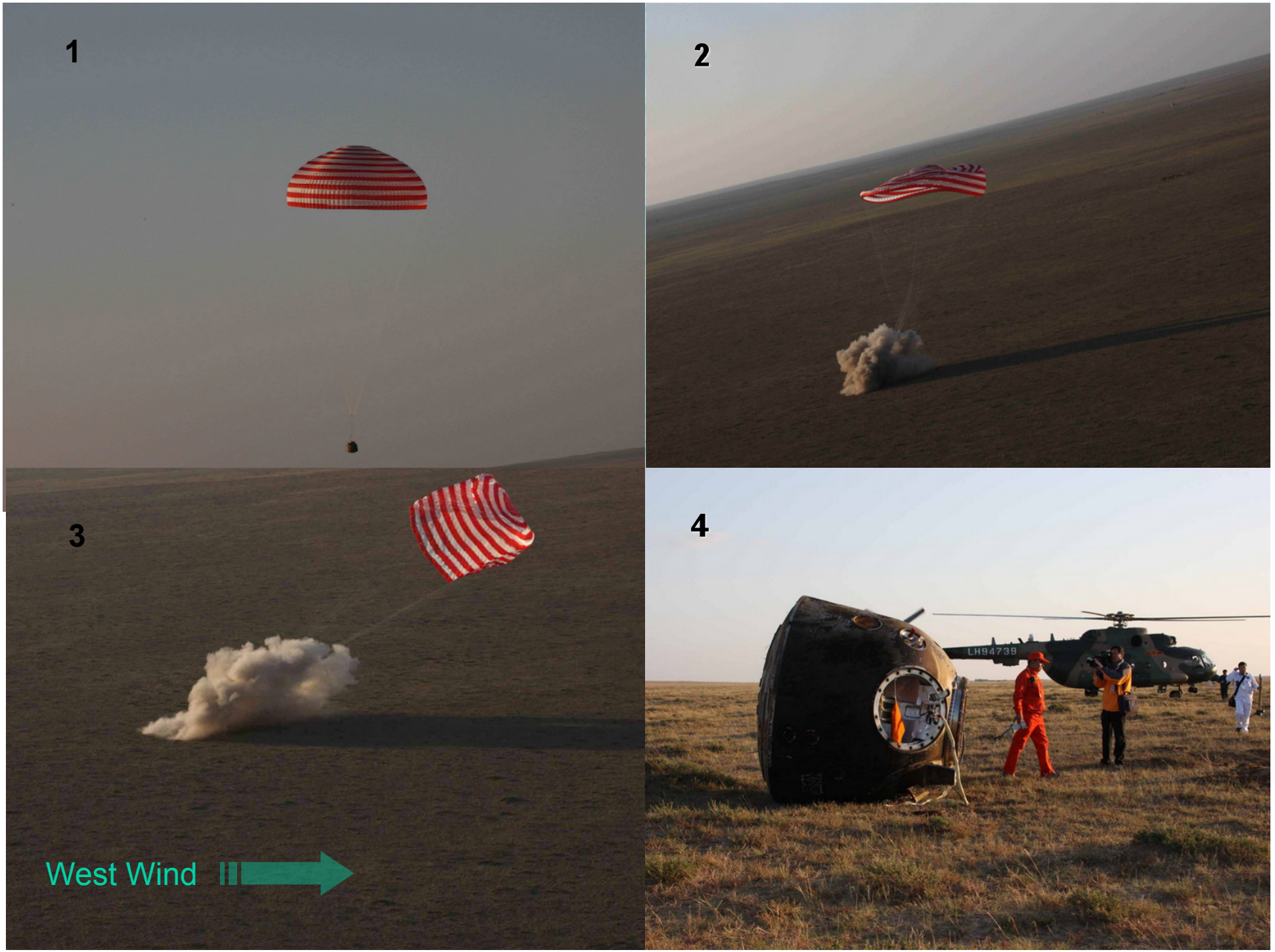
China has not carried out the relevant work of Gliders at present.

Through the MERSEA plan, Europe started to deploy Glider in Mediterranean Sea and the Atlantic partial seas, and received a lot of profile data.MERSEA project will give Glider use the assessment report.

Sea surface Wind and Wind Profile by Ground-based Doppler Wind Lidar **3D Wind： Volume Scan**

Campaign 1: Sea surface wind measurement

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For fun……

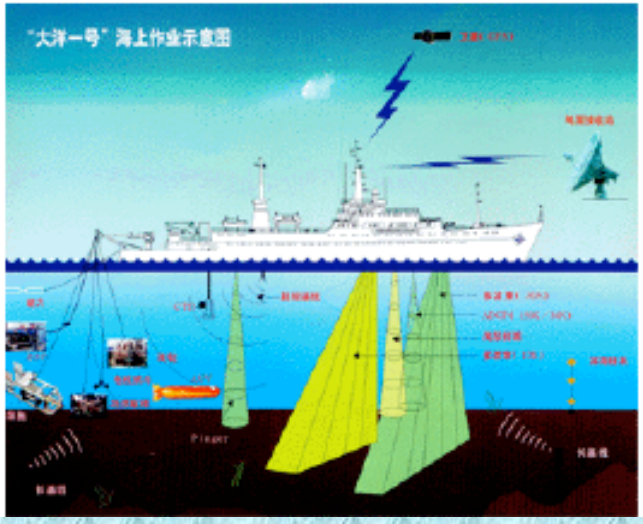
State Oceanic Administration

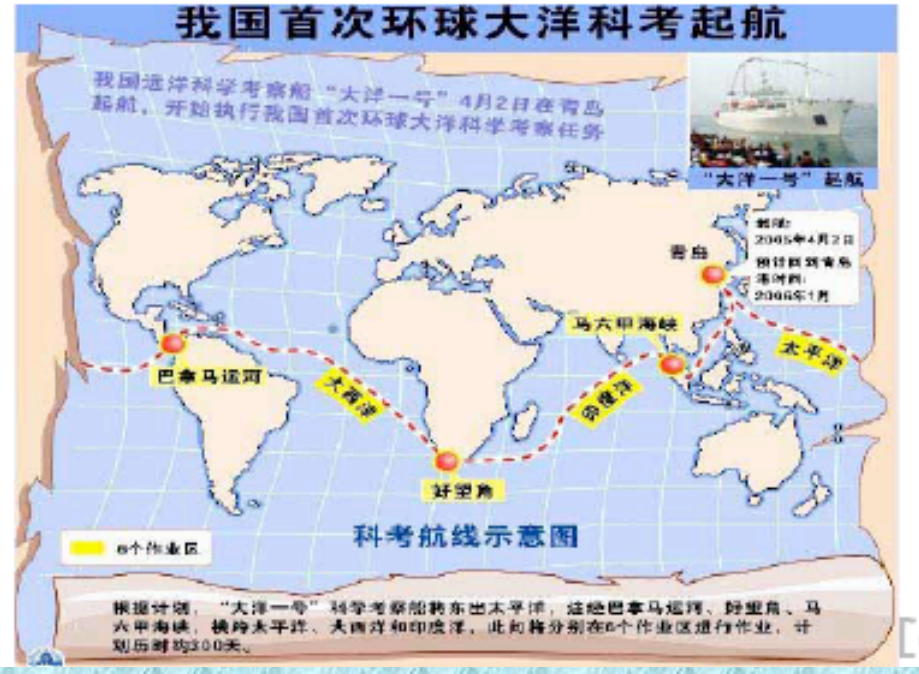
Office of China Ocean Mineral Resources Research and Development Association (Beijing)

R/V "Dayang-1

COMRA is an organization of coordinating the activities of deep sea bed exploration and exploitation of its member units.

The first cruise around the world in 2005-2006





Satellite data receiving and processing system in SIO, Hangzhou

In July, 2009, SIO install the satellite receiving antenna (L Band) and processing system in the Dayang-1, until now, More than one month at sea, every thing work well.

4. The gaps for satellite ocean observing systems between China and Europe

The technical performance of Chinese satellites and sensors are roughly similar to the satellites and sensors launched in this century by NASA, ESA etc.

There are only three microwave sensors of 19 Chinese on-orbit sensors for ocean.

only the service for products of ocean color parameters and SST are available.

Only L1 data of microwave sensor and hyperspectral sensor can be achieved

Comparison of ocean color sensors

	HY-1B/COCTS	FY-3A/MERSI	Envisat/MERIS	EOS/MODIS	OrbView-2/SeaWiFS
Launch Agency	CNSA SOA	CNSA CMA	ESA	NASA	NASA
Orbit	polar, 798km, 98.8deg, 10:30±30min (D)	polar, 836km, 98.75deg, 10:00-10:20 (D)	polar, 800 km, 98.55deg, 10:00 (D)	polar, 705 km, 98.2deg, 10:30 (D, Terra) or 13:30 (A, Aqua)	polar, 705km, 98.2deg, 12:00 (D)
Swath	3100km	3200km	1150km	2330 km	2801km
Quantization	10 bits	12 bits	16 bits	12 bits	10 bits
Spatial Resolution	1100m	250m (bands 1-5) 1000m (bands 6-20)	300m/1200m (all bands)	250 m (bands 1-2), 500 m (bands 3-7), 1000 m (bands 8-36)	1100m
Radiometric Accuracy	10% (bands 1-8)	7% (bands 1-4, 6-14) 10% (bands 15-20)	< 4%	5% (bands 1-19, 26) 1% (bands 20-25, 27-36)	< 5%
SNR, NEΔρ, NEΔT	SNR Band 1, 440; 2, 600; 3, 590; 4, 560; 5, 525; 6, 390; 7, 400; 8, 415	NEΔρ Band 1, 0.45%; 2-3, 0.4%; 4, 0.45%; 6-7, 0.1%; 8-14, 0.05%	SNR (typical) 1700	SNR Band 1, 128; 2, 201; 3, 243; 4, 228; 8, 880; 9, 838; 10, 802; 11, 754; 12, 750; 13, 910; 14, 1087; 15, 586; 16, 516	SNR Band 1, 499; 2, 674; 3, 667; 4, 640; 5, 596; 6, 442; 7, 455; 8, 467
Bands	1 412 nm, 20 nm 2 443 nm, 20 nm 3 490 nm, 20 nm 4 520 nm, 20 nm 5 565 nm, 20 nm 6 670 nm, 20 nm 7 750 nm, 20 nm 8 865 nm, 40 nm 9 10350 nm, 100 nm 10 11950 nm, 1100 nm	6 412 nm, 20 nm 7 443 nm, 20 nm 1 470 nm, 50 nm 8 490 nm, 20 nm 9 520 nm, 20 nm 2 550 nm, 50 nm 10 565 nm, 20 nm 11 650 nm, 20 nm 3 650 nm, 50 nm 12 685 nm, 20 nm 13 765 nm, 20 nm 14 865 nm, 20 nm 4 865 nm, 50 nm 15 905 nm, 20 nm 16 940 nm, 20 nm 17 980 nm, 20 nm 18 1030 nm, 20 nm 19 1640 nm, 50 nm 20 2130 nm, 50 nm 5 11250 nm, 2500 nm	1 412 .5 nm, 10 nm 2 442.5 nm, 10 nm 3 490 nm, 10 nm 4 510 nm, 10 nm 5 560 nm, 10 nm 6 620 nm, 10 nm 7 665 nm, 10 nm 8 681.25 nm, 7.5 nm 9 708.75 nm, 10 nm 10 753.75 nm, 7.5 nm 11 760.625 nm, 3.75 nm 12 778.75 nm, 15 nm 13 865 nm, 20 nm 14 885 nm, 10 nm 15 900 nm, 10 nm	8 412 nm, 15 nm 9 443 nm, 10 nm 3 469 nm, 20 nm 10 488 nm, 10 nm 11 531 nm, 10 nm 12 551 nm, 10 nm 4 555 nm, 20 nm 1 645 nm, 50 nm 13 667 nm, 10 nm 14 678 nm, 10 nm 15 748 nm, 10 nm 2 858 nm, 35 nm 16 870 nm, 10 nm 17 905 nm, 30 nm 18 936 nm, 10 nm 19 940 nm, 25 nm 5 1240 nm, 20 nm 26 1375 nm, 30 nm 6 1640 nm, 24 nm 7 2130 nm, 50 nm	20 3750 nm, 180 nm 21 3959 nm, 60 nm 22 3959 nm, 60 nm 23 4050 nm, 60 nm 24 4466 nm, 65 nm 25 4515 nm, 67 nm 27 6715 nm, 360 nm 28 7325 nm, 300 nm 29 8550 nm, 300 nm 30 9730 nm, 300 nm 31 11030 nm, 500 nm 32 12020 nm, 500 nm 33 13335 nm, 300 nm 34 13635 nm, 300 nm 35 13935 nm, 300 nm 36 14235 nm, 300 nm	1 412 nm, 20 nm 2 443 nm, 20 nm 3 490 nm, 20 nm 4 510 nm, 20 nm 5 555 nm, 20 nm 6 670 nm, 20 nm 7 765 nm, 40 nm 8 865 nm, 40 nm

Chinese on-orbit sensors for ocean

Satellite	Sensor	Launch date	Characteristics	Similar sensor	Application	Note
FY-1D	MVISR-2	2002.5	10 channels, VIS-NIR	AVHRR CZCS	SST, ocean color, meteorology	
FY-2D	VISSR-2	2006.12	5 channels, VIS-NIR	GOES / Imager	SST, meteorology	
FY-2E	VISSR-2	2008.12	5 channels, VIS-NIR	GOES / Imager	SST, meteorology	substitute for FY-2C
FY-3A	VIRR	2008.5	10 channels, VIS-NIR	AVHRR CZCS	SST, ocean color, meteorology	
FY-3A	MERSI	2008.5	20 channels, VIS-NIR	MODIS	ocean color, meteorology	
FY-3A	MWRI	2008.5	5 channels, H,V polarization	TMI	SST, SSW, meteorology coastal zone	
HY-1B	COCTS	2007.4	10 channels, VIS-NIR	OCTS SEAWIFS	ocean color, SST	
HY-1B	CZI	2007.4	4 channels, CCD,20nm,250m		coastal zone	
CRS-1	SAR	2006.4	L-band, 5m, HH		ocean dynamics, sea surface features, coastal zone	
CRS-3	SAR	2007.11	L-band, <5m, HH		ocean dynamics, sea surface features, coastal zone	
HJ-1A	HSI	2008.9	0.49-0.95 μ m, 4nm, 100m	HICO Hyperion	ocean color, vegetation, red tides, oil spill	
HJ-1A	CCD	2008.9	4 channels, 30m	Landsat7	coastal zone, SST	
HJ-1B	CCD	2008.9	4 channels, 30m	Landsat7	coastal zone, SST	
CBERS-2	CCD	2003.10	5 channels, 20m	Landsat7 Spot5	coastal zone	
CBERS-2B	CCD	2007.9	5 channels, 20m	Landsat7 Spot5	coastal zone	
CBERS-2B	HR	2007.9	high resolution camera, 2m	QuickBird	coastal zone	
ZY-2C	HR	2004.11	high resolution camera, 2m	IKONOS	coastal zone	
ZY-2C	PAN-MS	2004.11	4 channels, 5m	IKONOS	coastal zone	
DMC-BJ1	PAN-MS	2005.10	3 channels, 4m	Landsat7	coastal zone	

Summary of Data Products of six sensors for Ocean Observing System

Satellite / Sensor	Planned data products for ocean	Operational data products for ocean	Data browser		Data order		Similar Sensor
			website	manual	website	manual	
FY-3A / MERSI	ocean color	L1 chlorophyll concentration aerosol optical thick	√		√		MODIS
FY-3A / MWRI	SSW SST	L1	√		√		TMI
HY-1B / COCTS	ocean color SST	L1 chlorophyll concentration SST aerosol optical thick water leaving radiance diffuse attenuation coefficient suspended matter concentration	The first three*	other		√	OCTS, SeaWIFS
HJ-1A / HIS	ocean color	L1	√ *		√ *		HICO, Hyperion
CRS-1 / SAR（L）	ocean dynamics sea surface target	L1				√	
CRS-3 / SAR（L）	ocean dynamics sea surface target	L1				√	

Note: * presents the products only for the China sea

satellite ocean observing systems (1)

(1) Problems of the quality of the satellite and sensor itself

Some key parts of the sensor is forbidden to be sell to China. Taking the ocean color satellite for example, the design life of the Chinese ocean color satellites HY-1A and HY-1B were 2 years and 3 years, respectively. However, the design life of the Envisat/MERIS, SeaStar/SeaWiFS and EOS/MODIS were all more than 5 years, and the actually in-orbit operational time may more than 10 years.

(2)Lack of the on-orbit calibration system

On-orbit calibration system is very important for the quantitative using of the satellite data. However, up to now, few of the sensors onboard the Chinese satellites have the on-orbit calibration system.

satellite ocean observing systems (2)

(3)Incapability of the global monitoring

Most of the satellites of ESA, NASA and NOAA have the global detecting capacity, which is very important for the global monitoring for environment and security. However, few of the Chinese oceanic satellites have the capacity of global monitoring. Taking HY-1B for example, although it has the ability to detecting the global ocean color information, but because of the limitation of the oversea data storage memory (250 MB), HY-1B can only achieve 5 orbits data maximum in one day.

(4)Lack of the validation of the satellite products

One is the research capacity of algorithms development (very special costal water), but more important is the lack of synchronous dataset for validation.

Capacity to use foreign satellites

- Free use, mainly provided by USA
- Buy data
- Each year, China spends lot of money to buy data from ESA, Japan etc
- When disaster, through international Charter mechanism

5. The gaps for the data integration and information management between China and Europe

data integration and information (1)

(1)Low level of the data integration

There are several main bodies of Chinese oceanographic institutions in charge of observing, dissemination, and managing marine data, including CAS, SOA, CMA, MOE, and military agencies, with varying practise for data access, and often not been designed and operated to meet the near real time demands of operational forecasting systems.Although there are some data integration plans or programs in China, but the integrated systems are always limited in the same body or the same cruises, which lacks the high level of data integration to gather through the different bodies of Chinese oceanographic institutions.

(2)The quite limited data sharing

Because of the security, copyright and data policy reasons, the data sharing in China is quite limited. Although the meteorological and oceanic satellite remote sensing data, and the Argo buoys data are almost free sharing, but the data from in situ marine observation stations and data from research vessel observations are still difficult to be shared.

data integration and information(2)

(3)Low efficiency of the information service

Generally, there are two ways to distribute data in China, offline and online. Many data distributions are still through manual processing in China. Furthermore, because of the lacking consideration of the services for the downstream users, many online data sharing systems are inconvenient for users to access.

(4)Lacking the international links

At present, different departments in China have their ocean data integration standards and few of them consider the international links and compliant with international standards.

Also, the marine information is mainly used for the domestic management and marine activities, And the forecasting model also focus on the China Sea and its adjacent area, some extend to the North Pacific Ocean. In recent year, China is also pay much attention to the global ocean and climate change, but it is in the initial stage.

The connection or the contribution to the GOOS and GEMS is still small.

6. Comparing between the current status on the Ocean and coastal information products and services in China and Europe

the ocean and coastal information products and services

For the EU, which is composed by many countries, once the common signature is confirmed, capacity in national and European levels can be integrated to make available and deliver a generic services based on common ocean state variables necessary to meet the needs for environmental and security applications. Under several consecutive European projects, such as EuroGOOS, MERSEA, BOSS4GMES, and MyOcean, operational oceanography is structured over Europe in the frame of international programs such as GOOS and GEMS.

In China, the system of the marine information services has the typically administrative feature. There are lots of barriers between different agencies, even in the same agencies. Take SOA for example, the national centers, braches of the SOA, and local government all had their windows to release the ocean and coastal information products and services to the relative users and public, although the types of services are various according to their administrative functions and technical abilities. No real integrative system for the information services.

Anyway, equipments (hardware) is not a very big problem in China in the future. Equipments will be more and better, including field measurement sensors, float, satellite, etc.

And many application demonstration systems have been developed by different projects, but for the real operational running, lots things need to be developed for the downstream users. Otherwise, when the project finish, the demonstration system will be archived with the documents.

The data sharing and information service is always the largest problem. Some actions from the high level should be made, from top to bottom, to break the barriers between agencies, or even inside the agencies.

Now one kind of projects, named National Special Fund for the Commonweal Industry, only the research team from the institute and university can not apply this project, which must jointly propose with the downstream users (who running the system operationally). It is a good example to promote the products and service.

The ocean and coastal information products and services in EU are in a high level than that in China. But China is making the great progress to the integrated marine information service by setting up a large China “Digital Ocean” Program, which can make full advantages of the national marine resources. The program includes several important parts: ocean three-dimensional monitoring data and information collection and transmission, spatial data infrastructure, information resource exploration and usage, digital ocean application service system etc.

On June 12, 2009, China launched a website called iOcean (www.iocean.net.cn), the first digital marine service system open to the public in the country.

With the iOcean, public can access to a wealth of marine knowledge, and enhance the marine geo-spatial concepts, understanding and perception of a colorful world of the ocean. However, the “digital sea” construction is a huge, complex, long-term and systematic project, and it is still need time and numerous efforts to catch up the information service system in EU and contribution to the GOOS and GEMS.

- **China launched a website called iOcean (www.iocean.net.cn) on June 12, 2009, the first digital marine service system open to the public in the country.**

"iOcean the public version of the Chinese Digital Ocean"

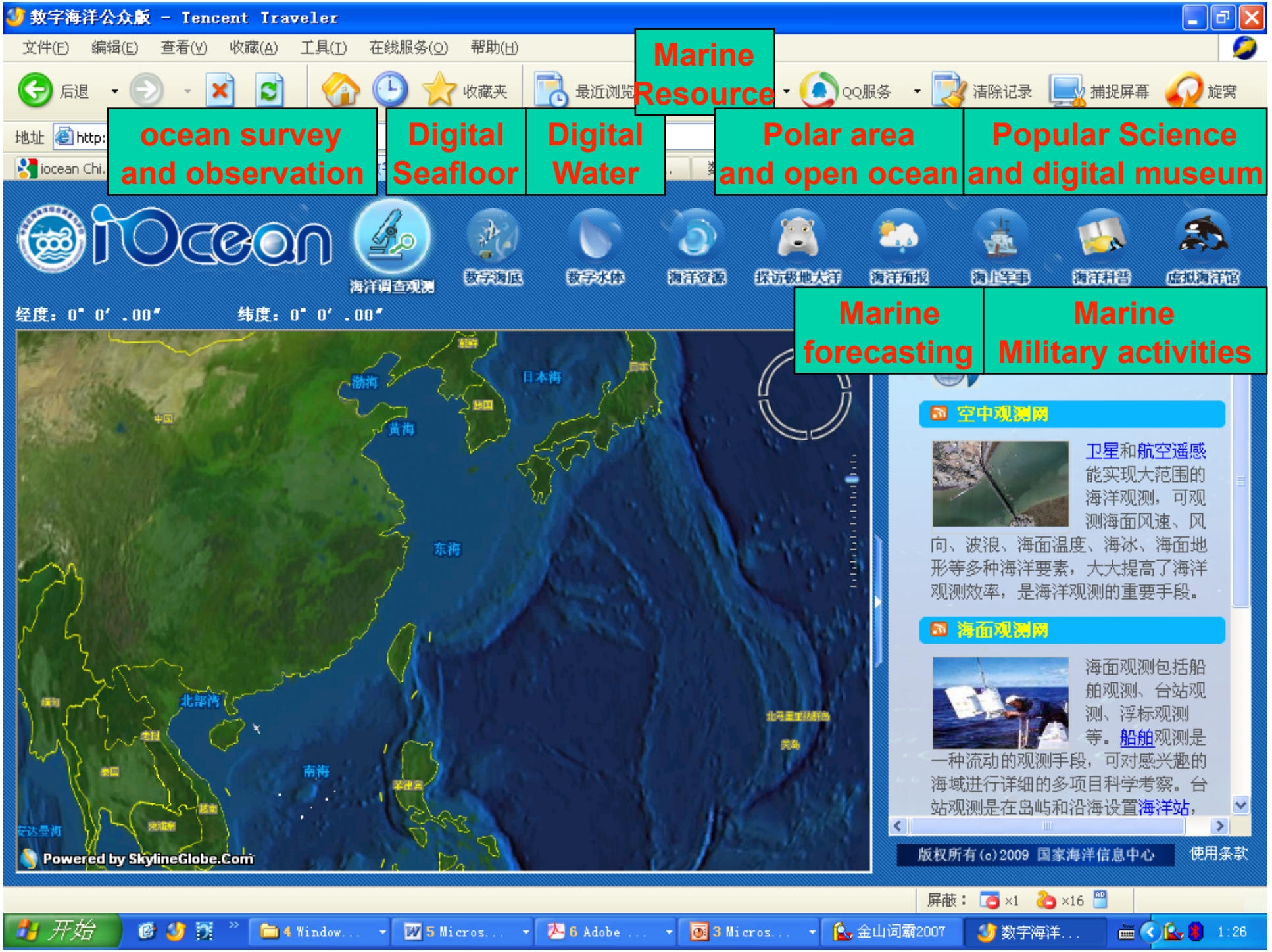
CHINA SCIENCE AND TECHNOLOGY NEWSLETTER
The Ministry of Science and Technology People's Republic of China

- **The official report:**

Applied with internationally advanced 3-D global sphere expression technologies, the system is made of an array of modules for ocean survey and observation, digitized see floor, digitized water body, marine resources, marine forecast, marine military activities, popular marine sciences, polar oceans, and virtual marine aquarium, allowing objective expression of vivid and dynamic natural marine elements and phenomena.

Chen Lianzeng said that iOcean, public access to a wealth of marine knowledge, and enhance the marine geo-spatial concepts, understanding and perception of a colorful world of the ocean.

Chen Lianzeng said that the "digital sea" construction is a huge, complex, long-term and systematic project.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海面观测网
海面观测包括船舶观测、台站观测、浮标观测等。船舶观测是一种流动的观测手段，可对感兴趣的海域进行详细的多项目科学考察。台站观测是在岛屿和沿海设置海洋站，
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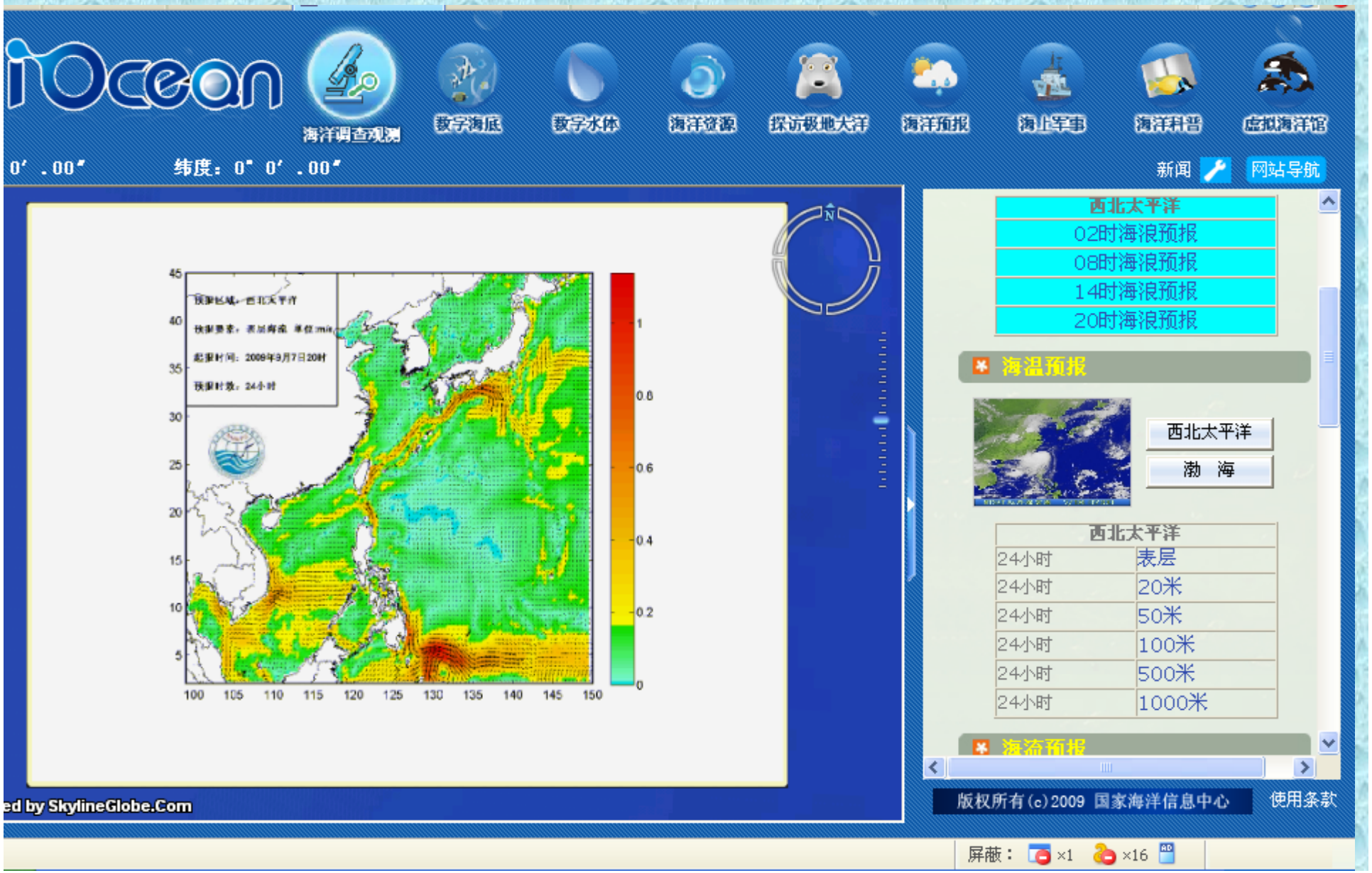


7. The gap for scientific research and education.

Europe has more marine institutions than that of China. If we consider the total budget, scientific and technological level etc, China is relatively weak, the equipment used in marine development is backward and some areas are still in rough shape. Nevertheless, China and Europe marine capacity building have obvious respective characteristics.

Geographic characteristics

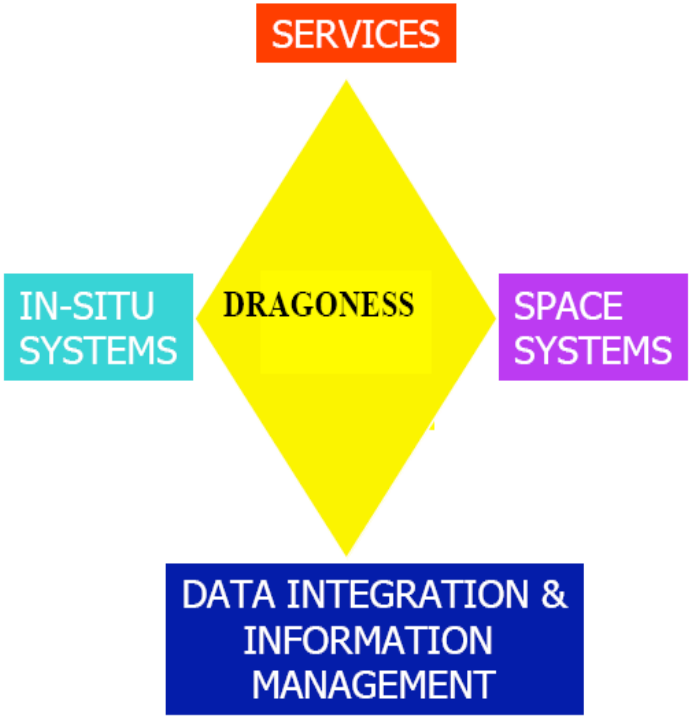
Europe side pays more attention to Arctic Ocean region, and China has more interests to watch Equator area, South China Sea and India ocean, because Asia Monsoon, west pacific ocean warm pool, the Tibet plateau are important factors to China's and world climate. So two observing systems are multi-compensate. Further cooperation between Europe and China marine monitoring will be very useful.

Research area difference

The Global monitoring on environment and security GMES is proposed by EU. European research area also has global characteristics. China pays more attention to the study of the inshore shelf oceanography, China has established a multidisciplinary oceanographic research system with regional characteristics. The research priority difference directly reflects the gaps between Europe and China.

8. towards the future capacity building

We have analyzed the main gaps for marine monitoring capacity building between China and Europe. The most important now is toward the Future. Both Europe and China sides has some new proposals to improve our marine monitoring system and to enhance our capacity building. The cooperation between Europe and China is also very important. Therefore, the next year, in the third report of WP5, future capacity building will be identified and recommended in order to develop more harmonized global systems of marine monitoring and forecasting for use in P.R. of China and Europe. This, in turn, will contribute to a more harmonized implementation of GMES/GEOSS.



- **Many impressive works have been done by the WP1-4, and we also make the comparison between China and EU based on the outcome of the 1st annual report of WP1-4, try to identify the limitations of China according to the marine capacity building.**
- **Some may be overlap with the conclusions of WP1-4, and Some may be not included. Activity, integration, navigation etc**

Capacity building for Marine Monitoring and data products

I. what we want to monitor (content, accuracy, measurement period etc.)

Marine hydrology: seawater temperature, seawater salinity, waves, flow rate, flow direction, sea-level height.

Marine meteorology: temperature, pressure, humidity, wind speed, wind direction, precipitation, cloud, visibility, weather phenomena

Marine resources (bio-, fishery, oil-gas, etc)

Sea ice: sea ice scope, sea ice thickness, density, sea ice structure.

Marine life: nutrients, plankton biomass, fish, algae, aquaculture species area, chlorophyll:

Marine disasters: tsunami, storm surge, sea surface height, tide inundated areas, Kuroshio, red tide. Vertical flow, internal wave

Marine pollution: marine pollution, marine oil slicks, suspended sediment

Marine Chemistry: seawater CO2 partial pressure, dissolved oxygen, seawater pH value

Marine bottom sediment: seabed topography, geomorphology, stratification Ocean currents: flow rate, flow movement, surface flow, deep stream

Thermohaline flow: temperature, salinity, current profile, thermocline layer

II. Integration capacity

observation integration

from space, airborne to bottom of sea

geographical distribution integration

and network

integration from observation to products creation and service

rapid response

quality

State Oceanic Administration

China Marine Surveillance Headquarters
(Beijing)

9 sub-brigades of surveillance fleets
3 airborne brigades
(more than 100 vessels, 9 airplanes)

Regional Branches
in Qingdao, Shanghai, and Guangzhou

III. Marine science and technology capacity

IV. Marine education and training

Abstract

The report focuses to identify the major gaps between two sides by the way of total assessment.

EU member countries and China have established marine monitoring system independently and effectively.

European side has more advanced technology on the monitoring arrangement, accuracy, data products both in quantity and quality.

Nevertheless, China and Europe marine observations have obvious respective geographical characteristics. So two observing systems are multi-compensate.

Further cooperation between Europe and China marine monitoring will be very useful which will greatly contribute to GMES and GEOSS.

Thank you!