D5.3: 3rd Report on Chinese and European Marine Monitoring

Capacity Building:

Future Suggestions.

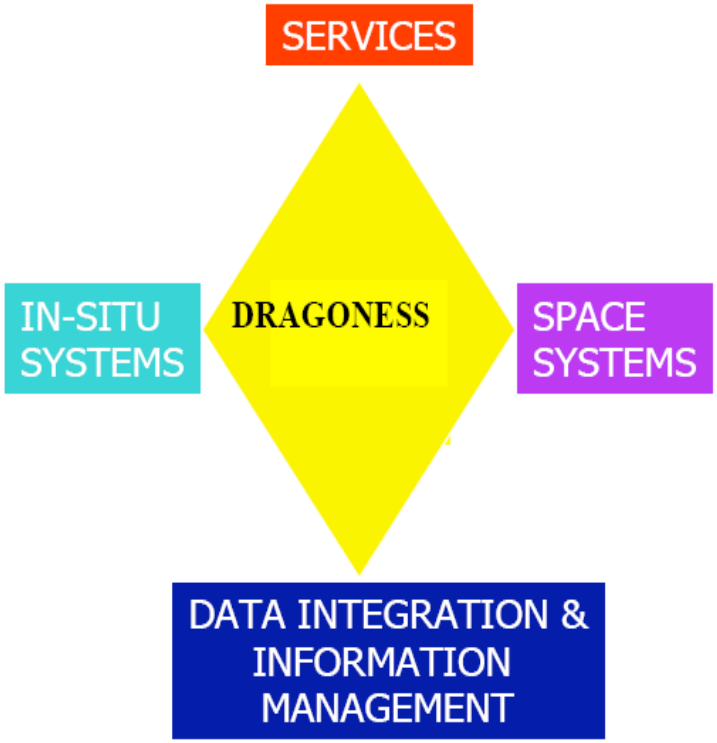
WP 5 – Capacity building in view of gaps and eventual European capabilities

- **Building on the outcome and achievements of WPs 1-4 an assessment of the marine information sources and prediction capabilities contributing to the GEOSS and GMES initiatives will be identified for both the European and Chinese marine waters.**
- **Mutual exchange of experience, available capacities and systems of information retrieval, analysis, dissemination and forecasting as the basis for decision-making will be assessed and shared.**
- **Based on this, 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 beyond the 2008 time frame.**
- **This, in turn, will contribute to a more harmonized implementation of GMES/GEOSS.**

- **(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.**



- **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 more need to be added.**

Outline

- 1. Capacity building of marine monitoring and forecasting in China and Europe： status, gaps and future
  - The overview of capacity building status in China
  - Capacity building of marine monitoring and Forecasting in Europe
- 2.The proposal for the capacity building of China marine observation in the future
- 3. Proposals for cooperation in the capacity building of marine monitoring and forecasting between China and Europe

- 2.The proposal for the capacity building of China marine observation in the future
  - 2.1 The National Medium- and Long-Term Program for S & T
  - 2.2 Priorities topics of Marine observation development
  - 2.3 Strengthening the construction of infrastructure platforms
  - 2.4 Talented workforce buildup
  - 2.5 Enlarging the user groups and interaction
  - 2.6Expanding international and regional cooperation and exchanges
- 3. Proposals for cooperation in the capacity building of marine monitoring and forecasting between China and Europe

The proposal for the future

The State Council of the People's Republic of China has released the "The National Medium- and Long-Term Program for Science and Technology Development (2006-2020)" in 2006.

Marine technology . Emphasis on the development of comprehensive multi-functional, multi-parameter and long-term operable marine techniques.

- The 3-D marine environment monitoring technology. Synchronized monitoring of marine environmental elements from space, offshore stations, water surface, and in-water. Research will be focused on remote marine sensing technology, acoustic probe technology, buoy technology, shore-based long-range radar technology, and marine information processing and application technology.
- Ocean floor-based multi-parameter fast sounding technology.
- Another two marine technologies are Natural gas hydrates exploitation technology and Deep-ocean operation technology.

Marine Science & technology in China: A Roadmap to 2050

edited by Chinese Academy of Sciences

Category	Content	Around 2020	Around 2030	Around 2050
Marine investigation and application	Area of marine exploration	Extend from West Pacific to East Indian Ocean, and two Polar regions	Extend to entire Pacific and Indian Ocean	Cover the whole global oceans
	Exploration depth	Reach down to 7,000 m with Human Occupied Vehicle (HOV) And 11,000 m with Remotely Operated Vehicle (ROV)	Human Occupied Vehicle down to 11,000 m Drill down to 1,000 m beneath submarine floor	Drill down to 2,000 m beneath submarine floor
	Environmental security	Realize dynamic environmental forecast in the coastal regions	Realize environmental dynamic forecast in key ocean zones and ocean shipping routes	Establish independent and advantageous global marine security system
	Ecological security	Realize real-time observation on ecological key factors in coastal regions	Realize the prediction and early-warning of significant marine ecosystems changes	Establish an integrated management mode for sustainable marine ecosystems
	Digital marine	Digitize preliminarily the sea territory and the exclusive economic zone	Finalize the digitization of China's offshore	Construct and complete preliminarily the global oceans digitization

1. Priorities topics of Marine observation development

- (1) Marine monitoring technology
  - Observation instrument development.
  - Marine remote sensing monitoring.
  - Coastal sea environment monitoring.
  - Offshore and Open Ocean monitoring.
  - Ocean floor environment monitoring.
  - Marine data transmission and information application.

1. Priorities topics of Marine observation development

- (2) Safeguard for marine environment and disaster
  - Early warning of coastal disaster. .
  - The forecasting of Open Ocean and the global ocean. .
  - The forecasting and evaluation of the marine emergency.

- (3) Maritime ecological and environmental protection
  - Start the action plan of marine ecological security
  - Establish coastal ecosystems observation system
  - Establish detection technological system in deep and far ocean

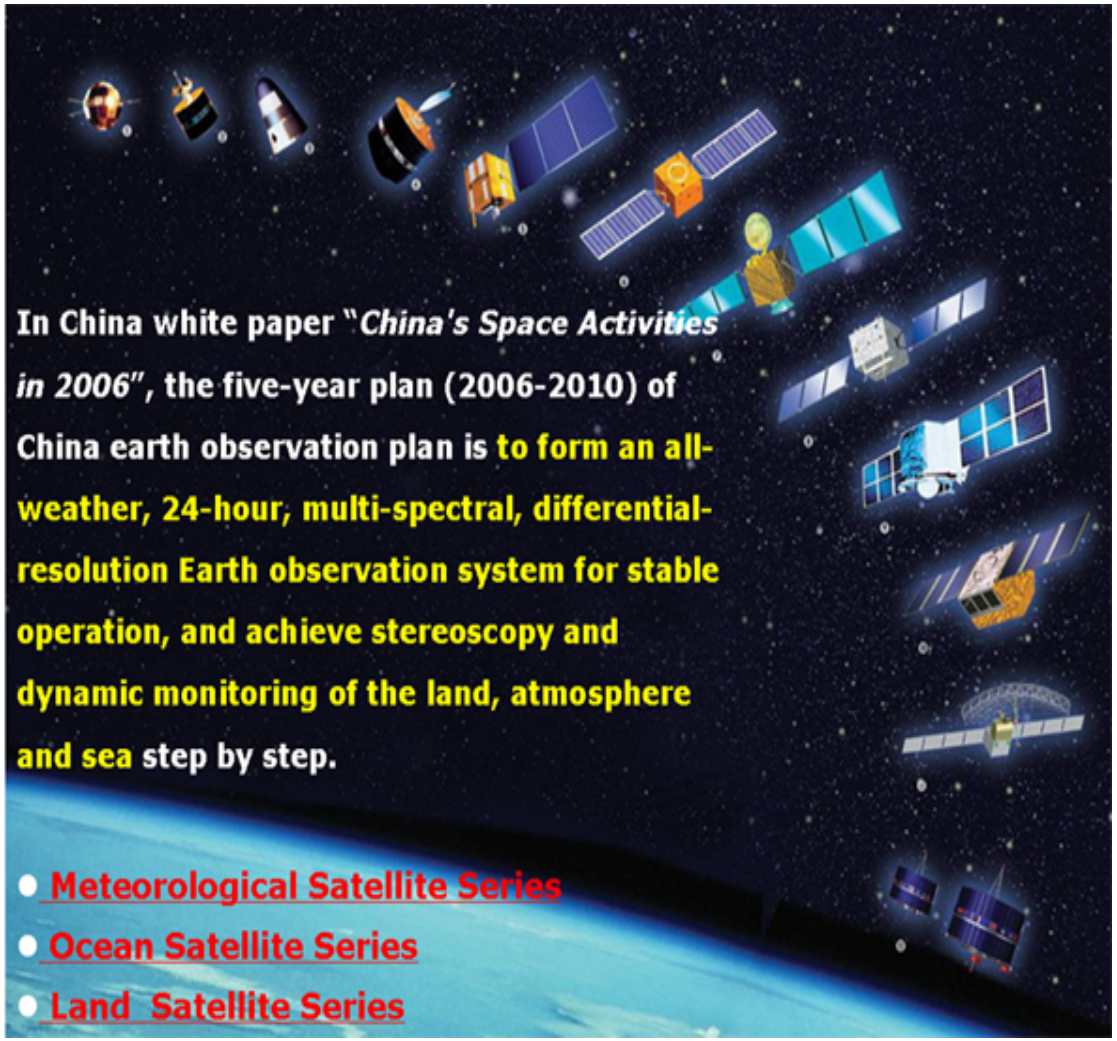
1. Priorities topics of Marine observation development

- (4) Global change watch and regional response
  - Long-term, Real-time Observation Means of Far-reaching Ocean
  - Real-time Observation Network of Coastal Marine Environment
  - The Platform for Marine Environment Investigation Instruments
  - Observational Data Sharing
  - Marine Numerical Simulation
  - Marine Environmental Forecasting

2. Strengthening the construction of infrastructure platforms

- Establishing a diversified, multi-channel input system.
- Strengthening the construction of infrastructure platforms
  - Large scientific projects and facilities.
  - Scientific data and information platforms.
  - National research and experiment bases.
  - Natural S&T resources service platforms.
  - National technical system for standards, metrology, and test.
- Establishing a mechanism for sharing infrastructure platforms.

(2) the Spaceborne observing systems in China



However:

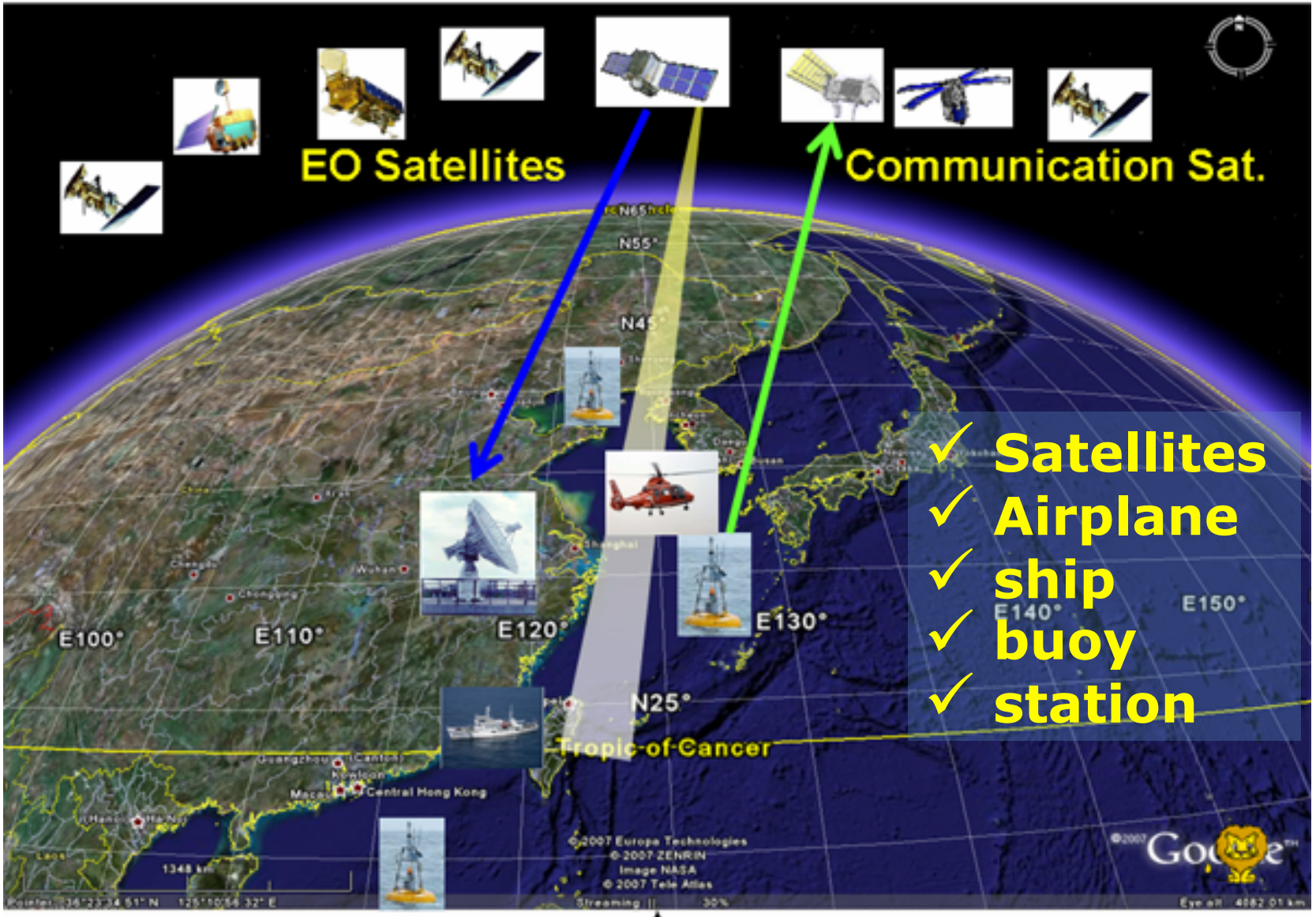
- Somehow overlap.

- For technology an application:

  Satellite>sensor

  >RS products>service..

Integrated EO monitoring system in China



MAMS

MAMS—Marine airborne multi-spectrum scanner

Made by Shanghai Institute of Technical Physics, Chinese Academy of Science

Equipped on the Chinese Marine Surveillance Plane for national oceanic right safeguarding

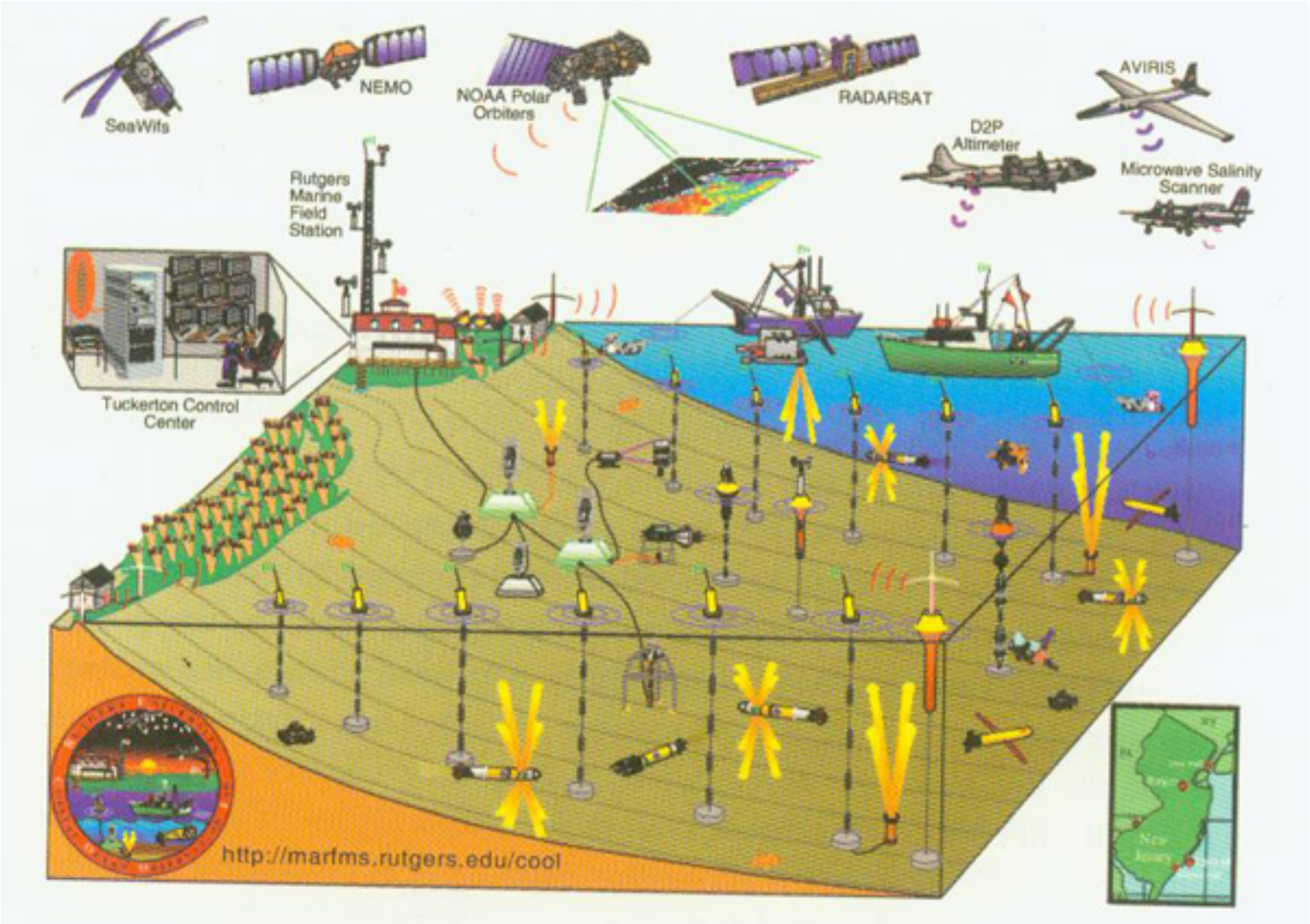
Fig. 1: Photo of MAMS

11 bands : ultraviolet to infrared

Bands	Band width(μm)	S/N	Application
ultraviolet	0.20～0.37	≥300	Oil spill, oil pollution, COD
Visible, near-infrared	0.40～0.42	≥300	Yellow substance，COD
	0.433～0.453	≥400	Chlorophyll concentration, eutrophication，yellow substance pollution
	0.48～0.50	≥500	Water attenuation coefficient, chlorophyll concentration, yellow substance
	0.51～0.53	≥500	Water attenuation coefficient, eutrophication, yellow substance pollution
	0.555～0.575	≥500	Suspended material, chlorophyll concentration, yellow substance, florescence base line
	0.66～0.68	≥500	Suspended material, florescence, COD
	0.73～0.77	≥750	Suspended material, atmosphere correction, florescence base line
	0.845～0.885	≥750	Marine aerosol, atmosphere correction
infrared	3.0～5.5	≤0.1	Coastal zone monitoring
	8.5～12.5	≤0.1	Sea surface temperature, oil pollution, thermal pollution

Chlorophyll, Sea surface temperature, harmful algae bloom, hot water drainage

大洋一号
DA YANG YI HAO



Three-dimensional network of marine observation
(Source: http://marfms.rutgers.edu/cool)

3. Talented workforce buildup

“Talent, patent and standard”

- Accelerating the Nurturing of a Contingent of world caliber experts
- Bring into Full Play the Important Role of Education in Cultivating Innovative Talents
- Supporting Enterprises’ Efforts in Nurturing and Attracting S&T Talents
- Intensifying Efforts in Attracting High Caliber Talents From Overseas
- Creating a Culture Environment Conducive to the Nurturing of Innovative Talents

4.Enlarging the user groups and interaction

- The development, utilization and dependence of the ocean require not only the strategic vision and vigor of high-level decision makers, but also recognition and support from people across the country.
  - A training system for scientists to engage in international academic exchanges and to take up senior positions at major international academic organizations.
  - Training of the users.
  - Marine publicity programs

Public Open day in SOED Lab （SIO/SOA）






“7.18” is the National Day of Marine Publicity”. The Lab is opened to the public with the professional team explaining and answering.

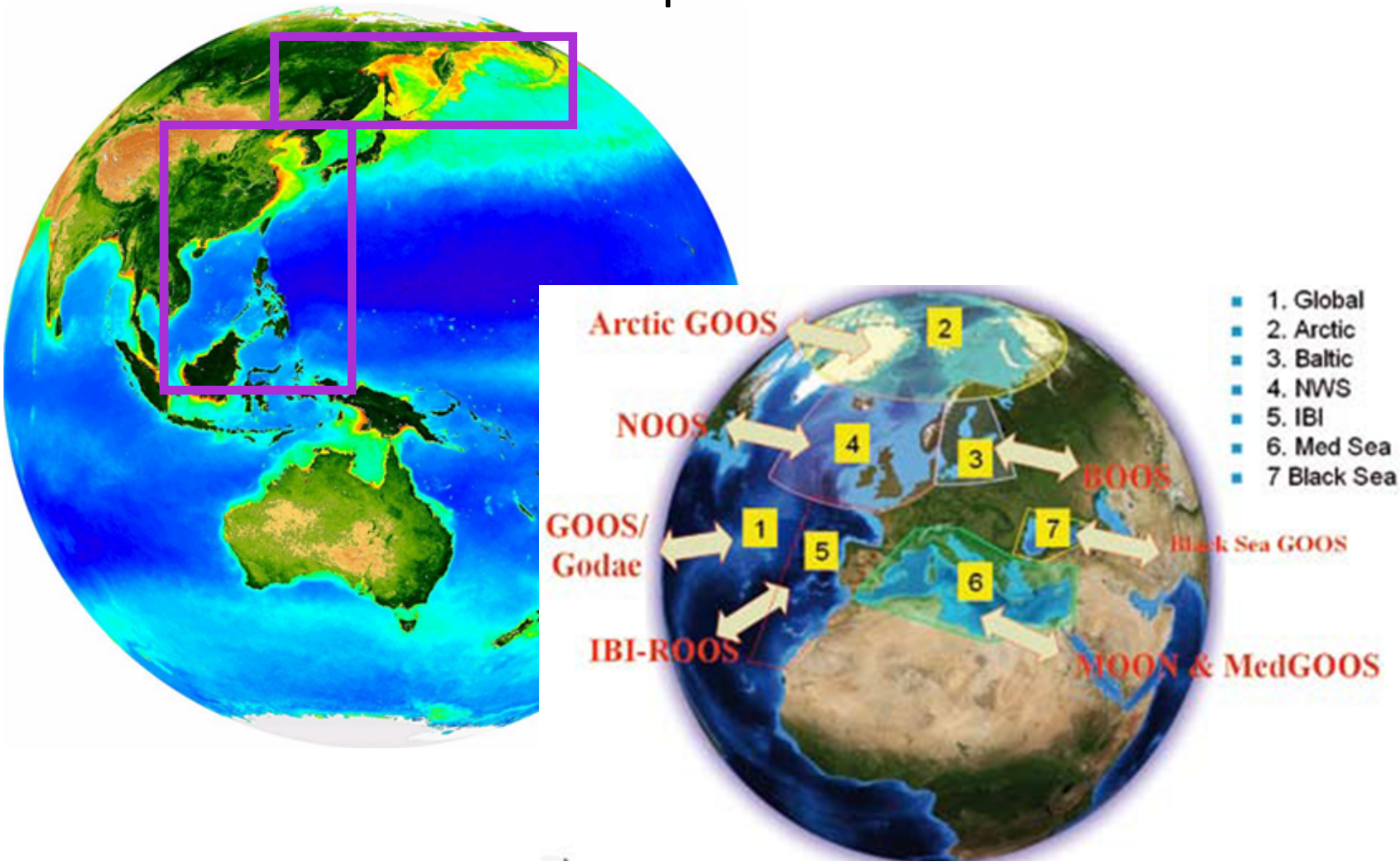
5. Expanding international and regional cooperation and exchanges

For the marine observation, the tendency is from single ocean observing technology to integrated development of three-dimensional network.

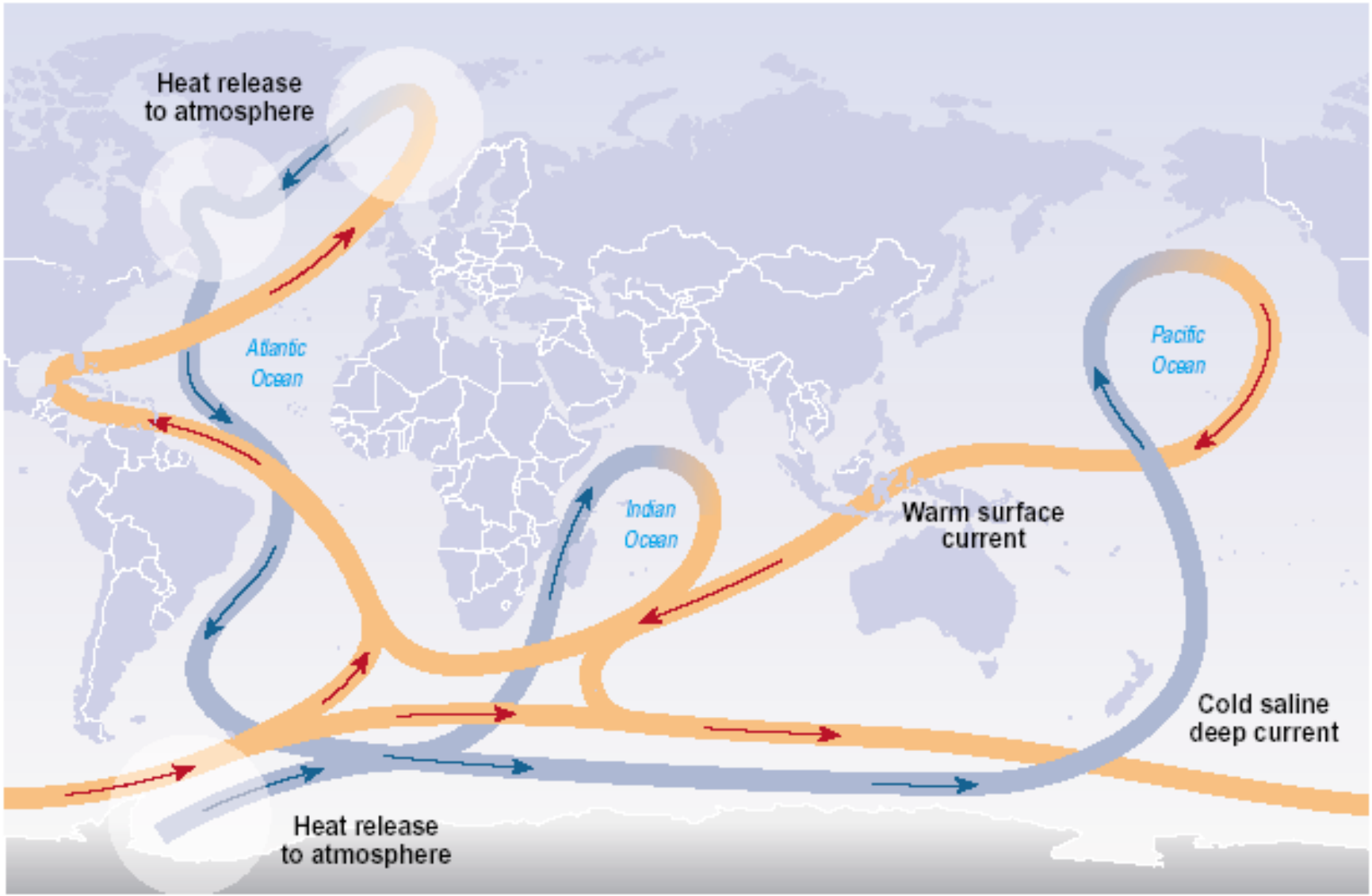
- To establish joint laboratories or R&D centers with overseas research institutes;
- To support the implementation of international cooperation projects
- To establish a collaborating S&T mechanism and to strengthen communications and exchanges.
- Participate actively in large international scientific projects and international academic organizations.
- Encourage multinational corporations to establish their R&D centers in our country.

- 3. Proposals for cooperation in the capacity building of marine monitoring and forecasting between China and Europe
  - 3.1 Monitoring coverage cooperation
  - 3.2. Monitoring contents and accuracy coordination
  - 3.3. Monitoring technology cooperation
  - 3.4. Marine science research priorities cooperation
  - 3.5. data exchange and application cooperation
  - 3.6. to establish cooperation mechanism between Europe and China
  - 3.7 work together forGEOSS/GMES

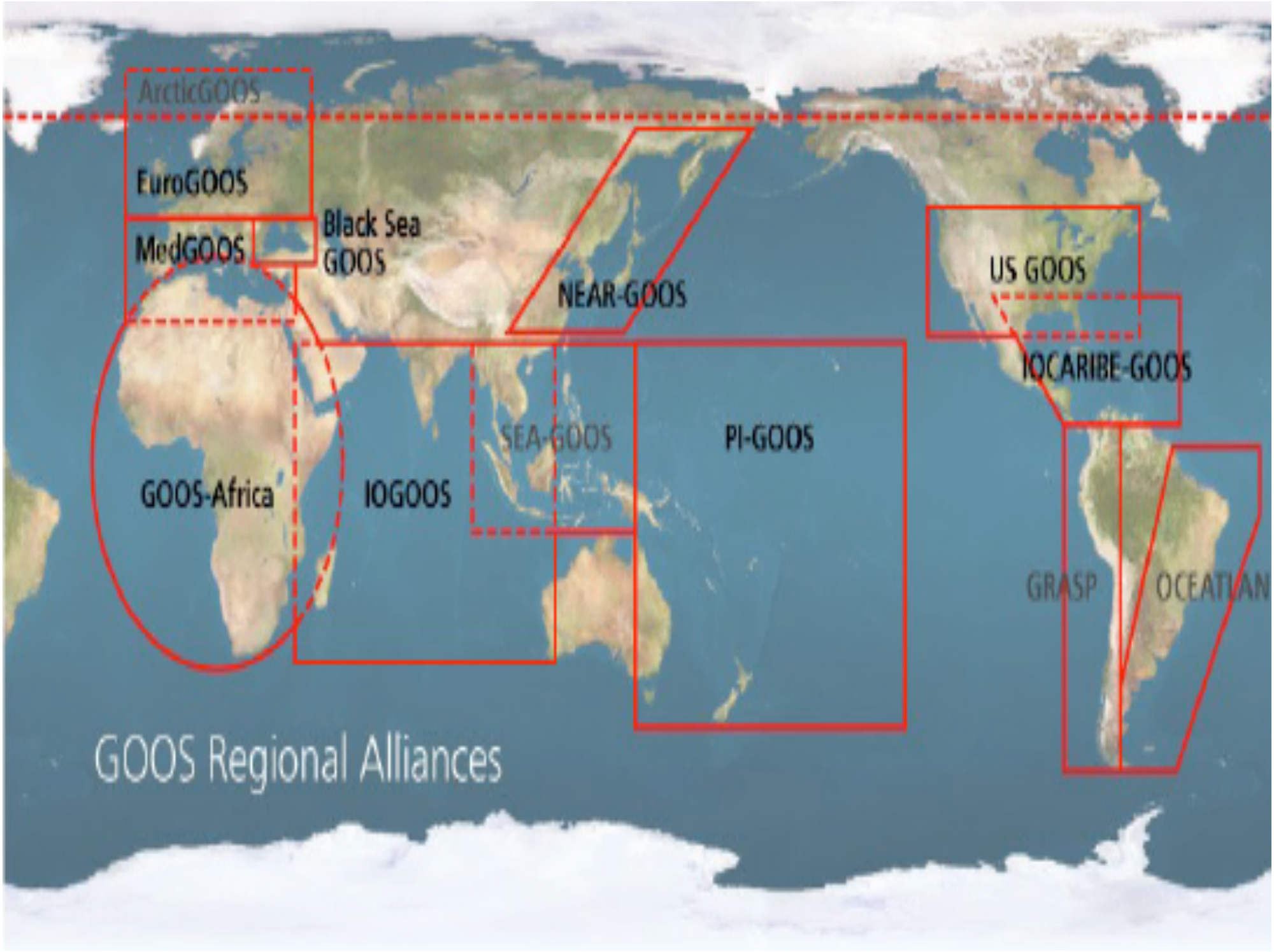
1. Monitoring coverage cooperation



Current circulation



全球温盐环流输送带示意图


ArcticGOOS
EuroGOOS
MedGOOS
Black Sea GOOS
NEAR-GOOS
US GOOS
IOCARIBE-GOOS
SEA-GOOS
PI-GOOS
GOOS-Africa
IOGOOS
GRASP
OCEATLAN
GOOS Regional Alliances

2. Monitoring contents and accuracy coordination

- Physical Oceanography,
- Marine Geology（Geological Oceanography）
- Marine Chemistry（Chemical Oceanography）
- Marine Biology（Biological Oceanography）

Chinese side has defined the observation parameters, as follows

Observing classification	Observing elements
Marine physical elements	Sea temperature, seawater salinity, thermohaline profile, ocean current, sea level, sea ice, waves, transparency, sea surface wind field, oceanic gravity field
Air-sea elements	Air temperature, air pressure, humidity, wind speed, wind direction, precipitation, cloud, visibility, weather phenomena, water vapor, CO_2, aerosol
Marine ecological Elements	water color, nutrient salt, plankton
Marine pollution	Sea water pollution, oil spills on the sea, suspended mud and sand
Marine biology	Nutrients, plankton biomass, fish, chlorophyl
Marine bed sediment	Seabed topography, landform & sediments
Ocean current	Current velocity, current direction, surface current, deep current
Marine disaster	Tsunami (huge wave), storm surge (lake location, water gain, floodplain coverage), sea level height, tide flooded area, black stream, red tide

3. Monitoring technology cooperation

- To make oceanic monitoring and to issue oceanographic forecasts, including sea surface temperature, salinity, sea waves, oceanic topography, sea surface wind fields, sea surface air pressure, sea ice, ocean characteristic imagery, chlorophyll, suspending sediments, etc.;
- To monitor disastrous oceanic events for mitigation, including ocean storms, high waves, tsunami, sea ice, Red tide, etc.; to monitor ocean pollution, such as sea surface oil slicks, major ocean pollutants, thermal circulating water, organic pollutants, nutritious salts & heavy metal components, etc.;
- To explore & develop ocean resources (e.g. sea aquatic production, oil & natural gas exploitation); to maintain national oceanic rights & interests,
- To monitor the enforcement of marine laws & regulations; to conduct research on interactions between oceans and global change.
- To establish an airborne, space-based, ship-based and subsurface ocean monitoring system, so as to an integrated oceanic monitoring system, covering atmosphere, land and ocean, as an important component of the Earth observation system.

4. Marine science research priorities cooperation

- Science Priorities
  - 1). To understand the role of the ocean in the Earth system
  - 2). To maintain the ocean's ecosystem while continuing to exploit ocean resources
  - 3). To evaluate and mitigate human impact on the marine environment
  - 4). To explore the deep-sea frontier

5. data exchange and application cooperation

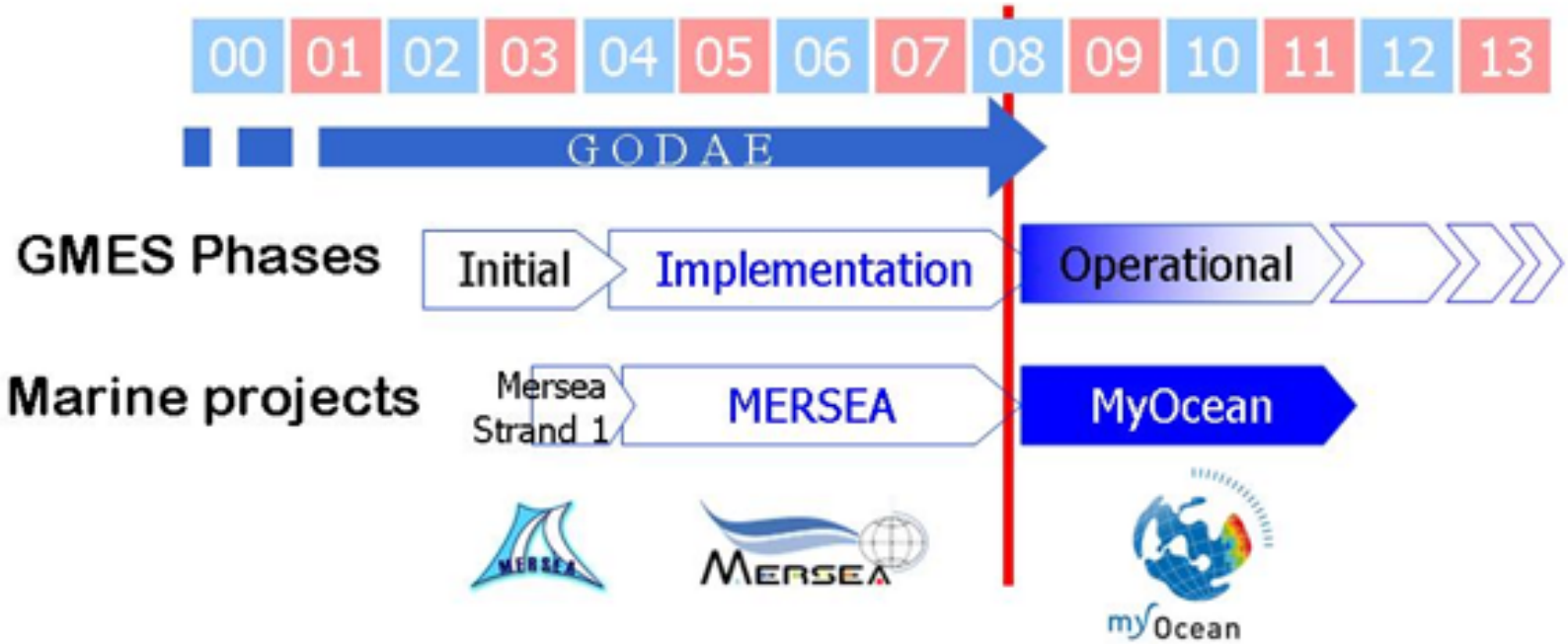
MyOcean

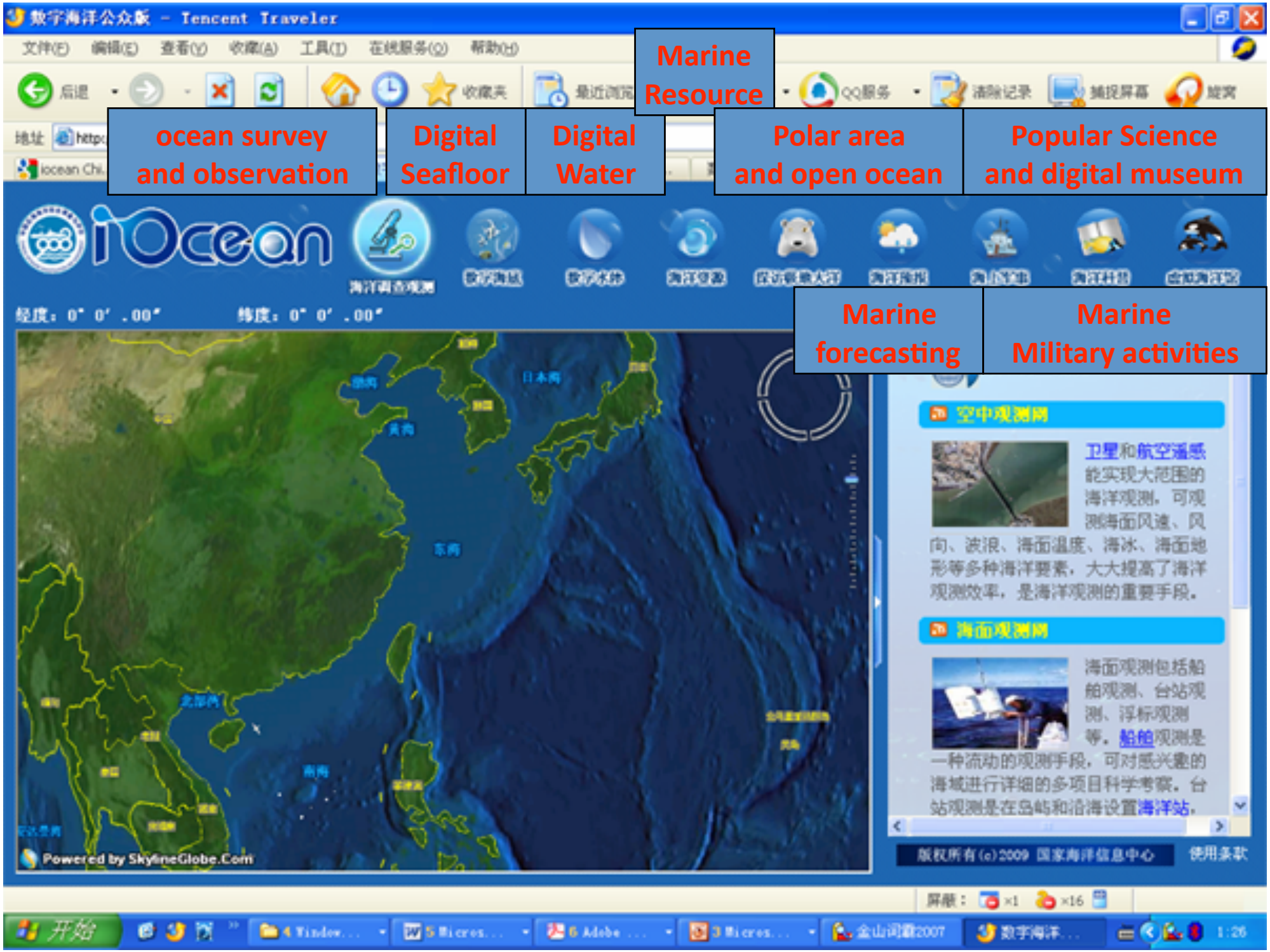
SERVICE DESCRIPTION		PRODUCT DESCRIPTION			
Benefits	Users	MFC Product Package	TAC Product Package	Coverage	Provider
Area 1: Marine Safety (marine operations, oil spill combat, ship routing, defense, search & rescue, ...)	National Oceanographic Agencies National Marine Safety Agencies Maritime Transport Industry	- baseline and standard ocean state products - daily fields	- SST - sea ice - in situ - daily fields	European Basins	All MFCs SST, SI, IS TACs
Area 2: Marine Resources (fish stock management)	ICES, FAO	- baseline and standard ocean state products - daily fields	- ocean color - in situ - daily fields	European Basins	All MFCs OC, IS TACs
Area 3: Marine Coastal Environment (water quality, pollution, coastal activities, ...)	National Coastal Monitoring Agencies	- baseline and standard ocean state products - boundary and initial ocean state conditions - daily or hourly fields	- ocean color - in situ - sea ice - daily fields	Global Ocean European Basins	All MFCs OC, IS, SI TACs
Area 4: Climate & Seasonal Forecasting (climate monitoring, ice, seasonal forecasting, ...)	MS & EU Met Offices EEA, OSPAR, HELCOM, UNEP/MAP National Environmental Agencies	- baseline and standard ocean state products - surface to bottom - re-analysis - seasonal forecasting - initial conditions - daily / weekly / monthly / yearly fields	- sea level - ocean color - in situ - ice - SST - re-processed data sets - daily / weekly / monthly fields	Global Ocean European Basins	All MFCs All TACs

MyOcean,
a European Commission "GMES" project

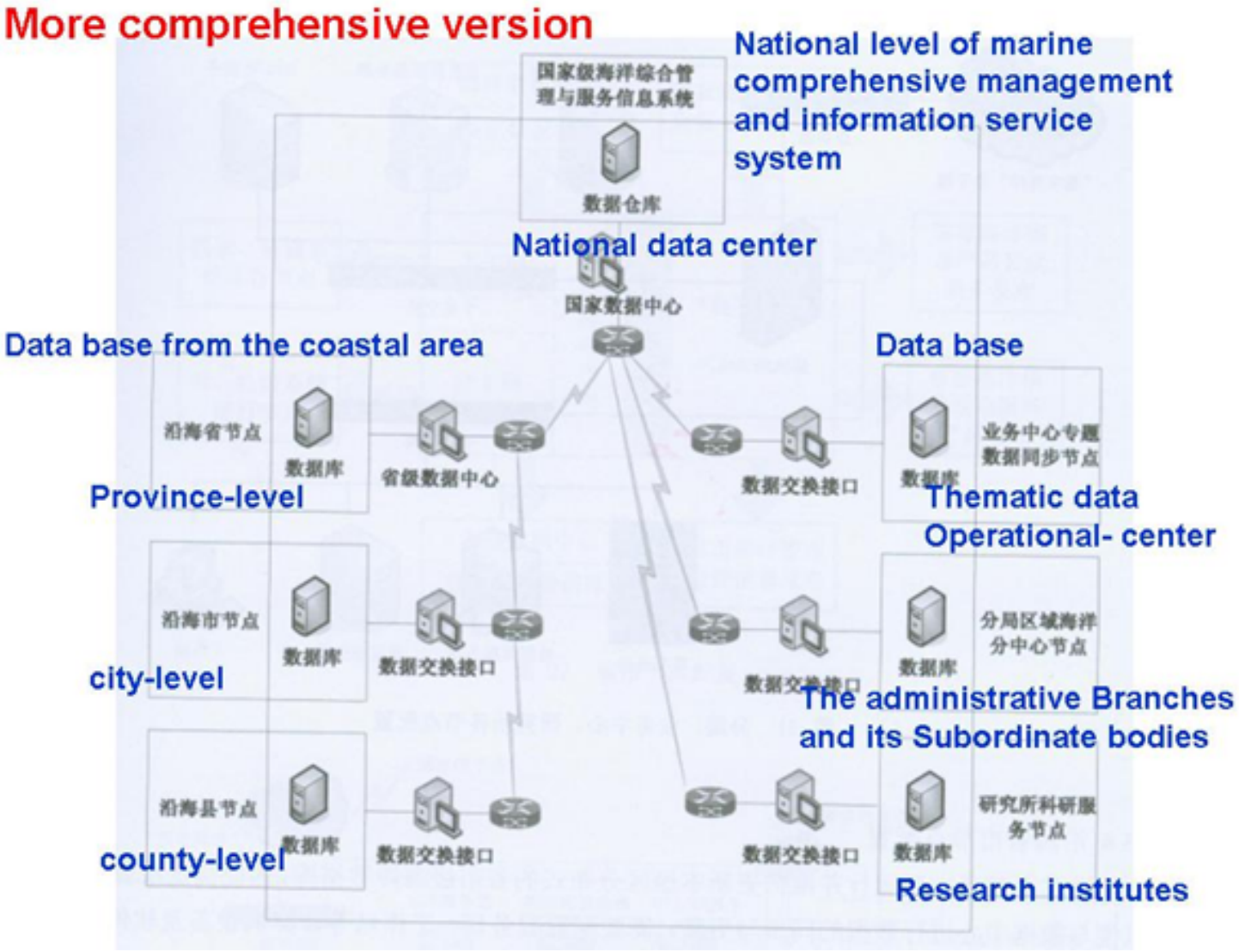
Marine Core Service

- **GMES** : the European Union program for « Global Monitoring for Environment and Security ».
  - A joint program European Commission / European Space Agency
  - Different themes ; the first 3 priorities are Marine, Land & Risk
  - Funded through the EC 7th Research Program




数字海洋公众版 - Tencent Traveler
Marine Resource
ocean survey and observation
Digital Seafloor
Digital Water
Polar area and open ocean
Popular Science and digital museum
iOcean
Marine forecasting
Marine Military activities
空中观测网
卫星和航空遥感能实现大范围的海洋观测，可观测海面风速、风向、波浪、海面温度、海冰、海面地形等多种海洋要素，大大提高了海洋观测效率，是海洋观测的重要手段。
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。
Powered by SkylineGlobe.Com
版权所有(c)2009 国家海洋信息中心
使用条款

China Digital ocean



6. To establish cooperation mechanism between Europe and China

- Person — Person cooperation
- Institute — Institute cooperation
- Ministry — Ministry cooperation
- Country — Country cooperation
- We suggest Europe will establish EMA(Europe Marine Agency),
- It is like ESA

7. Work together for GEOSS/GMES

- GEOSS/GMES 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.