

**DRAGON in support of harmonizing European and Chinese  
marine monitoring for Environment and Security System**

**DRAGONESS**



**BILATERAL EU-P.R. OF CHINA PROJECT 2007-2010**

**1st Annual Meeting - 17-19 September 2008**

**Nansen Environmental and Remote Sensing Center  
Bergen, NORWAY**



# DRAFT AGENDA

1. **Welcome**
2. **Approval of draft agenda**
3. **Brief 1<sup>st</sup> year Project Overview**
4. **Management Reporting - Status**
5. **Cost Reporting - Status**
6. **Presentation of Activity Reports by WP numbers**
  - ❖ *WP1- Review of In situ observing system*
  - ❖ *WP2- Review and utilization of spaceborne system*
  - ❖ *WP3- Level of data integration*
  - ❖ *WP4- Information production and services*
  - ❖ *WP5- Capacity building*
  - ❖ *WP6- Workshop, Summer school and Symposium*
7. **Review of Action Items**
8. **Other Contract Formalities**
9. **Any other business**
10. **Date/place of next Progress meeting and 2<sup>nd</sup> Annual meeting**
11. **Adjourn**

Welcome to

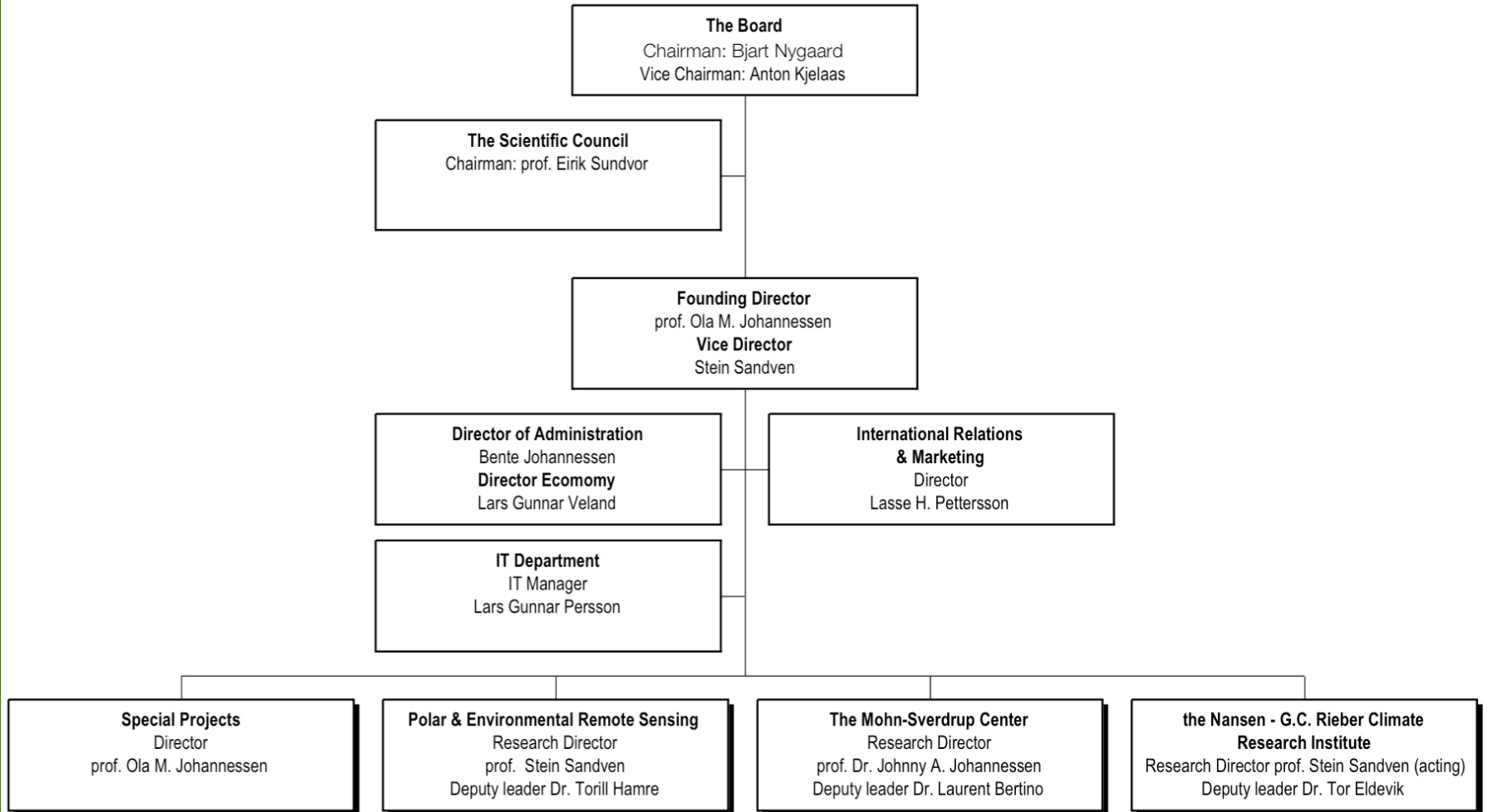
Nansen Environmental and  
Remote Sensing Center  
(NERSC)  
Bergen, Norway

a non-profit scientific foundation,  
established in 1986  
&  
affiliated with the University of Bergen

## NERSC Vision

**Understand, monitor and forecast  
the state and changes of local,  
regional and global environment  
and climate, and their impact on  
society**

# The Nansen Center Organisation Structure - 01.09 2008



# Staff

Total 64 including 32 scientists and 14 PhD

## Research Areas

- Climate understanding, variability and changes
- Developing and utilizing satellite methods for climate, environmental marine and sea ice studies
- Marine forecasting and operational oceanography
- Socio-economic impacts of global change

# DRAFT AGENDA



## DAY 1 - Wednesday 17 September

- **Welcome (1000-1030)**
  - NERSC Introduction (J.A. Johannessen)
  - NERSC International Profile (L. Pettersson)
- **1<sup>st</sup> year Project Overview (1030-1230)**
  - Status (J.A. Johannessen)
  - Issues for clarifications (all partners)
- **Lunch at 1230**

# DRAFT AGENDA



## DAY 1 - Wednesday 17 September

- **Management Reporting (1315-1430)**
  - Status (J.A. Johannessen)
  - Issues for clarifications (all partners)
- **Cost reporting: Planned versus Actual (1430-1600)**
  - Status (J.A. Johannessen)
  - Issues for clarifications (all partners)
- **Coffee and tea will be served**



# DRAFT AGENDA



## DAY 1 - Wednesday 17 September

- **Action review and identifications (1630-1720)**
  - Status (J.A. Johannessen)
  - Issues for clarifications (all partners)
- **High latitude climate change: The cryosphere in transformation**
  - NERSC director O.M. Johannessen
- **Film “Svalbard-Arctic Four Seasons” in the NERSC Cinema**
- **Sea Food Buffet at NERSC 1830**
- **Adjourn at 2030**

# DRAFT AGENDA



## DAY 2 -Thursday 18 September

- **Review Activity Reports (0900-1500)**
  - ❖ *WP1- Review of In situ observing system*
  - ❖ *WP2- Review and utilization of spaceborne system*
  - ❖ *WP3- Level of data integration*
  - ❖ *WP4- Information production and services*
  - ❖ *WP5- Capacity building*
  - ❖ *WP6- Workshop, Summer school and Symposium*
- Coffee and tea will be served
- Lunch at 1230
- **Review of Action Items**
- **Other Contract Formalities**
- **Any other business**
- **Date and place of next meeting**
- **Dinner at Hotel Augustin at 1900**

# DRAFT AGENDA

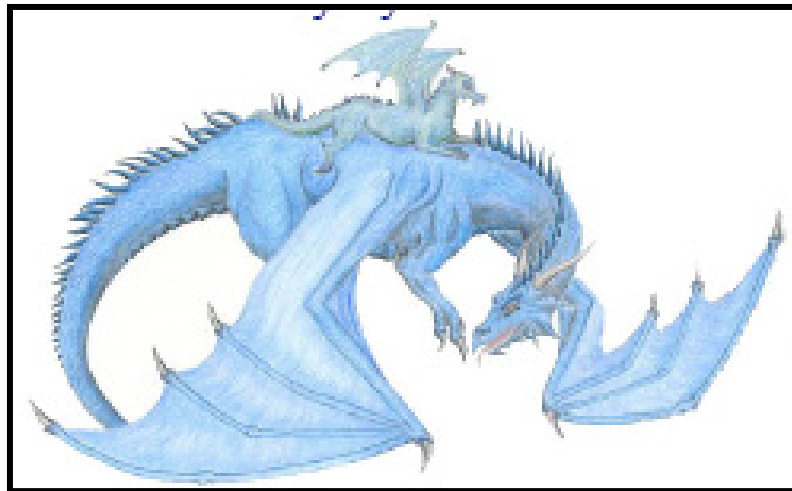


## **DAY 3 - FRIDAY 19 September**

- **Working Group meetings (0900 - 1300)**
- **Lunch at 1300-1330**

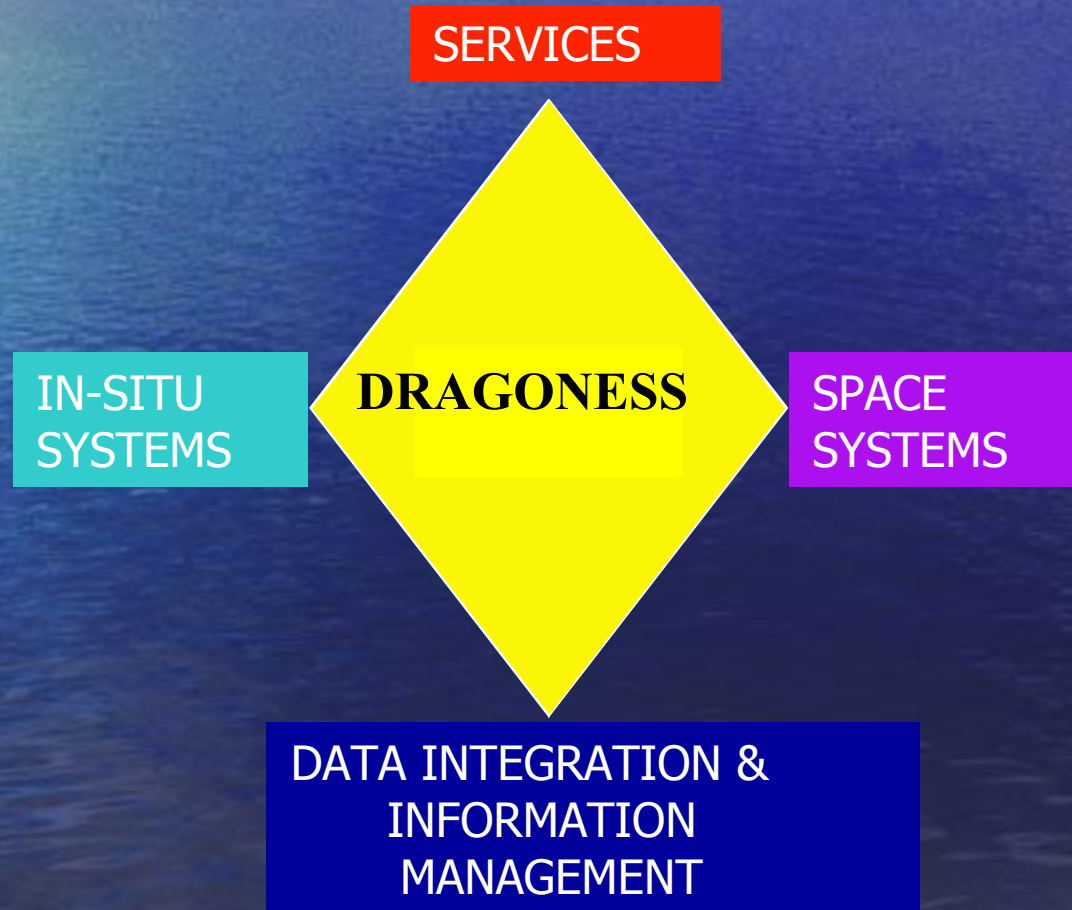
# 1<sup>st</sup> year Project Overview

*The primary objective of the DRAGONESS SSA project is to make an inventory of Chinese and European capacities of marine monitoring for environment and security including Earth observation data.*



# APPROACH

The inventory will be established and harmonized in the frame of the Global Earth Observation System of Systems (GEOSS) and the Global Monitoring for Environment and Security (GMES) diamond. This is also consistent with GOOS.



# PARTNERS

<b>Partner role</b>	<b>Partner No.</b>	<b>Participant organisation name</b>	<b>Partner short name</b>	<b>Country</b>	<b>Date enter project</b>	<b>Date Exit project</b>
CO	1	Nansen Environmental and Remote Sensing Center	NERSC	Norway	1	36
CR	2	GKSS Furchungszentrum	GKSS	Germany	1	36
CR	3	Ocean Remote Sensing Consulting	ORS	Germany	1	36
CR	4	Institut Francais De Recherche Pour L'exploitation De La Mer	Ifremer	France	1	36
CR	5	Collecte Localisation Satellites	CLS	France	1	36
CR	6	The Nansen-Zhu International Research Center	NZC	P.R.China	1	36
CR	7	Ocean Remote Sensing Institute, Ocean University of China	ORSI-OUC	P.R.China	1	36
CR	8	Institute of Atmospheric Physics, Chinese Academy of Sciences	IAP	P.R.China	1	36
CR	9	National Satellite Ocean Application Service	NSOAS	P.R.China	1	36
CR	10	Beijing Normal University	BNU	P.R.China	1	36
CR	11	Ministry of Science and Technology	MOST	P.R.China	1	36
CR	12	National Marine Environmental Forecasting Center	NMEFC	P.R.China	1	36
CR	13	Second Institute of Oceanography, State Oceanic Administration	SIO-SOA	P.R.China	1	36

# Attendants at 1st Annual Meeting

Instit ute	Name	Arrival Date	Depart ure Date
ORSI	Mingxi a He Zhi shen Liu Chao fang Zhao Lei Guan	15 /09/2008	21 /09/2008
	Chu anmin Hu	15 /09/2008	20/09/2008
	Ge C hen	15 /09/2008	20 /09/2008
NME FC	Liyi ng Wa n Yun Li	16/09/2008	20/09/2008
SIO Š SO A	Ya n Bai Fang Go ng	15/09/2008	20/09/2008
IAPĚ N ZC	Yo ng qi Gao	Augus t , 2008	Oc to ber , 2008
NRSCC MOST	Li qing Shao	15 /09/2008	21 /09/2008
BNU	Ke p ing Du	15 /09/2008	21 /09/2008
NSO AS			
ORS -C	W. Al pers	16/09/2008	21/09/08
GKSS	???	???	???
IFRE MER	J.-F. Piolle B. Chapro n	16/09/2009	19/09/2008
CLS	H. Et ienn e	16/09/2008	19/09/2008
NERSC	J. A -Jo hann esse n K.-F. Da gestad		



(i) Kick-off meeting in Beijing from 11-12 October 2007. Meeting report published in *EOS*, 13 May 2008.

(ii) Brief Progress meeting jointly with DRAGON symposium in Beijing on 24 April 2008.

(iii) DRAGON-2 program approved. Will run from 2008-2012. Ensure continuous interaction.

## MEETINGS

### Ocean Monitoring Collaborations Between Europe and China

*DRAGONESS Project Kickoff Meeting*  
*Beijing, China, 11-12 October 2007*

A coordinated, concerted action between Europe and China in ocean monitoring kicked off with its first meeting, held in Beijing.

The project, named DRAGONESS (DRAGON in support of harmonizing European and Chinese marine monitoring for Environment and Security System), is funded by the European Union's (EU) Framework Programme for 3 years. Researchers from the two continents will establish an inventory of Chinese and European capacities in marine monitoring for environment and security in the framework of challenges identified within international programs such as Global Ocean Observing System, Global Earth Observing System of Systems, and Global Monitoring for Environment and Security. In particular, the DRAGONESS aims to (1) assess existing Chinese and European information products and services arising from integrated use of remote-sensing, in situ observations, models, and data assimilation methods; (2) identify monitoring gaps and barriers (e.g., restrictive data availability); and (3) stimulate exchange

and initiation of a new European-Chinese partnership in Earth observation science and technology in support of global environmental monitoring.

The DRAGONESS project is both benefiting from and complementing the joint European Space Agency (ESA) and China's Ministry of Science and Technology (MOST) DRAGON collaboration, with a focus on Earth observations from satellites. DRAGON will run until 2012.

More than 30 participants from five European research institutes and eight Chinese institutes attended the kickoff meeting, which was hosted by MOST and the Ocean University of China. An official welcome was provided by the director of the National Remote Sensing Center of China, Guocheng Zhang. A detailed revision and discussion of the project background, objectives, tasks, and milestones followed (see <http://dragoness.nersc.no>).

In particular, meeting participants agreed that monitoring the marine environment is urgently needed to advance understanding

of mesoscale and submesoscale processes and physical and biogeochemical interaction. Monitoring the marine environment is also crucial to tracking pollution, forecasting and tracking extreme events, understanding climate change, and aiding operational oceanography. Because of the myriad of important applications, sustainable monitoring of the ocean is necessary, speakers stressed. In this context, the five work packages in the project (review of in situ observing systems, review of spaceborne observing systems, specification of data integration and information management, specification of ocean and coastal information products and services, and capacity building) are therefore highly relevant.

The project is now evolving around these work packages, with the first progress report delivered in April 2008. This will be followed by the first annual meeting, to be held in Bergen, Norway, in the autumn of 2008. The second and third annual meetings and a final symposium will be coordinated with the DRAGON program to secure a wider promotion of the DRAGONESS achievements.

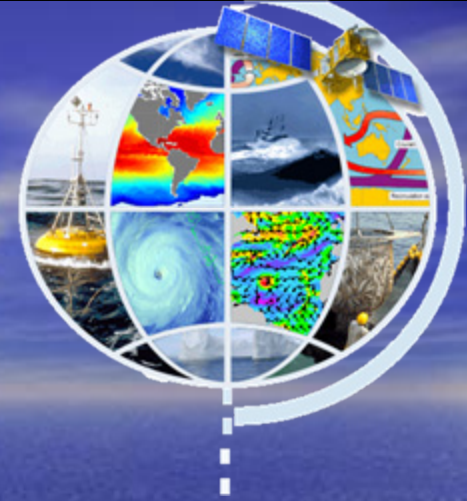
For more information, contact the program coordinator, Johnny Johannessen ([johnny.johannessen@nersc.no](mailto:johnny.johannessen@nersc.no)), and the Chinese coordinator, Ming-Xia He ([mxhe@orsl.ouc.edu.cn](mailto:mxhe@orsl.ouc.edu.cn)).

—JOHNNY A. JOHANNESSEN, Nansen Environmental and Remote Sensing Center, Bergen, and Geophysical Institute, University of Bergen, Norway; and MING-XIA HE and CHUANMIN HU, Ocean Remote Sensing Institute, Ocean University of China, Qingdao





## Main Deliverable



The inventory shall highlight strengths and weaknesses, identify gaps and inconsistencies, and provide recommendations for a strategy to develop harmonized monitoring elements which meet the requirements of international standards and monitoring programs (i.e. GEOSS) in the context of environmental monitoring.

DRAGONESS will also stimulate exchange and initiation of new partnership in Earth Observation science and technology in support to global environmental monitoring by bringing together scientists from Europe and China.

## DRAGONESS relevant in view of the *Societal Benefit Areas* identified by GEO

- **Reducing loss of life and property from natural and human-induced disasters:** forecasting of ocean currents, waves and sea-ice, provide upper-ocean heat content as prediction, coastal management, support to search and operations at sea.
- **Understanding environmental factors affecting human health and well-being:** coastal water quality monitoring, pollution detection monitoring, harmful algal blooms, responsible fish strategies.
- **Improving management of energy resources:** support to offshore operations and maritime transport.
- **Understanding, assessing, predicting, mitigating, and adapting to climate variability and change:** the role of the ocean for climate development of ocean climate indicators.



## DRAGONESS relevant in view of the *Societal Benefit Areas* identified by GEO

- **Improving water resource management through better understanding of the water cycle:** role of the ocean in global water cycle, evaporation, precipitation.
- **Improving weather information, forecasting and warning:** extended weather forecasts need timely high quality ocean information.
- **Improve management and protection of coastal & marine ecosystems**  
Development of ecosystem models in the coastal domains is an active area of research; their implementation and validation is ongoing.
- **Understanding, monitoring and conserving biodiversity:** operational oceanography services give the understanding of the oceanic factors at the basis for ecosystem based fishery management.
- **Supporting sustainable agriculture (including fishery) and combating desertification:** the physical and biogeochemical coupling and on ecosystem development of importance for fishery.



- **Management and Cost Reporting**

- Status (J.A. Johannessen)
- Issues for clarifications (all partners)

Examples will be shown:

- DRAGONESS management report with cost overview
- Summary of Financial Report (EPSS form)
- Form C - Financial Statement
- Audit Certificate

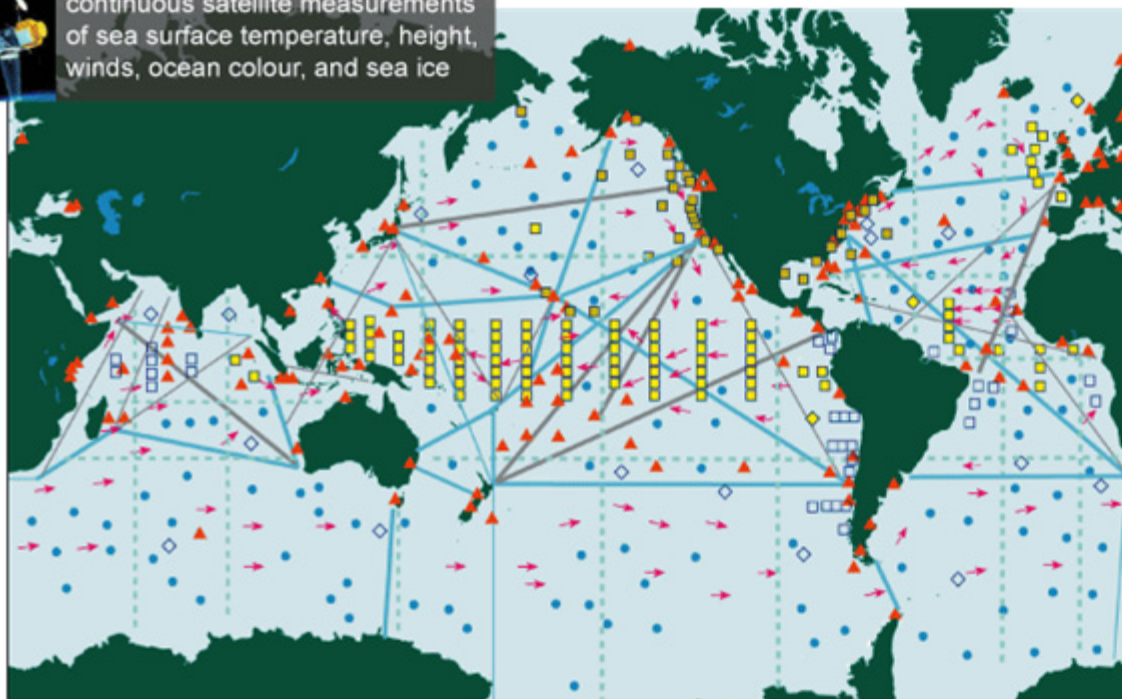
# Initial Global Ocean Observing System for Climate

Status against the GCOS Implementation Plan and JCOMM targets

Total *in situ* networks **57%**

January 2007

continuous satellite measurements of sea surface temperature, height, winds, ocean colour, and sea ice



57% **Surface measurements** from volunteer ships (VOSclim)

200 ships in pilot project



100% **Global drifting surface buoy array**

5° resolution array: 1250 floats



42% **Tide gauge network** (GCOS subset of GLOSS core network)

170 real-time reporting gauges



81% **XBT sub-surface temperature section network**

51 lines occupied



81% **Argo profiling float network**

3° resolution array: 3000 floats



43% **Repeat hydrography and carbon inventory**

Full ocean survey in 10 years

Reference time series 21%

58 sites



48% **Global reference mooring network**

29 moorings planned



66% **Global tropical moored buoy network**

119 moorings planned

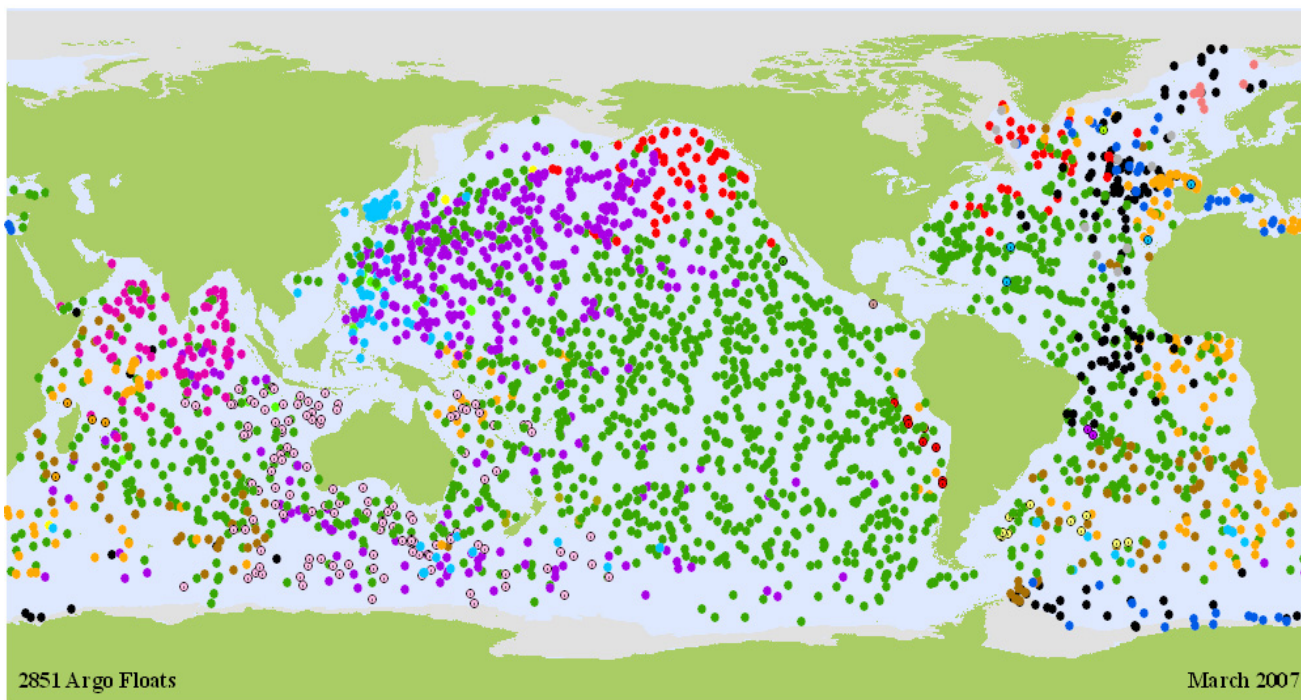
GCOS



• A total of 5635 platforms are maintained globally.



The pre-GODAE in-situ ocean observing system was clearly inadequate for the global scope of GODAE => Argo : a joint GODAE/CLIVAR pilot project.



2851 Argo Floats

March 2007

- |                   |                       |                 |                     |                          |                        |
|-------------------|-----------------------|-----------------|---------------------|--------------------------|------------------------|
| ○ ARGENTINA (12)  | ● CHILE (8)           | ● FRANCE (179)  | ● JAPAN (385)       | ● NETHERLANDS (10)       | ● SPAIN (4)            |
| ○ AUSTRALIA (125) | ● CHINA (14)          | ● GERMANY (140) | ● SOUTH KOREA (102) | ● NEW ZEALAND (6)        | ● UNITED KINGDOM (99)  |
| ● BRAZIL (2)      | ○ COSTA RICA (1)      | ● INDIA (79)    | ● MAURITIUS (4)     | ● NORWAY (8)             | ● UNITED STATES (1533) |
| ● CANADA (89)     | ● EUROPEAN UNION (46) | ● IRELAND (1)   | ● MEXICO (1)        | ● RUSSIAN FEDERATION (3) |                        |



Outstanding progress thanks to international cooperation.

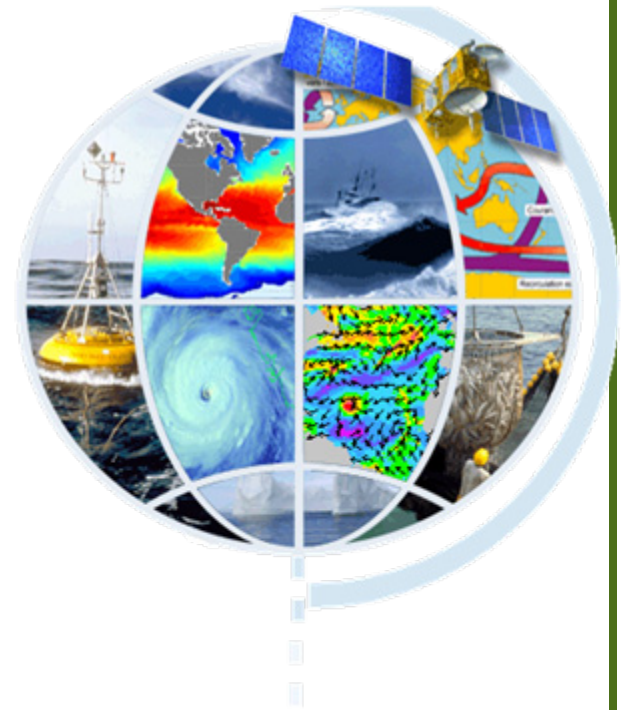
A global array (3000 floats) is now in place

An efficient data management system is in place.

Main issue is long term sustainability

# MERSEA End-to-End Assessment

- Project structure and workplan
- Assessment approach
- Assessment status and results
- What's next

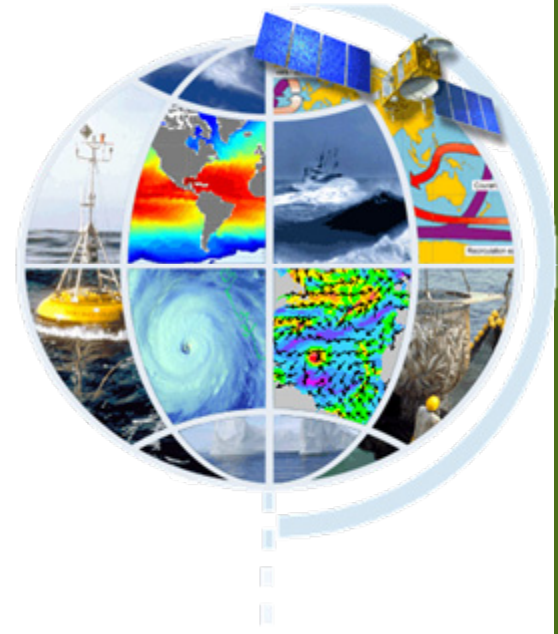
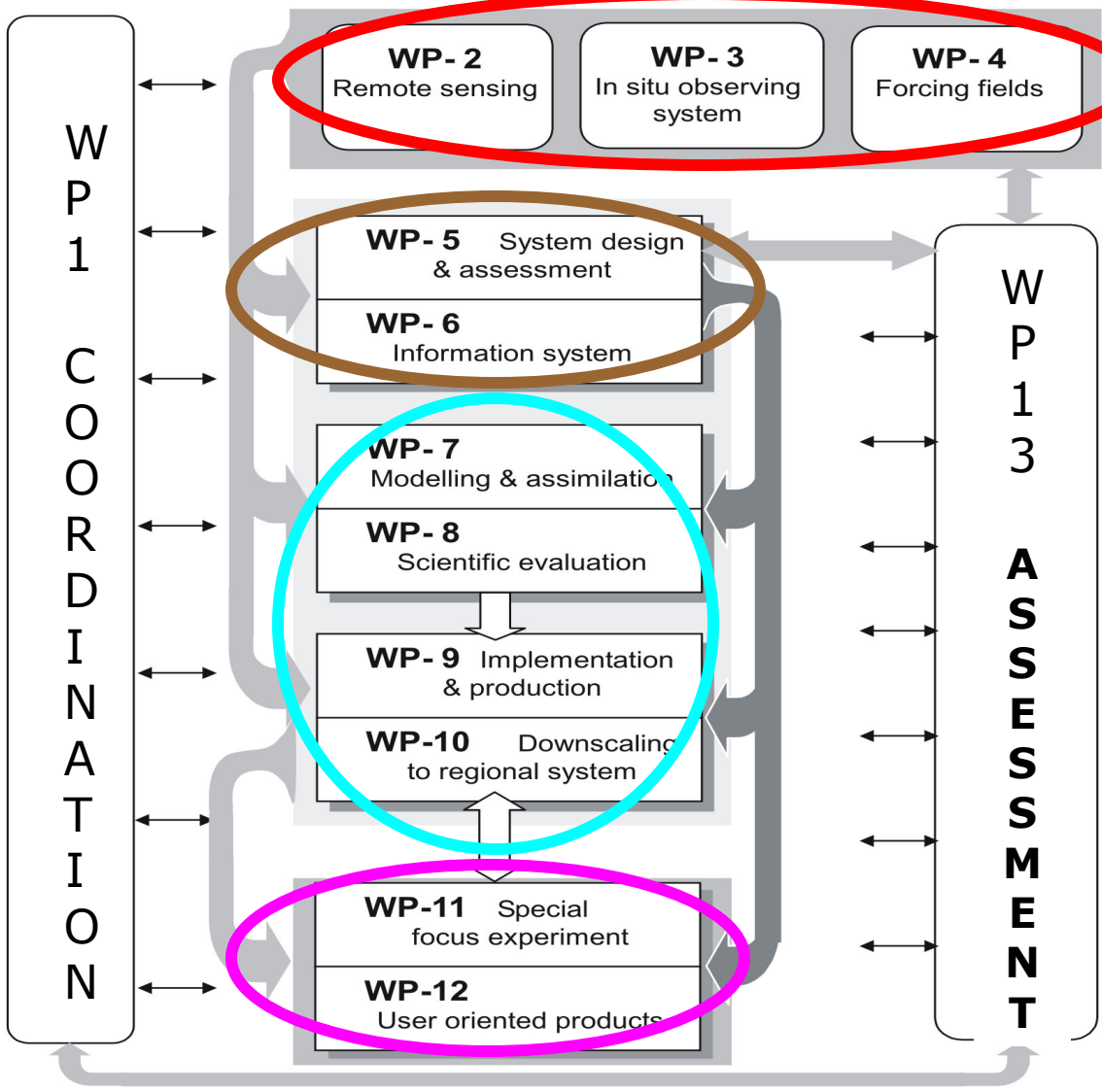


# Objectives

- **Develop a single** European system for global operational monitoring and forecasting of the ocean together with a **network of regional systems** targeting European waters and the Arctic.
- **Merge and assimilate diverse data** from space-borne sensors and in situ measurement networks in order to **monitor the ocean physics, biogeochemistry and ecosystems and to provide forecasts** on prediction time scales ranging from days to months.
- **Contribute to the ocean component of the future GMES MCS system** and in particular information production and services to intermediate users and with relevance for policy makers.

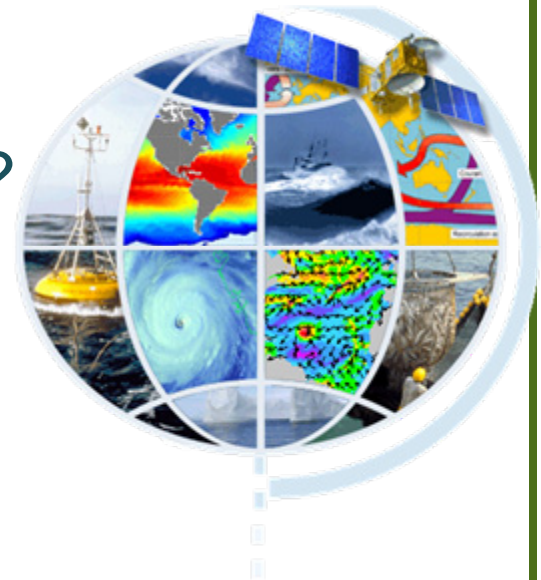


# Project structure and workplan

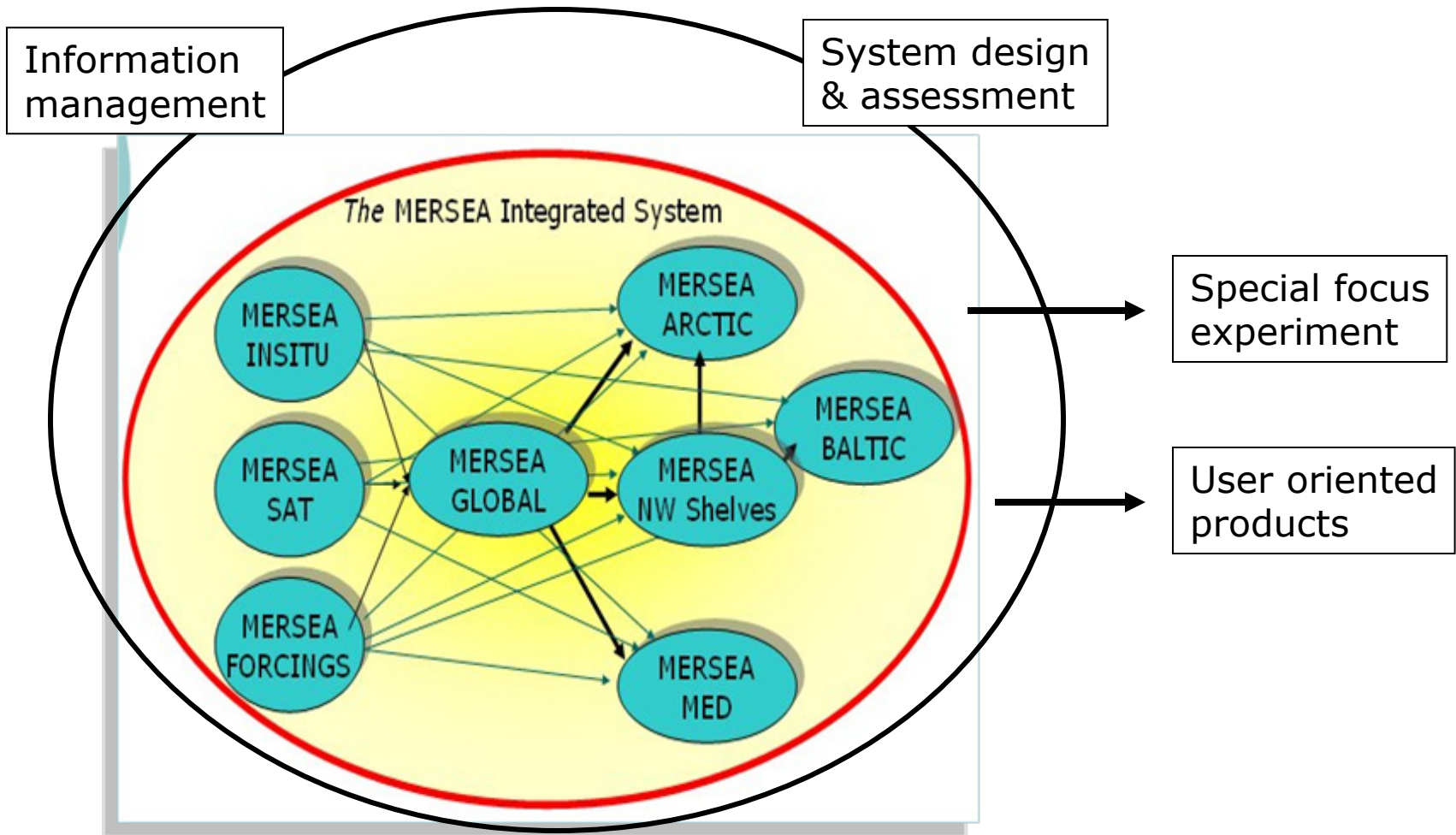


# E2E Assessment approach

- *Does the system comply with the workplan?*
  - Scientific assessment and validation
  - System assessment (measured in part by the Key Performance Indices = KPI)
- *Progress since MERSEA Strand-1?*
- *Is MERSEA fit for purpose?*
  - Operational requirements
  - GMES – MCS Implementation Report
  - EEA: indicator reporting; are they adequate ?
  - Application demonstration: oil spills, offshore industry, seasonal forecasting, ecosystems, waves, ...
  - Users contact, user requirements, user feedback,



# Assessment status and results



## MERSEA OCEAN REMOTE SENSING PORTAL

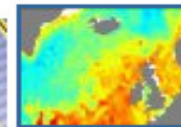
### Welcome

### Data centers

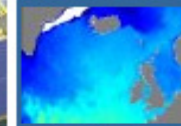
- Altimetry
- Sea Surface Temperature
- Ocean Colour
- Sea Ice

### Project Activities

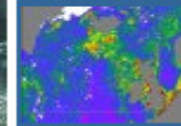
Ocean observation from space provide long-term, high resolution and global coverage of major sea surface parameters, that are key input for forecasting systems. Satellite data are essential to constrain ocean models and are used for assimilation, forcing and validation. Mersea Remote Sensing component provide **standardized** and **interoperable** satellite datasets for **operational** applications.



Altimetry



Sea Surface Temperature



Ocean Colour

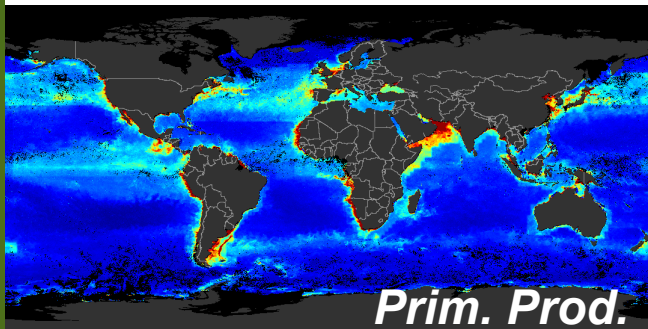
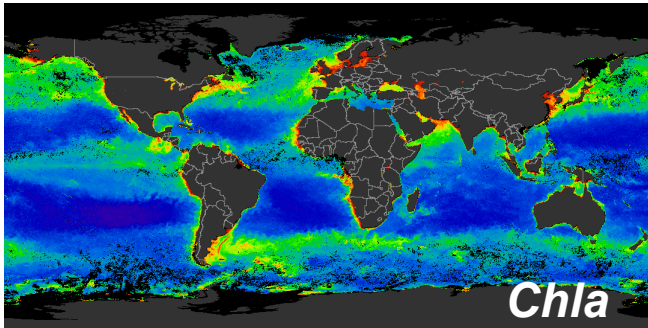


Sea Ice

R/S TACs are based on existing European processing facilities: **CNES/CLS SSALTO/ DUACS for altimetry**, **Eumetsat SAF for sea ice**, **SAF, GHRSSST and Medspiration for SST**, **Ocean colour to be built from MERSEA, Marcoast and Globcolour**.

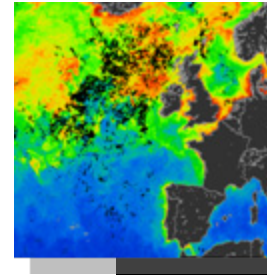
R/S TAC has **contributed to data harmonization and integration**, **established interface with modelling and assimilation centers**, **provided inputs to the GMES MCS Implementation Group** (Space Working Group)

# On the way to OC TAC

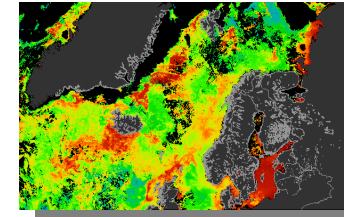


- Monthly mean
- netCDF, COARDS-CF

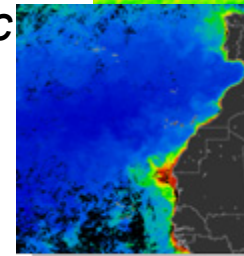
*NE Atlantic Drift*



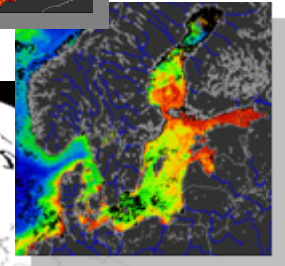
*European Sub-Arctic*



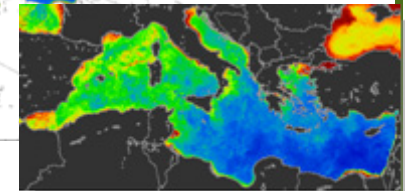
*NE Subtropical Atlantic*



*Baltic Sea*



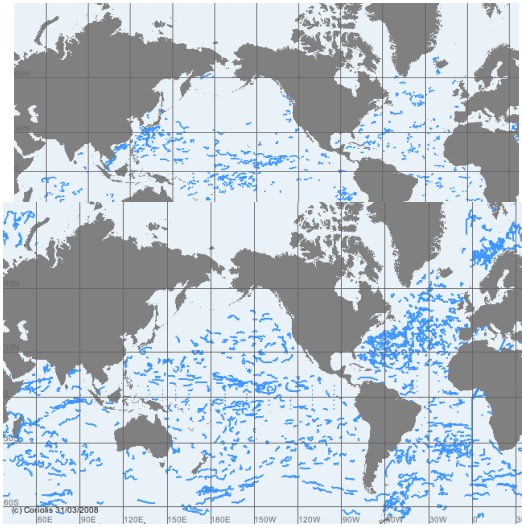
*Mediterranean sea*



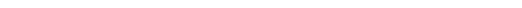
# In-situ data integration and transmission to models \* by 3

## Drifters (DBCP)

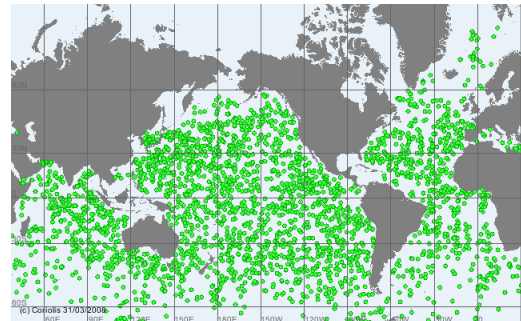
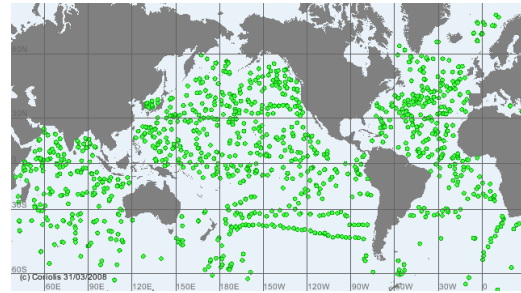
March  
2004



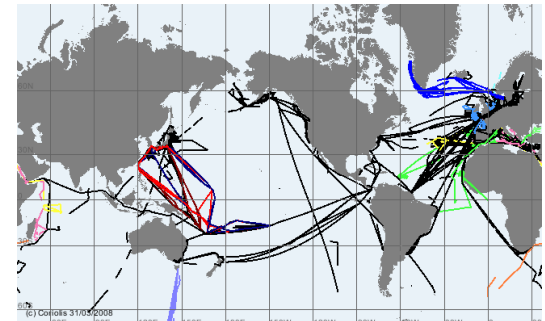
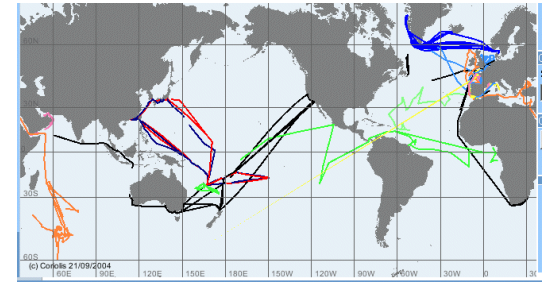
April  
2008



## Floats(Argo)



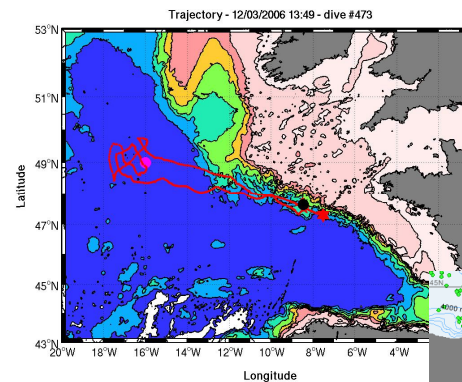
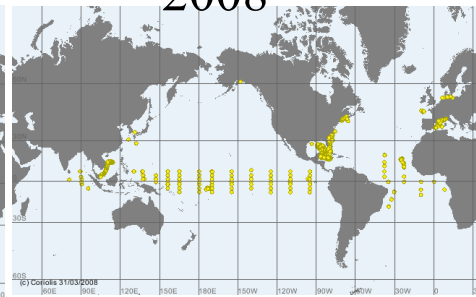
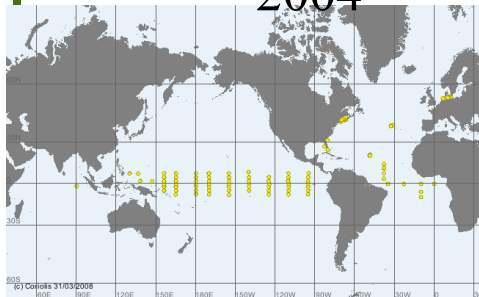
## Vessels(Gosud)



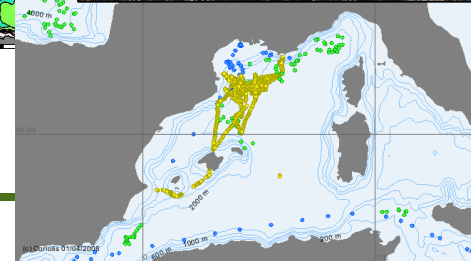
## Moorings(OceanSITES)

2004

2008

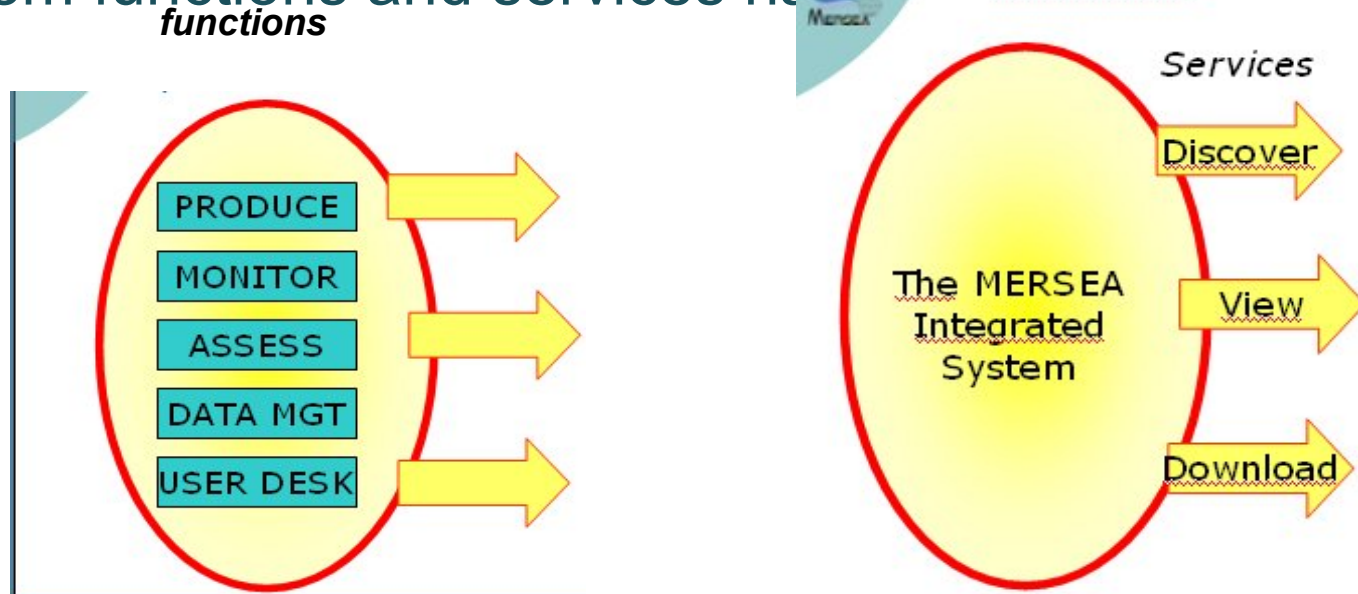


## Gliders (EGO)



# Efficiency of system design

- An Integrated System, not centralized, with complementary European national institutional & academic centre components has been established
- System functions and services have been implemented



- demonstration targeted operation during TOP1 and TOP2

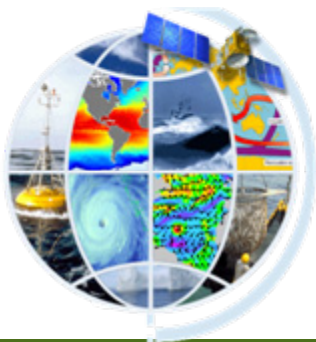
# Scientific assessment

- Systematic validation of data products (biases, rms errors)
- **Dedicated validations** of ocean forecasting systems
- Enhancement, and extension at the **global** scale of the **metrics** and “rules for scientific validation”
- **Validation tools implemented**, tested and improved by all forecasting centers during TOP1 and TOP2
- Like metrics, **ocean indices/indicators** also designed and tested
- The scientific assessment tool designed in MERSEA **has been endorsed by international ocean forecasting centers** (e.g. GODAE)
- Less effort on model – model comparison, which was proved effective in MERSEA Strand-1
- **Forecast skills are progressing but difficult to assess**

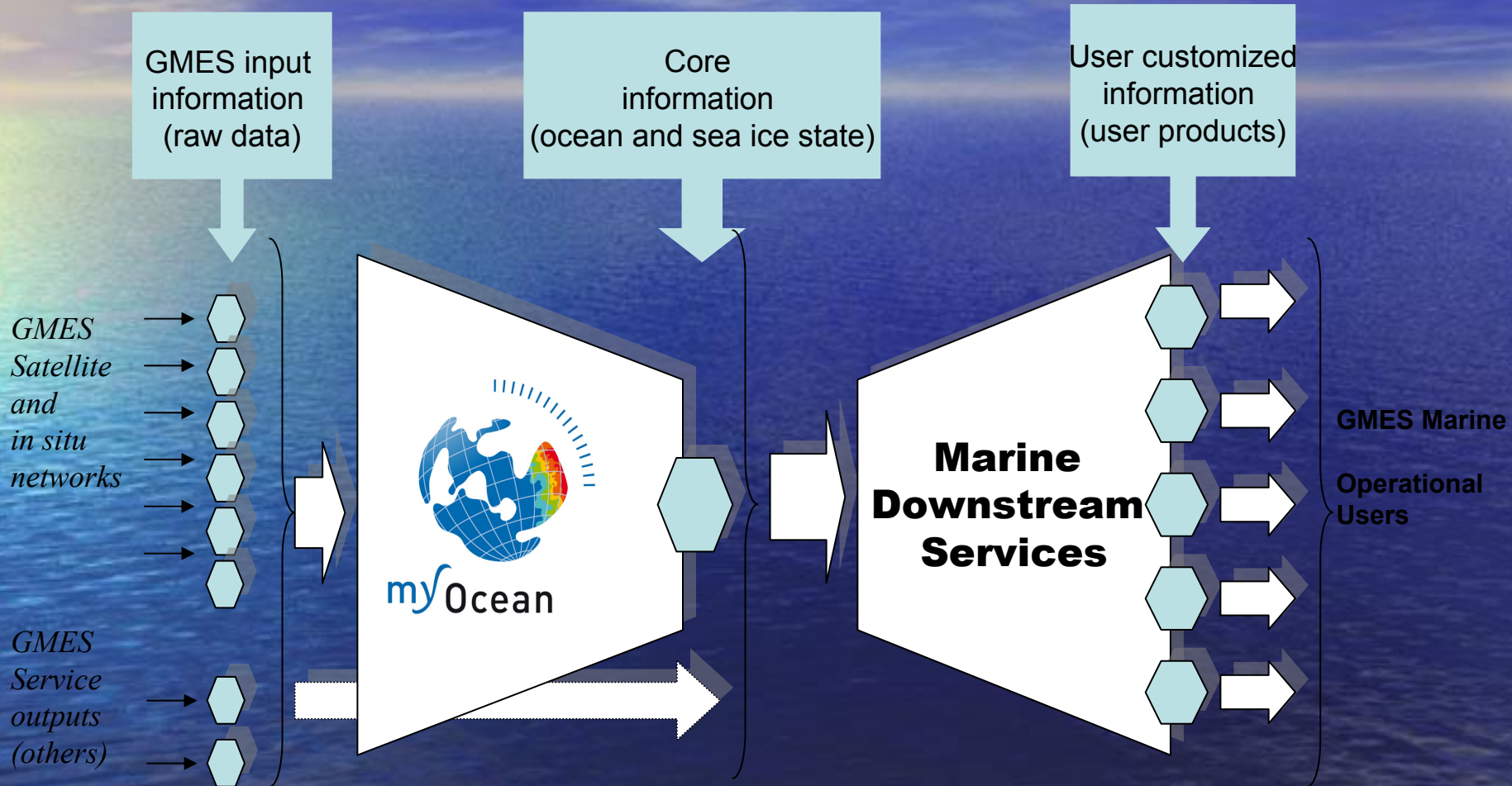


# From MERSEA IP to MyOcean

- At the end of the project MERSEA Integrated System components are operated routinely
- MERSEA Integrated system production offers a first base for the Marine Core Service to be implemented in MyOcean with kick-off in January 2009 for a 3 year duration.



# Marine Core Services for GMES: Structure of Products, Services and Delivery system



# User Involvement

- The users, their requirements, their assessment

## Area 1

### « MARINE SAFETY »

(marine operations,  
oil spill combat, ship routing,  
defense, search & rescue, ...)

## Area 3

### « MARINE AND COASTAL ENVIRONMENT »

(water quality, pollution,  
coastal activities, ...)

## Area 2

### « MARINE RESSOURCES »

(fish stock management,  
ICES, FAO, ...)

## Area 4

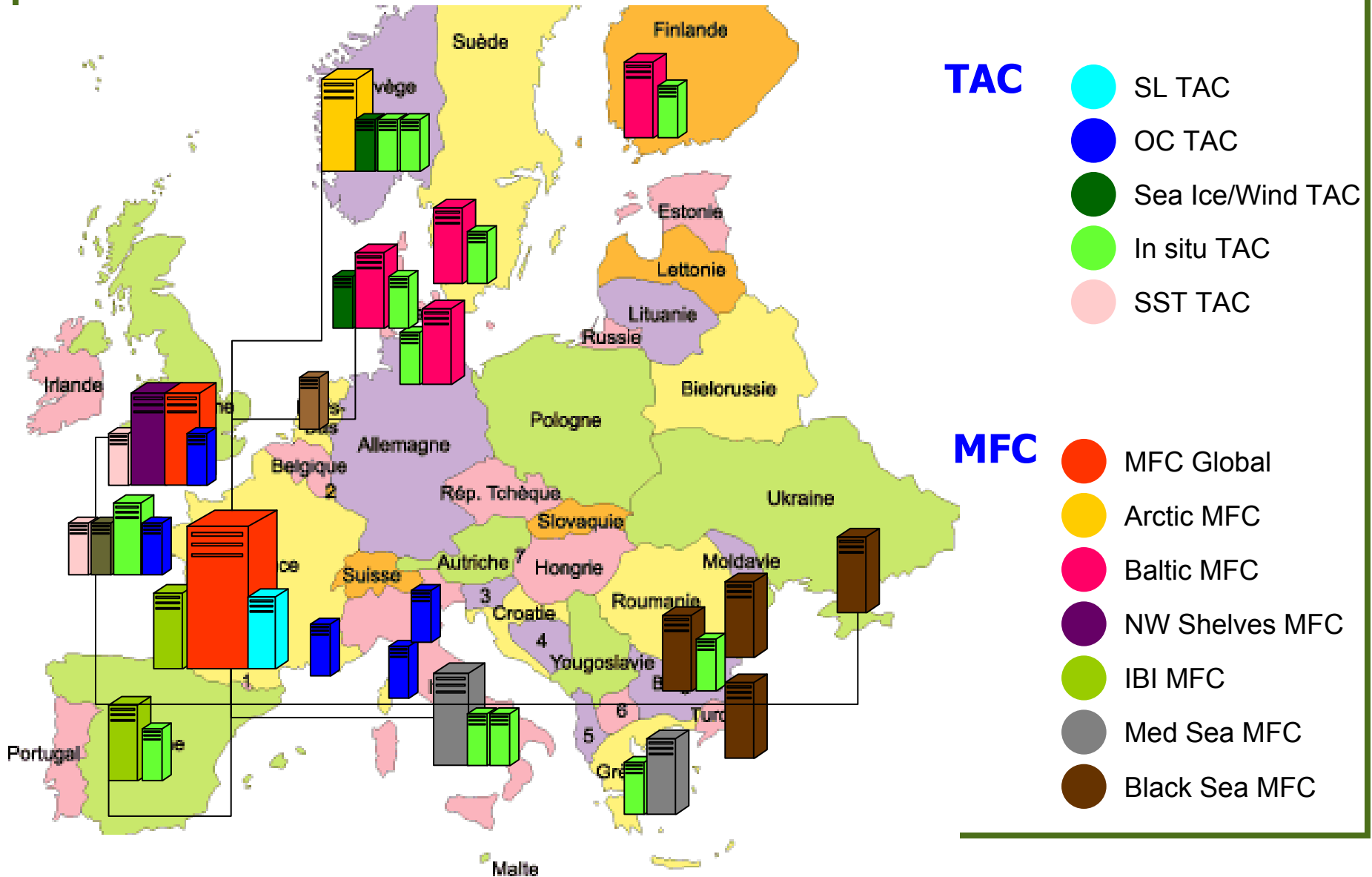
### « CLIMATE & SEASONAL FORECASTING »

(climate monitoring, ice,  
seasonal forecasting, ..)

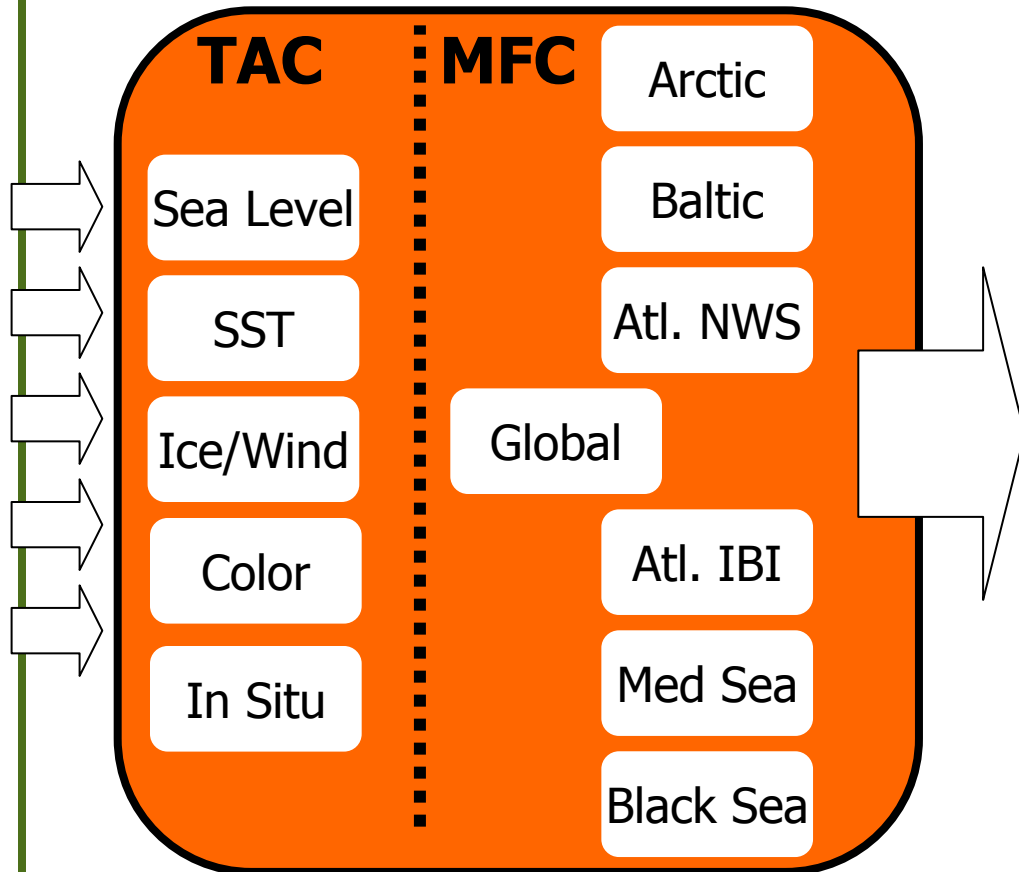
# The products and services portfolio

SERVICE DESCRIPTION		PRODUCT DESCRIPTION			
Area of Benefits	Users	MFC Product Package	TAC Product Package	Coverage	Provider
<b>Area 1: Marine Safety</b>  (marine operations, oil spill combat, ship routing, weather forecasting for ecasing defense, search & rescue, É)	EMSA National Oceanographic Agencies Nat. Weather Prediction Centre  National Marine Safety Agencies  Maritime Transport Industry	- baseline and standard ocean state products - daily / hourly fields	- SST - sea ice/ wind - in situ - sea level  - daily fields	European Basins	All MFCs  Sea level, SST, SI, ISTACs
<b>Area 2: Marine Resources</b>  (fish stock management)	ICES, FAO, EE A, Nat. Marine Res. Inst., Nat. Directorate of Fisheries	- baseline and standard ocean state products - daily fields	- ocean color - sea ice/ wind - in situ  - daily fields	European Basins	All MFCs  SST, OC, , Sea ice/ wind, ISTACs
<b>Area 3: Marine and Coastal Environment</b>  (water quality, pollution, coastal activities, É)	National Coastal Monitoring Agencies  EE A, EMSA OSPAR, HELCOM, UNEP/MAP	- baseline and standard ocean state products - boundary and initial ocean state conditions - re-analysis  - daily / hourly fields	- ocean color - in situ - sea ice/ wind - sea level - SST - reprocessing  - daily fields	Global Ocean  European Basins	All MFCs  All TACs
<b>Area 4: Climate &amp; Seasonal Forecasting</b>  (climate monitoring, ice, seasonal forecasting, É)	MS & EU Met Offices  EE A, 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 - Sea ice/ wind - SST  - re-processed datasets  - daily / weekly / monthly / yearly fields	Global Ocean  European Basins	All MFCs  All TACs

# An organization of 12 production units



# 12 PRODUCTION UNITS



MFC also conduct assimilation

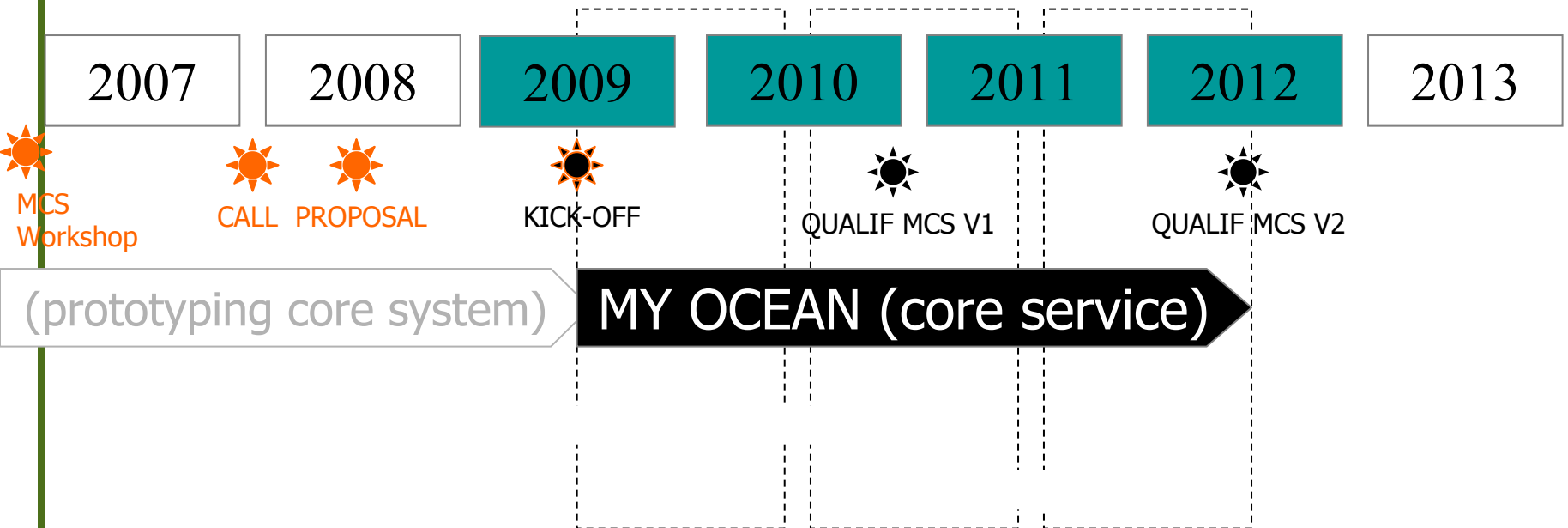
- **5 TAC : Thematic Assembly Centers**
  - “Observations”
- **1 global and 6 regional MFC: Monitoring and Forecasting Centers**
  - “Model / Assimilation”

- Each Production

# TIMELINE

GMES Implementation

GMES Operations



- Currently EU and ESA are preparing the call for Downstream services. Call will open in July and close in November 2008. Expected start of Downstream Service project in second half of 2009 to maximize coupling with and benefit from MyOcean.





# Work Package List, Person-months and Deliverables

WP No.	WP TITLE	Lead contractor	Person months	Start month	End month	Deliverable number
0	<b>Management and Coordination</b>	NERSC	2,5	1	36	D0.1 D0.2 D0.3
		ORSI	3			
1	Review and utilization of in-situ observing system	ORSI/ NERSC	18,9	1	34	D1.1 D1.2 D1.3
2	Review and utilization of spaceborne observing system	ORS/ ORSI	18,6	1	34	D2.1 D2.2 D2.3
3	Review of level of data integration and information management	ORSI/ IFREMER	24,7	1	34	D3.1 D3.2 D3.3
4	Review of ocean and coastal information products and services	NMEFC/ CLS	32,1	1	34	D4.1 D4.2 D4.3
5	Capacity building in view of gaps and eventual European capabilities	MOST / GKSS	22,8	6	36	D5.1 D5.2 D5.3
6	Workshop, Summer school and Symposium	NERSC / NZC/ ORSI	12,6	6	36	D6.1 D6.2 D6.3
	<b>Total (person months)</b>		<b>135.2</b>			

# Deliverables list

Deliverable number	Deliverable Title	Delivery month (#)	Nature RE : Report	Dissemination level PU: Public
D0.1 D0.2 D0.3	First Annual report Second Annual report Final DRAGON ESS report	12 24 36	RE RE RE	PU PU PU
D1.1 D1.2 D1.3	1 <sup>st</sup> , 2 <sup>nd</sup> and final report on existing in situ observing systems, methods and protocols with recommendations to fill possible gaps and harmonize measurement protocols.	12 24 34	RE RE RE	PU PU PU
D2.1 D2.2 D2.3	1 <sup>st</sup> , 2 <sup>nd</sup> and final report on existing spaceborne systems, their performance, algorithms and data processing procedures with recommendations for harmonizing data products.	12 24 34	RE RE RE	PU PU PU
D3.1 D3.2 D3.3	1 <sup>st</sup> and 2 <sup>nd</sup> report on available data + information systems including the identification of gaps and a strategy to develop integrated systems. Report on methods for use of data in models	12 24 34	RE RE RE	PU PU PU
D4.1 D4.2 D4.3	1 <sup>st</sup> and 2 <sup>nd</sup> report on current ocean/coastal information services in P.R. China. Report on the service structure for Chinese monitoring for coastal environment and security.	12 30 34	RE RE RE	PU PU PU
D5.1 D5.2 D5.3	1 <sup>st</sup> , 2 <sup>nd</sup> and final report on existing gaps and a strategy and recommendations to build up the capacity by training and education	12 24 34	RE RE RE	PU PU PU
D6.1 D6.2 D6.3	Workshop report Summer school /CD-ROM for lecture material Final symposium report	12 24 34	RE RE RE	PU PU PU