Deltares
Enabling Delta Life

Coastal observatories for the North Sea; supporting operational user needs and marine policy
Management of expectations

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NCK-bijeenkomst, 25 januari 2013

Topics of the presentation

1. *Marine Scientific research and technological development has offered a wide range of observational systems and modeling capability for the coastal and marine environment.*

2. *Integration of these validated tools into and a NRT-information source for coastal monitoring have shown their benefits in supporting user needs of the scientific marine society,coastal and marine practitioners and EU-Marine policy regulations.*

3. *Ferrybox, smart buoys, drifters and EO-based Ocean color are connected with hind-/forecast modeling for providing information for environmental assessments, compliance checking and daily operational coastal and marine management.*

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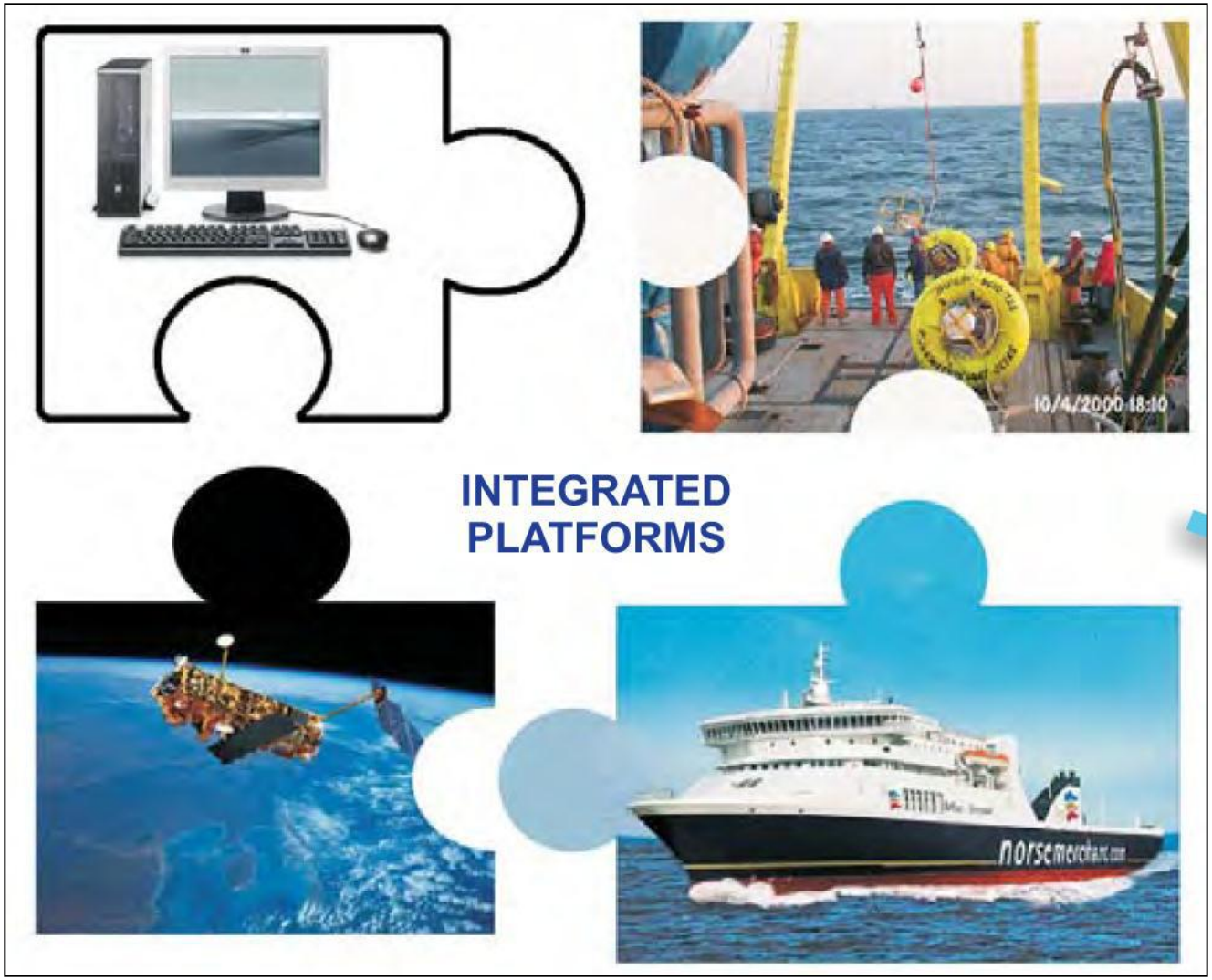
Coastal Observatories: information services & products



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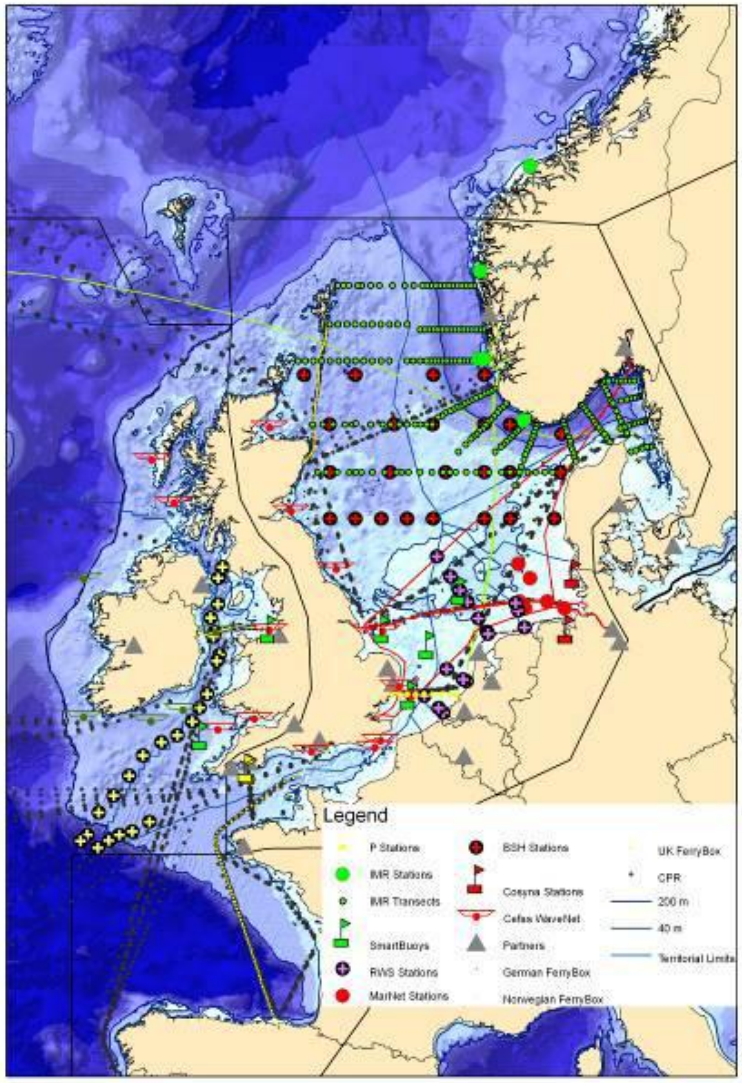
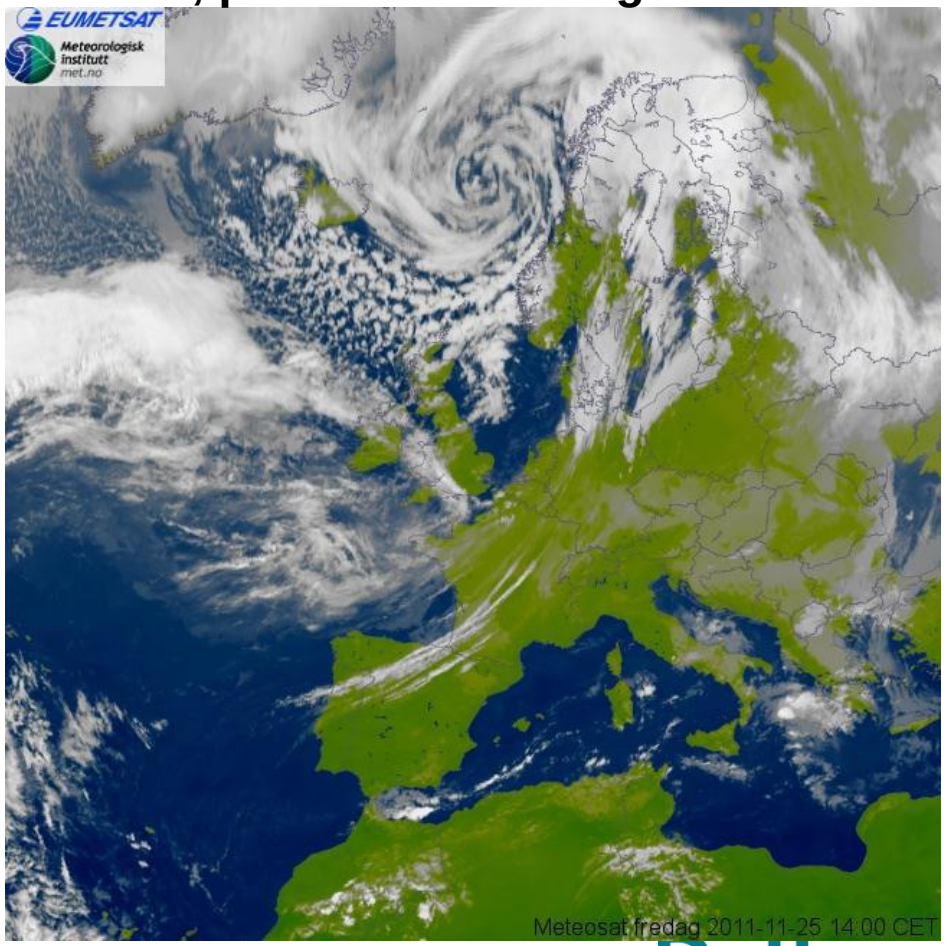
Scope of the presentation



what kind of products do the users really want to have to support the work to assess, predict and manage the ocean ??



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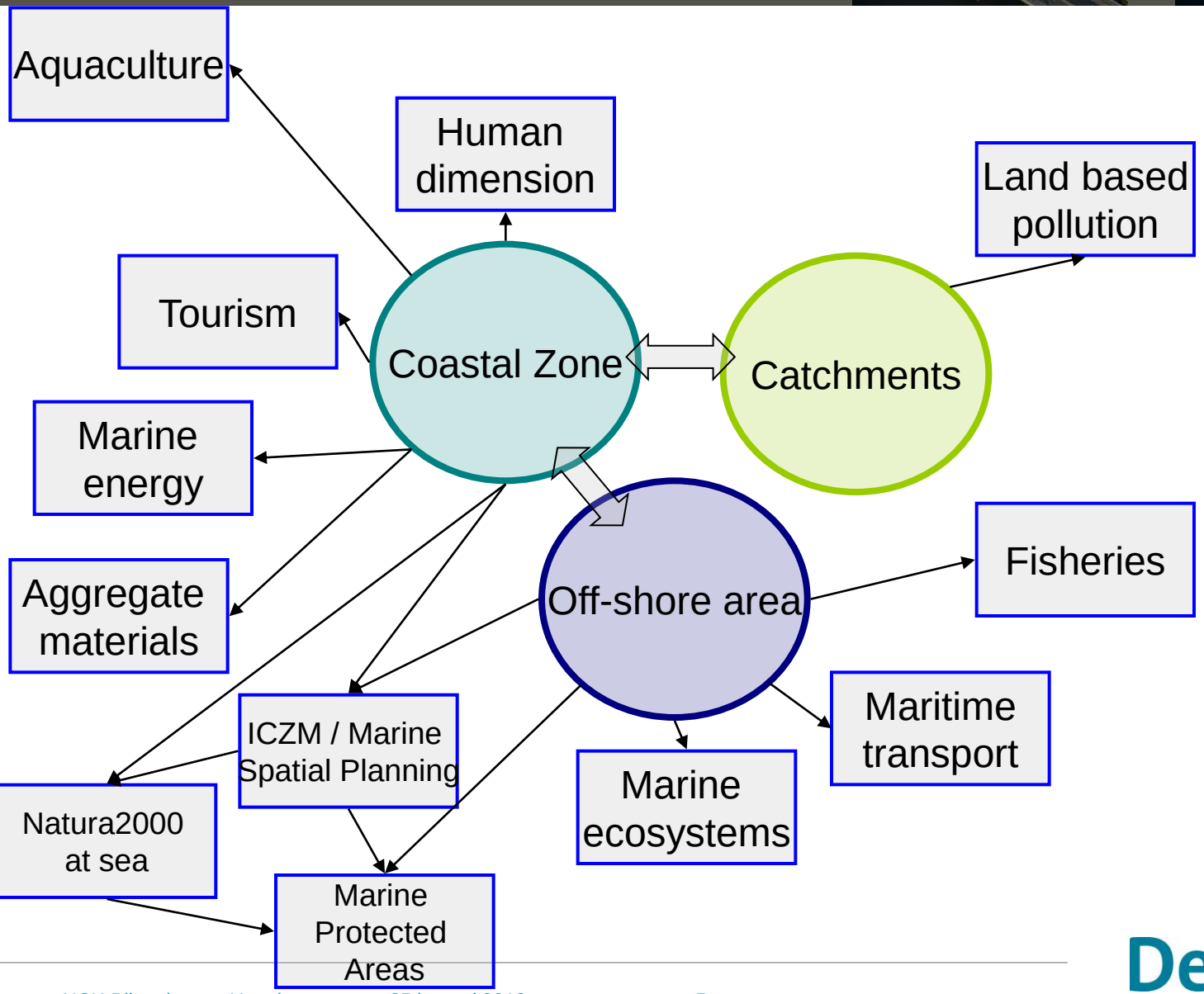
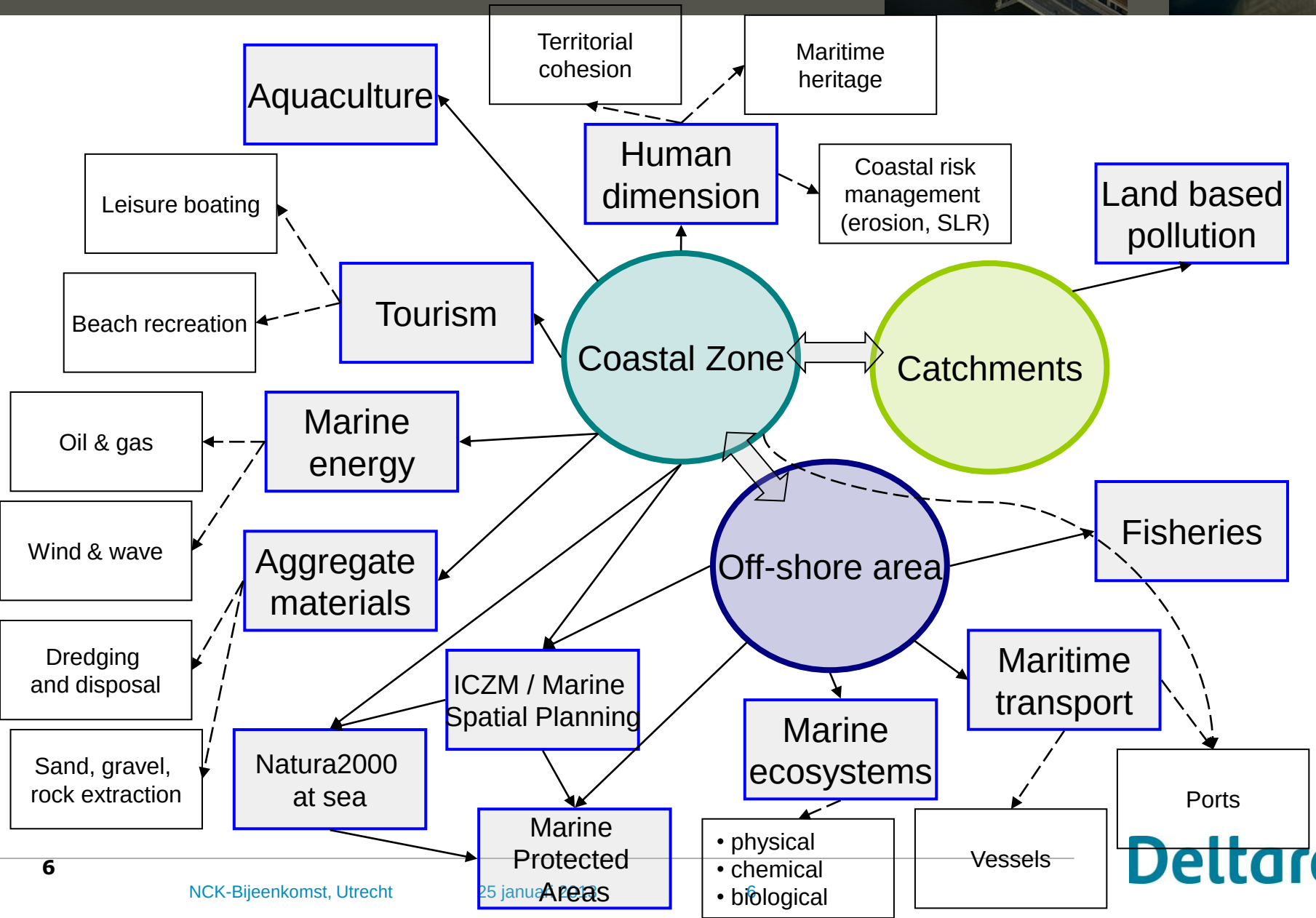
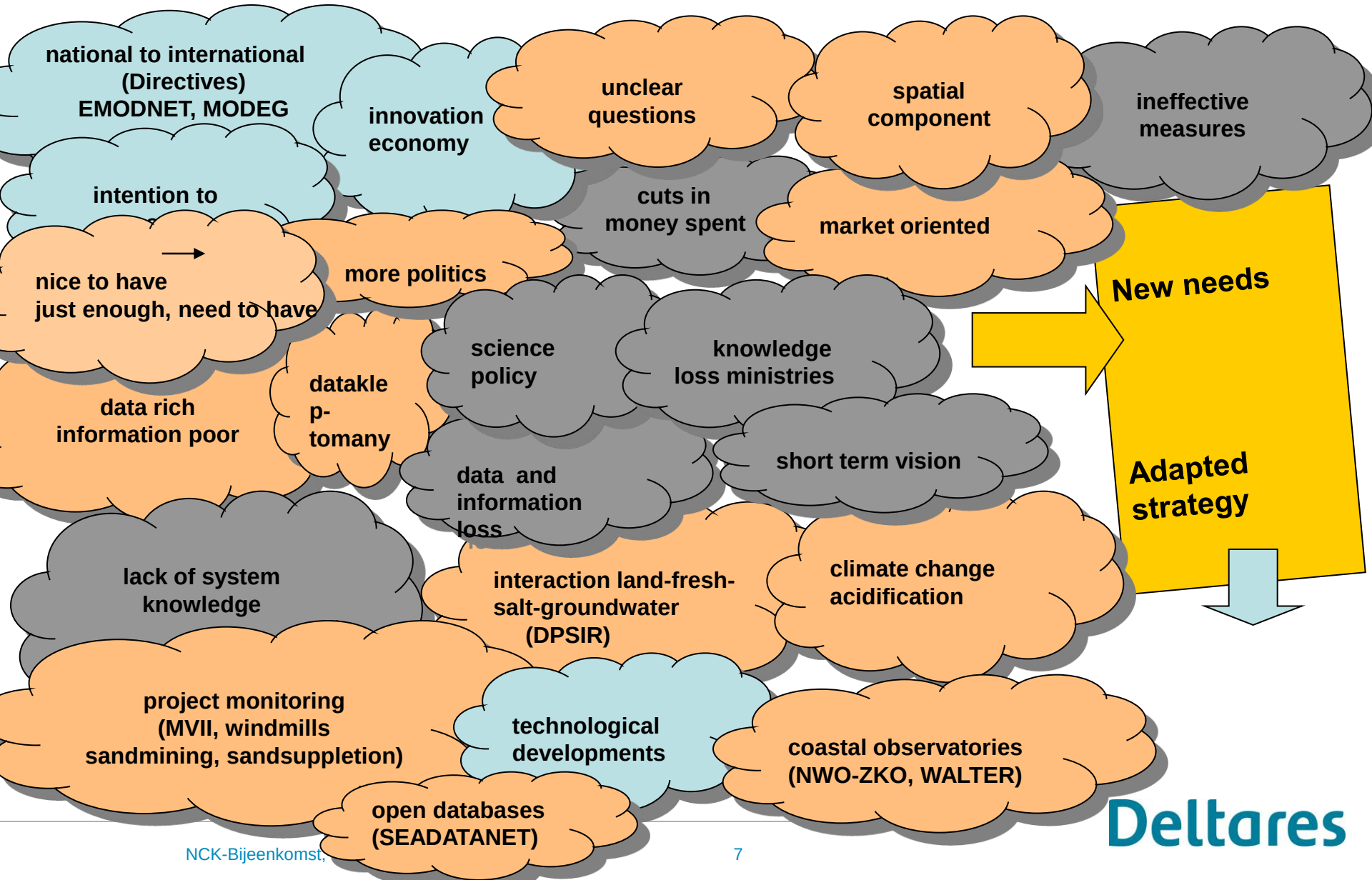
Playground & Issues (Andrus Meiner, EEA)



Relevant issues (and stakeholders) to deal with



Changing environment (Remy Laane, Deltares)



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What do we need from Operational Oceanography?

Users perspective

- experts as model developers
- authorities as decision makers
- commercial marine services (off shore)

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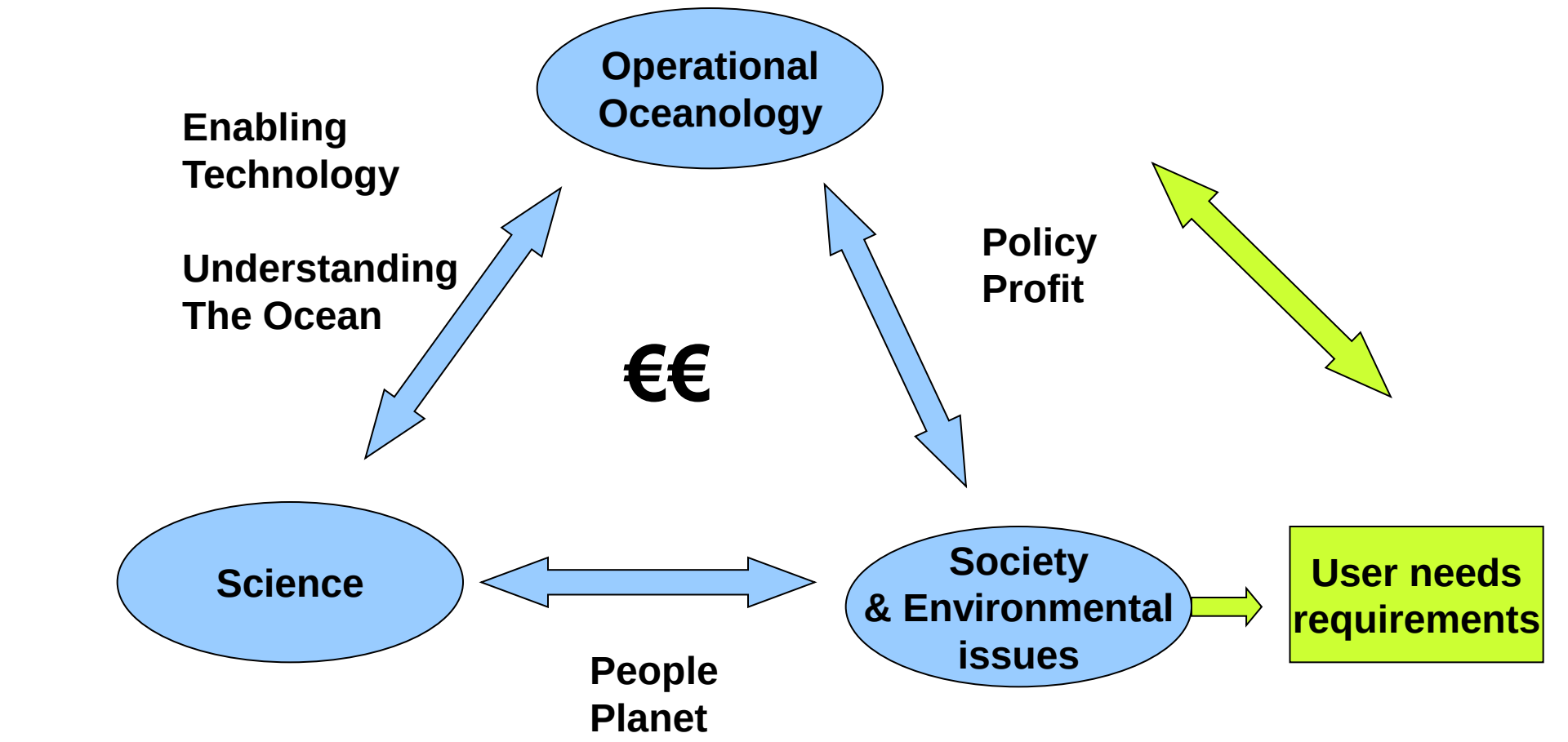
User perspective



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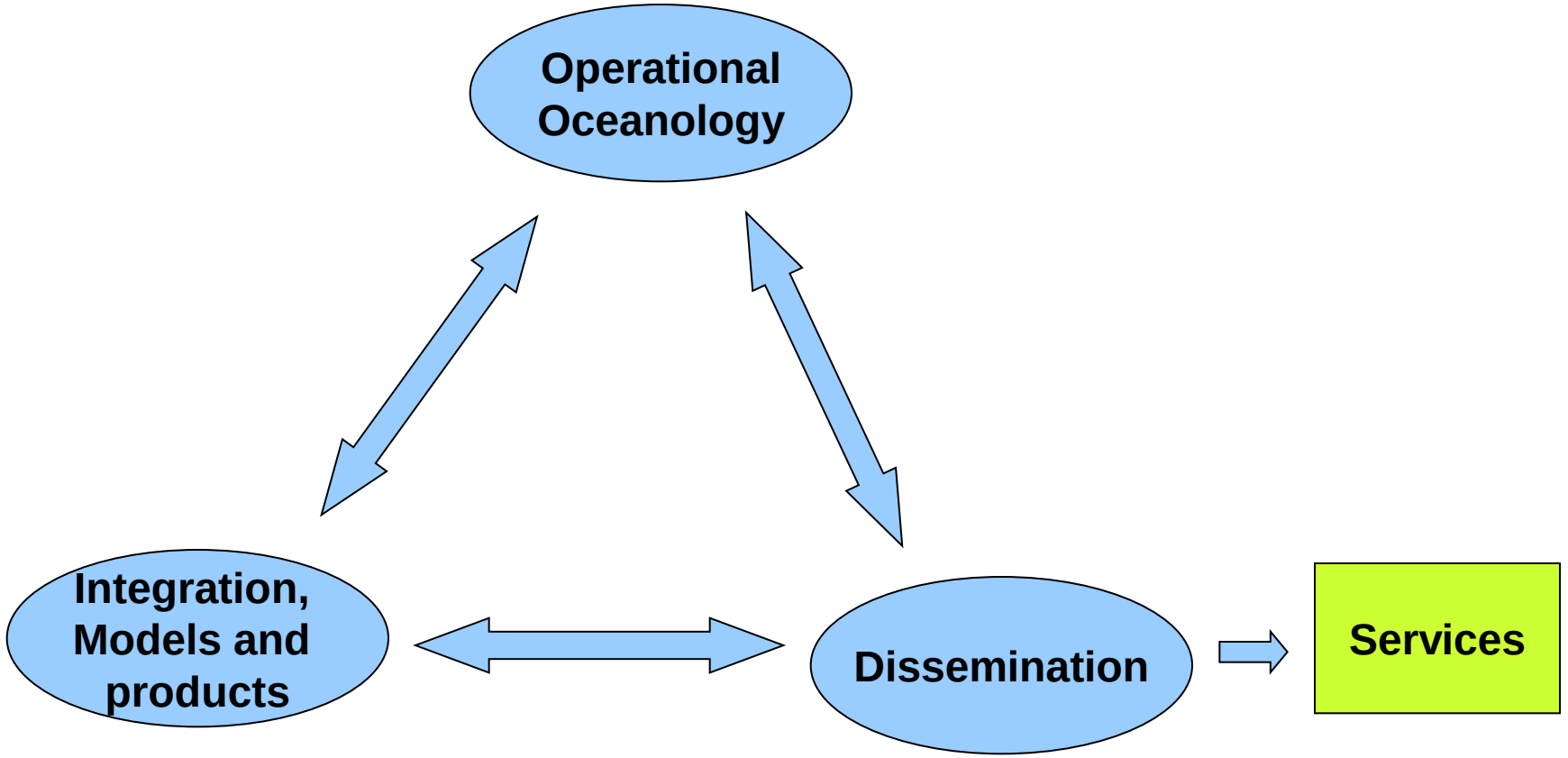
Service perspective



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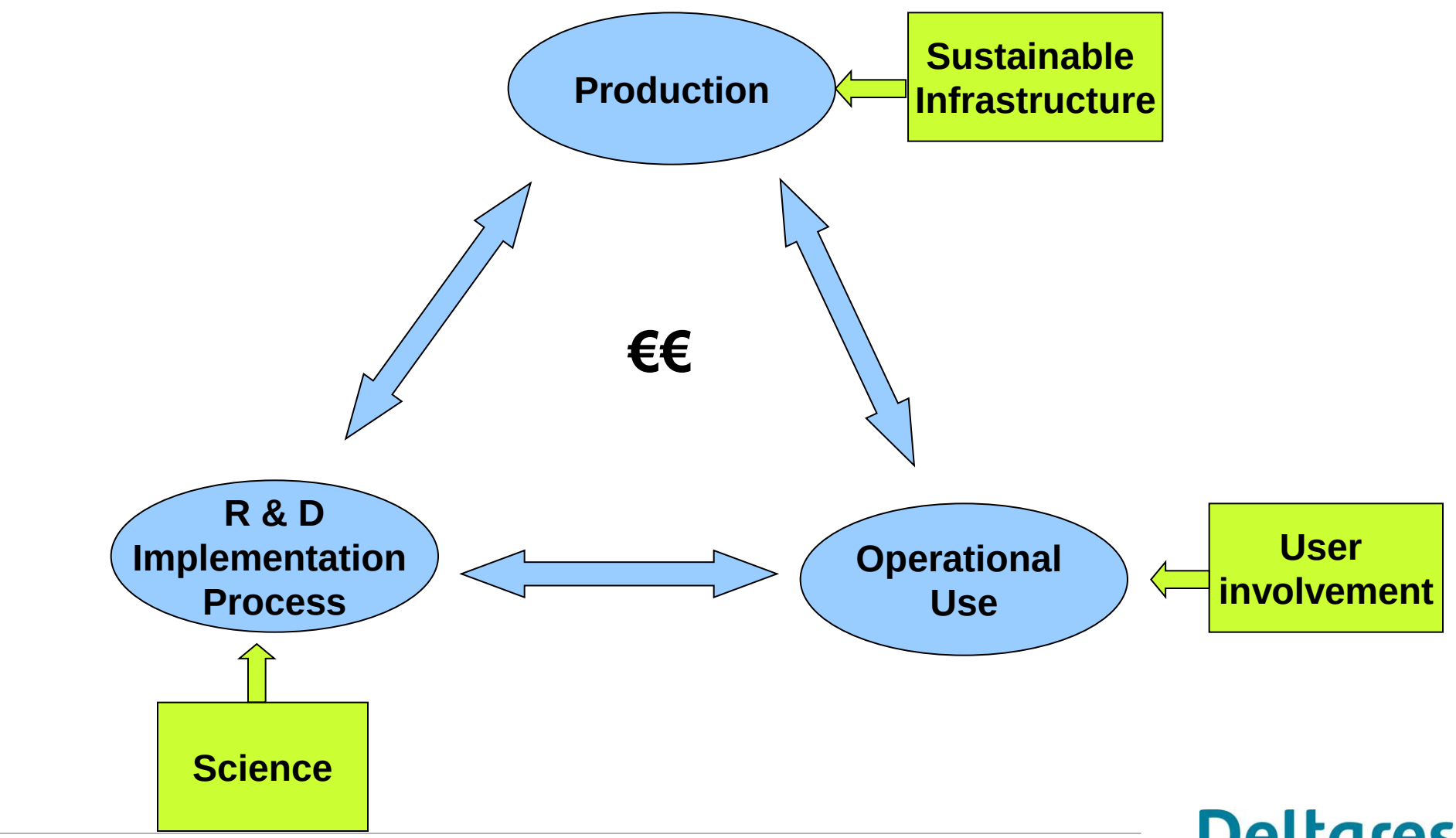
Governance perspective



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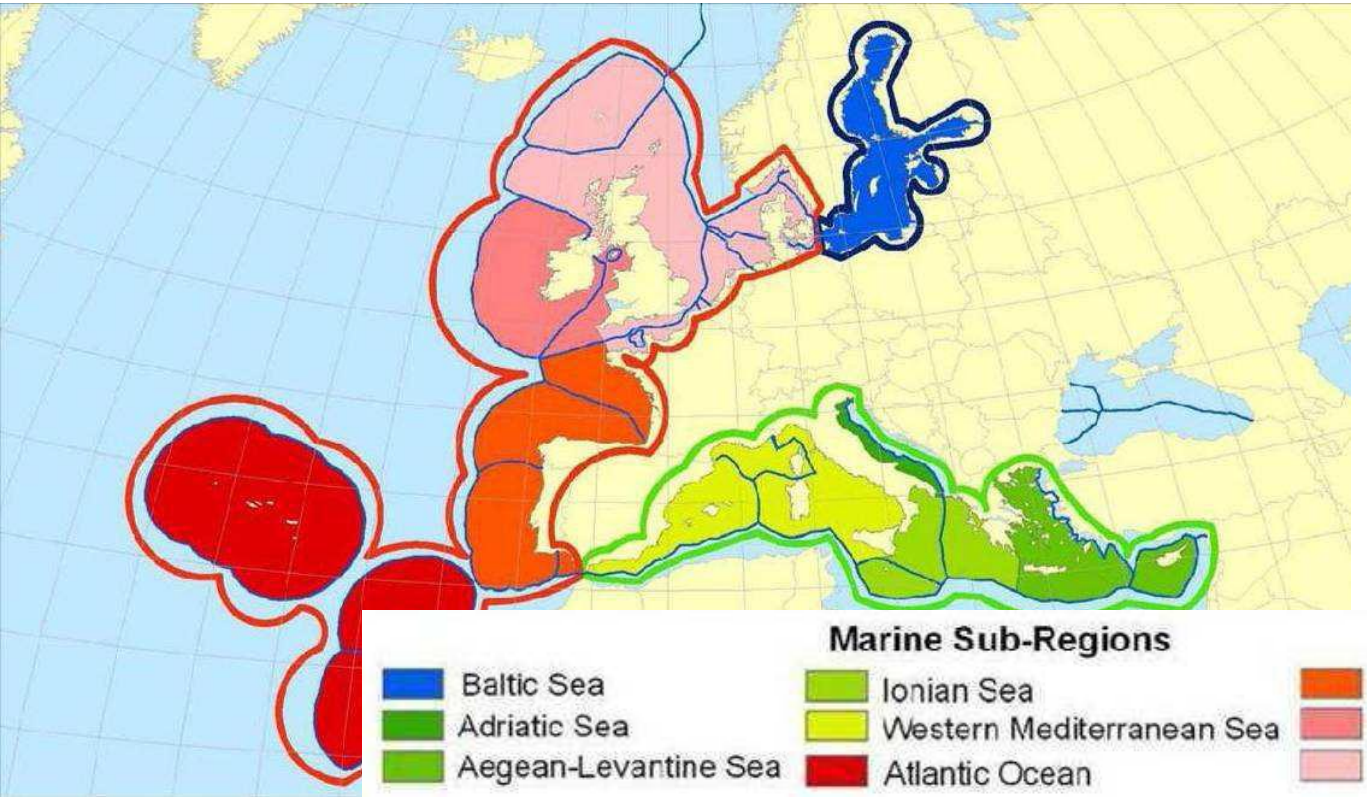
EU-Policy Marine Strategy Framework Directive

MSFD adopted by EC 15 July 2008

→ Ecosystem-based approach ←

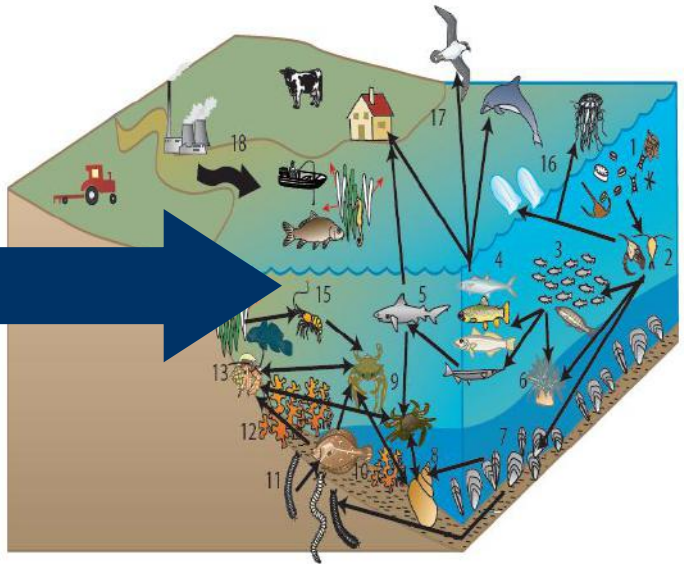
1. Reduce human pressures on marine resources
2. Protect marine environment
3. Maintain biodiversity
4. Clean, healthy and productive seas



Marine Strategy Framework Directive (MSFD)

Ecosystem-based approach:
Pressures in balance with ecosystem functioning
Sustainable use

- Fishing
- Maritime transport
- Oil- and gas exploration
- Sand extraction
- Dredging
- Wind energy
- Cables, pipelines
- Military activities
- Tourism
- Emssions



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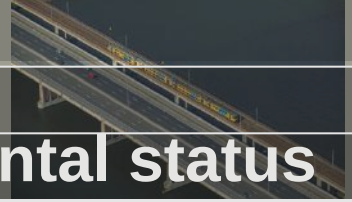
MSFD
11 descriptors for good environmental status



PHYSICAL / BIOLOGICAL DISTURBANCE

INPUTS

Biological diversity
Species level
Habitat level
Ecosystem level

Sea-floor integrity

Hydrographical conditions

Commercial fish

Food webs

Non-indigenous species

Eutrophication

Contaminants

Contaminants in seafood

Litter

Noise

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Accumulation of Impact (noise from construction of windfarms)

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DOMAINS

Observations

Arctic ROOS
BOOS
IBIROOS
MOON
NOOS
Black Sea ROOS ?
EuroARGO ?

Forecasting

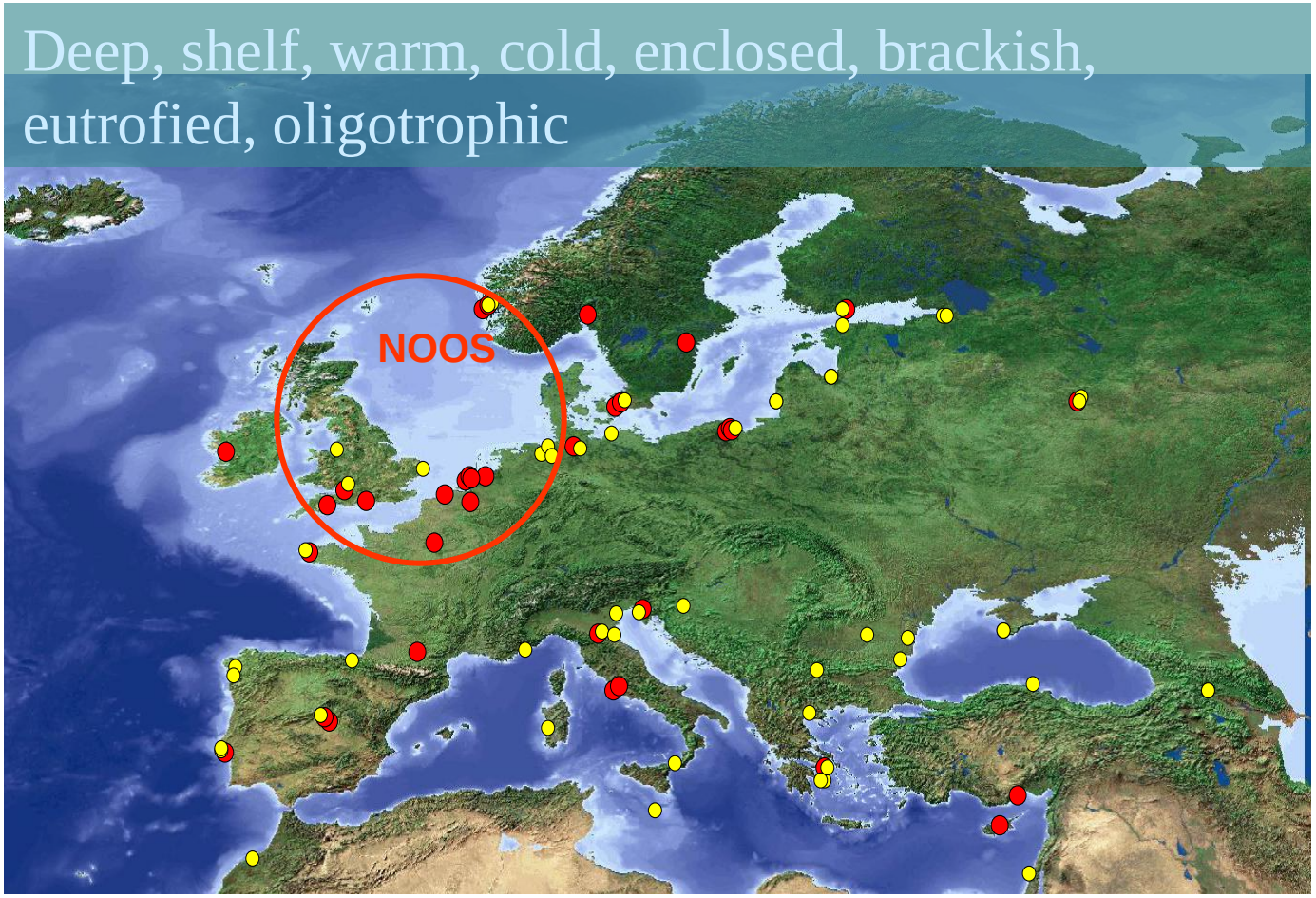
- ECOMF ?
  - Global
  - Arctic
  - Baltic
  - NWS
  - IBI
  - Med
  - Black Sea

Working Groups

- Science
- Technology
- Data
- Products

EuroGOOS

The European Network of National Oceanographic Services



EuroGOOS is an association of national governmental agencies and research organisations, founded in 1994, committed to European-scale operational oceanography within the context of the intergovernmental Global Ocean Observing System (GOOS). EuroGOOS has 34 members, providing operational oceanographic services and carrying out marine research, from 16 European countries.

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Oceanographic community provides services → users

- Search and rescue forecast modelling
- Oil spill or marine pollution drift
- Harmful or nuisance algal bloom monitoring and early warning
- Coastal flood forecasting (waves, storm surges)
- Sea Ice forecasting
- Fisheries management assessments

- Transport [ports and harbours operation, ship routing]
- Safety of life at sea (GMDSS)
- Defence and Naval operations
- Supporting tourism and leisure
- …….

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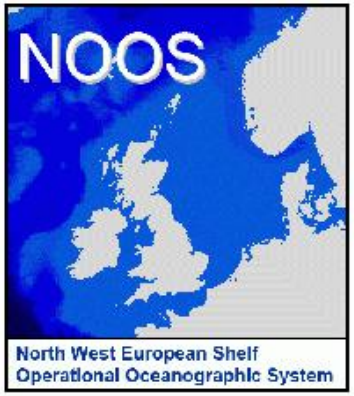
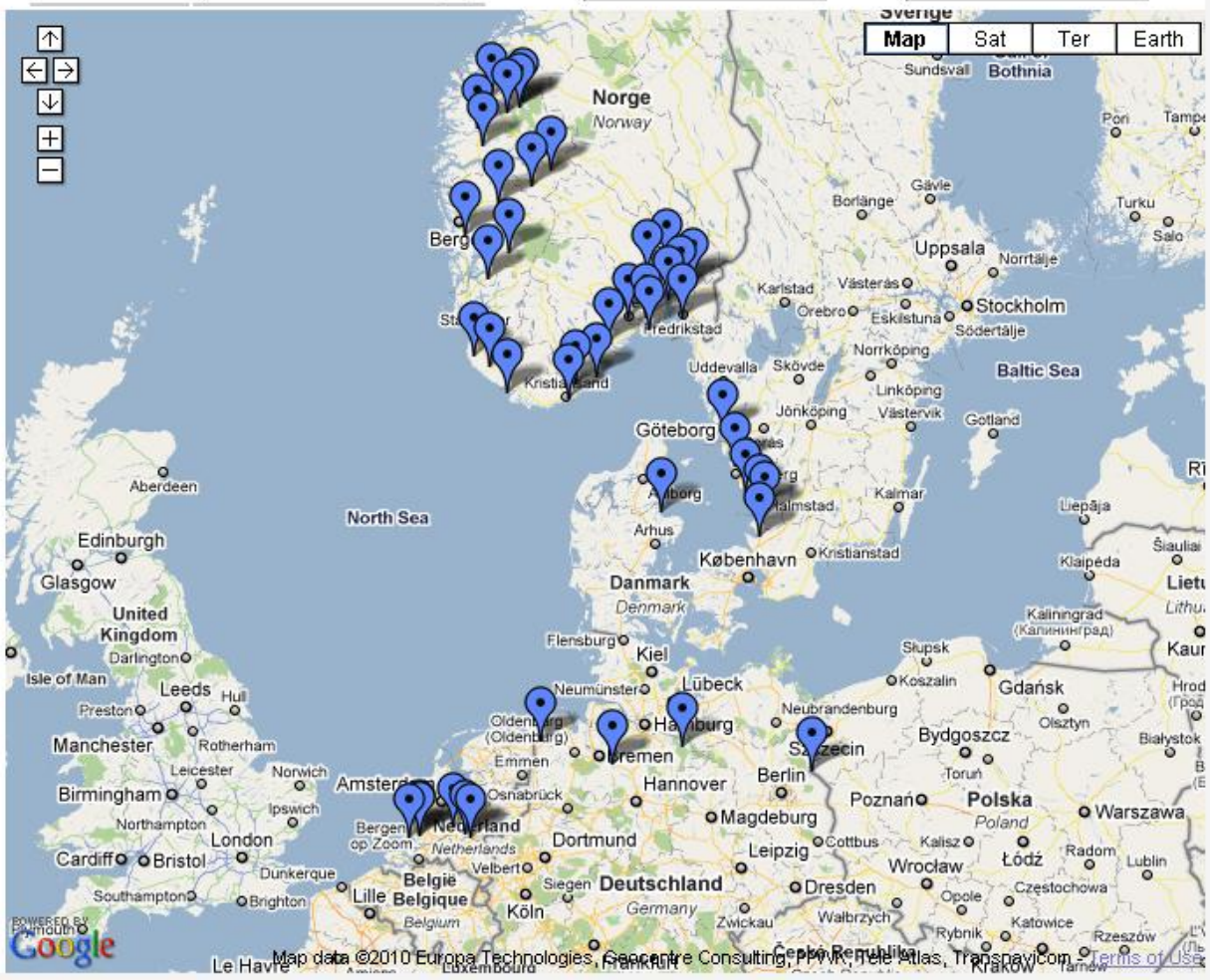
NOOS Operational services: River run off



HOME | PRODUCTS | REPORTS | PROJECTS | BACKGROUND | INFOSYSTEM | LINKS | CONTACT

DISCHARGE

Location set: NOOS-DISCHARGES **From:** 2010-10-12 00:00:00 **To:** 2010-10-15 00:00:00



NEWS

Breaking News:

07.10.10 13:19

SST anomaly map

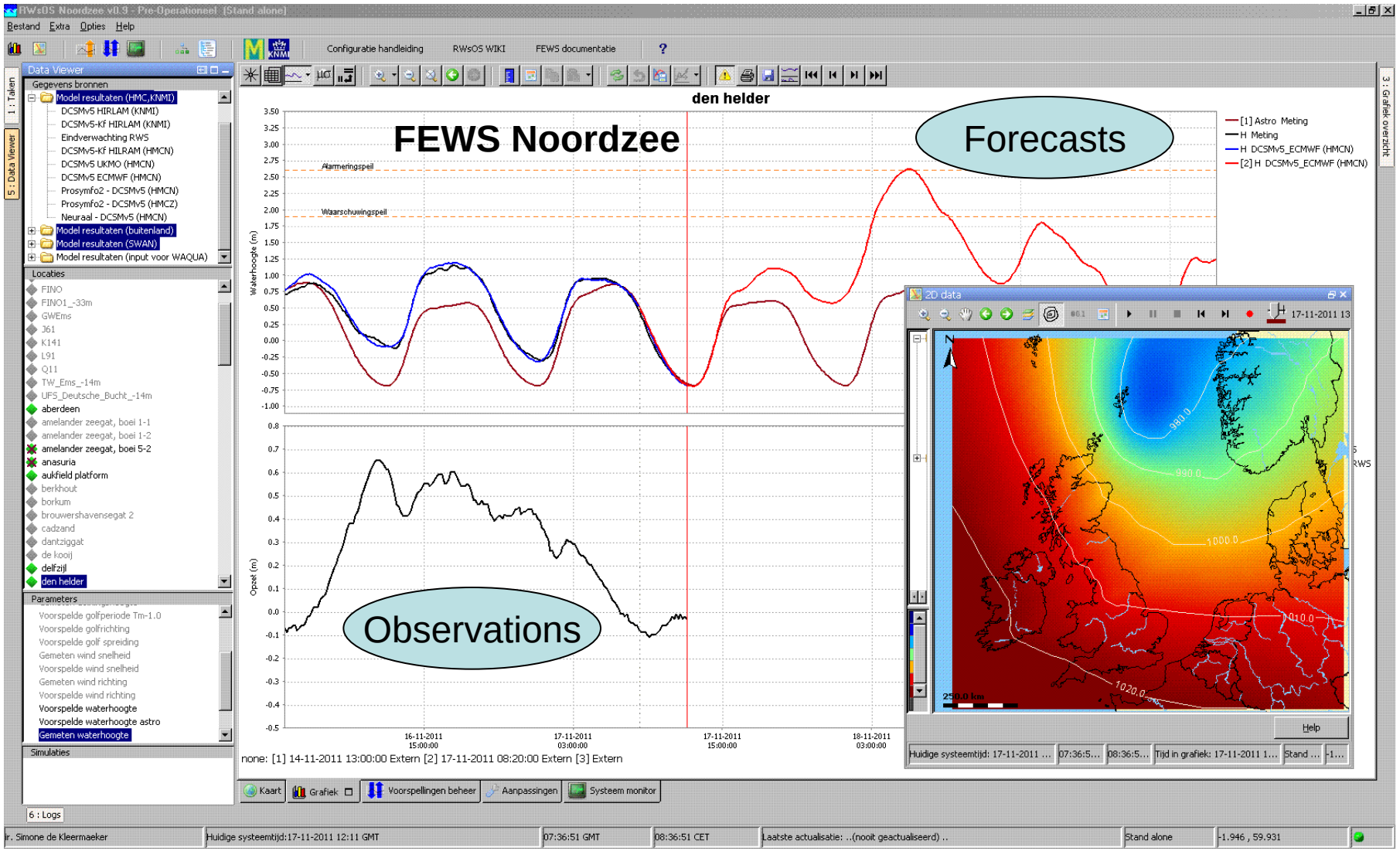
Extension of SST data provision

[more]

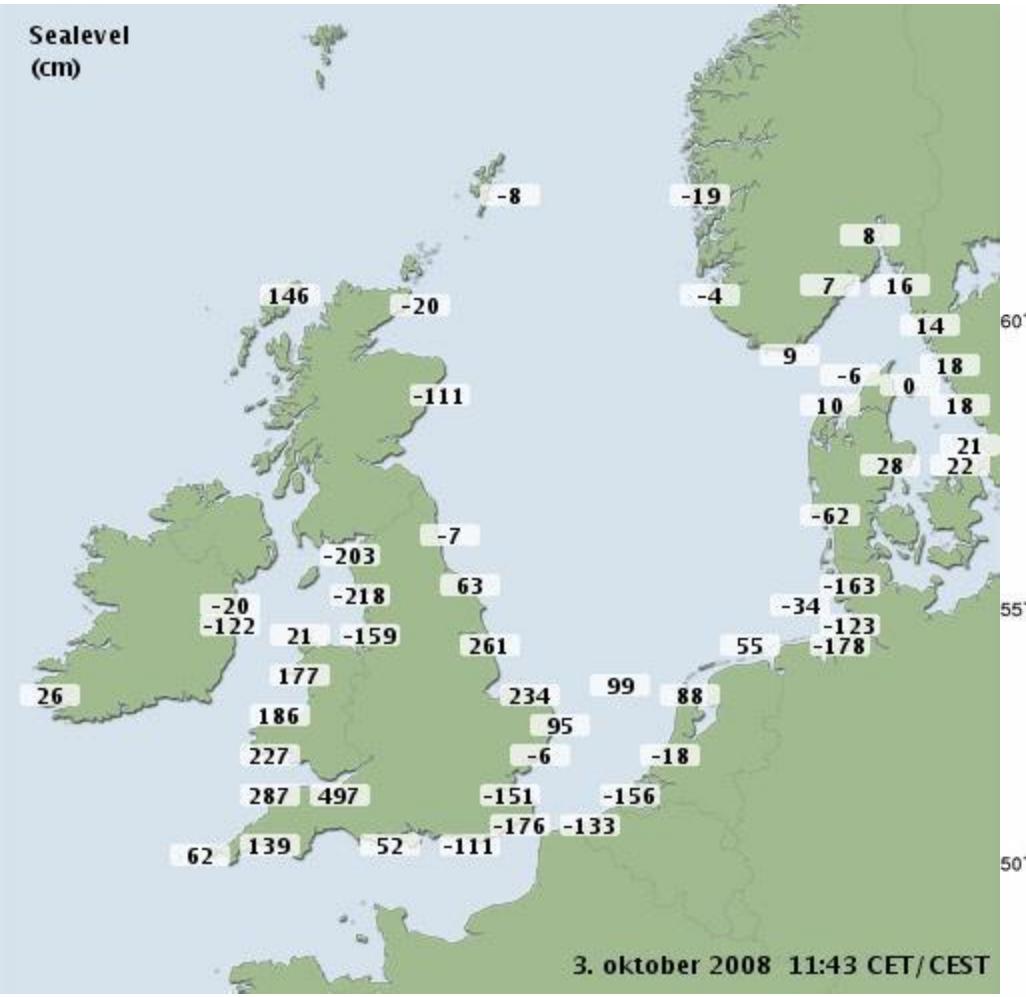
go to Archive ->

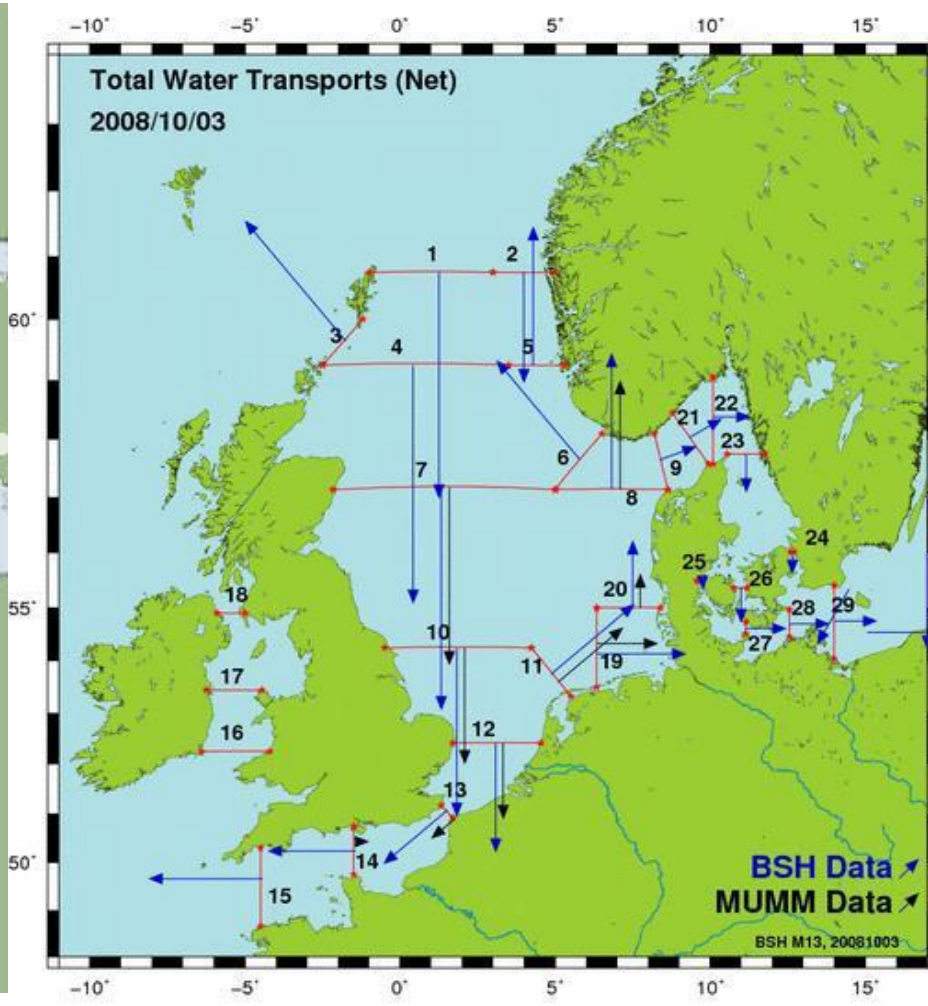
go to News archive

NOOS - Operational systems



NOOS-products: Water transport on NS-transects





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EU GMES
MyOcean Marine core service areas

Area 1
« MARINE SAFETY»
(maritime operations,
sea pollutions,
ship routes,
search and rescues ...)

Area 2
« MARINE RESOURCES»
(fishery,
ICES, FAO, ...)

Area 3
« COASTAL & MARINE ENVIRONNEMENT »
(Water quality, pollution,
costal activities ...)

Area 4
« CLIMATE & SEASONAL FORECAST »
(Climate change and
impact mitigation,
meteorological forecasting, ..)

myOcean

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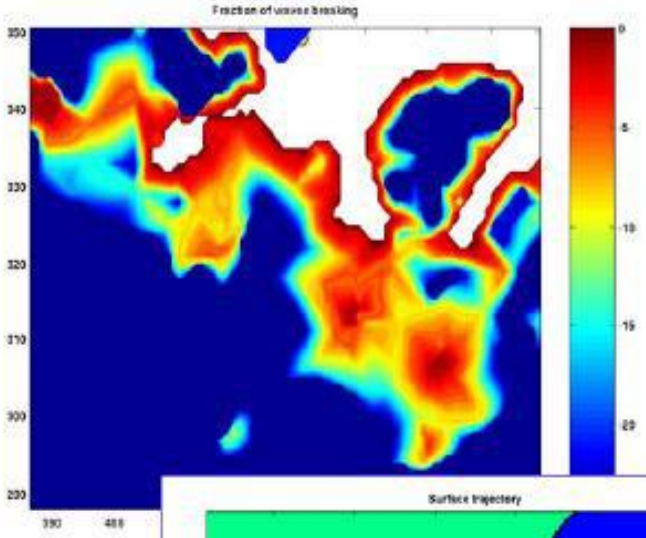
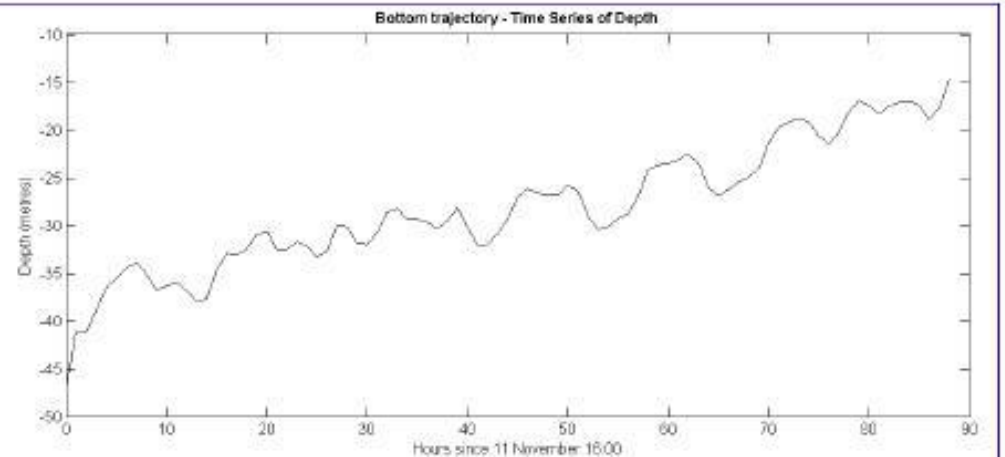
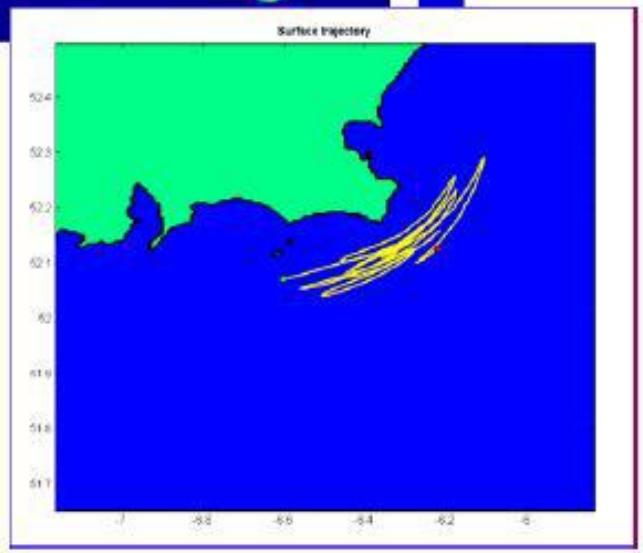
Search and rescue support

Marine Core Service







The main families of in-situ observing systems for MyOcean are:

1. **Argo profiling floats** measure mainly Temperature and Salinity from sea surface to 2000 m depth with good, consistent spatial resolution.

2. **Research vessels** deliver several high-accurate parameters (including Chlorophyll-a and Temperature) from sea surface to the ocean floor, but with intermittent spatial coverage.

3. **Surface moorings** measure a wide variety of sub-surface variables including Temperature, Salinity, Currents over long periods of time. These data are essential for model validation

4. **Gliders** provide physical data (Temperature, Salinity and Currents) as well as biogeochemical data (Chlorophyll-a, oxygen, nutrients,…) from surface to 1000 m below the surface, depending on the equipment. These instruments can be steered from shore via satellite.

5. **Ferry boxes** are found on board ferries or regional ships. They measure Temperature, Salinity, Turbidity, and Chlorophyll, nutrient, Oxygen, pH and algal types.

6. **Tide gauges** provide long-term reference and validation for Sea level data.

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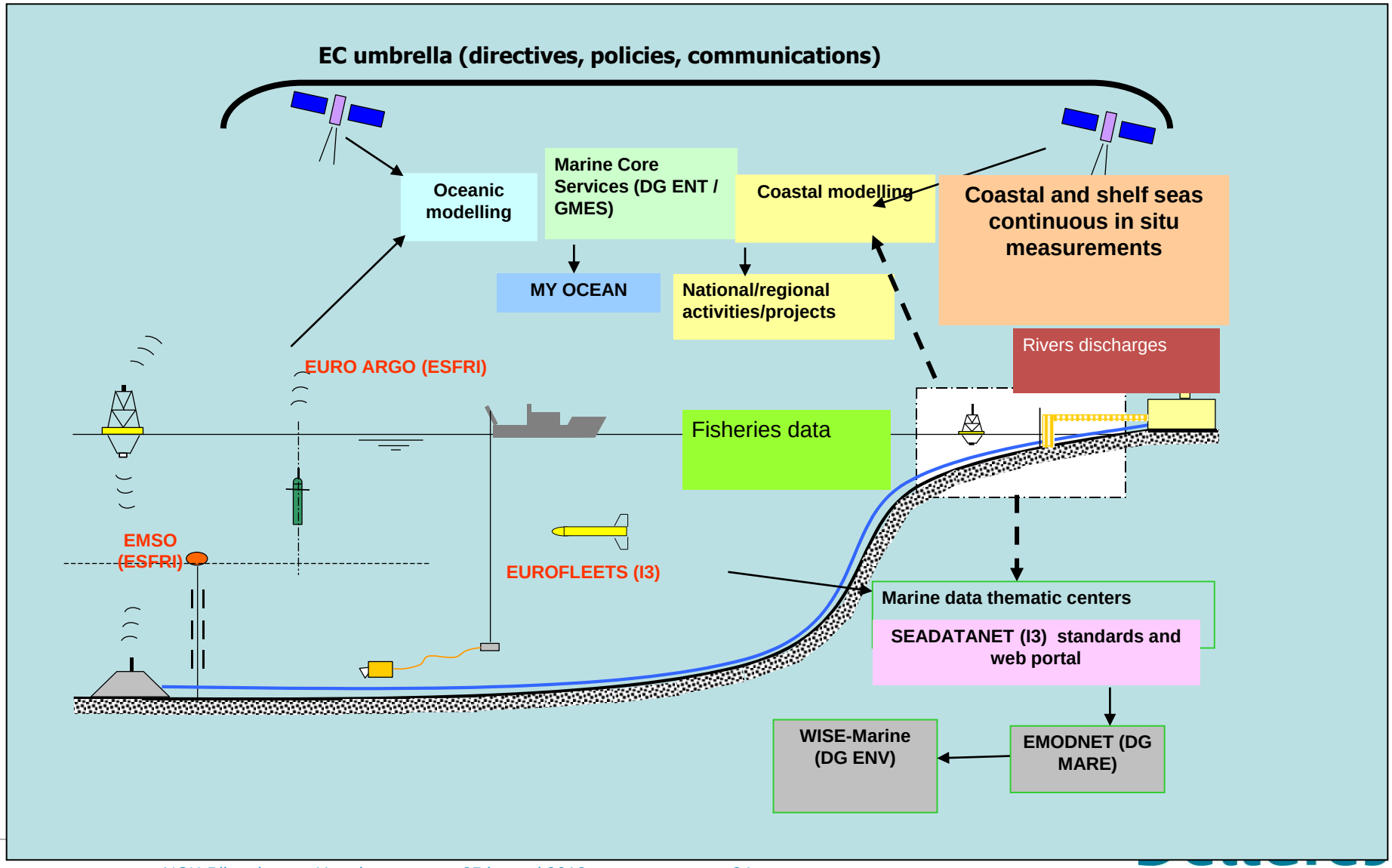
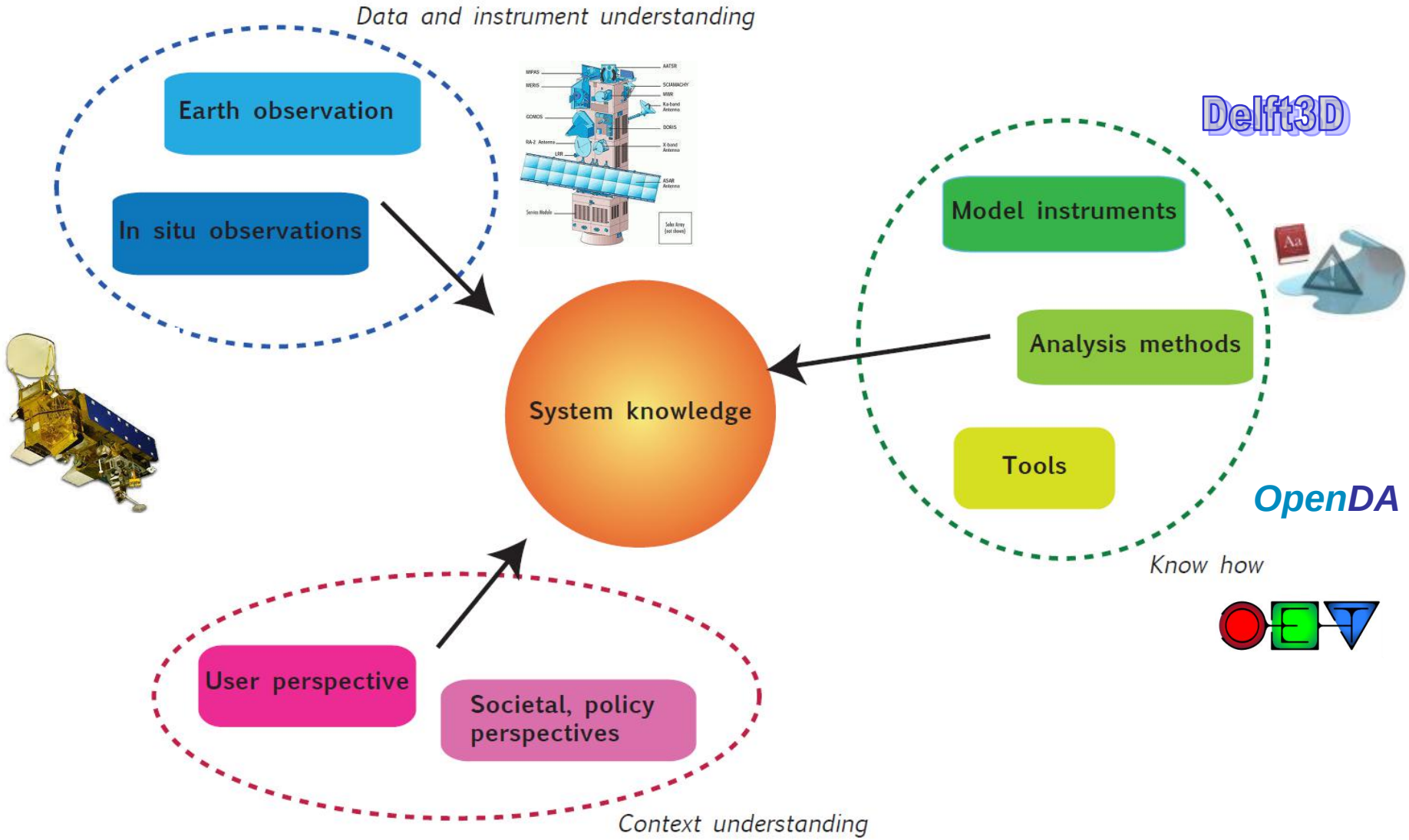
Joint European Research Infrastructure network for Coastal Operational Observatories (EU-FP7-JERICO)



The Deltares approach (Down stream services)

(Meinte Blaas, Deltares)



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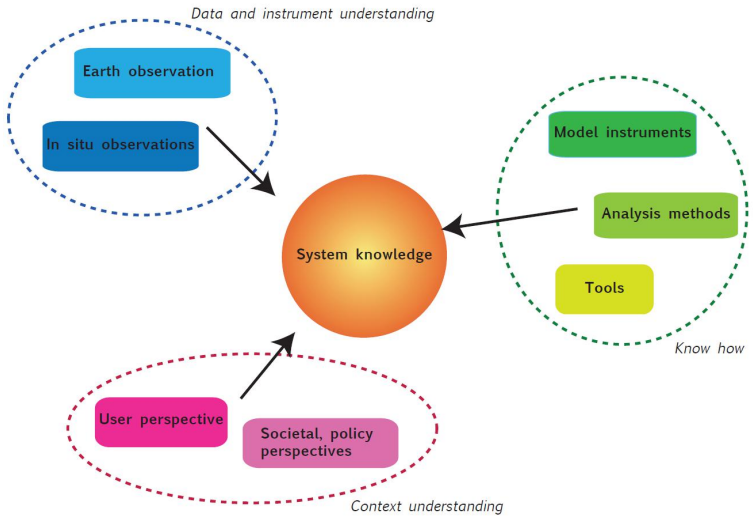
Water quality application of EO

- Hindcasts & Compliance checking
  - Model-supported monitoring
- Forecasting and Early Warning
  - Algal blooms
  - Oil spills
- Research and Analysis
  - Validation methods
  - Monitoring strategies
  - Model validation



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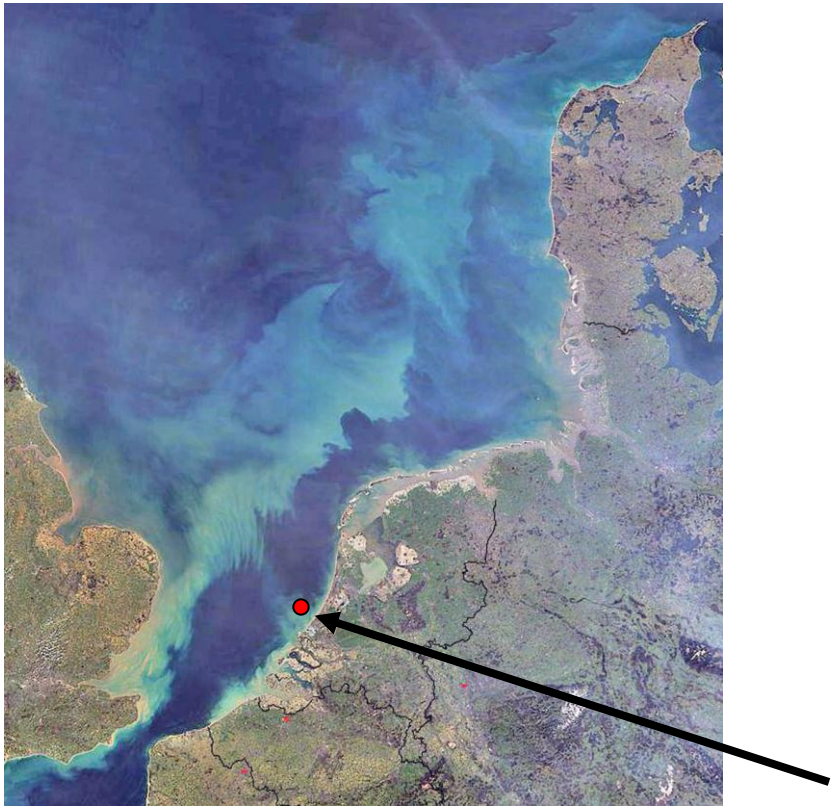
Compliance check large-scale offshore mining

Model-Supported Monitoring of SPM: MoS MoS = MoS^2

Extension of present reclamation by
Port of Rotterdam (2008-2013):
over 200 * 10^6 m^3 sand mined from offshore sea floor

MoS²: Model-Supported Monitoring of SPM



MODIS @ Terra recording of the North Sea, March 26, 2007
(MODIS Rapid Response Project NASA/GSFC)

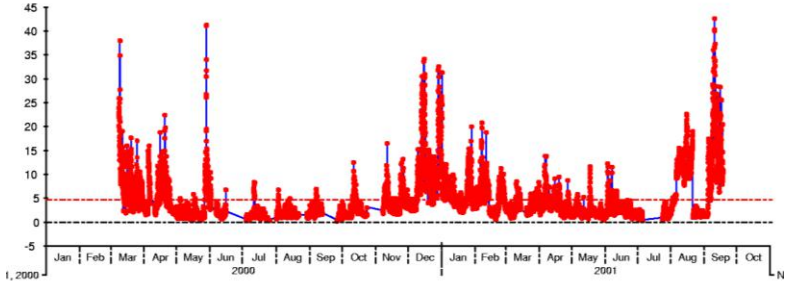
The issue:

SPM affects marine environment:

- Underwater light climate
- Pollutant & nutrient transport
- Composition of sea bed

Interests coastal managers

Determine SPM conditions Dutch coastal zone before and during sand mining



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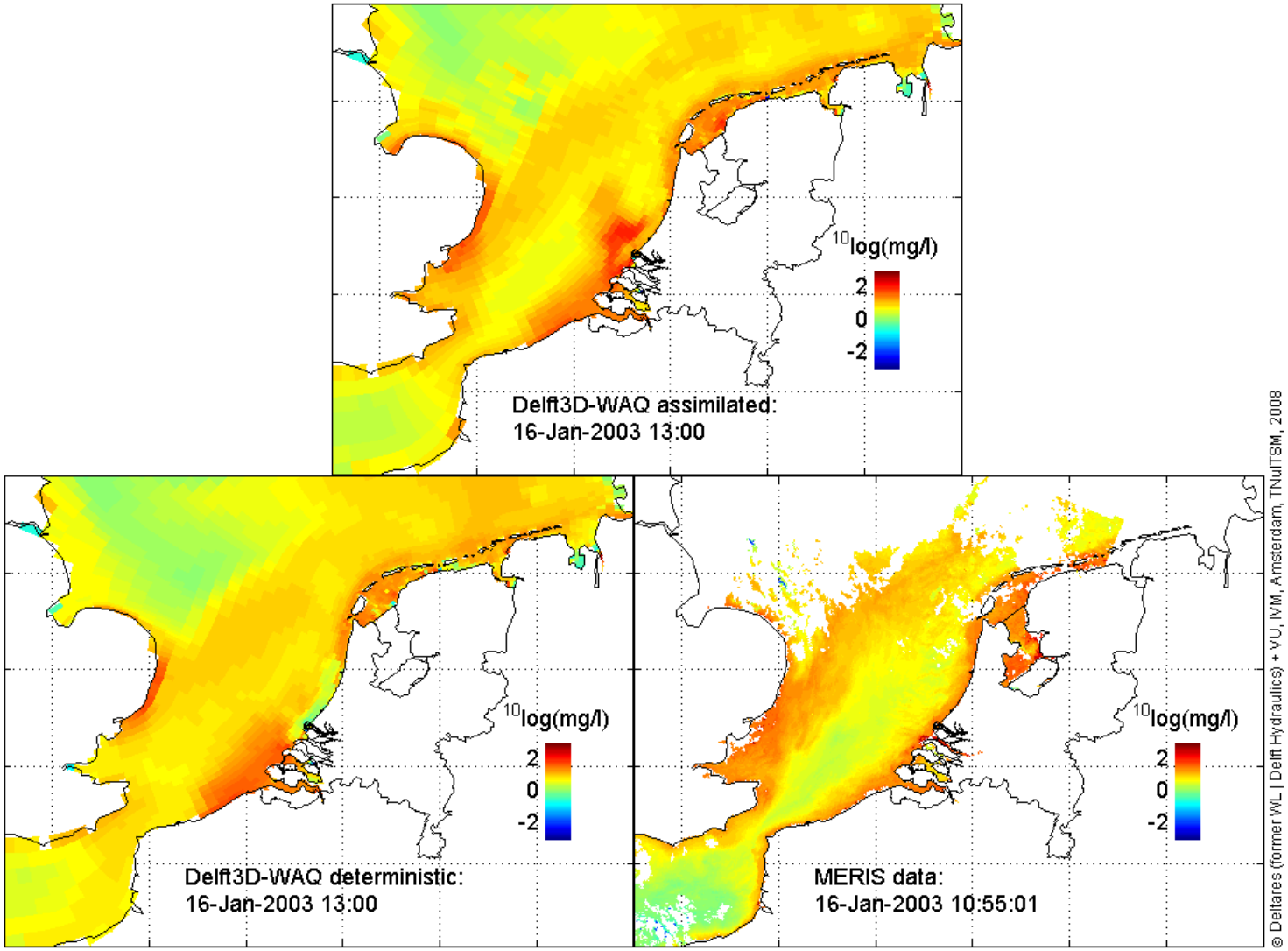
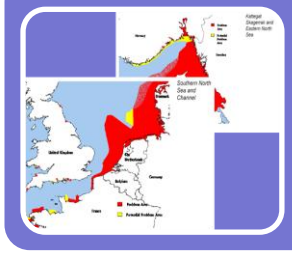
MoS²: Assimilation Results



Operational application: Algal Bloom Forecasts

The issues



High biomass algal bloom events occur each year in many places in the European waters (result of eutrophication)

high biomass blooms are perceived as threatening

- They can be composed of dangerous toxic species
- Their biomass can decay rapidly, sink to the bottom to form pools of hypoxic matter

They cause nuisance (smelly foam on beaches)

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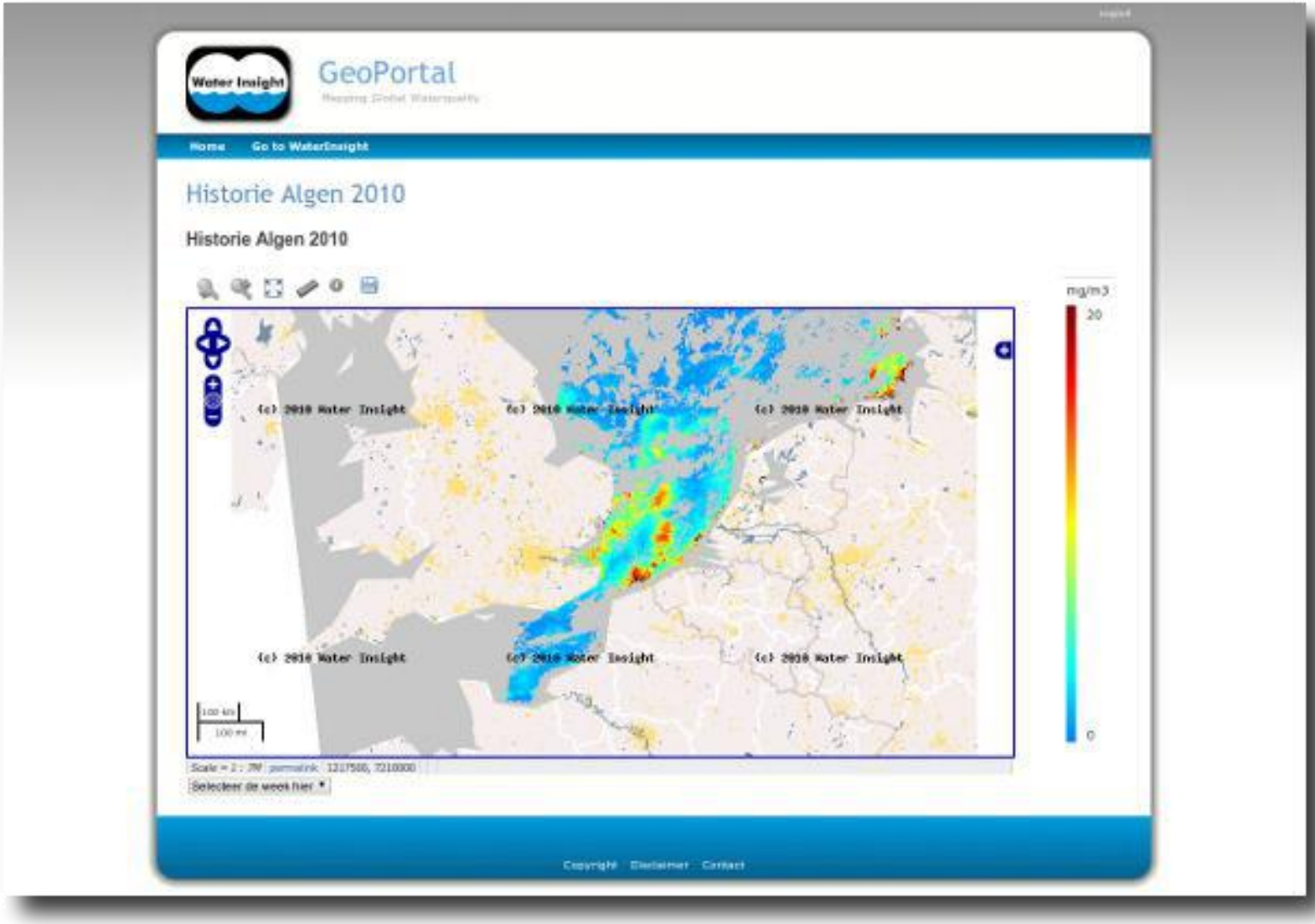
Harmful Algae Geo-Portal



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Other commercial services (BMT ARGOSS)

Environmental, MetOcean and Maritime information systems, services and consultancy

Capabilities:

- Weather & MetOcean forecasting and hindcast services and consultancy
- Oil Spill and Search & Rescue information services
- Vessel Manoeuvring and Performance Systems
- Port Operations

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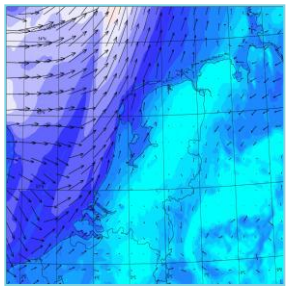
BMT ARGOSS

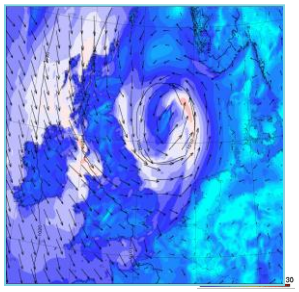
Hindcasting and forecasting

Readily available wind, wave and weather data sources

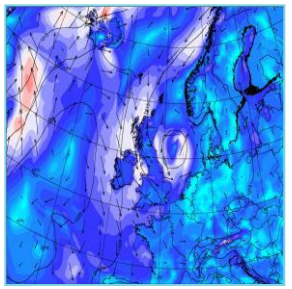
- **Regional weather models (WRF)**
  - Resolution down to 1 km
- **Global and regional wave models at resolutions down to app. 10 km**
  - NCEP and ECMWF
  - Quality validated with remote sensing data
  - 3 Hourly data available (1992 onwards)
  - Transformation of spectra to near shore sites
- **Dedicated models set up when required**



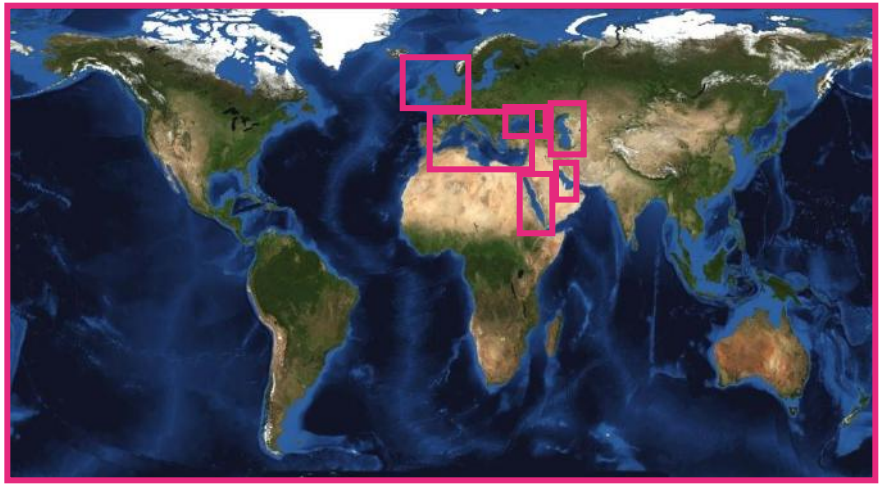
U10, NL, 3X3 KM



U10, NW EU, 9X9 KM



U10, Atlantic, 27X27 KM



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The final remarks

Co-operation is not sufficient

–

We have to integrate our systems.

We need to have a responsible governance system.

–

Investments are now; Costs are for the tax-payers

–

Benefits are for our children and a sustainable Marine eco-system


Thank you