

Observing the Ocean:

A changing Paradigm

A vision for Operational Oceanography

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** PDG Ifremer

As compared to the Atmosphere

- ❑ **Difficulty for three-dimensional observation**
- ❑ **Economic and social interest
focused on coastal regions**
- ❑ **Implication of monitoring and prediction
less immediate**

Recent evolutions

- ❑ **Increasing perception of ocean issues**
climate – resources – usages - environment
- ❑ **Knowledge and technology**
allowing the establishment of operational systems (in particular WOCE, TOGA, JGOFS, LOICZ, CLIVAR...)
- ❑ **Demonstration of preoperational system**

Ocean issues

eg coastal ocean (GOOS)

- ❑ Improved security and efficiency of usages of coastal oceans
- ❑ Mitigation of natural hazards
- ❑ Detecting and monitoring – Impacts of climate change
- ❑ Reduction of risks afar human health (HAB, virus)
- ❑ Protection and restoration of marine ecosystems
- ❑ Sustainable exploitation of marine resources
- ❑ Military operations

Many diverse issues

Ocean systems eg coastal ocean

- ❑ Monitoring systems for risk assessment
- ❑ Impact study systems (eg coastal management)
- ❑ Prediction systems

Physical and ecosystem descriptions
Complementary systems

A key experiment for the open ocean GODAE

- ❑ IOC/WMO/ICSU/UNEP
- ❑ ARGO – JASON observation
- ❑ Demonstration on the world scale

*An intrinsic link between
operational system and research*

An international effort: the high-precision satellite altimetry program

From back to
front side:

D. WILLIAMS
(EUMETSAT)

B. SMITH
(NOAA)

J.L. FELLOUS
(then with
CNES)



From back to
front side:

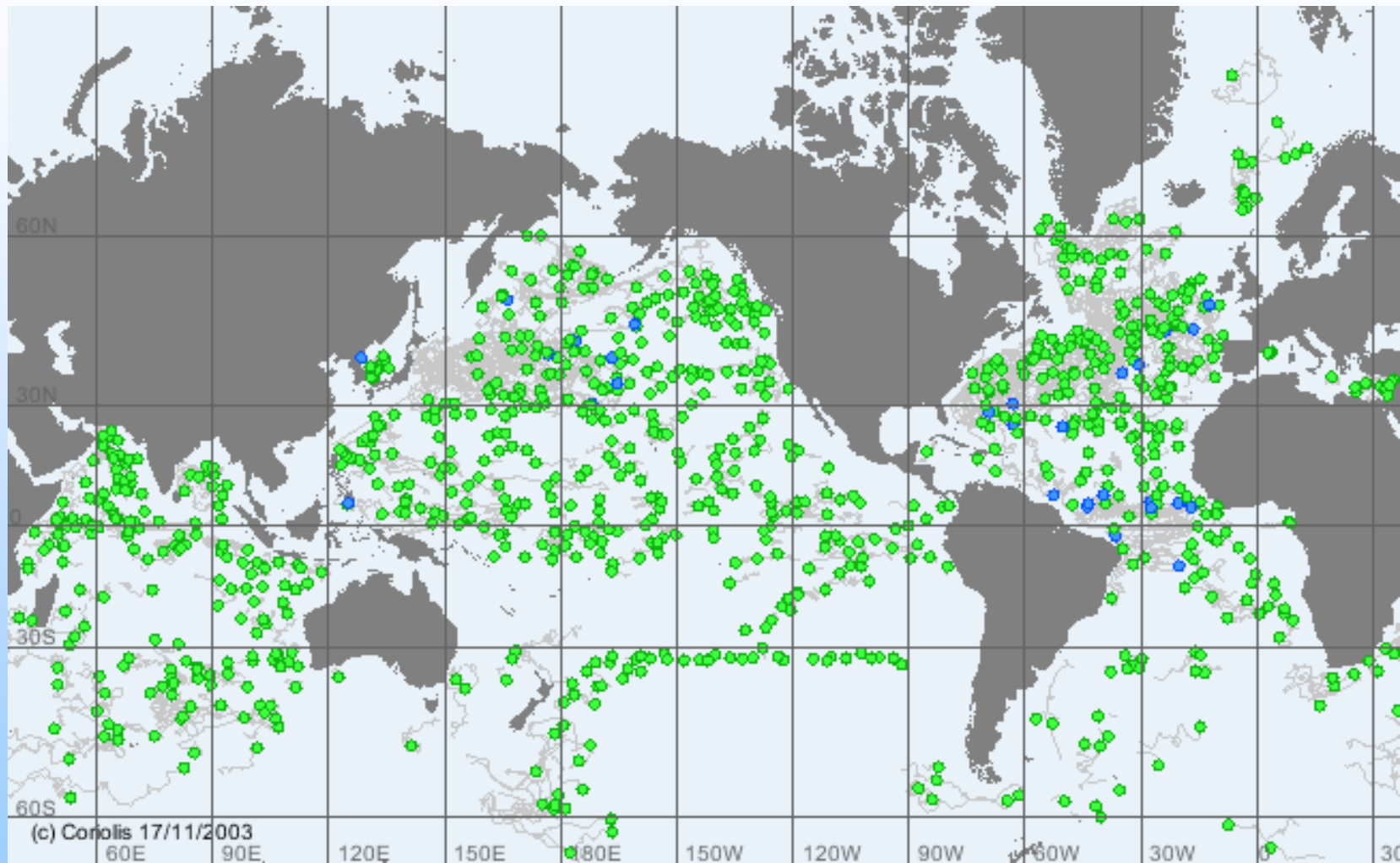
T. MOHR
(EUMETSAT)

G. WITHEE
(NOAA)

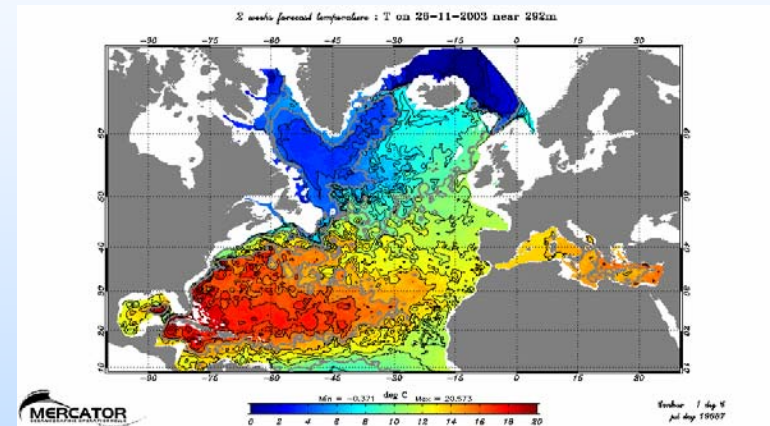
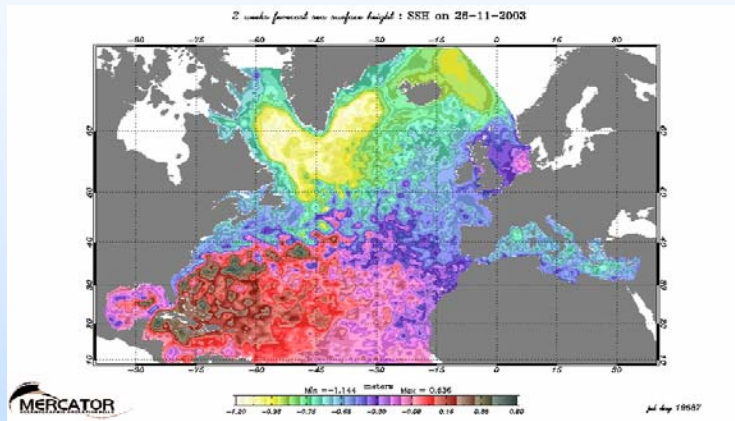
G. ASRAR and
A. CONDES
(NASA)

**Signature of the letters exchanged by CNES and
EUMETSAT with NASA and NOAA on the Ocean Surface
Topography Mission, Kyoto, 7 November, 2001**

CORIOLIS 2003 data set

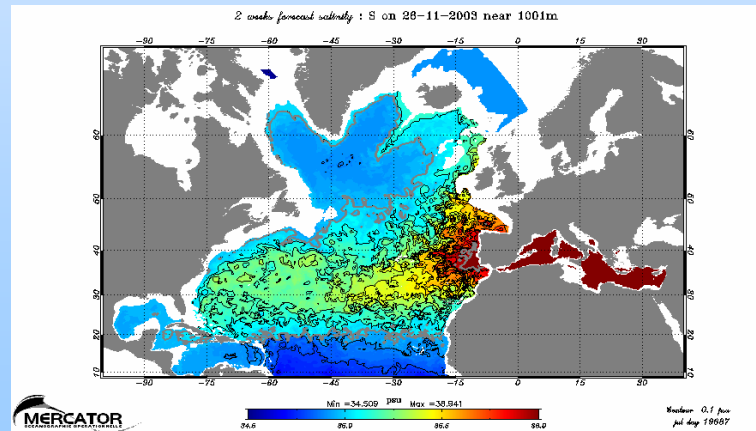


MERCATOR Bulletin for November 26, 2003 : how is the ocean next week ?



Sea Surface
Height

Sea Surface
Temperature

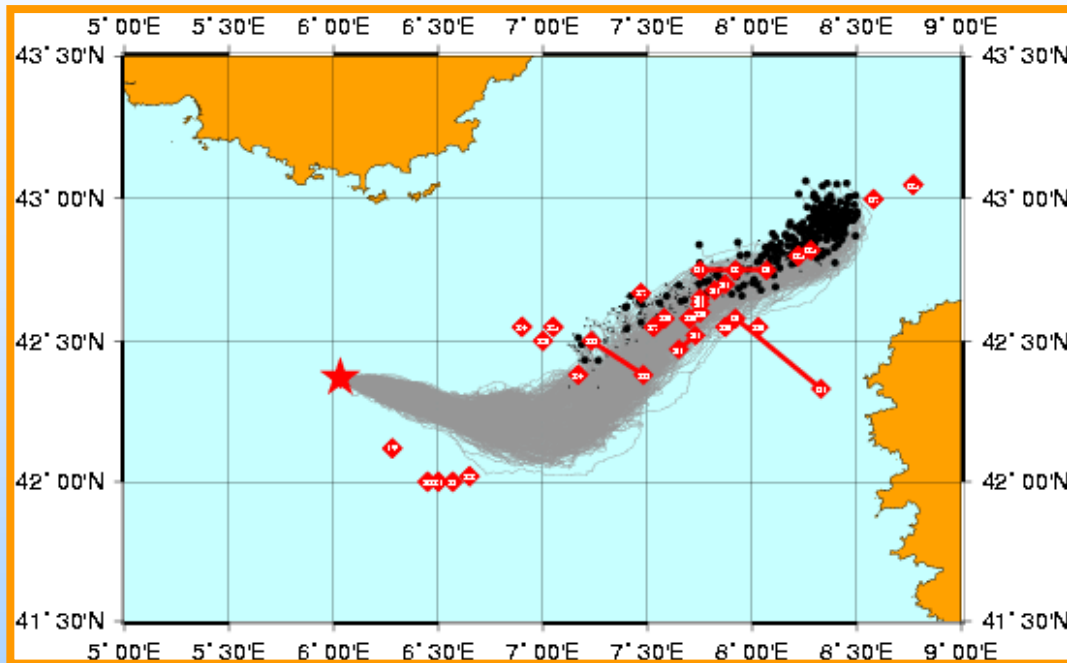


Salinity at
1000 m depth



L'accident du LYRIA

18 août 1993,
Méditerranée (Toulon),
Accident du pétrolier LYRIA,
2800 tonnes d'hydrocarbures



Accident

Oil Observations

3-week Dispersion Cloud
of the **MOTHY** model
forced with **MERCATOR** currents
+ **T/P & ERS2** altimetry

□ Exercice rejoué par
l'équipe PREVI/MAR de
Météo-France avec leur
modèle de 

□ **Mercator** fournit les
analyses 3D de courants
dans la zone (modèle au
1/16°).

(courtesy P.Daniel, Météo-France)

GOOS strategic plan

- ❑ A new, internationally organized, system resembling the global meteorological network
- ❑ Modification and enhancement of existing systems and organisations
- ❑ And observations which have not been routinely assembled before

A ambitious undertaking

Modelling and Assimilation

A key component

- ❑ High resolution
- ❑ Coupling physics and ecosystems

Development needs

(eg assimilation in ecosystem models)

Computer capacity requirement

centers such as ECMWF

Regional dimension

- ❑ **Regional needs (coastal ocean)**

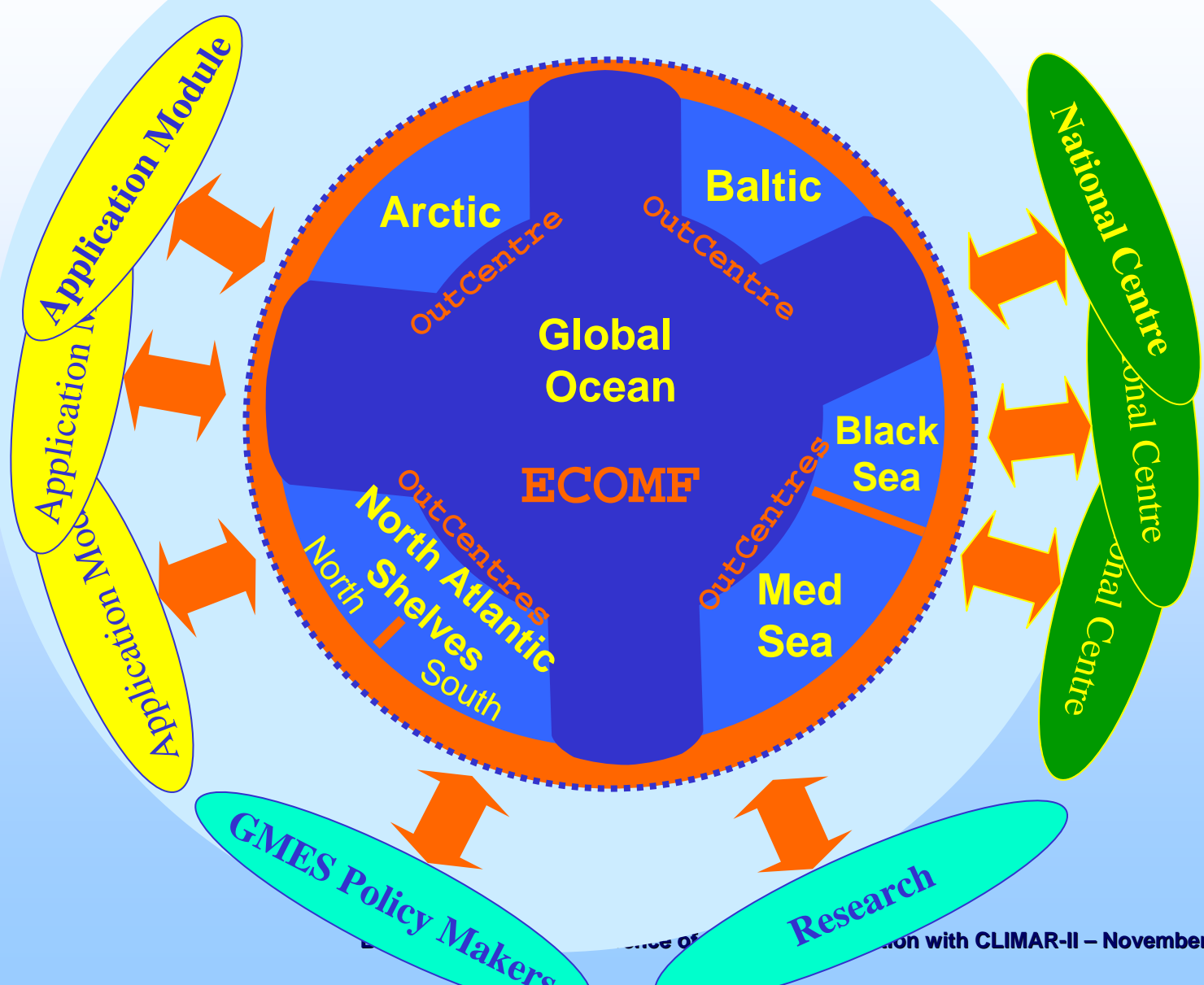
- ❑ **National fundings and commitments**

Eg **Baltic, Mediterranean**
Caribbean (IOCARIBE)
North-east and South-east Asia
etc

MERSEA

ECOMF and OutCentres

MERSEA components Forecast system



Building a European common space of joint systems to monitor and forecast global ocean and european seas [ECOMF and Outcentres]

to deliver a new European service of public interest to European Research and Policy Makers,

National Centres (where national state activities are conducted)

and **Application Modules** (devoted to a specific area (e.g. coastal) or a specific thematic (e.g. oil spills, and algae blooms))

Cost benefit ratio

eg Gulf of Marine Ocean observation System
Go MOOS

☐ Users direct the organisation

- Commercial mariners
- Coastal resource managers
- Scientists
- Educators
- Search and rescue teams
- Public health officials

☐ Potential annual benefits

- 33 M US \$
- if 1% in lives-at-risk saved (90 to 91%)
 - ❖ 6 lives per year

JCOMM and GOOS

❑ **Joint WMO/IOC**

- Technical commission for Oceanography and Marine Meteorology (250 experts)

❑ **Recognizes the need for integrated marine meteorological and oceanographic data and services**

❑ **Seeking commitments**

- ensuring delivery of products
- capacity building
- global networks for maritime services

❑ **Implementation mechanism for physical oceanography and meteorological component of GOOS on global scale**

Conclusion

□ Operational Oceanography

an ongoing implementation

in close cooperation with WMO through JCOMM

Learning from the 150-year history of WMO