

MERCATOR, From routine assimilation of NRT altimeter data to added value ocean products

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SUMMARY

The MERCATOR project is a french initiative aiming at developing an operational capacity of global ocean monitoring and prediction. As a contribution to the GODAE experiment (2003-2005), it will assimilate routinely near-real-time ocean observations into a 1/4° global ocean model with a 1/15° configuration covering North-Atlantic and Mediterranean sea. The baseline for assimilation is given by optimal interpolation (SOFA scheme). JASON-1 / Envisat altimetry and ARGO in situ profilers are identified as key datasets. The system will provide routine ocean nowcasts and forecasts to end-users, and serve a wide variety of ocean application sectors. MERCATOR will progressively develop its near-real-time service, starting on routine operation on January 2001 by providing its first ocean forecast on North Atlantic. Overall strategy of the MERCATOR project towards GODAE to develop its full monitoring capacity - and main realisations - will be presented ; the poster will be specially focussed on near-real-time activities and developments made to provide an added-value and qualified information to end-users

MERCATOR OBJECTIVES

The goal of the MERCATOR project is the implementation of an ocean forecasting system able to :

- simulate the **global ocean** with a primitive-equation high resolution model, **assimilating satellite and in situ data** to provide *hindcasts* and near-real time *nowcasts* and *forecasts* of the global ocean circulation,
- be operated on an **operational** mode (ie routine and near-real-time) to answer (i) **research**, (ii) national **state** (military and civilian) service, and (iii) **commercial** oceanography **end-user needs**,
- contribute to the development of a **seasonal and climate** forecasting system by providing ocean initial conditions for ocean/atmosphere coupled models.

INCREMENTAL APPROACH

Following an incremental approach, Mercator will progressively increase its operational capacity towards GODAE. The first **Mercator prototype** will be operated in near-real-time (NRT) from early **2001** :

global ocean NRT routine observation-based monitoring
satellite **Altimetry** and Coriolis (ARGO, ...) **in situ profiles** as main data sets ; cross comparisons, combination, statistics

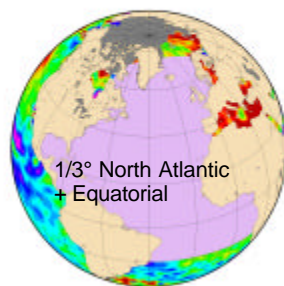
North and Tropical Atlantic ocean NRT routine modelisation and assimilation
Atlantic ocean [20°S-70°N] ; OPA model, resolution 1/3°
multivariate assimilation (SOFA/PALM) of Altimetry and T/S profiles.
weekly nowcasts and forecasts

THE 2001 RENDEZ-VOUS

The goal of **near-real-time operation** (*hindcast, nowcast, forecast*) of the first MERCATOR Prototype based on :

optimal interpolation **assimilation** (SOFA, De Mey, 1998) with **PALM** coupling (CERFACS, Piacentini)
of **first near-real-time altimetry** (T/P, JASON1, ERS2, Envisat, GFO) and later (mid 2001) **in situ profiles** (T/S profiles) in the ocean **OPA model** (LODyc, 98) on a 1/3° grid covering North and Tropical Atlantic (from 20°S to 70°N)

near-Real-time retrieval and processing of **satellite and in situ observations** on a global scale.



Global : only observations

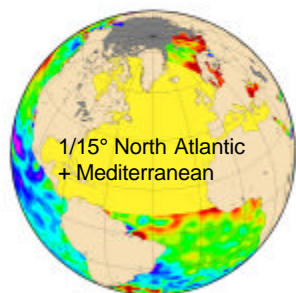
THE GODAE RENDEZ-VOUS

near-real time routine operation of a Mercator configuration based on :

a **high resolution 1/15°** ocean model covering **North Atlantic and Mediterranean sea**

coupled with

a **middle resolution 1/4°** ocean model covering the **global ocean** with assimilation of **near-real-time altimetry** (T/P, JASON1, ERS2, Envisat, GFO) and **in situ observations** (T/S profiles) with hybrid assimilation methods based on interpolation optimale and advanced methods (variational, etc)



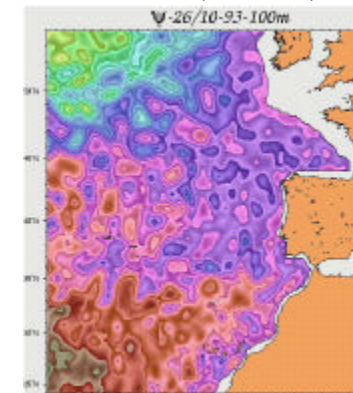
Global : 1/4° PE

MERCATOR 1/3° DEVELOPMENT STATUS:

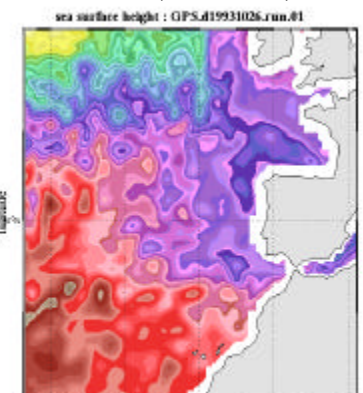
- Model setup finished
- Assimilation scheme developed and tested (altimeter data only)
- A 3 year assimilation has been performed from 1993 to 1995 using the optimal interpolation scheme (SOFA) with a lifting and lowering assimilation scheme (Cooper and Haines)
 - T/P and ERS-2 data assimilated
 - ECMWF forcing
 - Reynolds SST heat flux correction terms
- Assimilation spin up to start soon
- Overall system finished by the end of 2000
- First real time bulletin on **January the 17th 2001**

TWO OPERATIONNAL SYSTEMS ASSIMILATING REAL TIME ALTIMETER DATA

1/10° QG (SOPRANE)

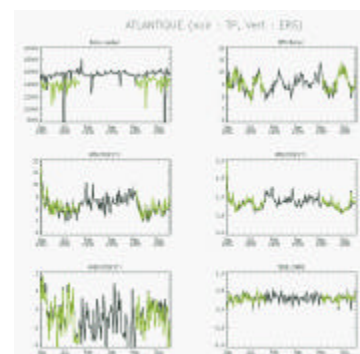


1/3° PE (MERCATOR)

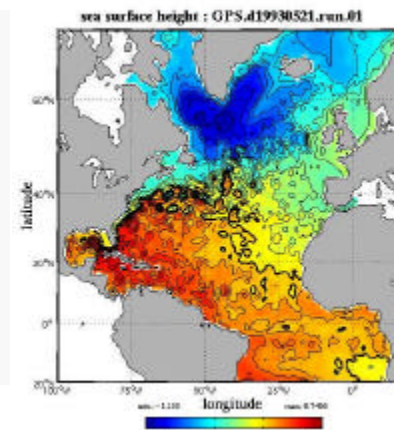


SAMPLE OUTPUTS FROM THE ASSIMILATION RUN

Assimilation diagnostics

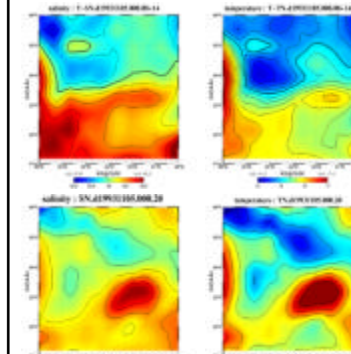


A synoptic field (May 1993)



Comparison with in situ data in the Azores Front and meddies region during SEMAPHORE 93

MERCATOR 1/3°
ERS and T/P assimilation with OI



300 m

1000 m

Objective analysis
of in situ data

