



THE MEDITERRANEAN OCEAN FORECASTING SYSTEM

**M.Tonani
and the GNOO-INGV group**

GNOO
GRUPPO NAZIONALE di
OCEANOGRAFIA OPERATIVA



Istituto Nazionale di
GEOFISICA e
VULCANOLOGIA


MOMAR, 18 April 2012, Livorno, Italy

Outline:

- introduction
- system components description
- products validation
- conclusion

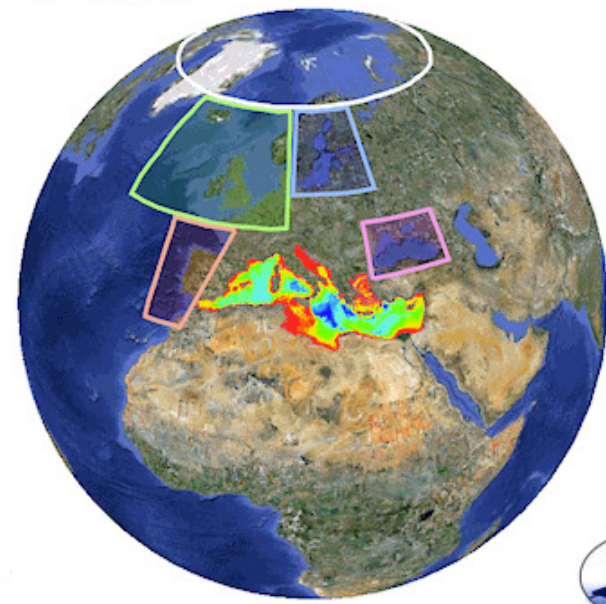


Mediterranean Forecasting System (MFS)



Mediterranean Sea Monitoring and Forecasting Centre

WP 9 MED MFC partnership



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myOcean

MFC-Currents Forecast

MFC-Biogeochemistry Forecast

Cal/Val System

Istituto Nazionale di Geofisica e Vulcanologia

OGS








MERCATOR
Océanographie Opérationnelle

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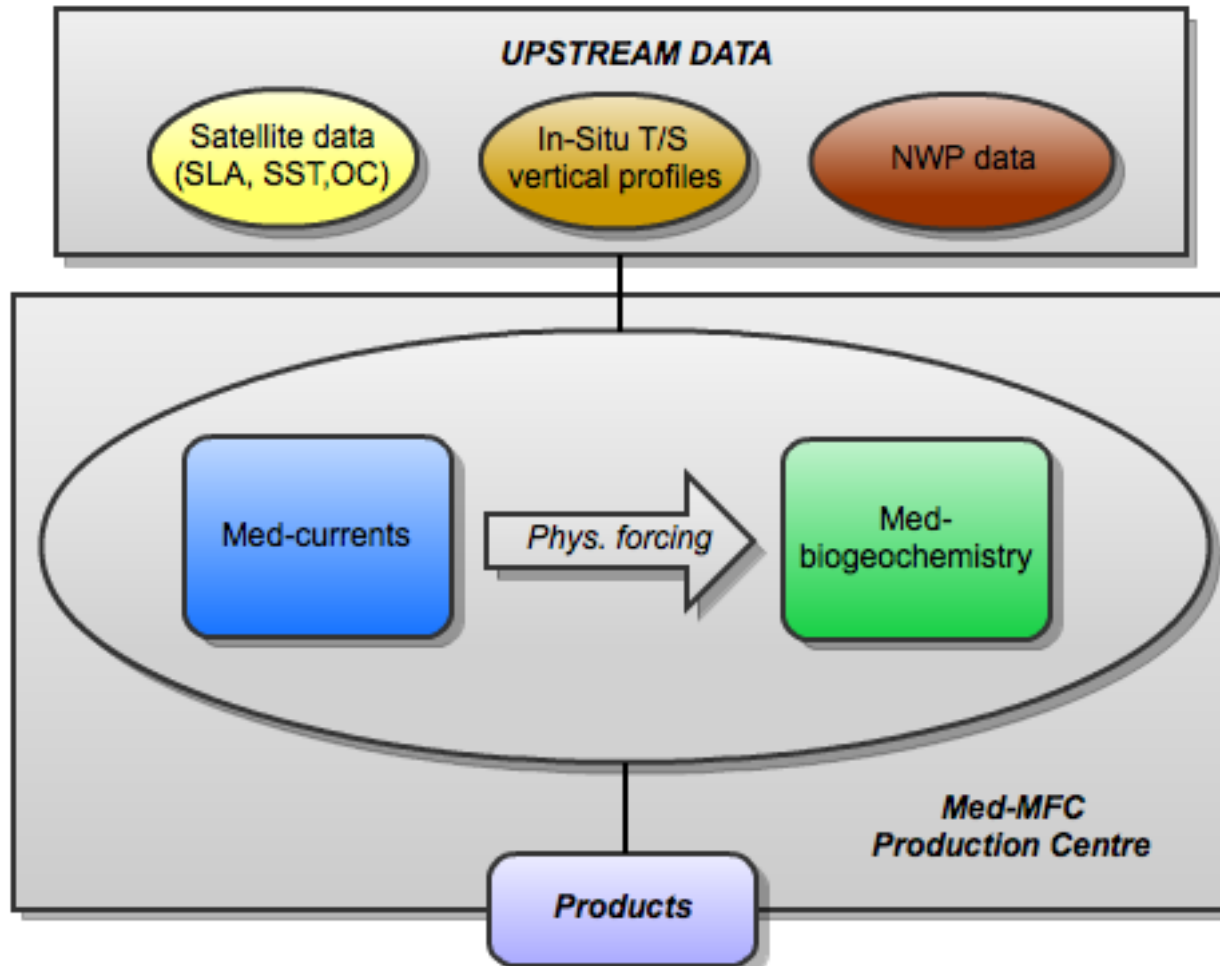
I.M.E.D.E.A
Institut Mediterrani d'Estudis Avançats

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

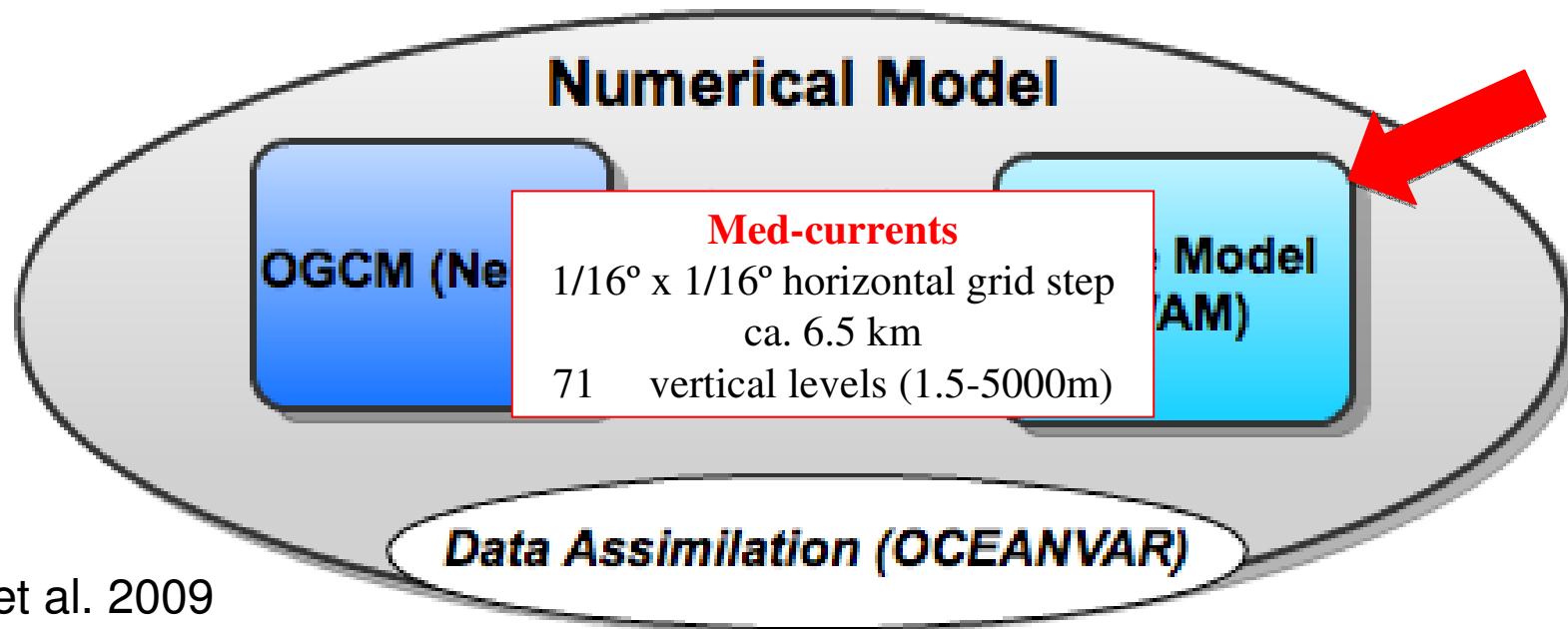
NIB
NATIONAL INSTITUTE OF BIOLOGY

MFS components



MFS physical component



Oddo et al. 2009

Tonani et al. 2008

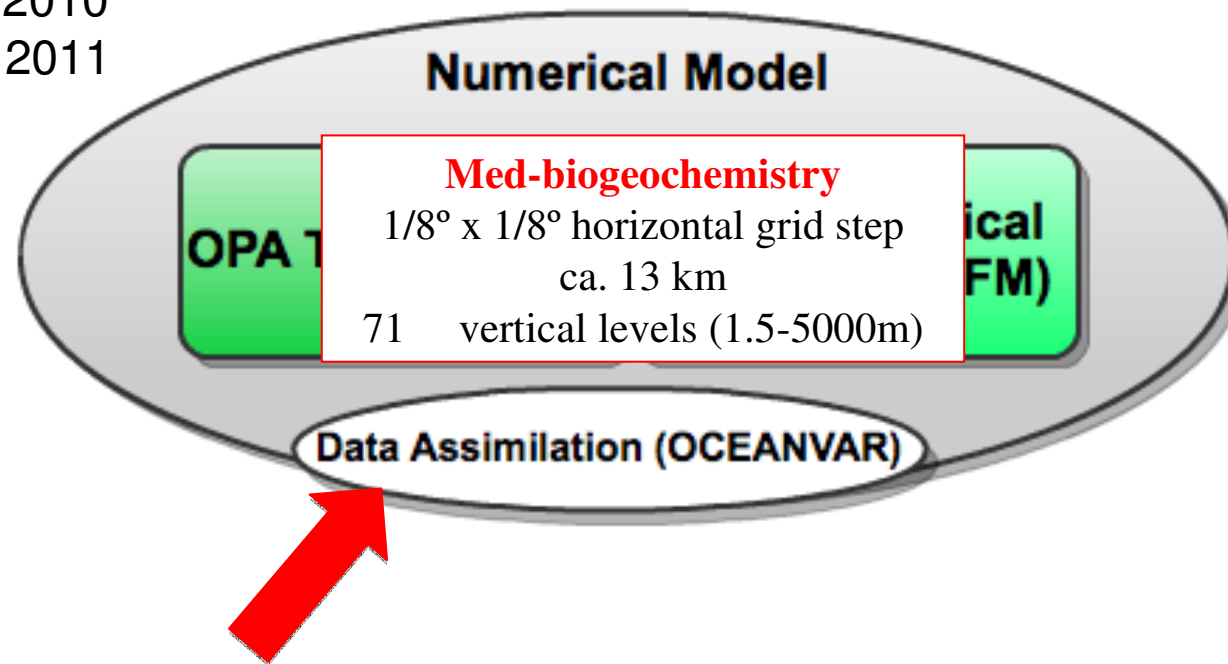
Dobricic et al. 2008

Wind drag coefficient=

neutral component (compute by Wave model) and turbulent part

MFS biogeochemical component

Lazzari et al. 2010
Teruzzi et al. 2011



Assimilation of available surface chlorophyll concentration measured by Satellite

MEDSEA-ANALYSIS-FORECAST-

- Sea Surface Height
- Temperature
- Salinity
- Currents

- Stokes drift currents
- Wavenumber



Med-MFC-currents

MEDITERRANEAN SEA PHYSICS ANALYSIS AND FORECAST

The Mediterranean Sea Physics Analysis and Forecast (Mediterranean Sea Physics Analysis and Forecast) is produced by the Institute for Marine and Coastal Studies (INGV) and the Institute for Oceanography and Applied Geophysics (IOAG). The analysis is performed daily: 10-day forecast, weekly: 15-day analysis, once: reanalysis. The analysis is performed once a week and is the operational nominal product for the Mediterranean Sea.

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MEDSEA-FORECAST-BIO-006-002

- Chlorophyll
- Nutrients
- Dissolved Oxygen conc.
- Primary production
- Phytoplankton biomass

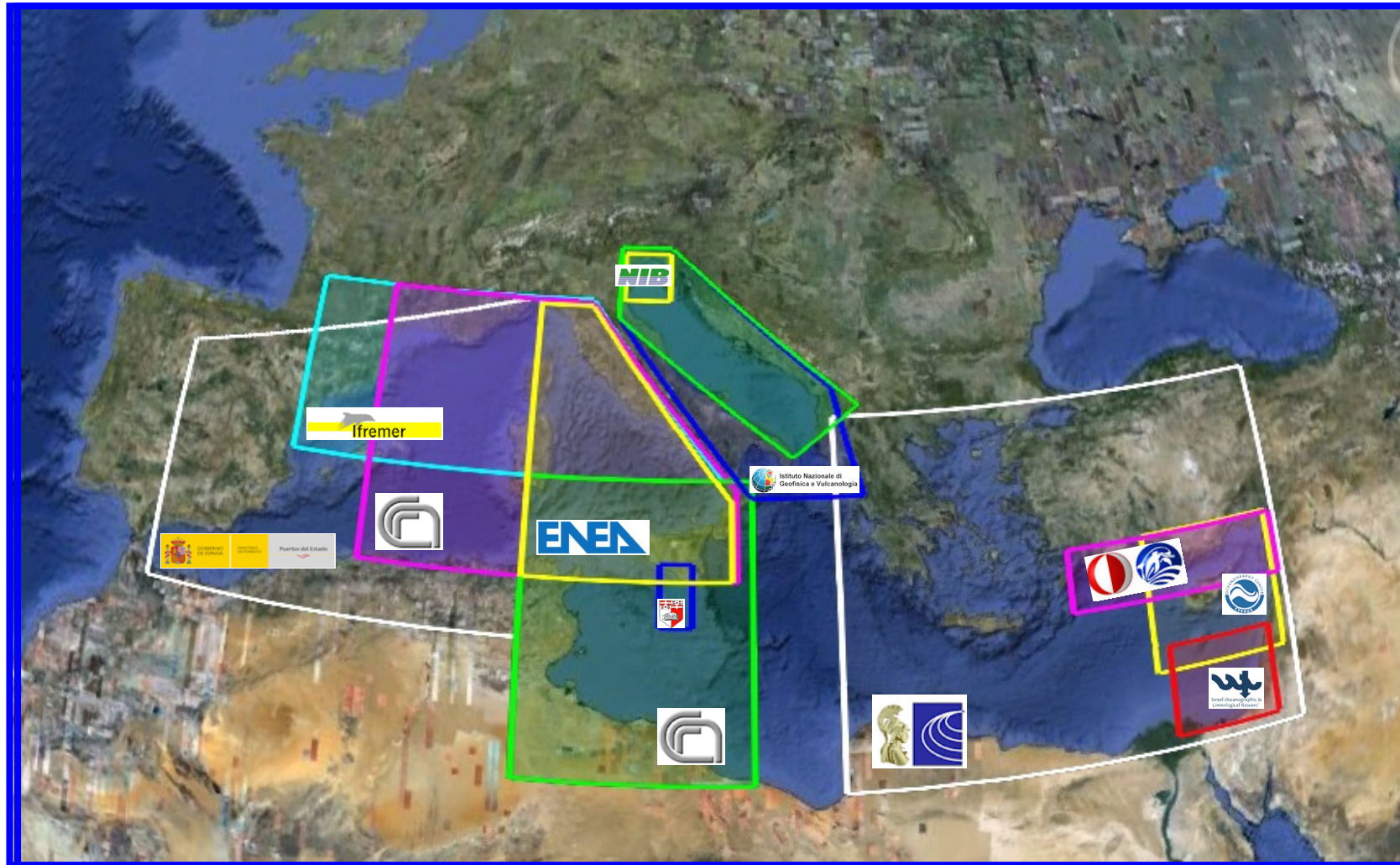
Med-MFC-biogeochemistry

MEDITERRANEAN SEA BIOGEOCHEMISTRY FORECAST


The Mediterranean Sea Biogeochemistry Forecast (Mediterranean Sea Biogeochemistry Forecast) is produced by the Institute for Oceanography and Applied Geophysics (IOAG). The analysis is performed bi-weekly: 10-day forecast, once: analysis. The analysis is performed bi-weekly and is the operational nominal product for the Mediterranean Sea. The analysis is performed bi-weekly and is the operational nominal product for the Mediterranean Sea. The analysis is performed bi-weekly and is the operational nominal product for the Mediterranean Sea.

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MFS users: from basin scale to coastal operational systems

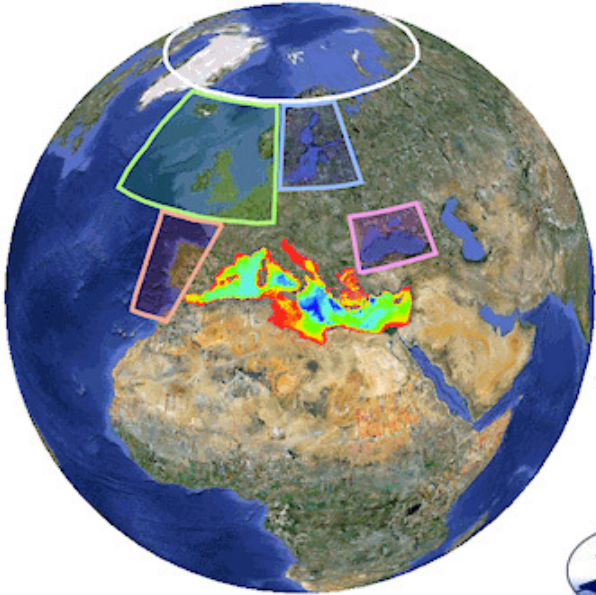


<http://gnoo.bo.ingv.it/myocean>



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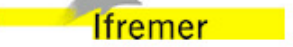


MFC-Currents
Forecast

MFC-Biogeochemistry
Forecast

Cal/Val
System



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MOMAR, 18 April 2012, Livorno, Italy

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Evaluation
NRT Evaluation
Marine Ecosystem
Forecast
Data Access

Related Links
myOcean
GNOO
Italian National
Forecast MFS
Italian National
Forecast AFS

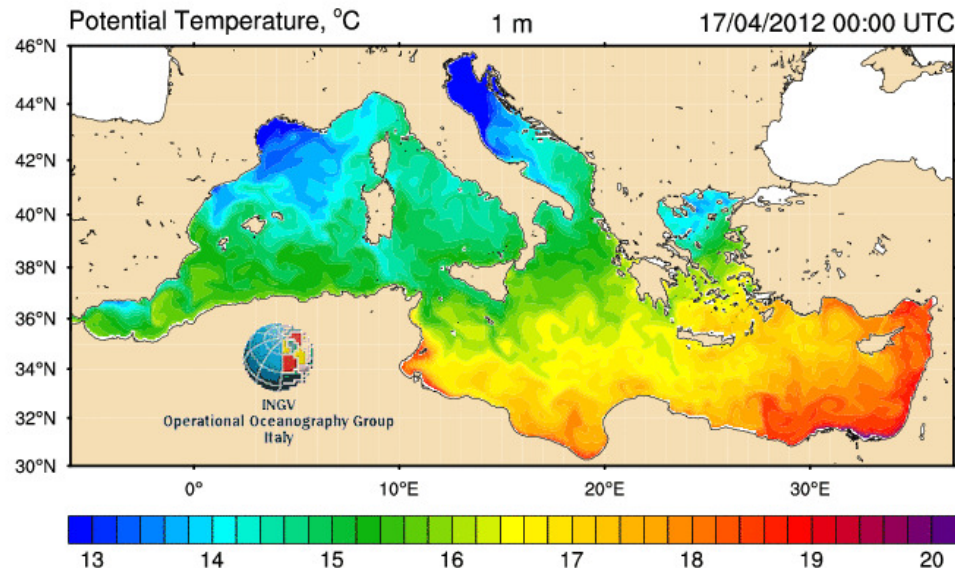
MFS Analysis

The analysis is computed once a week and the last seven days of analysis are released.
Daily mean maps are an average from 12:00 to 12:00 of the next day.
This page presents maps from 03/04/2012 12:00 UTC to 10/04/2012 12:00 UTC.
The last update was done at 11/04/2012 10:12 UTC

Mixed Layer Depth is a depth where potential density exceeds the potential density at 10 m by 0.01 kg/m³.
The bottom depth is assigned if there is no such value.

Volume Transports Transects

Date: 04/04/2012 00:00 UTC Region: Mediterranean Variable: Potential Temperature Depth: 1 m



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Content:

- maps (forecast and analysis)
- evaluation

Update frequency:

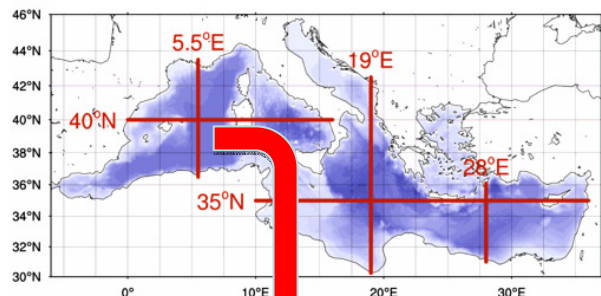
- daily for forecast
- weekly for analysis and evaluation

TRANSECTS (<http://gnoo.bo.ingv.it/myocean>)

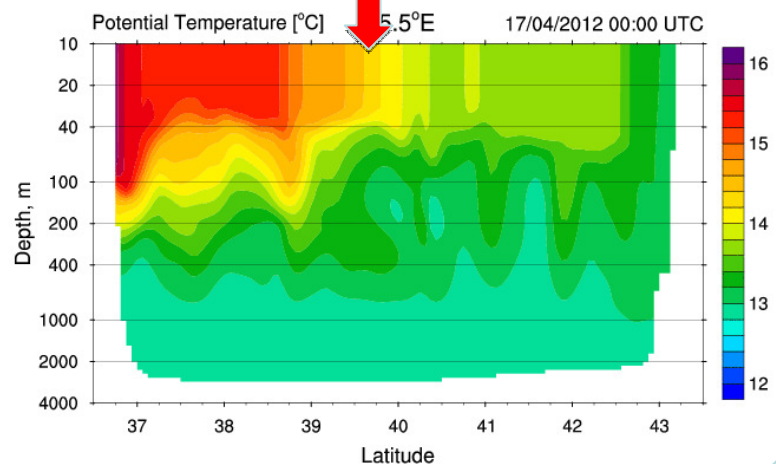


MFS Analysis Transects

The analysis is computed once a week and the last seven days of analysis are released.
Daily mean transects are an average from 12:00 to 12:00 of the next day.
This page presents transects from 03/04/2012 12:00 UTC to 10/04/2012 12:00 UTC.
The last update was done at 11/04/2012 10:12 UTC



Date: 04/04/2012 00:00 UTC
Variable: Potential Temperature
Transect: 5.5 E



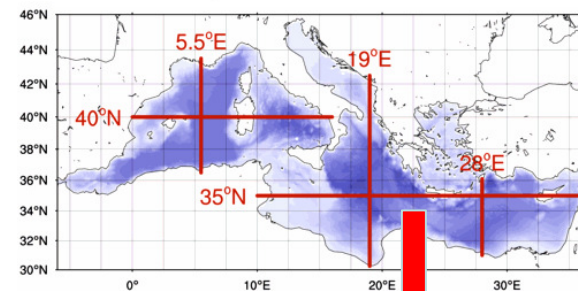
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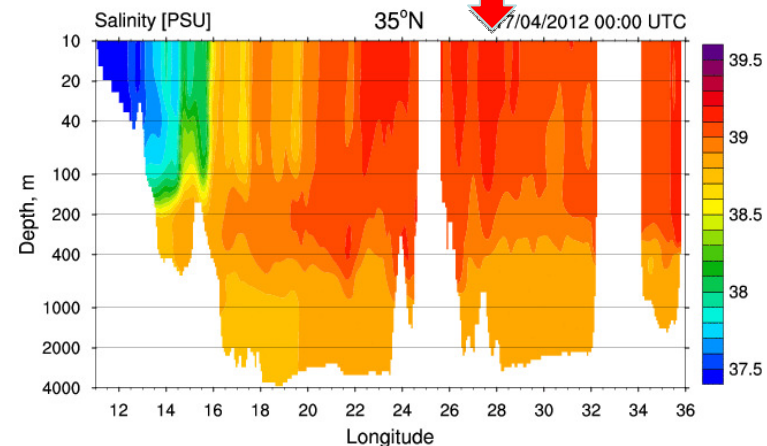


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Variable: Potential Temperature
Transect: 5.5 E



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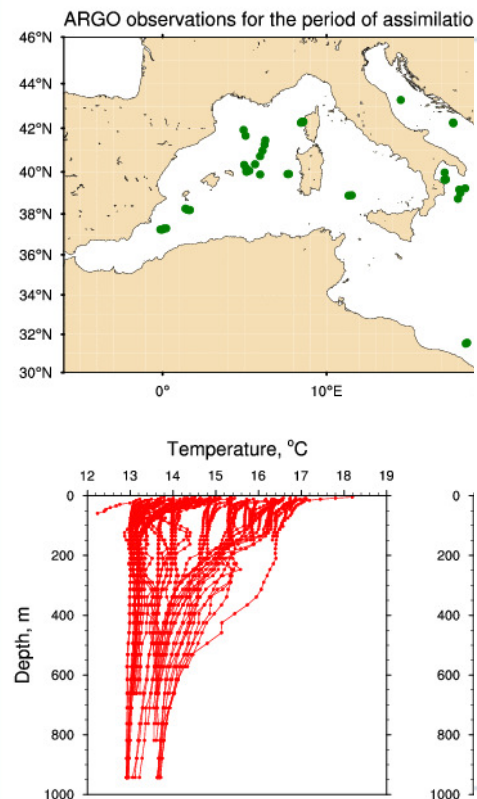
ASSIMILATED DATA: <http://gnoo.bo.ingv.it/myocean>

Assimilated Data

The data assimilated in the analysis are
 - Satellite along track Sea Level Anomaly (SLA);
 - Satellite optimally interpolated Sea Surface Temperature (SST);
 - In situ vertical profiles of temperature and salinity by VOS XBTs, A
 This page presents the data assimilated in the last analysis cycle (15 days)
 from 26/03/2012 12:00 UTC to 10/04/2012 12:00 UTC. The last update

[ARGO floats](#) [Sea Level Anomaly](#) [Sea](#)

ARGO observations for the last



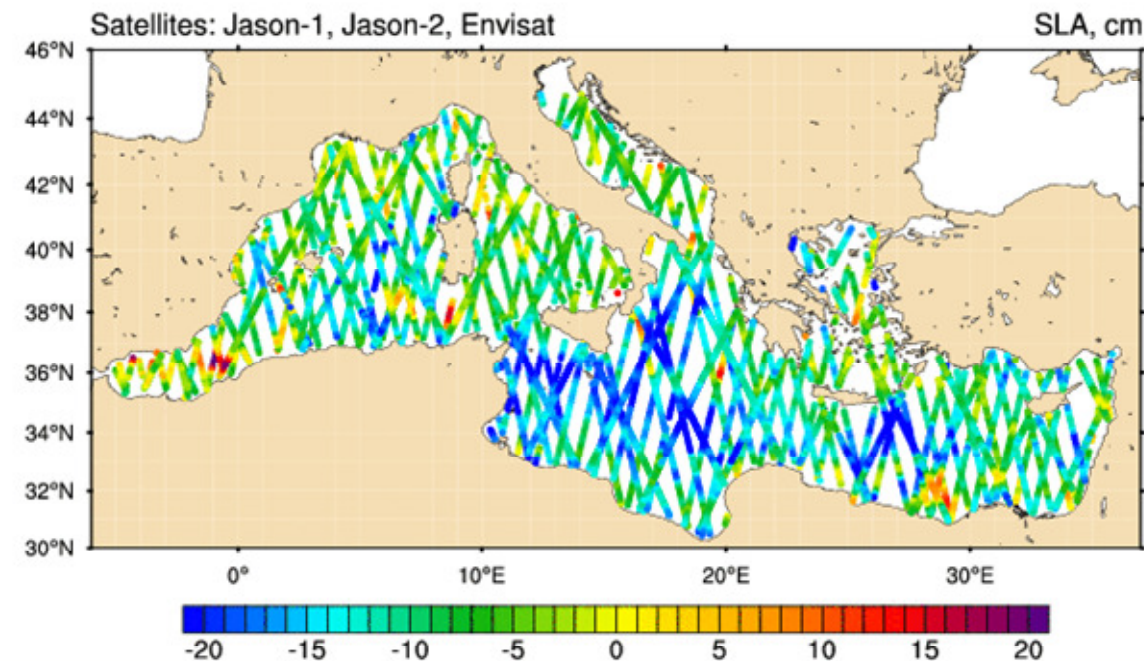
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Assimilated Data

The data assimilated in the analysis are
 - Satellite along track Sea Level Anomaly (SLA);
 - Satellite optimally interpolated Sea Surface Temperature (SST);
 - In situ vertical profiles of temperature and salinity by VOS XBTs, ARGO floats and CTD.
 This page presents the data assimilated in the last analysis cycle (15 days)
 from 26/03/2012 12:00 UTC to 10/04/2012 12:00 UTC. The last update was done at 11/04/2012 10:29 UTC.

[ARGO floats](#) [Sea Level Anomaly](#) [Sea Surface Temperature](#) [VOS XBTs](#)

Sea Level Anomaly along tracks for the last assimilation period

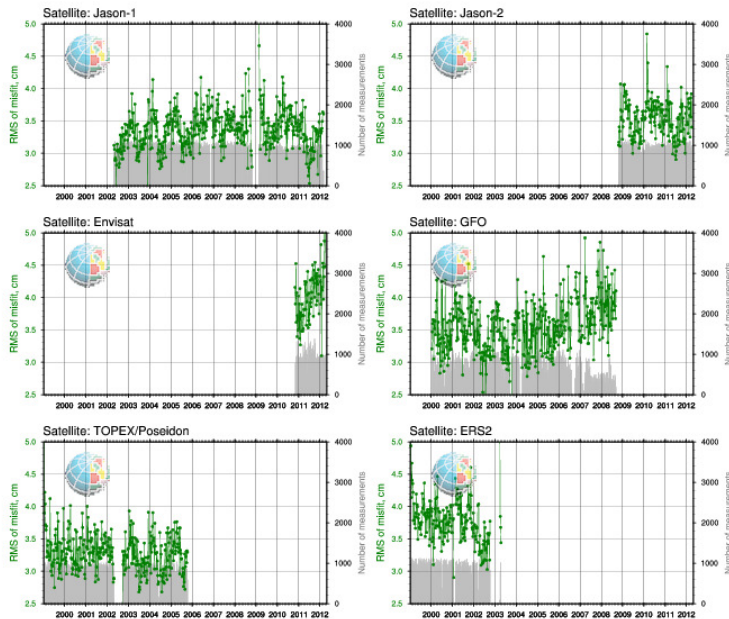
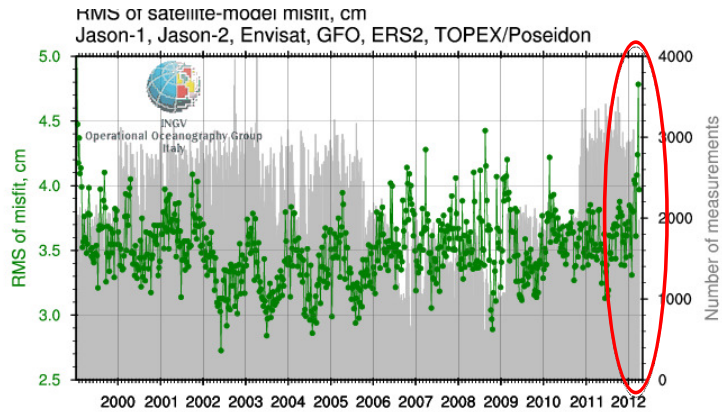


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EVALUATION: <http://gnoo.bo.ingv.it/myocean>

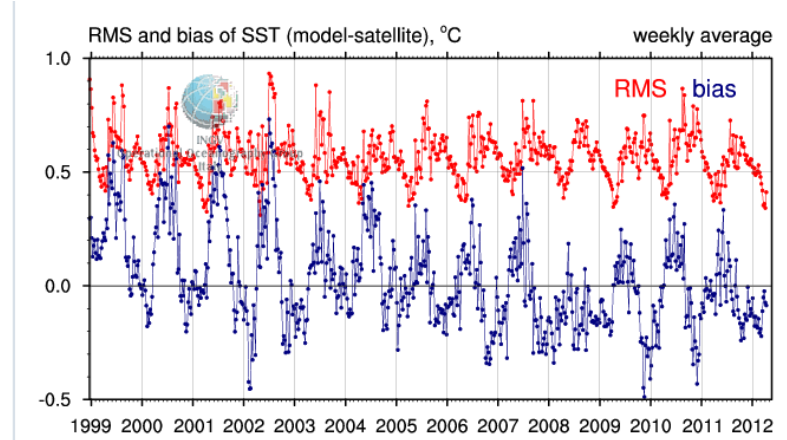
RMS of satellite-model misfit



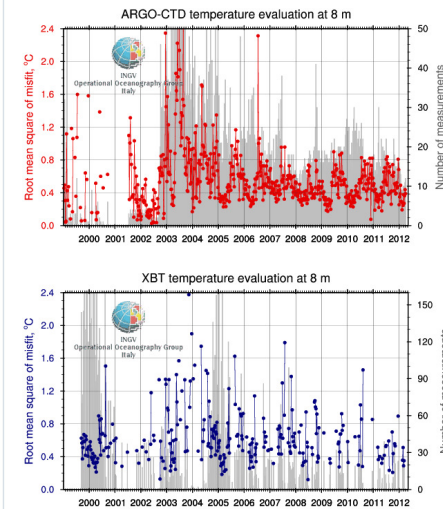
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RMS and bias of SST (model-satellite)



RMS of T Argo-model misfit at 8m



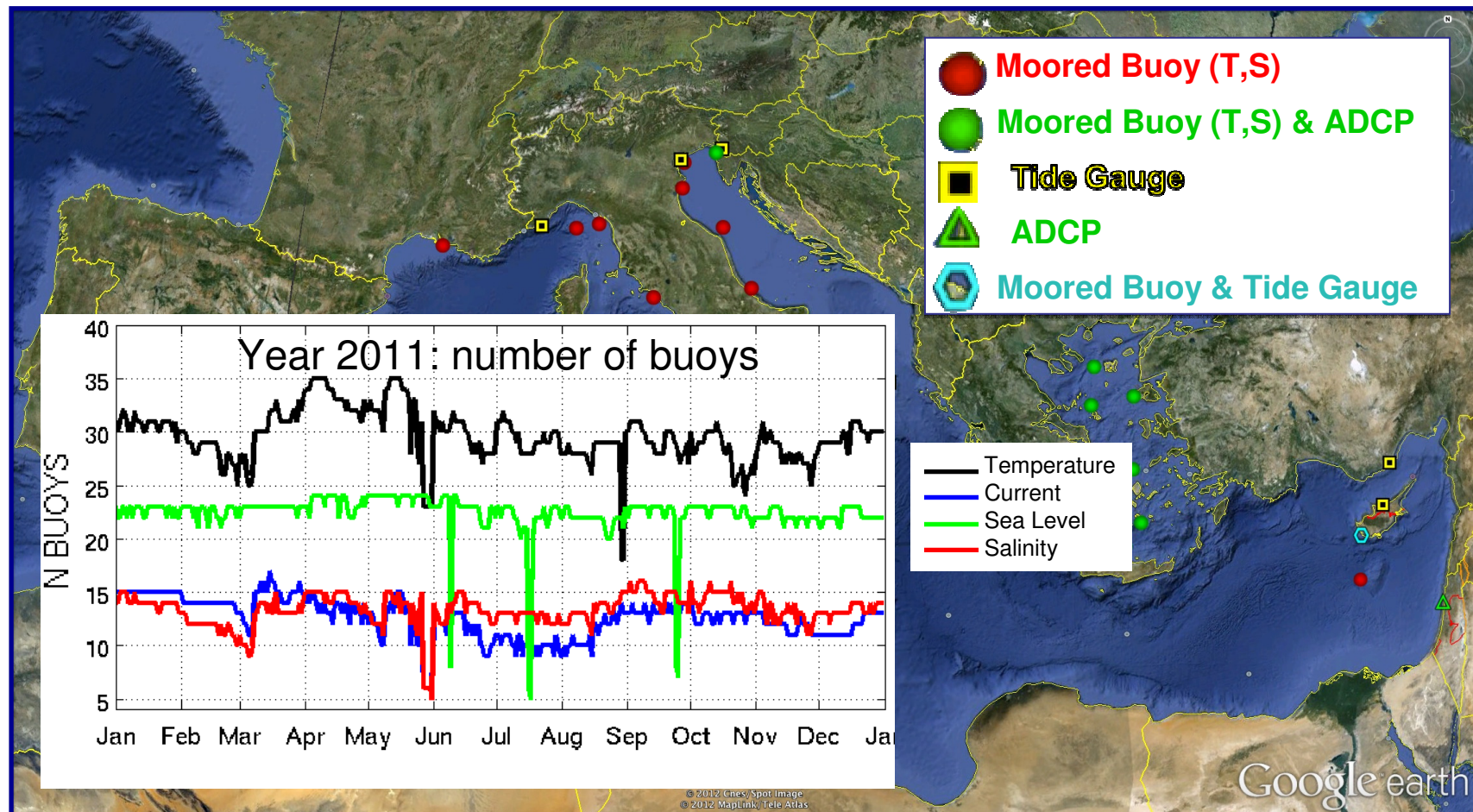
NRT Products evaluation



* Mediterranean Operational Oceanography Network



MyOcean-MOON CalVal network



MyOcean-MOON CalVal SW

MED_MFC-Currents
Long Time Series
Evaluation



CalVal myOcean WP9



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MED_MFC-Biogeochemistry
Chlorophyll Evaluation



Athos

Moored buoy

Latitude: N 39°57'50"
Longitude: E 24°43'12"
Sea bottom depth: 212 m

Temperature: 1m 20m 50m 75m
100m
Salinity: 1m 20m 50m 75m
100m
Currents: 1m

Begin: 2010-03-25
End: 2012-02-17
Interval: 3 hours

Seawatch buoy. Quality control by
range check, comparison with
regional climatology, spike detection
and stationary test.

[Web page](#)

Buoy Time Series

Variable: **Temperature**
Salinity

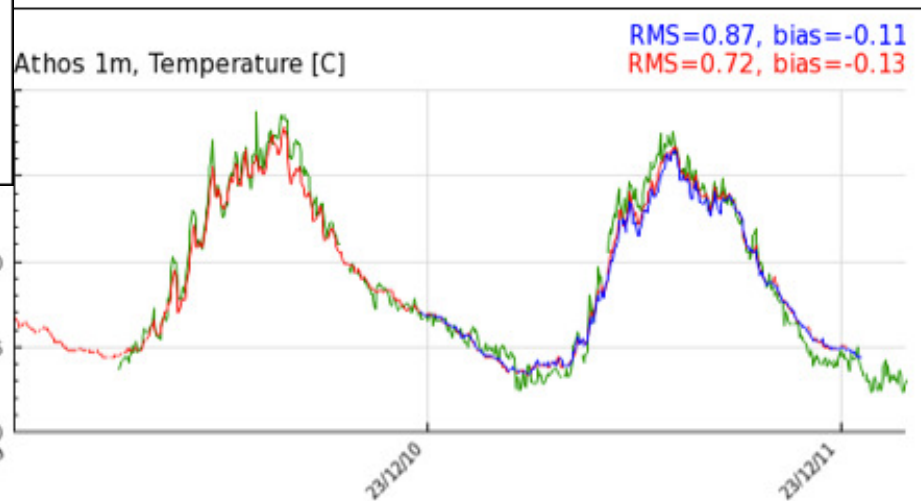
1st datasource: **In situ daily mean**

2nd datasource: MFS National sys

3rd datasource: MFC Currents V1 AN
MFC Currents V1 FC -3d

Organisation: ALERMO FC
ALERMO AN
SCRM AN
POSEIDON FC
CYCOFOS FC
WORM AN
SELIPS FC
ROSARIO FC
NAPOM FC

Buoys: S1
ODAS (W1M3A)
Cabrera
Enderrocat
Athos
E1-M3A
Kalamata
Lesvos
Mykonos
Pylos
Santorini

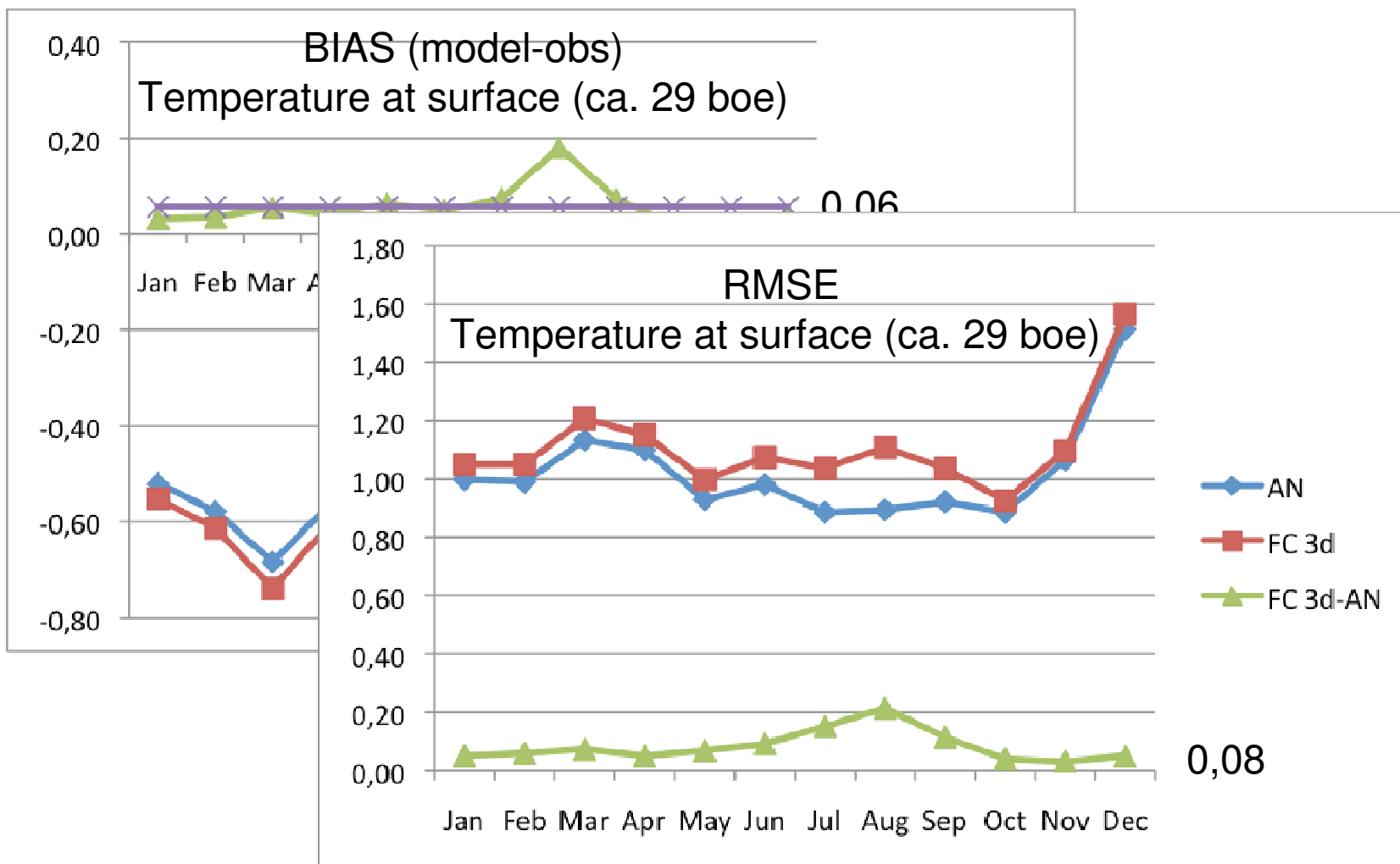


Buoy Profiles

About



MyOcean-MOON CalVal SW: year 2011



Iera-Petra gyre

General circulation



Pinardi et al. 2004



Iera-Petra gyre



Conclusion:

MFS products are delivered to the Italian Coast Guard for the Costa Concordia emergency management

