



Argo and the GMES Marine Core Service

the MyOcean example

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Marine
Core
Service

Talk outline

- MyOcean project presentation and articulation with Euro-ARGO
 - The challenge, the market, the mission, the offer, the production, the service
- Illustration of the impact of ARGO on MyOcean system (monitoring and forecasting) performances
 - The Arctic Monitoring and Forecasting system (Norway)
 - The Global MFC (France)
 - The Mediterranean MFC (Italy)
 - The Global MFC backup system (UK)
- 2 examples of examples showing how model simulations (DRAKKAR) can help interpret ARGO data



Marine Core Service

What is « MyOcean » ?

■ MyOcean is a PROJECT

- An FP7 project, the GMES « Marine Fast Track » project
- 3 years ; has started on 1st April 2009, will end 31 March 2012
- Cost 20 M€/year, with 11 M€/year EC funding

- **2009 – 2010 – 2011 – (2012)**

■ MyOcean is a SERVICE

- The main component of the « **GMES** » Marine Core Service
- Global & regional Ocean monitoring and forecasting

- **Marine Core Service**

■ MyOcean is a TEAM of European partners

- 61 partners, out of 29 countries ; an effort of ~150 person/year
- 20 core partners committed for operations; european best monitoring and forecasting systems

- **Pan-European team**



The challenge

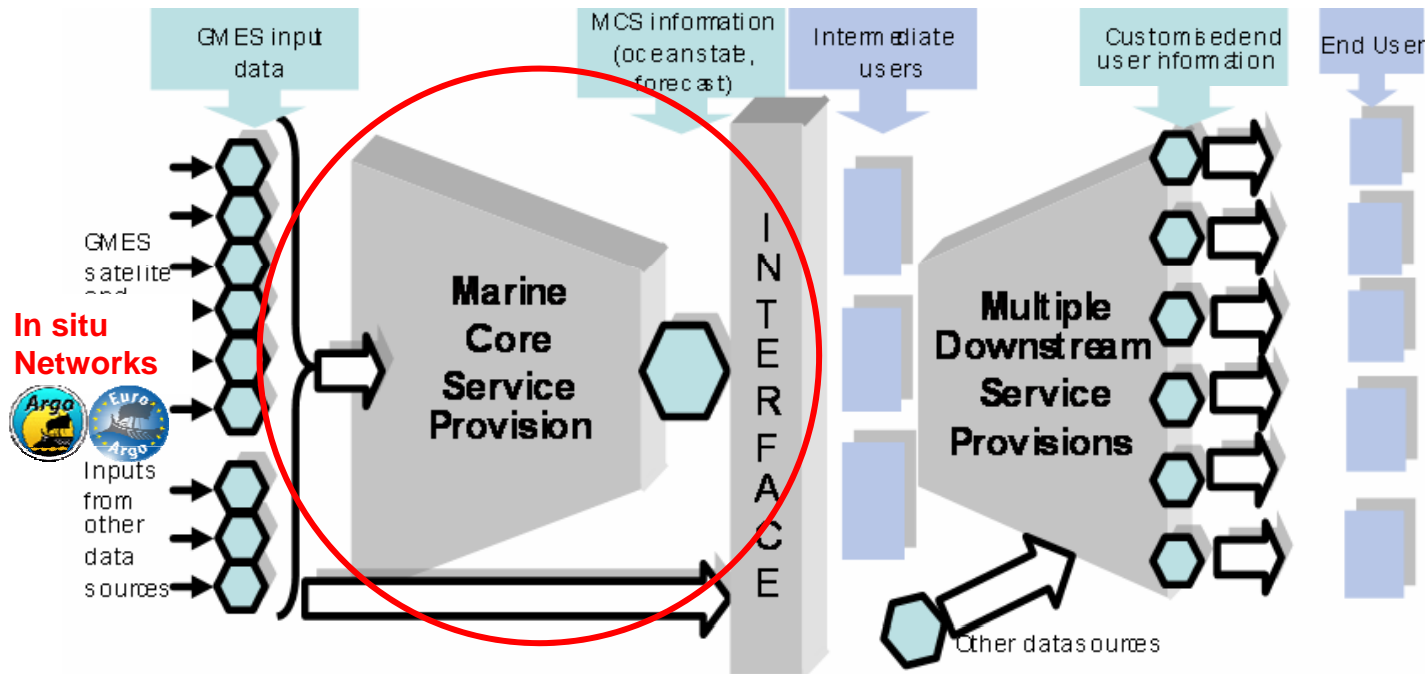
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A European Marine “core” service

seeking for the “european added value”

Marine Core Service



From GMES MCS
Implementation Group report
by P.Ryder & al, oct 2005

- In 3 years, create the maximum “core” value for the users by providing on a reliable basis *“the common denominator data for all users in the marine sector, in other words the information for existing & new downstream services.”*

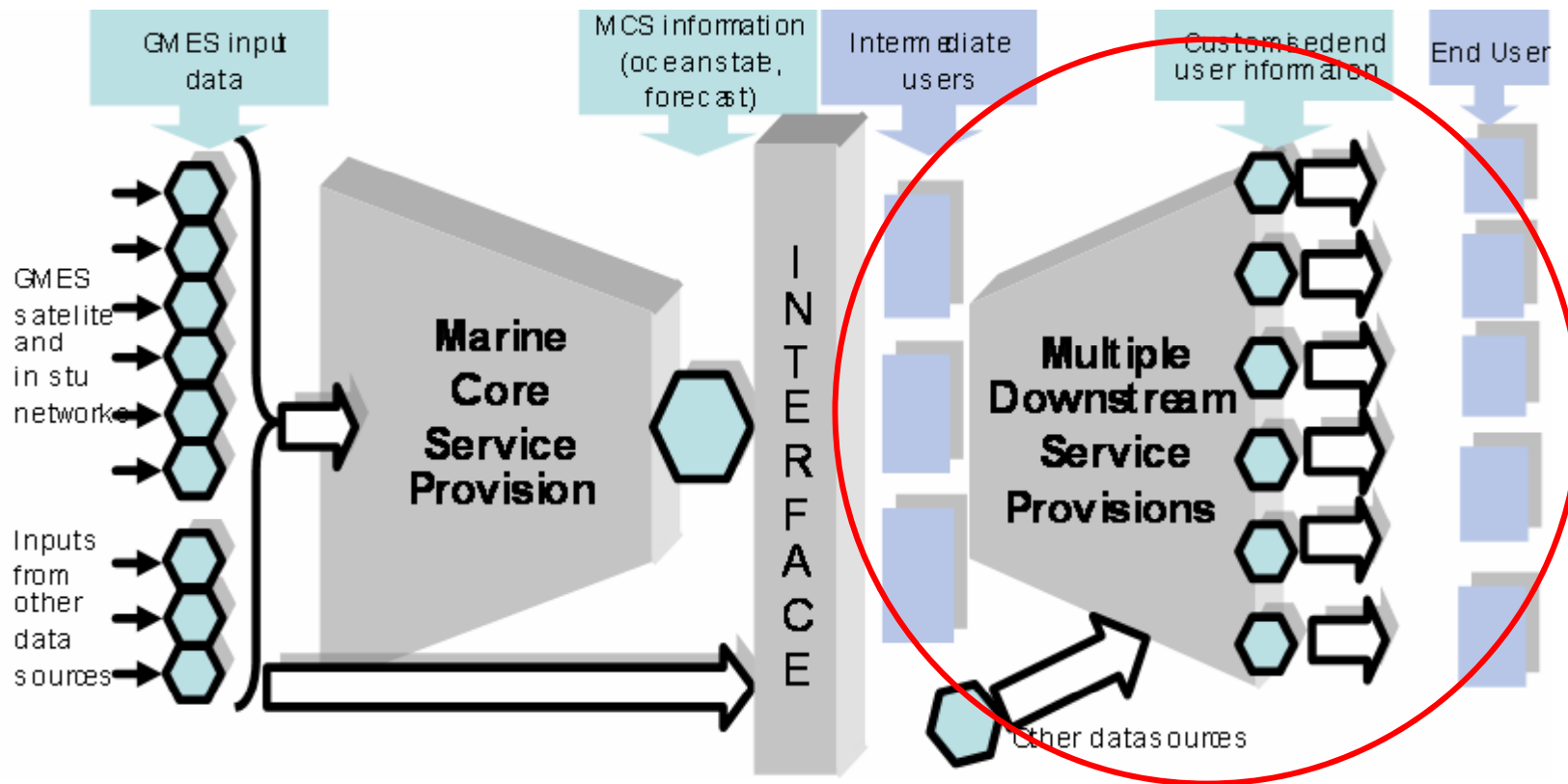


The market

GOAL: Collecting and understanding users' requirements, to adjust the MyOcean offer

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Users of the MyOcean core service are specialized **service providers** of the downstream sector.

- 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, ..)

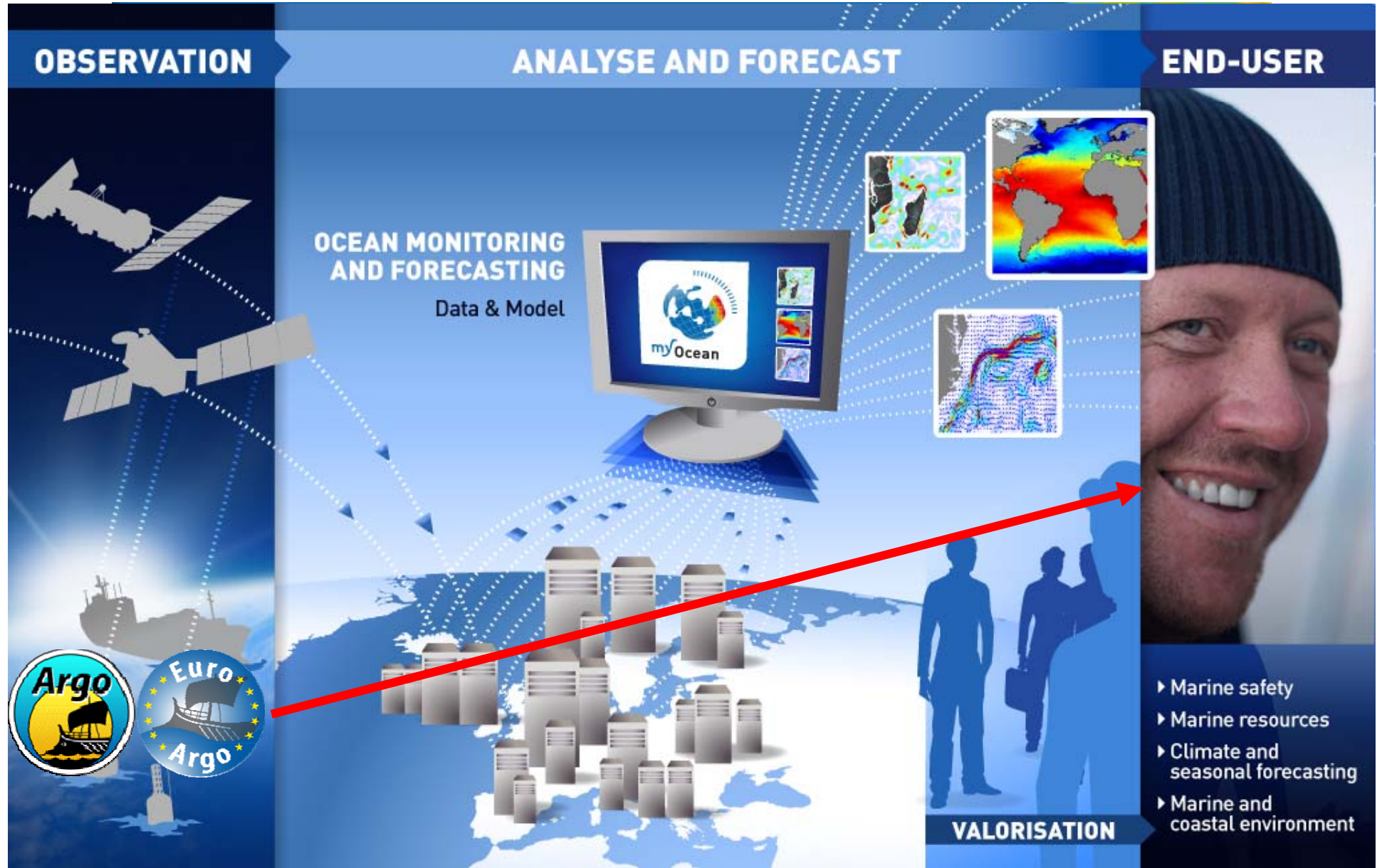


The mission

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The Mission





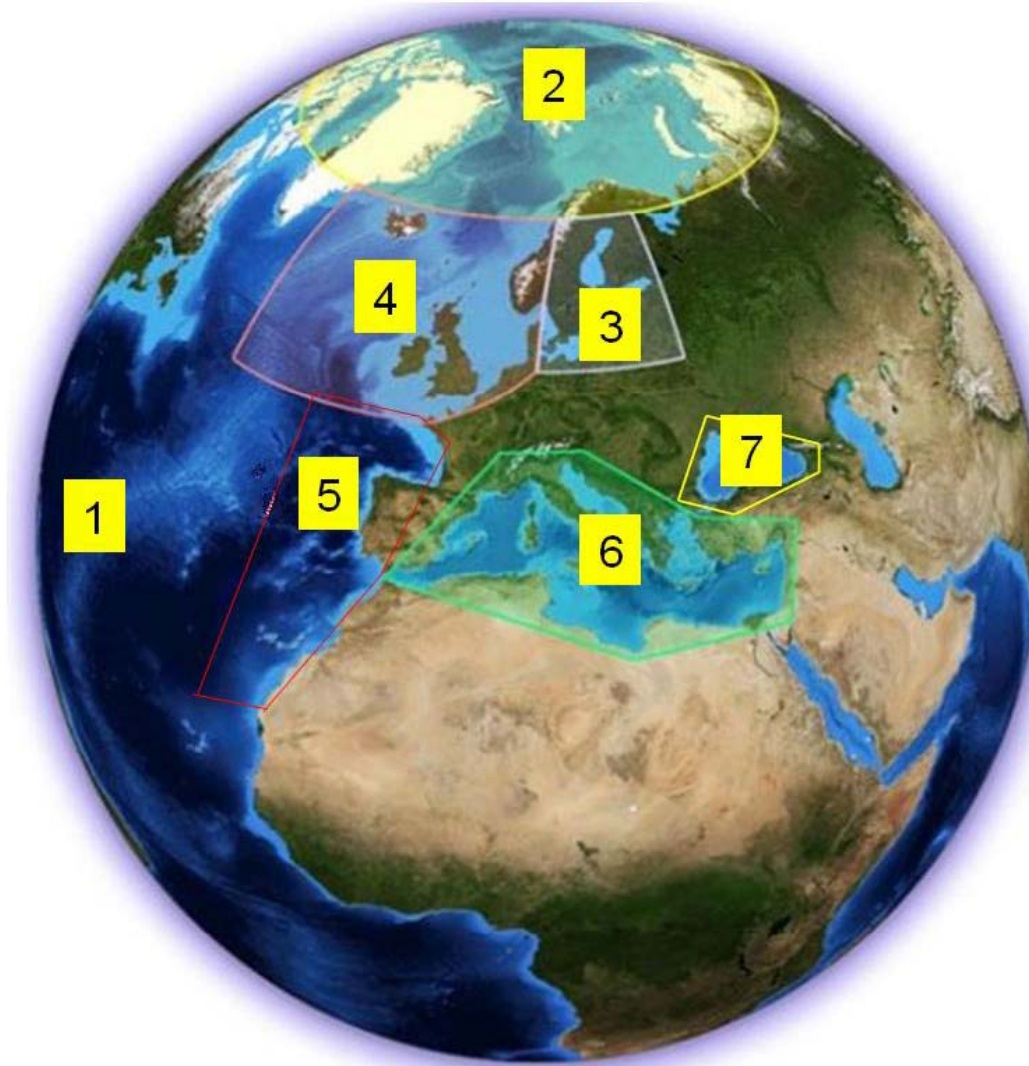
The offer

GOAL: Proposing a clear offer to users,
with the best core information available

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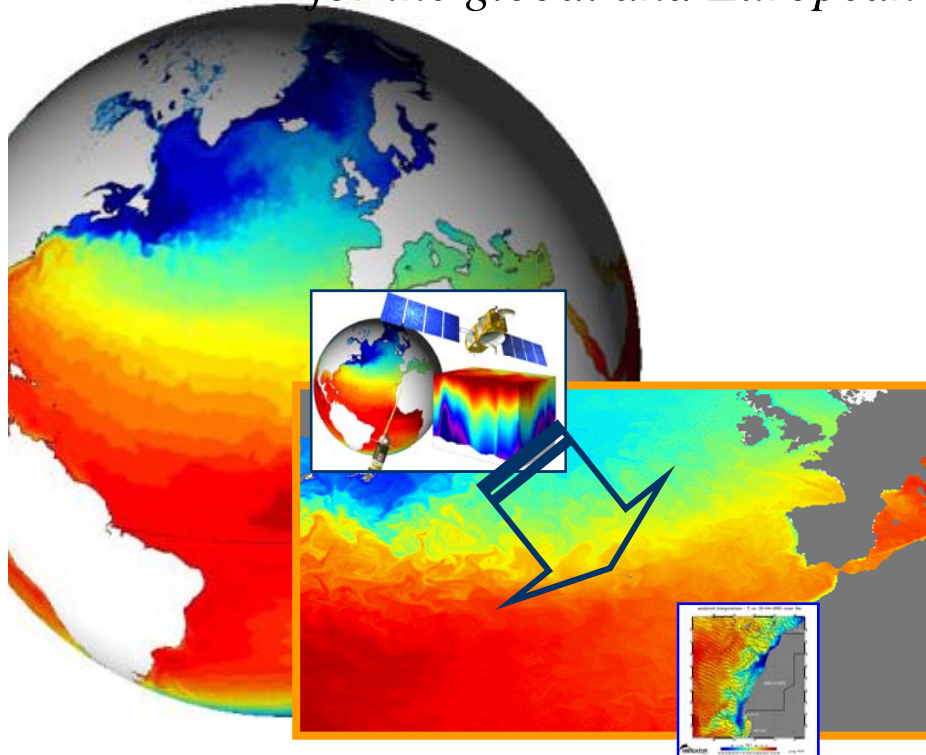
The MyOcean value **The Global Ocean + 6 European Seas**



- 1. Global
- 2. Arctic
- 3. Baltic
- 4. NWS
- 5. IBI
- 6. Med Sea
- 7. Black Sea

The MyOcean offer

- **MyOcean** will
 - “*deliver regular and systematic reference information (processed data, elaborated products) on the state of the oceans and regional seas:*
 - *at the resolution required by intermediate users & downstream service providers, of known quality and accuracy,*
 - *for the global and European regional seas.*”



- Physical state of the ocean, and primary ecosystem
- For global ocean, and main European basins and seas
- Large and basin scale ; mesoscale physics
- Hindcast, Nowcast, Forecast
- Data, Assimilation and Models



The production

GOAL: Ensure the best production of the « core » information through the involvement of first-rank players in Europe.

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The Production Units

5 Thematic Assembly Centres

- Sea Level
- Ocean Color
- Sea Surface Temp.
- Sea Ice & Wind
- In Situ**



Observations

7 Monitoring and Forecasting Centres

- Global Ocean
- Arctic Ocean
- Baltic Sea
- Atlantic NWS
- Atlantic IBI
- Mediterranean Sea
- Black Sea

Models

Service Desk



TAC

- Sea Level
- Ocean Color
- Sea Ice & Wind
- In situ**
- Sea Surface Temperature

MFC

- MFC Global
- Arctic
- Baltic
- NW Shelves
- IBI
- Med Sea
- Black Sea

The Production Units





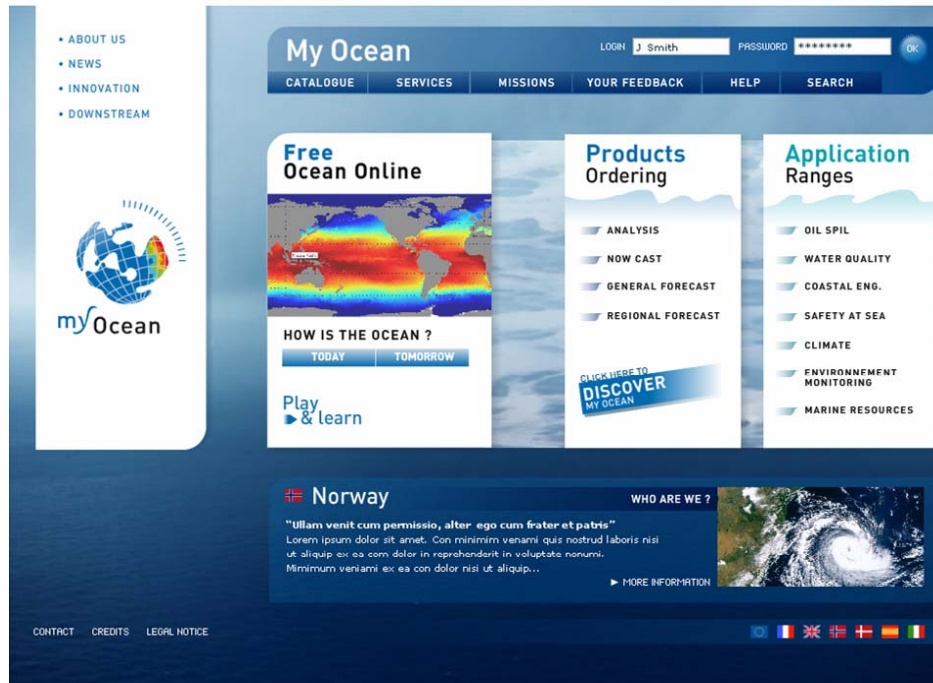
The service

GOAL: Providing an easy and reliable access
to the information

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The MyOcean value ... for the core service



- One single desk, one access point to the MyOcean pan-european information

- A pan-european **service desk**, **single** and reliable entry point for users, **connected to all** production units in Europe

- Open access
- Free access



MyOcean



- Project
- Products & Services
- User's Feedback





- Project
- Products & Services
- User's Feedback

MyOcean Products & Services

SERVICE ONLINE CATALOGUE SERVICE DESK DATA POLICY

MYOCEAN INTERACTIVE CATALOGUE

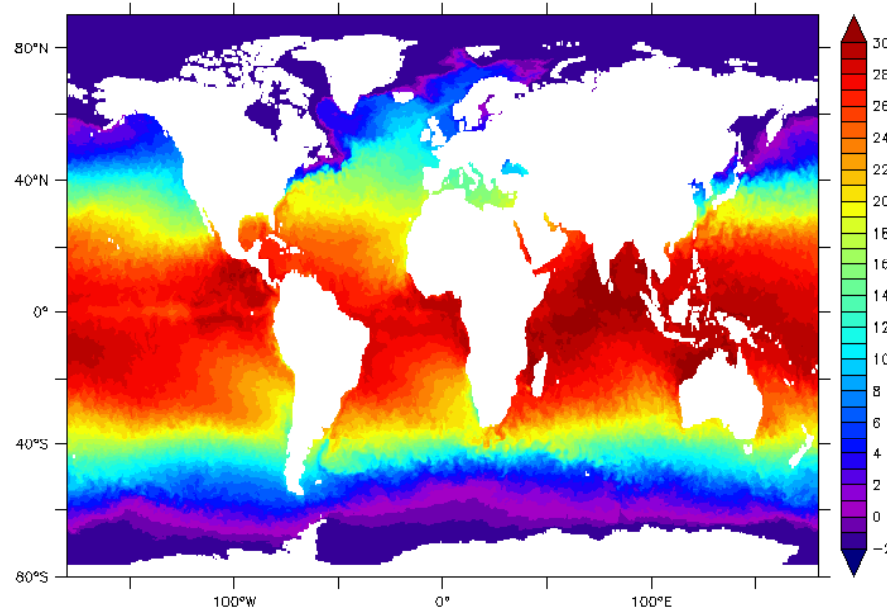
Search mode: multi-criteria or full catalogue

Full Catalog [GO >>](#)

SELECT AN AREA

SELECT A PHYSICAL PARAMETER

SELECT A PRODUCT





- Project
- Products & Services
- User's Feedback

MyOcean Products & Services

SERVICE ONLINE CATALOGUE SERVICE DESK DATA POLICY

MYOCEAN INTERACTIVE CATALOGUE

Search mode: multi-criteria or full catalogue

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SELECT AN AREA

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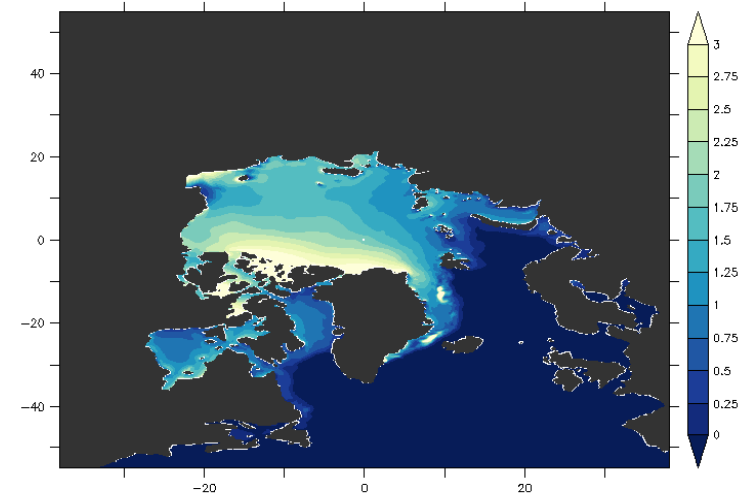


- Temperature
- Wind
- Sea ice
- Salinity

Observation



Ice Thickness (Arctic)



01/04/2009, Ice thickness



- Project
- Products & Services
- User's Feedback

MyOcean Products & Services

SERVICE ONLINE CATALOGUE SERVICE DESK DATA POLICY

MYOCEAN INTERACTIVE CATALOGUE

Search mode: multi-criteria or full catalogue

Full Catalog **GO >>**

SELECT AN AREA

SELECT A PHYSICAL PARAMETER

SELECT A PRODUCT



- Temperature
- Wind
- Sea ice
- Salinity
- Current

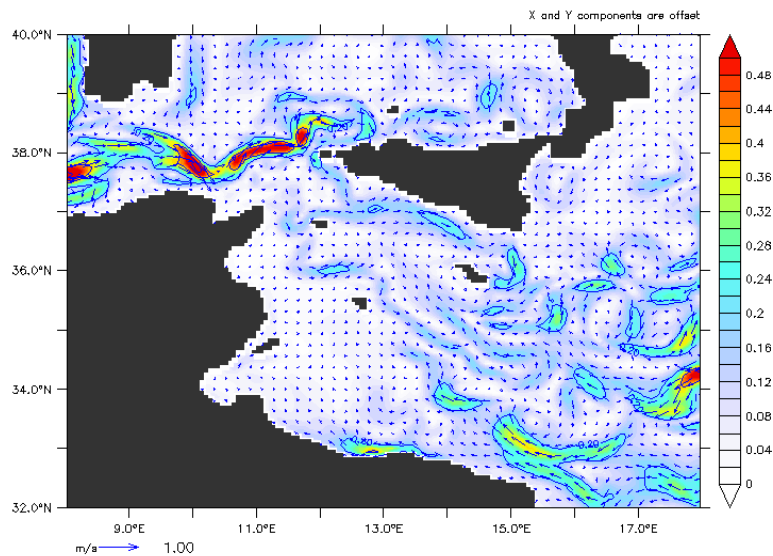
Observation



CONTACT CREDITS LEGAL NOTICE



Surface Currents (Med Sea)





myOcean

Contact point

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(Pierre BAHUREL)

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The impact of Argo in **MyOcean** systems

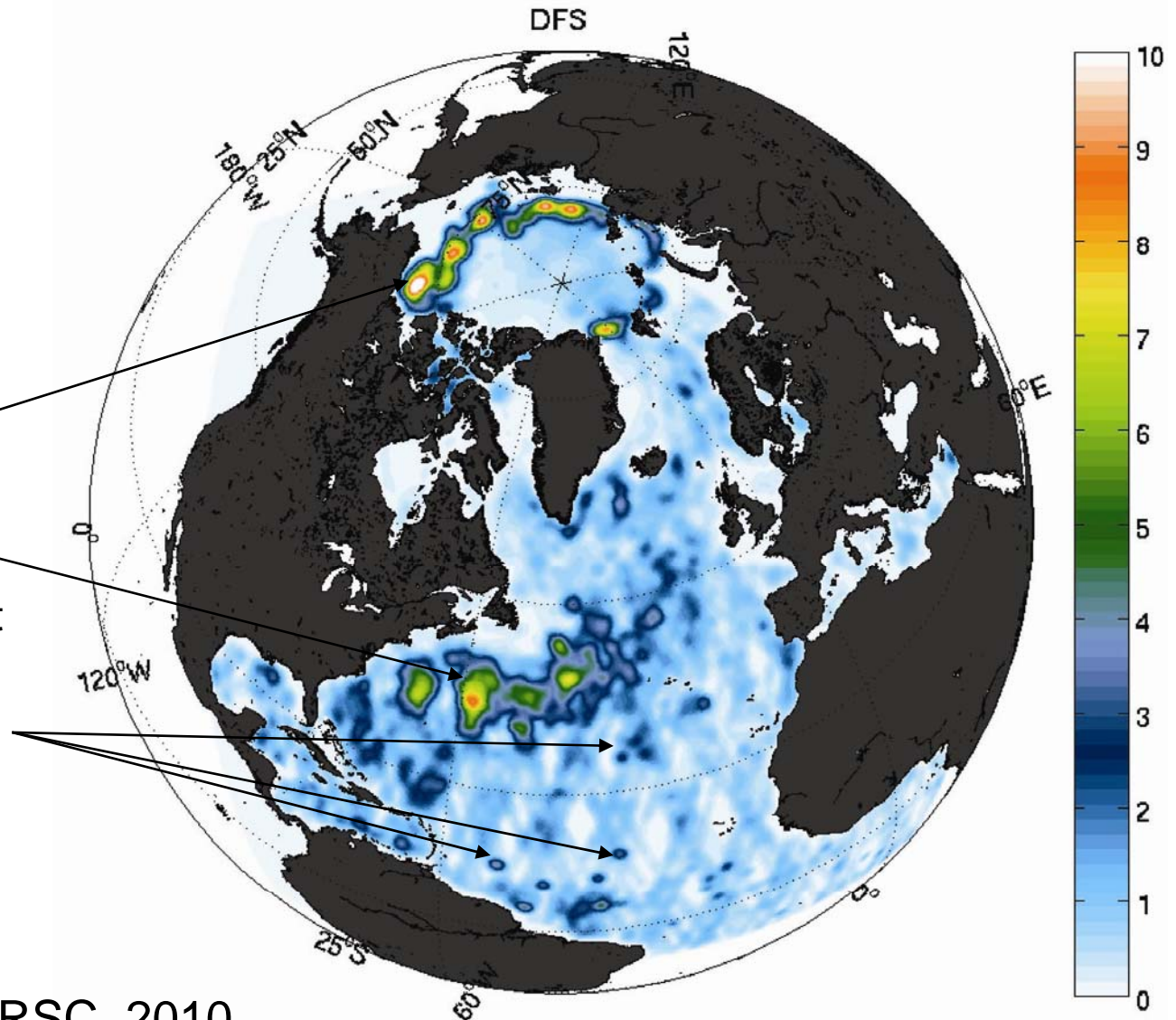
How: Showing some illustrations of the use of
ARGO data in the MyOcean Monitoring and
Forecasting Centers

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Impact of observations in the Arctic system: reduction of degrees of freedom

- DFS shows where observations have impacted the assimilation
- This is a typical assimilation update example in TOPAZ
- The update is stronger
 - close to the sea-ice edge,
 - in the Gulf Stream extension region
- We see a positive impact
 - along altimeter tracks
 - at Argo profiles location
- This shows that Argo has a positive impact

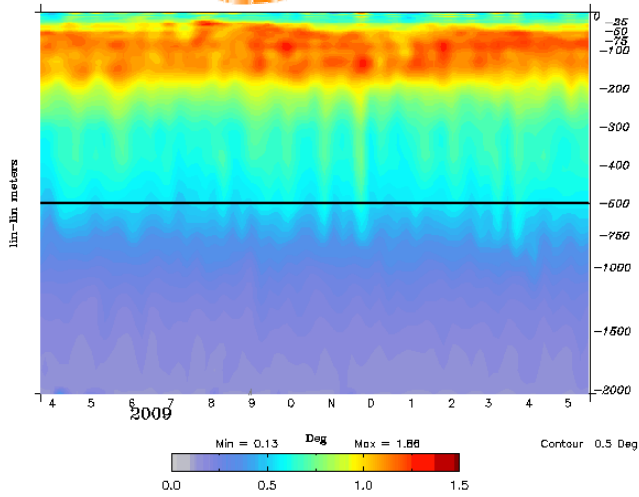




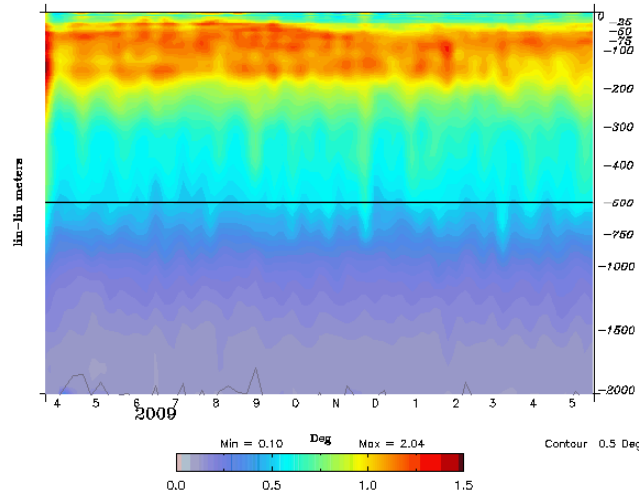
Global systems performances: Global T and S RMSDiff

Marine Core Service

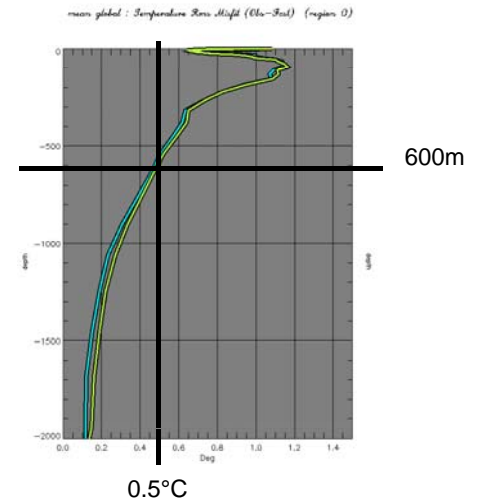
Temperature



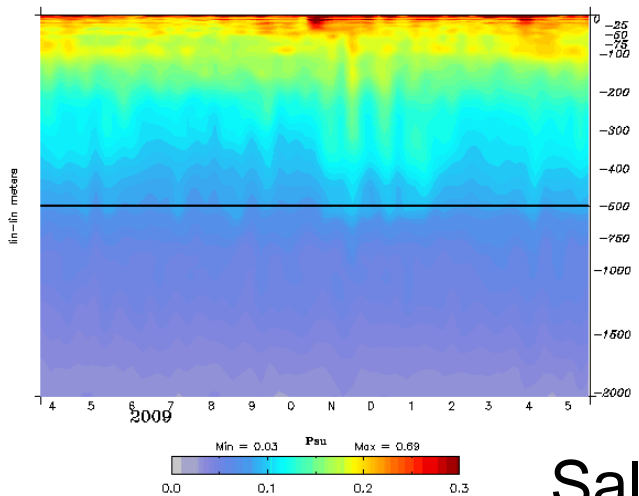
Global 1/4°



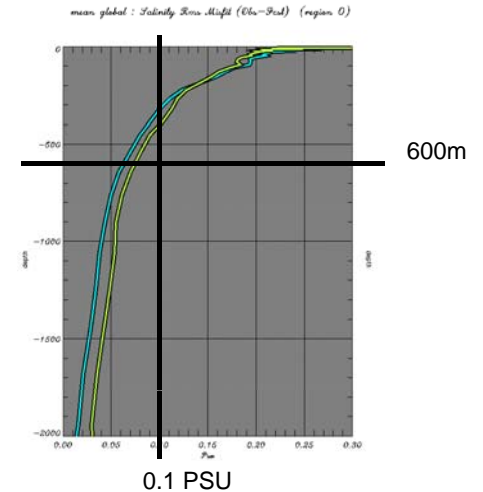
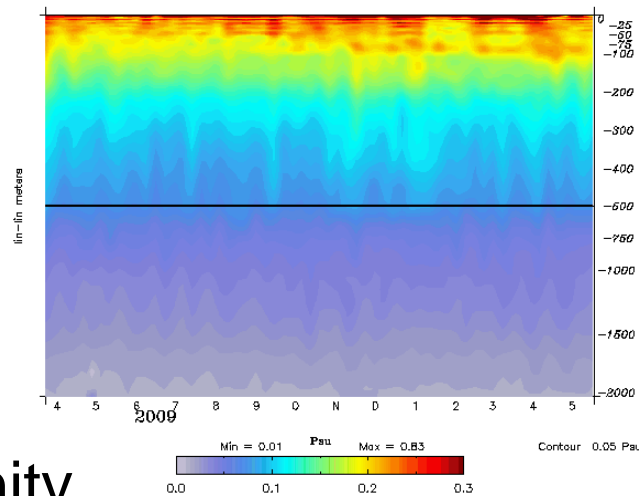
Global 1/12°



0.5°C



Salinity



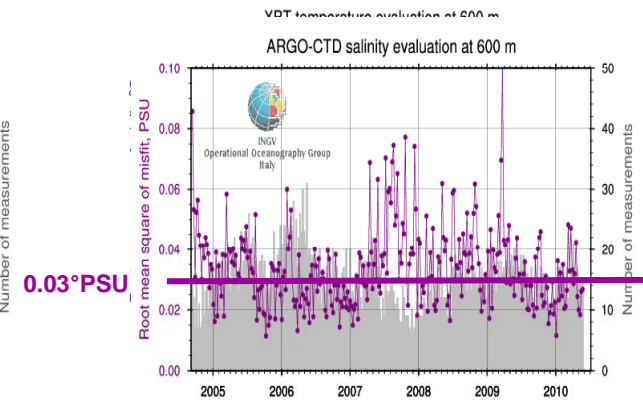
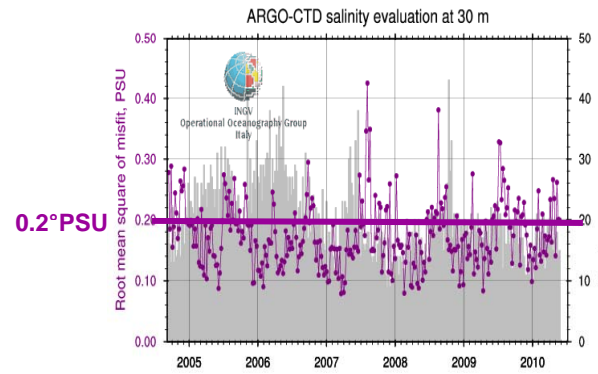
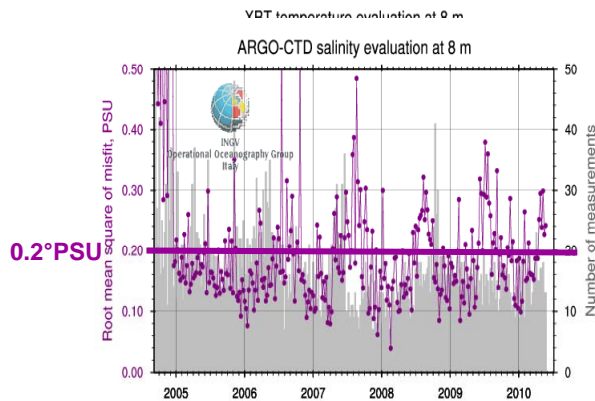
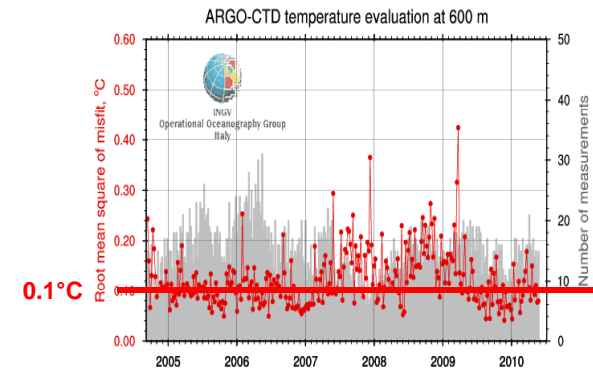
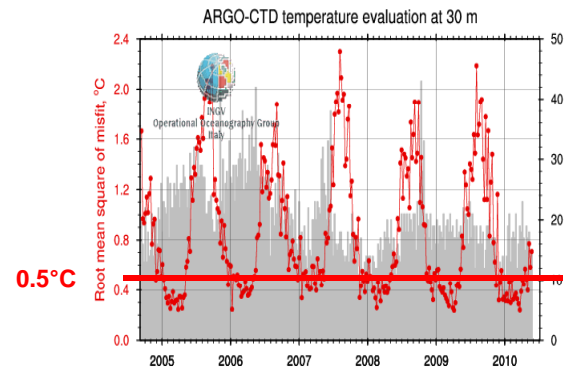
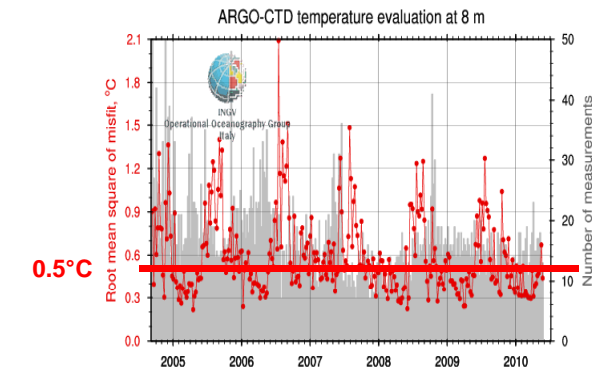
0.1 PSU

Mediterranean sea system performances: T and S RMSDIFF

Near surface (8m)

30 m

600 m



<http://gnoo.bo.ingv.it/mfs/myocean/evaluation.html>



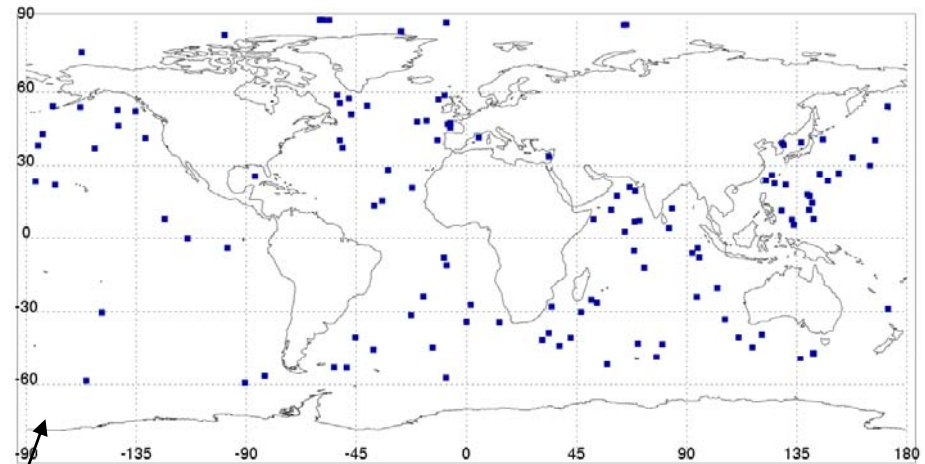
Impact of ARGO data on the Met Office Global system performances

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- Met Office assimilation system is based on daily assimilation of data covering the last 24-hour period
- Doing so, Argo observations arriving late (delay > 24 hours) are not taken into account in real-time
- Met Office has implemented an operational 2-day hindcast to assimilate the late arriving observations
- Last one-day R/T coverage
- One-day coverage after one more day

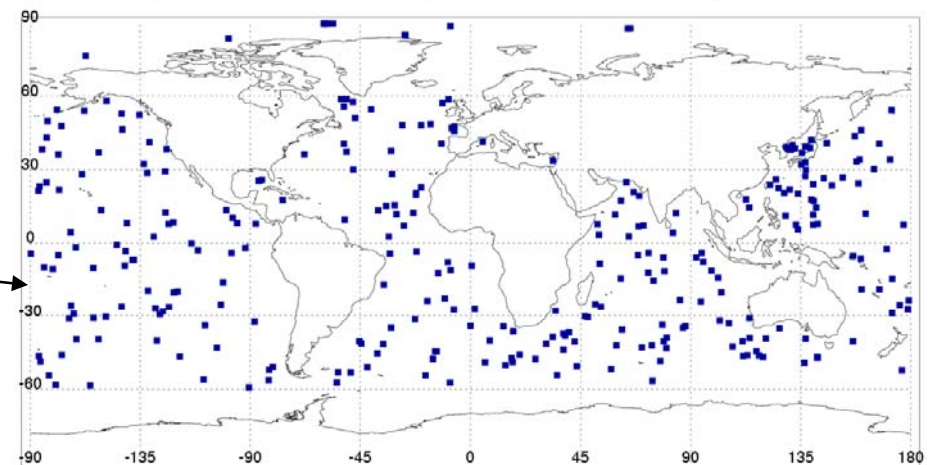
128 profiles

T: mean obs - bkg: 2010/06/07 to 2010/06/07
Points: 128 depths: 0-2001 filtered type: Argo* extrema: -1.643, 1.815 mean: 0.033 rms: 0.4828



302 profiles

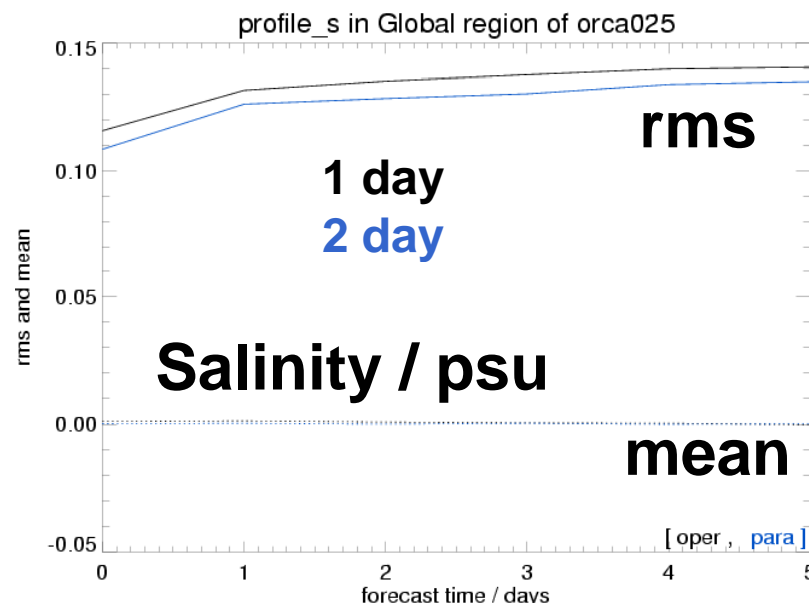
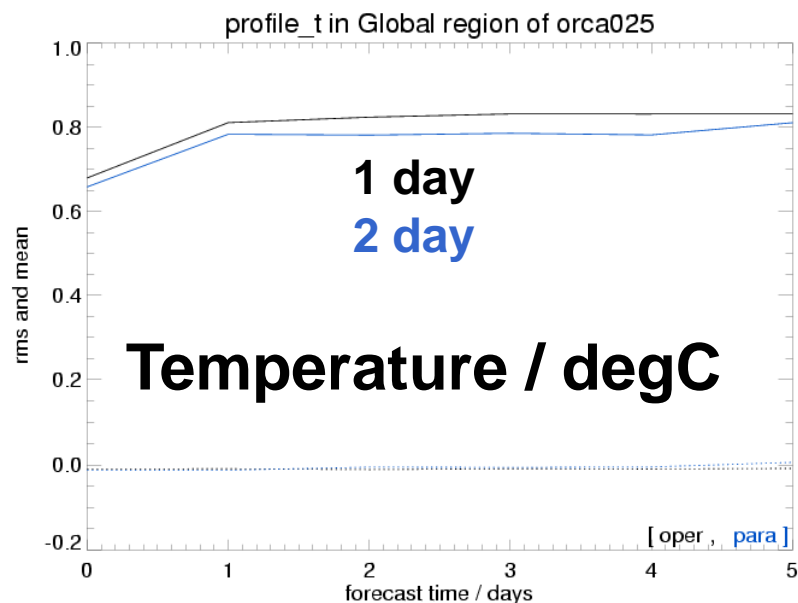
T: mean obs - bkg: 2010/06/07 to 2010/06/07
Points: 302 depths: 0-2072 filtered type: ARGO* extrema: -1.775, 1.815 mean: 0.02844 rms: 0.4683



From Daniel Lea, Met Office, 2010

Improvement in model analysis and forecast vs obs

Marine Core Service



Average forecast error vs common obs over a 1 month period in April. Comparing the existing operational system running 1 day hindcast and the new system running a 2 day hindcast

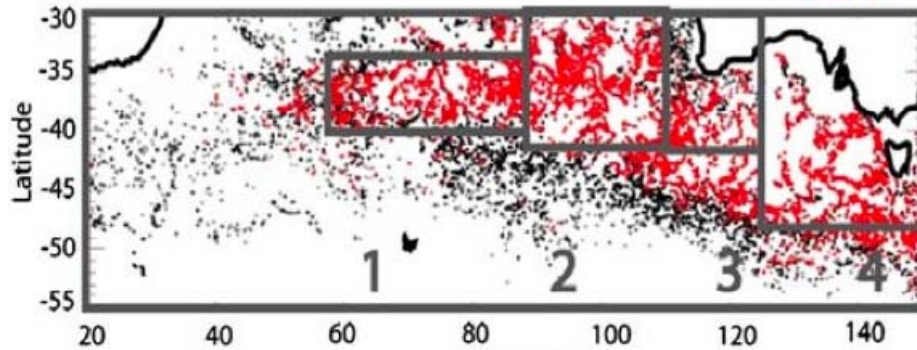
Change in RMS error for 2 day hindcast compared to 1 day hindcast

Profile temperature	4% reduction
Profile salinity	5% reduction

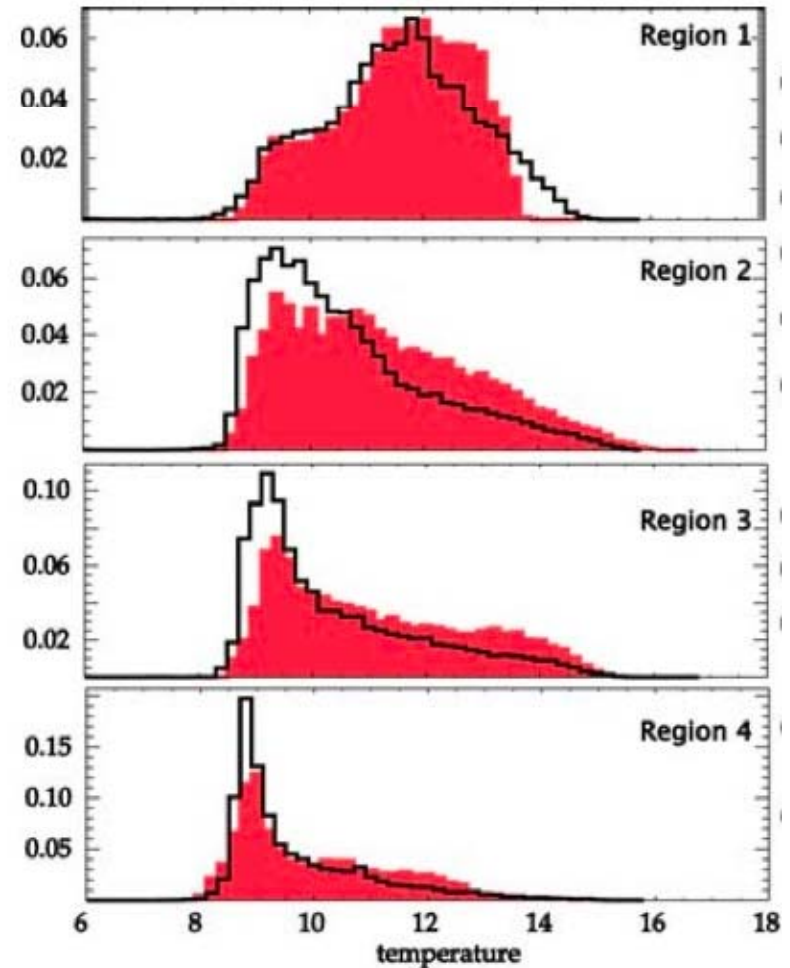
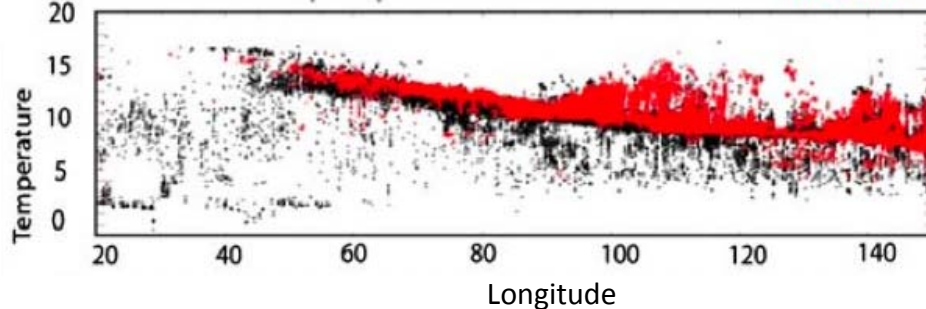
Sub Antarctic Mode Water study from ARGO and a 1/4° global DRAKKAR simulation

1. Extract **model** output onto instantaneous **ARGO** profiles
2. Locate SAMW from both with the same depth-VP-density criteria
3. Compare spatial and statistical distributions of SPMW
4. Use model for dynamical investigations

SAMW distribution for ARGO and **model**



SAMW properties for ARGO and **model**

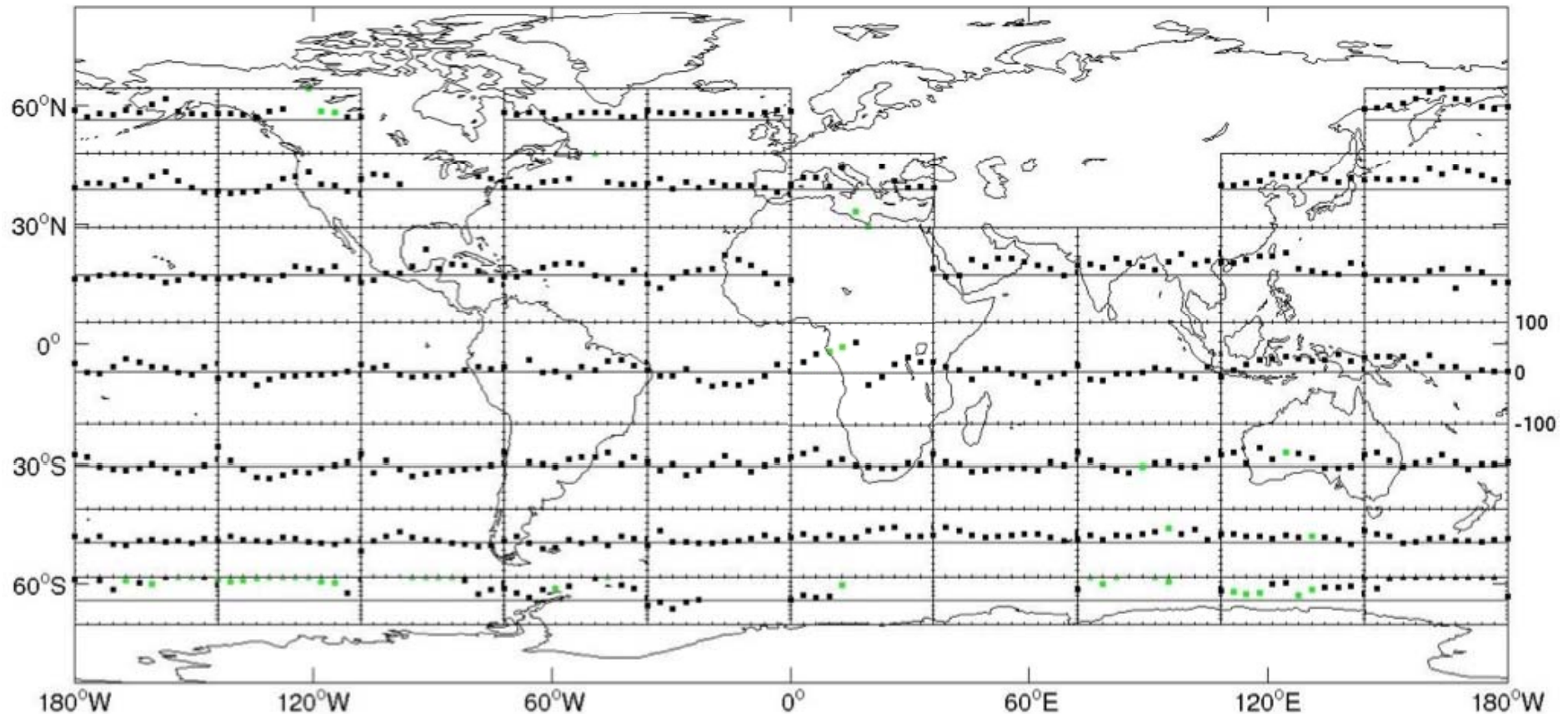


Distorsion of mixed-layer heat content (MLHC) by the ARGO sampling

~30°x30° bins, One dot/month

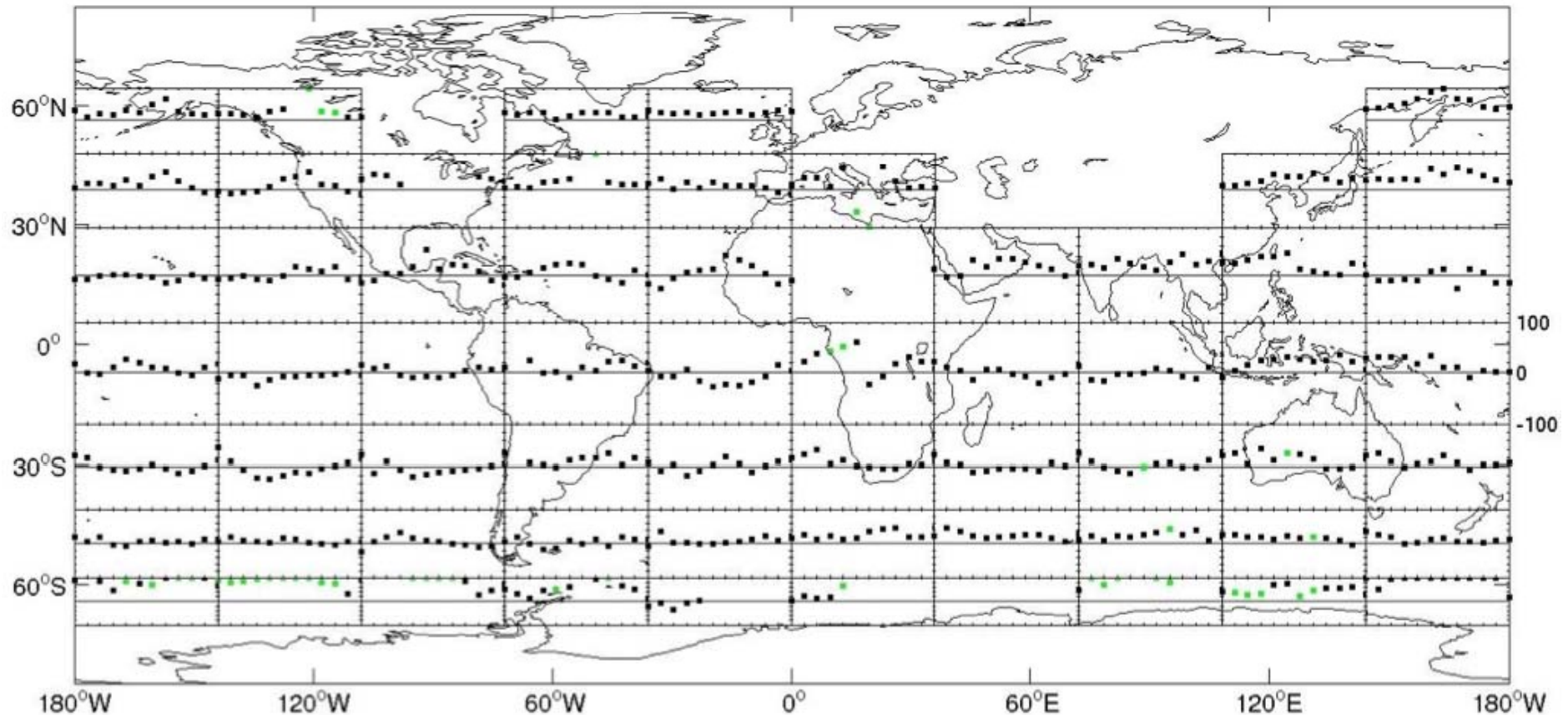
Positive values → MLHC overestimation (in %) with ARGO sampling

Illustrates the effect of Argo sampling on the estimation of one climate indicator



Distorsion of mixed-layer heat content (MLHC) by the ARGO sampling

1. Extract **model** output onto instantaneous ARGO profiles.
2. Compute “exact” and ARGO-like medians (m_E , m_A) of model MLHC in monthly regional bins
3. Compute relative distorsion index = $(m_A - m_E) / \Delta m$ (Δm =width of “exact” MLHC PDFs in each bin)
4. Build global map.



Summary / Conclusions

- The European Union is building a **professional Marine Core Service** capacity
 - GMES, MyOcean
 - Analysis and forecast of the state of the ocean (physical + biogeochemical)
- The European **key players** in the field **coordinate their effort** to achieve this within **MyOcean**
 - Observation processing,
 - Modeling and data assimilation from global to regional European seas,
 - Professional qualification of systems and services,
 - Operational service provision and continuous improvement
- The main mission is to get the **satisfaction of the users**
 - Easy access to ocean data and forecast products
 - Free and open access data policy: numerical products can be discovered, viewed and downloaded
 - Professional service
- **Downstream specialised services** are developing in Europe thanks to this core infrastructure
- Observing systems, including **ARGO**, are one of the key elements on which this infrastructure is build

