GODAE OceanView

GODAE OceanView and Related Activities in the Indian Ocean

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www.godae-oceanview.org

GODAE OceanView

Outline of Talk

- About us:
  - Where do we come from ?
  - What are our challenges ?
  - Who are we ?
  - What is our structure ?
- Relevance to Indian Ocean
- Capacity building in ocean monitoring and forecasting in the Indian Ocean

GODAE (Global Ocean Data Assimilation Experiment) achievements and successes (1997-2008)

Implementation of observing and data processing systems

- Argo and GHRSST (pilot projects), altimetry, in-situ

Implementation of global modelling & data assim. capabilities

- High resolution and climate

Implementation of data/product serving capabilities

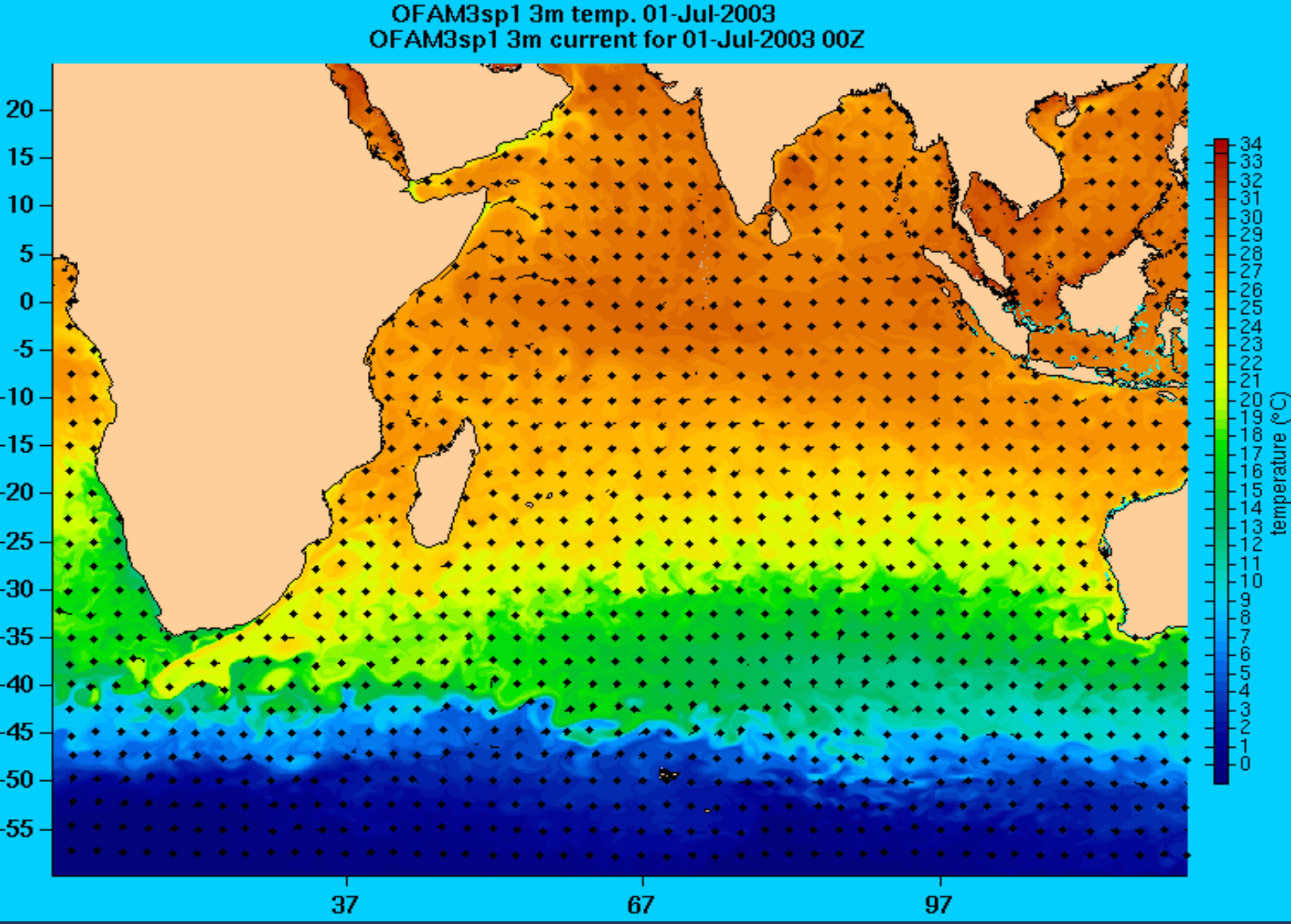
- Inter-comparison / validation, metric and standardisation

Demonstration of feasibility and utility

- Mesoscale now- and forecasting, ocean climate res., marine pollution & safety, weather forecasting, marine resources, etc.

Scientific advances

- **Modelling, data assimilation, scientific validation**


OFAM3sp1 3m temp. 01-Jul-2003
OFAM3sp1 3m current for 01-Jul-2003 00Z
20
15
10
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-5
-10
-15
-20
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7
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5
4
3
2
1
0
temperature (°C)

New Challenges (1/3)
Face emerging new societal needs

- Understand/monitor/forecast the Earth system from days to decades
  - Improve **atmospheric forecast** where the ocean impacts it (tropical cyclones, monsoons, …)
  - Application of ocean prediction techniques to improve **climate and decadal prediction** including the ocean contribution
- Where (most) people live
  - Improve **near-shore/coastal waters real-time prediction** (coupling to and/or downscaling from the offshore/deep ocean; physics, biogeochemistry)
  - Understand the **impact** of climate change in **coastal regions** (downscaling)
- For the sustained exploitation of the seas
  - Develop **ecosystem-based management** of marine living resources

→ *Support **environmental policies** through environmental **monitoring***

New Challenges (2/3)
Improve and extend our capacities

- **Research and development** in ocean modelling, data assimilation
- **Coupling with other components** of the Earth system
- **Cooperation** with international research programs (e.g. WCRP, IGBP, SCOR)

→ *Improve **accuracy** of the ocean products*

New Challenges (3/3)
Better observe the ocean

Help the international organizations in charge of the development of the **ocean observing systems**:

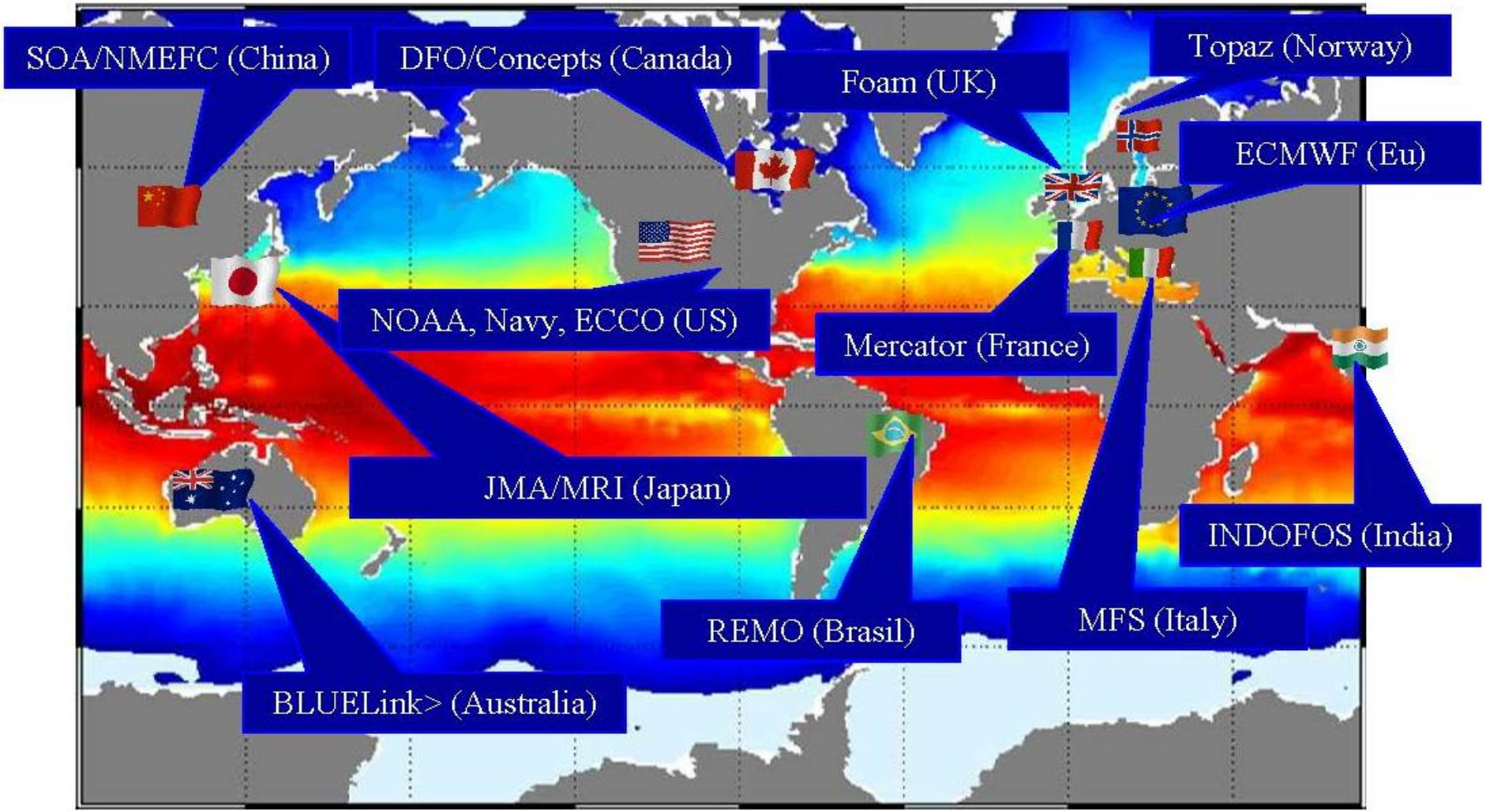
- For the transition to **sustained** operations of the global **in situ and space observing system**
  - better use of existing systems, such as ARGO, Jason, …
- For the design/assessment of **new observing systems**
  - new observable (e.g. bio, …), new focus (e.g. coastal, …)
- For the **optimization** of the resources
  - measure the relative impact, assess the utility, etc… through OSE/OSSE

→ *Evaluate **benefit** and **optimize** use of the GOOS*

GODAE OceanView
Scope and Objectives

- **Leading the scientific development on the implementation of operational ocean forecasting systems**
- Improving the **accuracy and utility** of ocean analysis and forecasting products
- Promoting the development of **downstream use of ocean data and information products** from GODAE OceanView systems
- Supporting the **transition to operational services**
  ➔ Links with JCOMM/ET-OOFS
- Demonstrating the **value of the observing systems**

GODAE OceanView



GODAE OceanView Task Teams

Currently 5 TASK TEAMS:

→ address specific topics of particular importance to GODAE OceanView

→ require collaboration with international research programs or other groups (e.g. coastal community):

- **I**nter-comparison and **V**alidation **T**ask **T**eam **IV-TT** (Alistair Sellar & Fabrice Hernandez)
- **O**bserving **S**ystem **Eval**uation **OSEval-TT** (Peter Oke & Gilles Larnicol)
- **C**oastal **O**cean and **S**helf **S**eas **COSS-TT** (Pierre De Mey & Villy Kourafalou)
- **M**arine **E**cosystem Analysis and **P**rediction **MEP-TT** (Rosa Barciela & Pierre Brasseur)
- **S**hort-to-**M**edium-**R**ange **C**oupled **P**rediction **SMRCP-TT** (Gary Brassington, Matt Martin, Hendrik Tolman)

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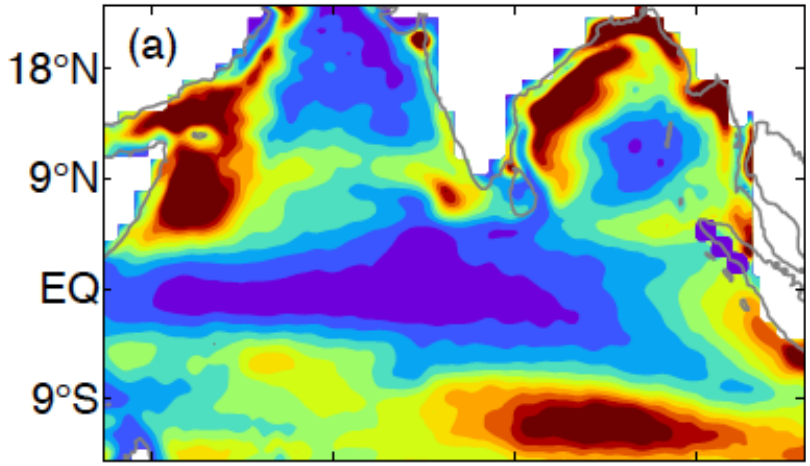
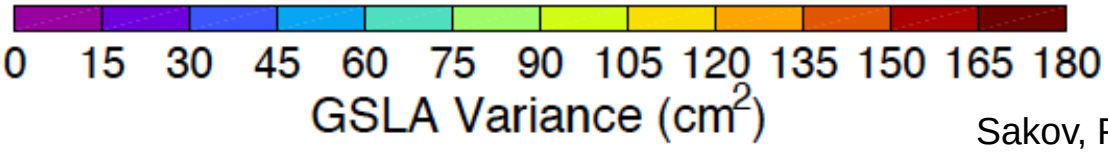
Observing System Design





Sakov, P., P. R. Oke (2008)

GODAE OceanView Intercomparison

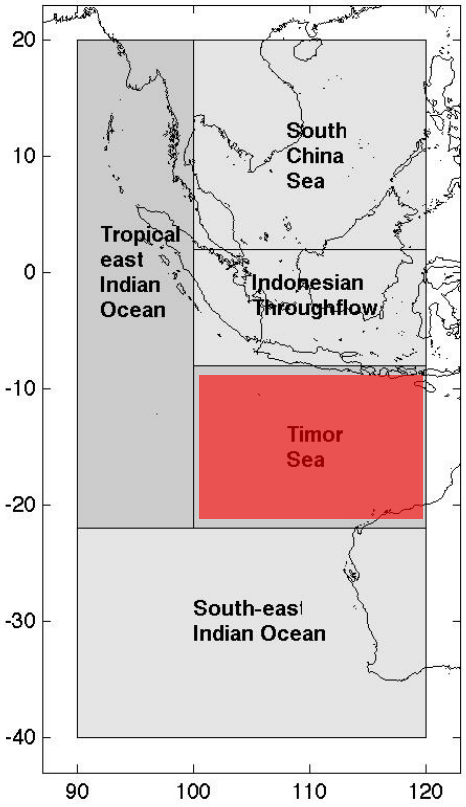
OMAPS(fc) = Bluelink operational 3-4-d forecasts

OMAPS(ban) = Bluelink operational hindcast (6-9-d behind RT)

HYCOM = US Navy hindcast (5-d behind RT)

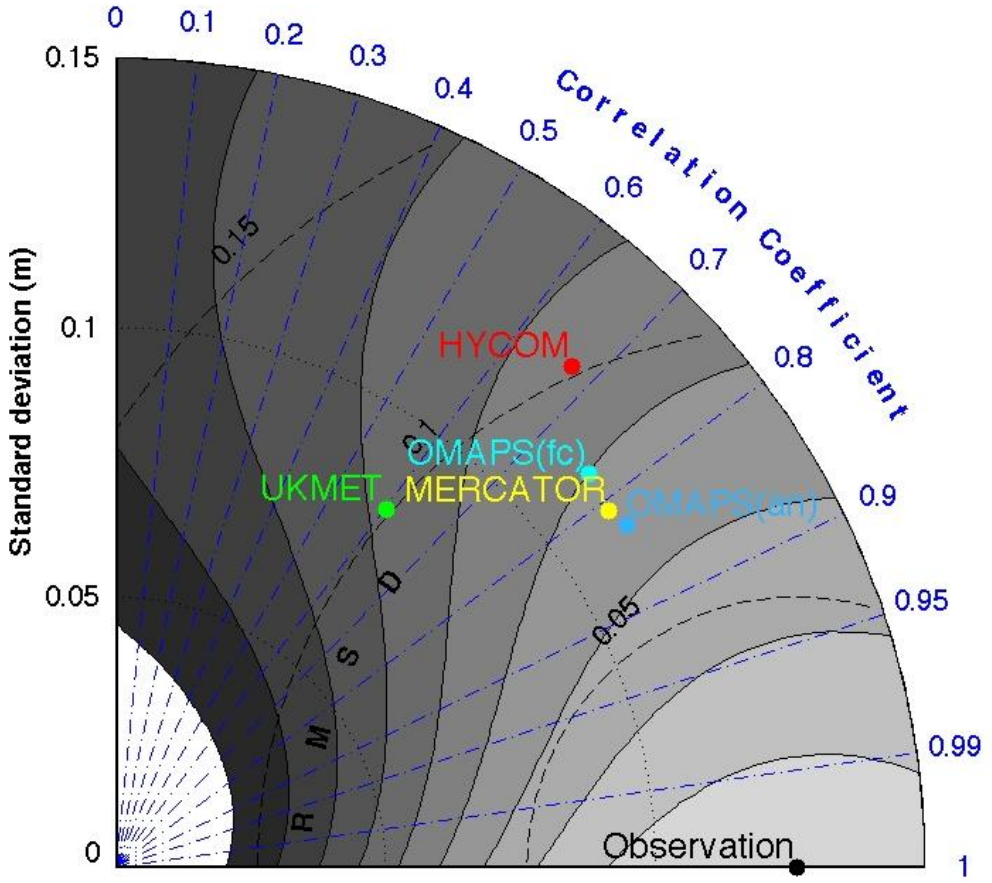
Mercator = French hindcast (7-14-d behind RT)

UKMet = UK hindcast (~3-m behind RT)



Timor Sea 01-Feb-2008 - 30-Apr-2008
Sea Level Anomaly
Observations(#obs): JASON/ENVISAT (22728)

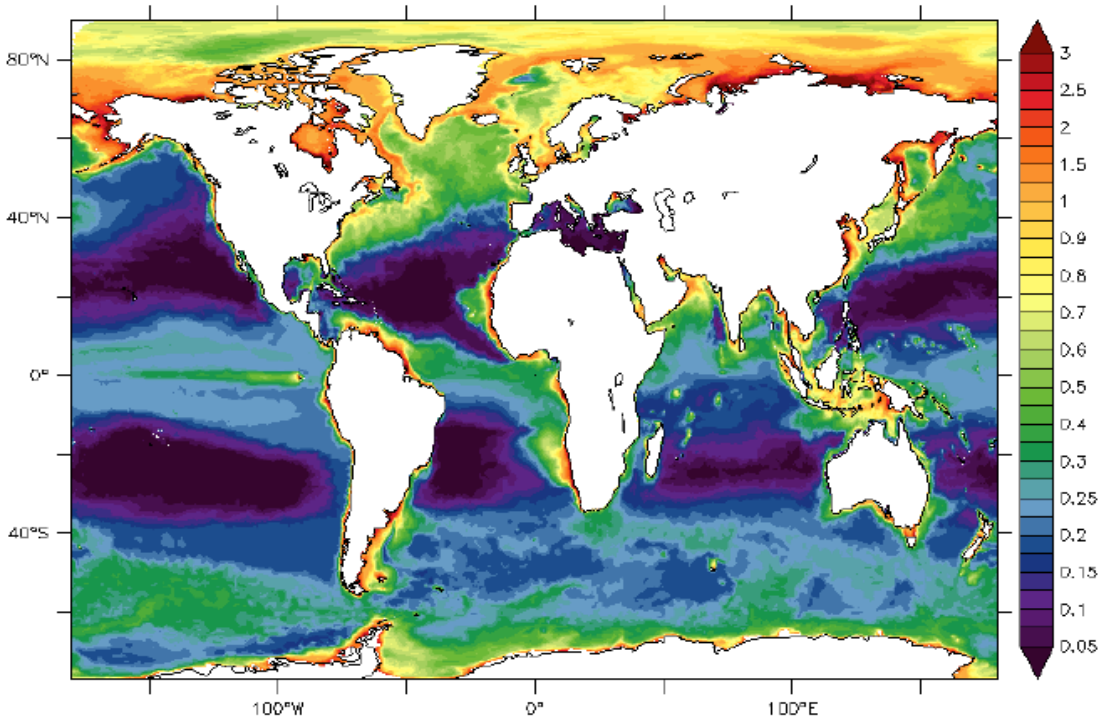
System	HYC	MER	UKM	OM(an)	OM(fc)
Bias (m)	-0.14	-0.19	0.01	-0.01	-0.01



MERCATOR VERT

GREEN MERCATOR

annual mean chlorophyll – top 15m



mg/m3

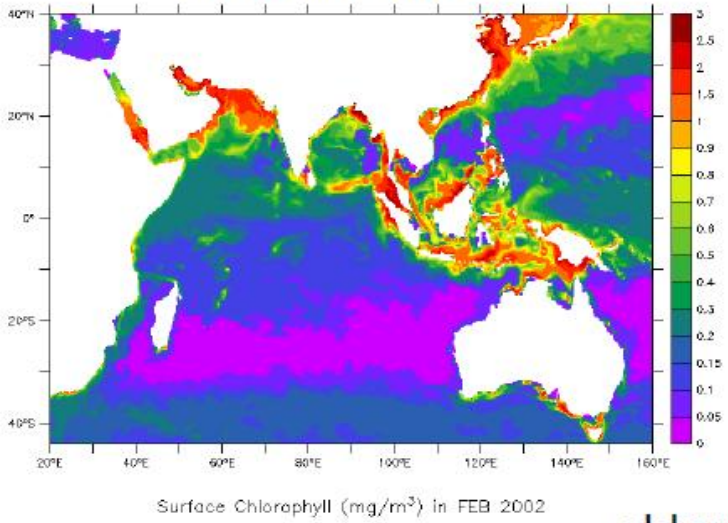
BIOMER_orca025_T323

global coupled physical-biogeochemical hindcast at ¼° resolution
1994 – 2010

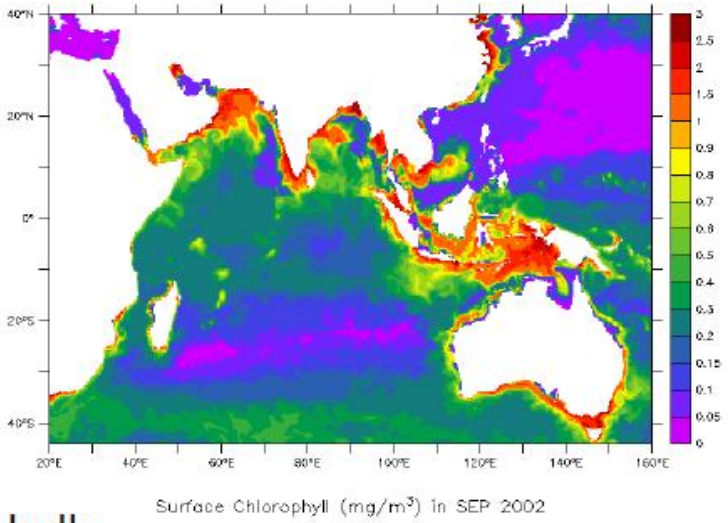
contacts: marion.gehlen@lsce.ipsl.fr; abdelali.elmoussaoui@mercator-ocean.fr

MERCATOR VERT - GREEN MERCATOR

winter monsoon



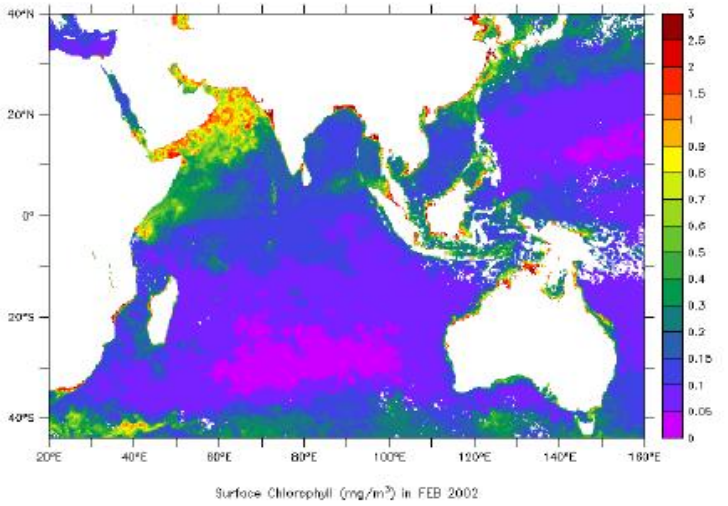
summer monsoon

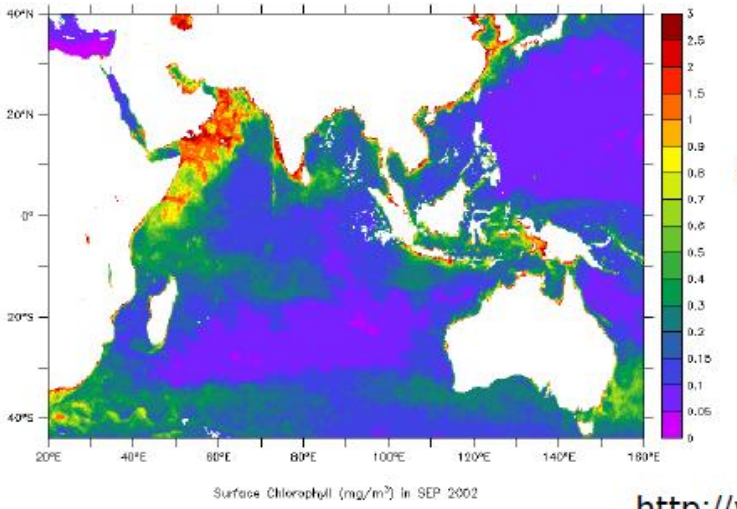


model
top 15 m

YEAR 2002

chlorophylle



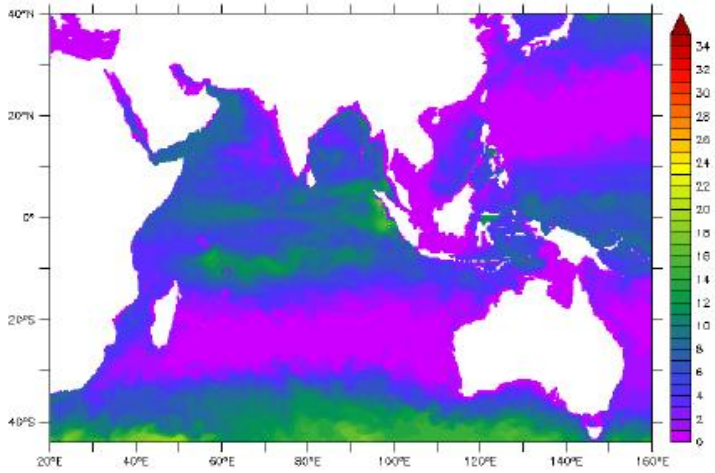


observations

http://www.globcolour.info/

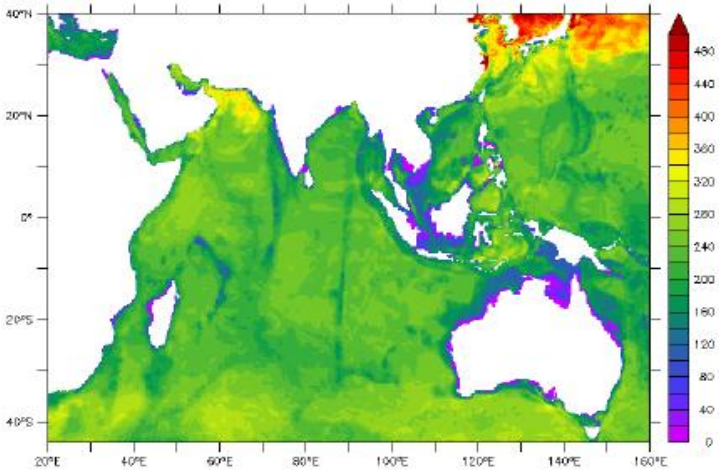
MERCATOR VERT - GREEN MERCATOR

nitrate



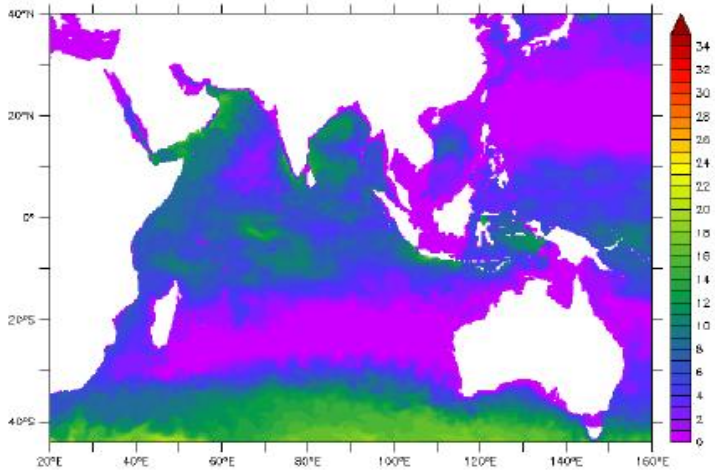
Surface Nitrates (μ mol N .L^{-1}) in FEB 2002

phytoplankton biomass

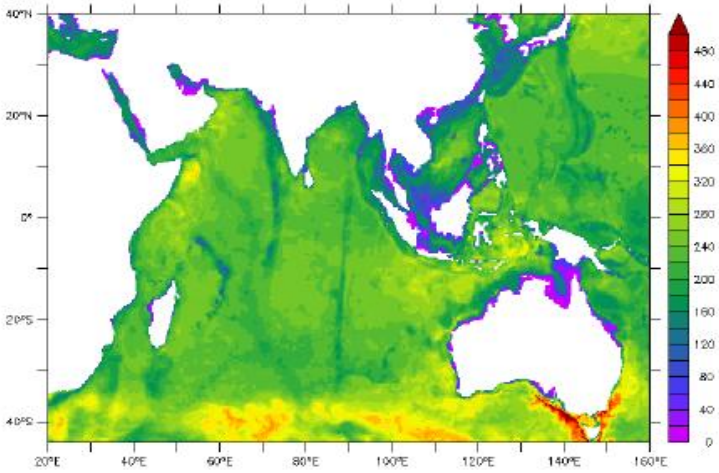


Integrated biomass (mmol C .m^{-2}) in FEB 2002

winter monsoon



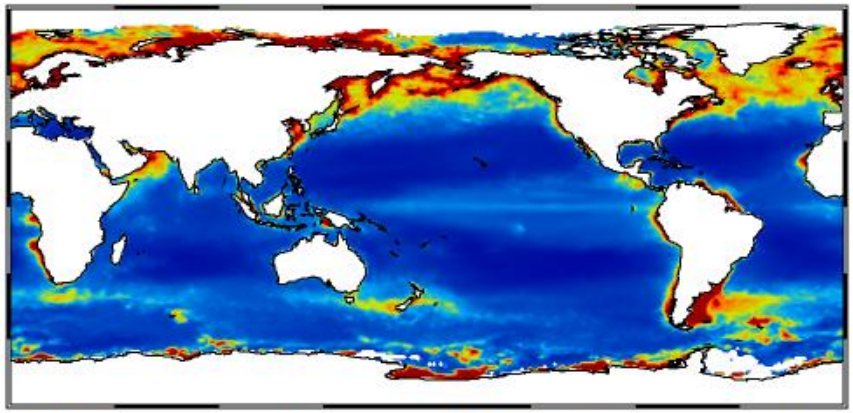
Surface Nitrates (μ mol N .L^{-1}) in SEP 2002



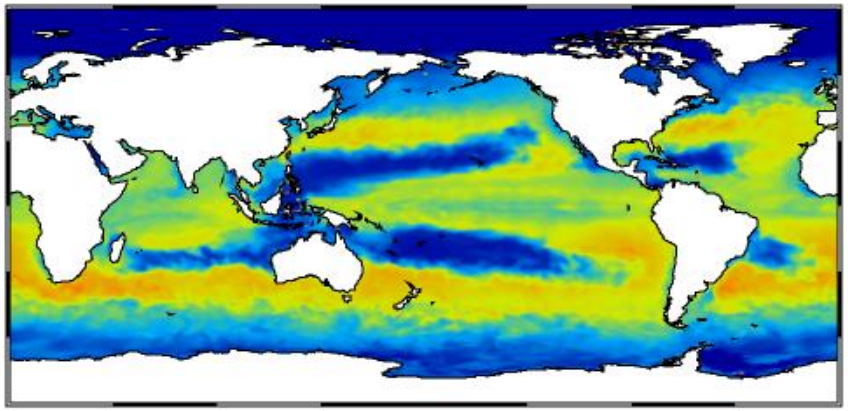
Integrated biomass (mmol C .m^{-2}) in SEP 2002

summer monsoon

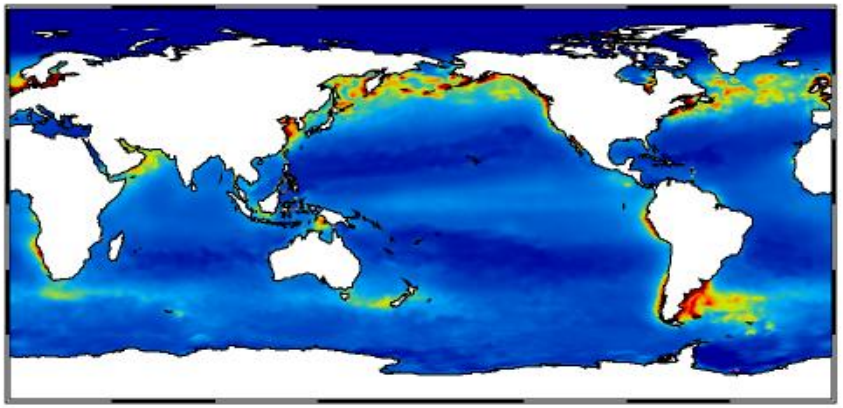
Impact of chlorophyll assimilation



Observations (2008 mean)

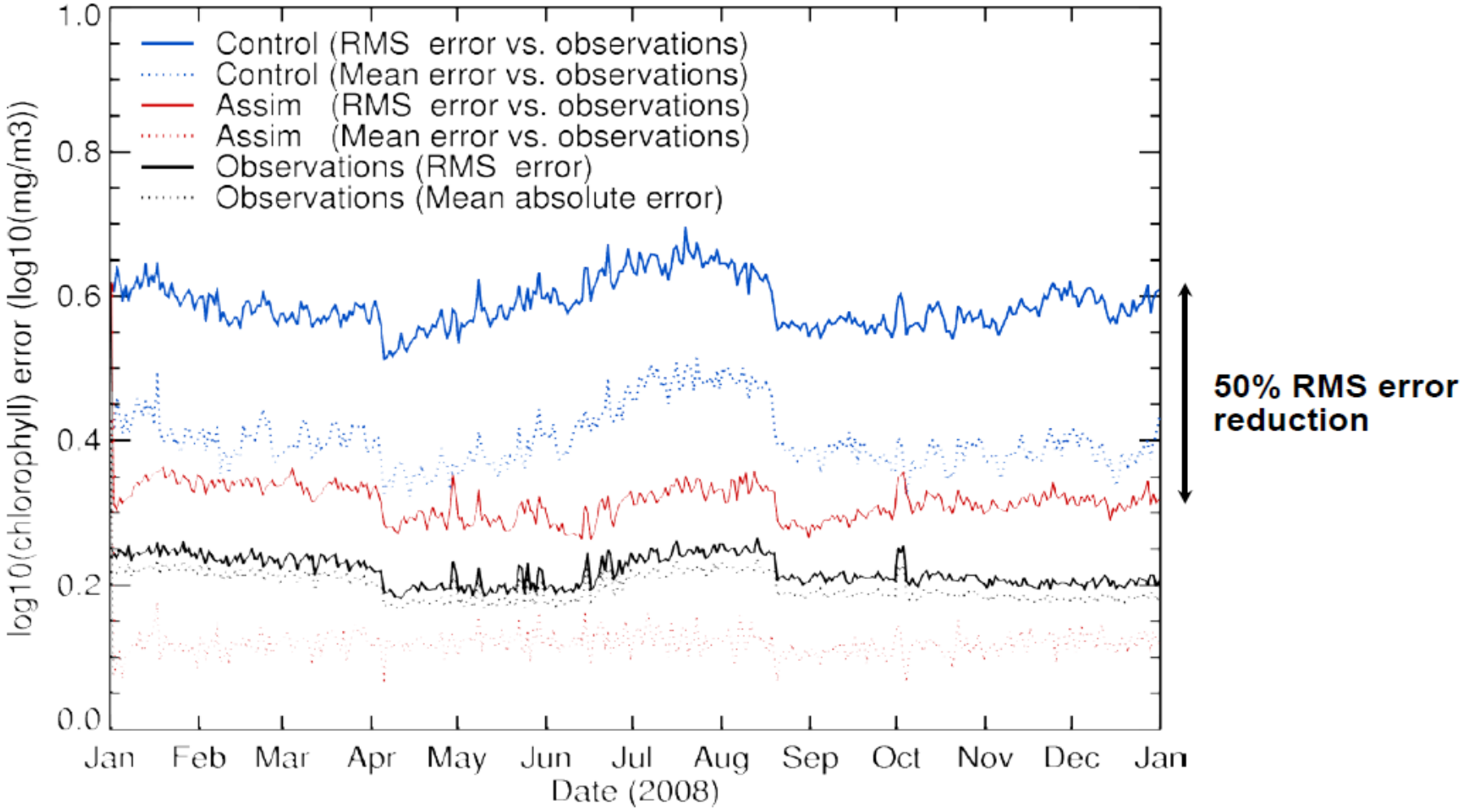


FOAM-HadOCC – no chl assim

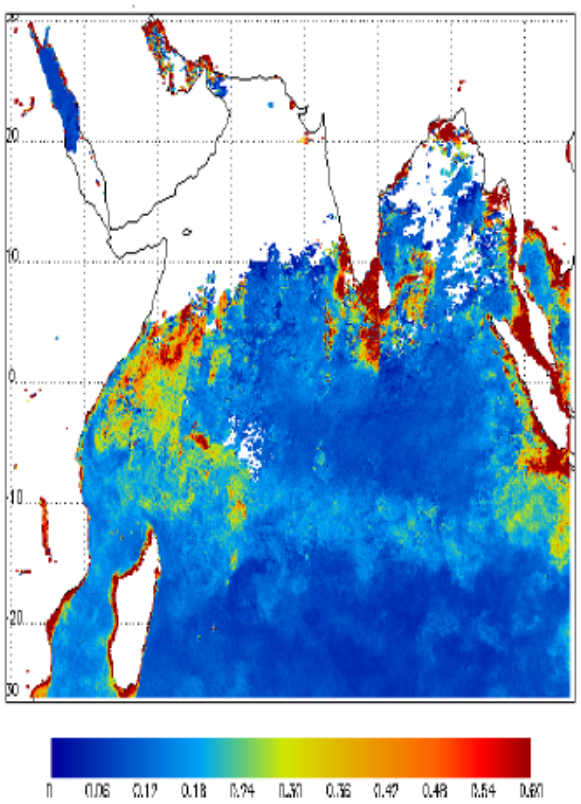


FOAM-HadOCC – chl assim

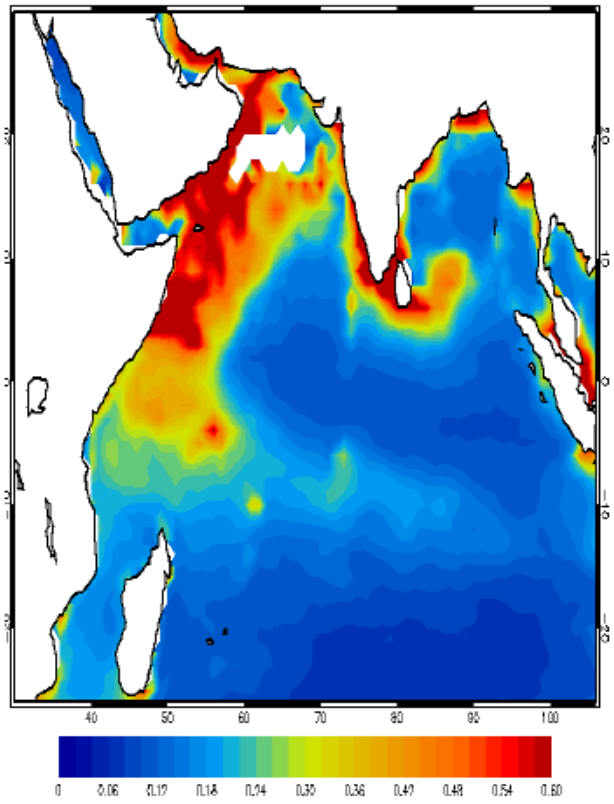
Global impact of chlorophyll assimilation



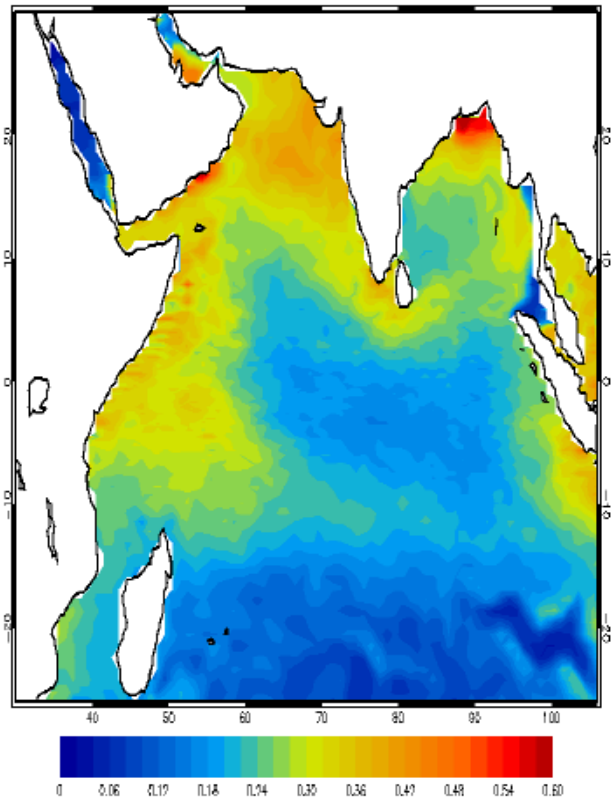
Chlorophyll coverage – Indian Ocean July 2008 (during monsoon season)



Observations (July 2008)



Climatology (July 1998-2007)

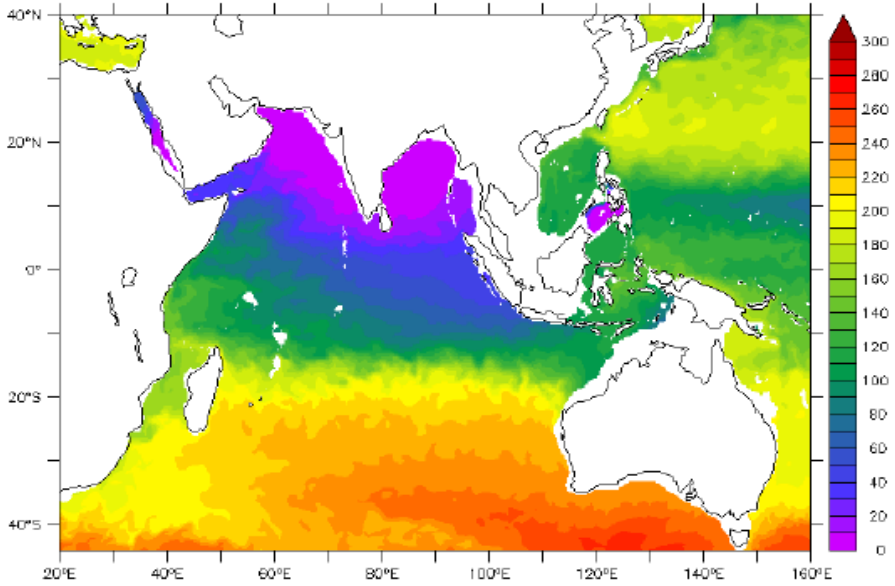


FOAM-HadOCC (July 2008)

MERCATOR VERT - GREEN MERCATOR

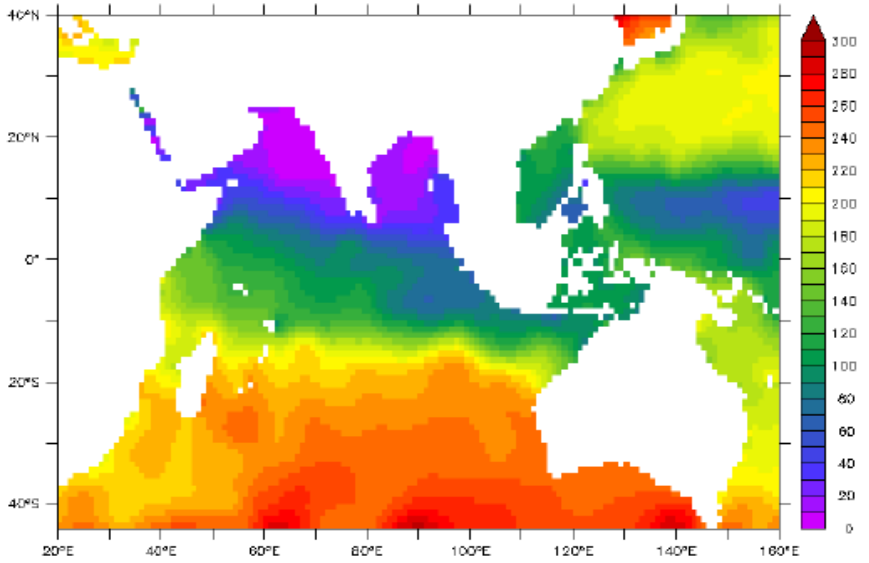
oxygen levels at 400 m
permanent OMZ - no intermonsoonal variability

model



Oxygen at 400 m depth (μ mol .L^{-1}) in FEB 2002

observations (WOA)



Oxygen at 400 m depth (μ mol .L^{-1}) in FEB 2002

Summary

- GODAE OceanView focuses on the **international coordination of scientific development of global ocean forecasting systems**. Forecasting centres (UKMO, Mercator, NRL, BLUElink, INCOIS, …) provide forecasts for Indian Ocean.

- Many scientific and technical challenges remain to be solved and require ongoing joint international efforts, e.g.
  - Modelling (e.g. vertical velocity),
  - Data assimilation (accuracy vs. approximations),
  - **sustainability of ocean observing system:** satellite remote sensing (needs to be fit-for-purpose in operational oceanography); bgc observing system needs to be significantly developed.

- GODAE OceanView does not have the resources but supports **capacity building in operational oceanography**, subject to external funding, e.g. Summer School in Perth (Jan 2010).

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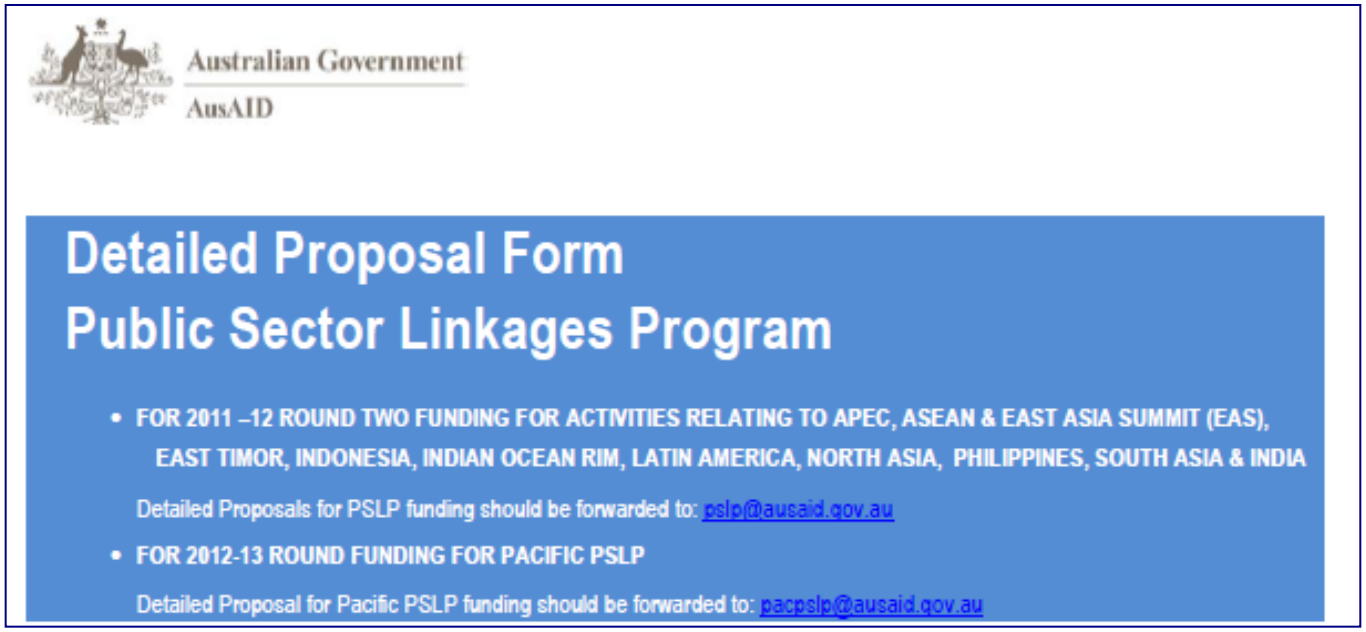


Workshop on *Capacity Building to Progress, Validate and Apply Indian Ocean Forecasting Systems (all IOR-ARC countries)*

Audience: Indian Ocean Rim Association for Regional Cooperation (IOR-ARC)

➔ ***Builds on and is linked to*** **IOGOOS/IOC Pilot Project: *Modelling for Ocean Forecasting and Process Studies (MOFPS)***

Implementation Partners:

(1) CSIRO, contact: Dr Andreas Schiller

(2) UNESCO Intergovernmental Oceanographic Committee (IOC); contact: Dr Nick D'Adamo, Officer-in-Charge Perth Regional Programme Office

(3) Bureau of Meteorology, Centre for Australian Weather and Climate Research, contact: Dr Gary Brassington

(4) GODAE OceanView (www.godae-oceanview.org)

Counterpart Organisations:

(1) Indian National Centre for Ocean Information Services (INCOIS), Indian Ministry of Earth Sciences, Hyderabad, contact: Dr Satheesh Shenoi, Director INCOIS

(2) South African Weather Services, Cape Town, contact: Dr Johan Stander, Regional Manager, Co-President JCOMM

Key Objectives

- **Identify the leading societal needs/drivers for each country** that could be met through the proposed development in Indian Ocean forecasting, data analysis and modelling capacity.

- Guide the **development of a detailed work plan and proposal for a major effort** in support of marine capacity building within IOR-ARC countries, leading to collaboration and capacity building on a much larger scale among the participating IOR-ARC countries.

Gaps and Needs Analysis

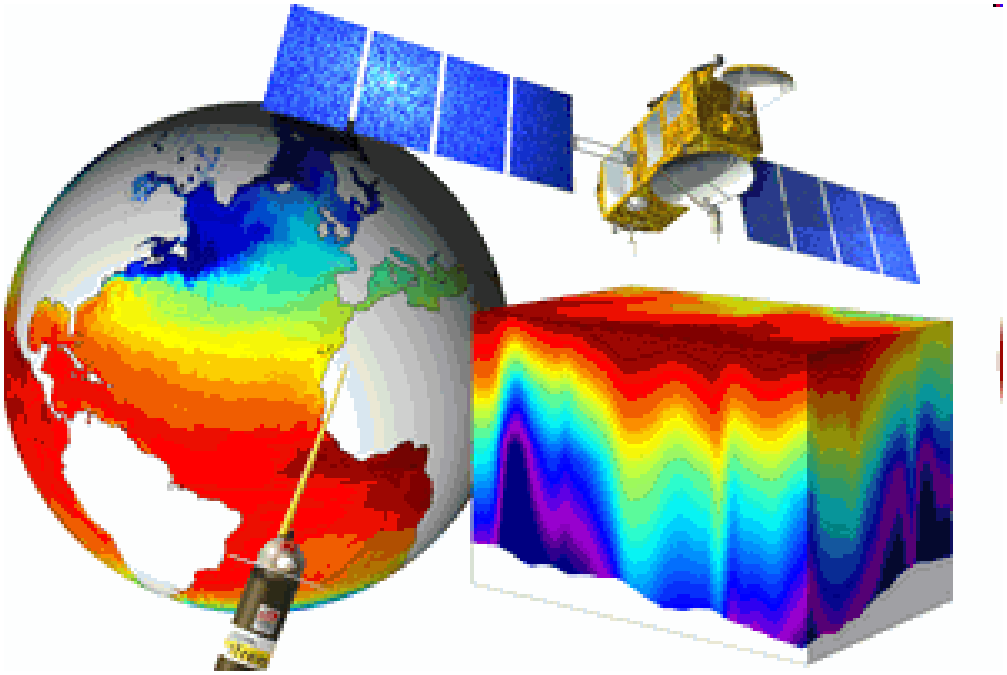
Common to all IOR-ARC countries:

➢ Design and implement a **Capacity Development** program (including training and demonstration project work) in:

- numerical ocean modelling and data assimilation (i.e. the assimilation of relevant data from the Global Ocean Observing System) into models in order to develop skilful forecasts/predictions;
- ocean observations (both for the collection of data, and data analysis thereof);
- associated IT / data management, with reference to the region's developing national ocean data centre.
- Exemplification of scenarios through the validation and inter-comparison of global and regional-scale models in the Indian Ocean.

➢ Develop and apply an **operational ocean monitoring and forecasting** system for ecological, economic and social objectives.

GODAE OceanView



Thank you !