

# CSI (Colour Scene Investigation): *from operations to applications*

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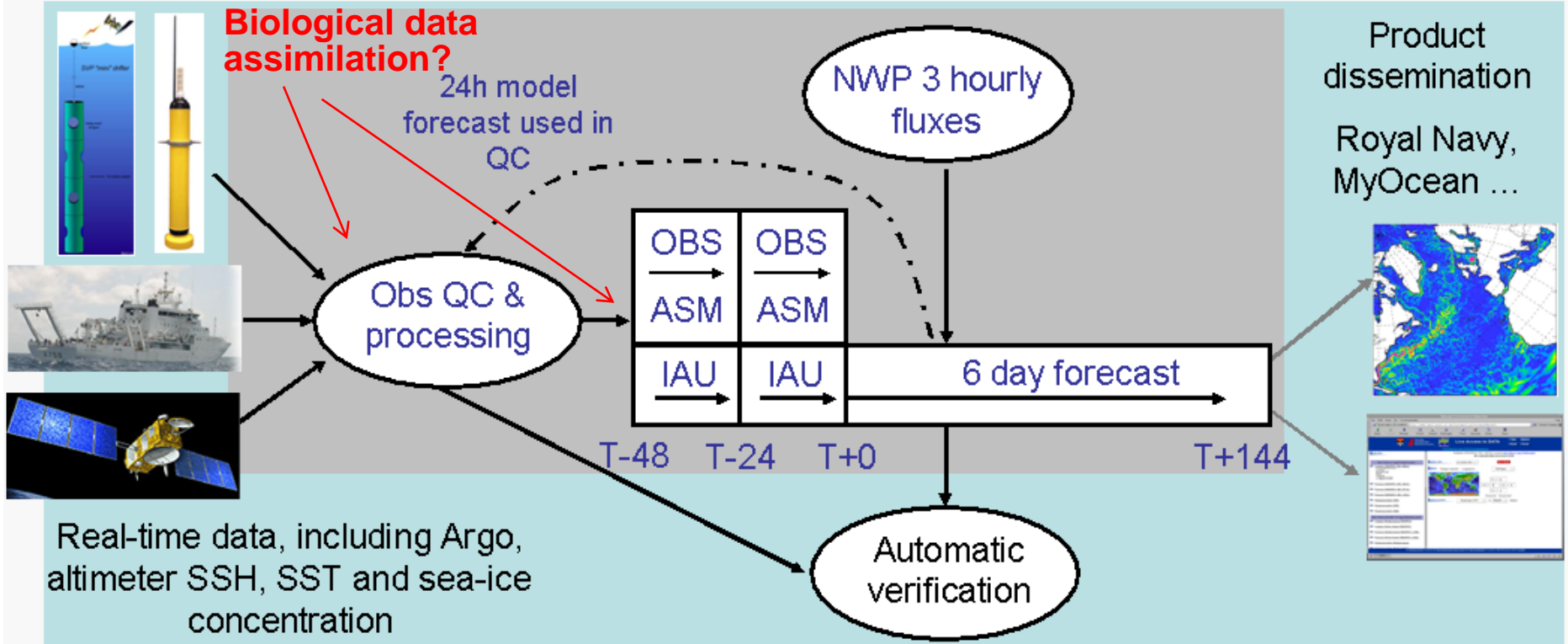


# Outline

## Table of Contents

- The role of ocean colour in operational systems
- Ocean colour data assimilation
- End-user requirements
- Opportunities for improvement

# Generic schematic of a marine operational system



- BlueLink (Australia)
- ECCO/HYCOM/NCEP/RTOFS (USA)
- M... (USA)
- R... (USA)
- NMETC (China)
- MOVE/MRI.COM (Japan)
- FOAM (UK)
- CONCEPTS/NOGEO (Canada)
- TOPAZ (Norway)

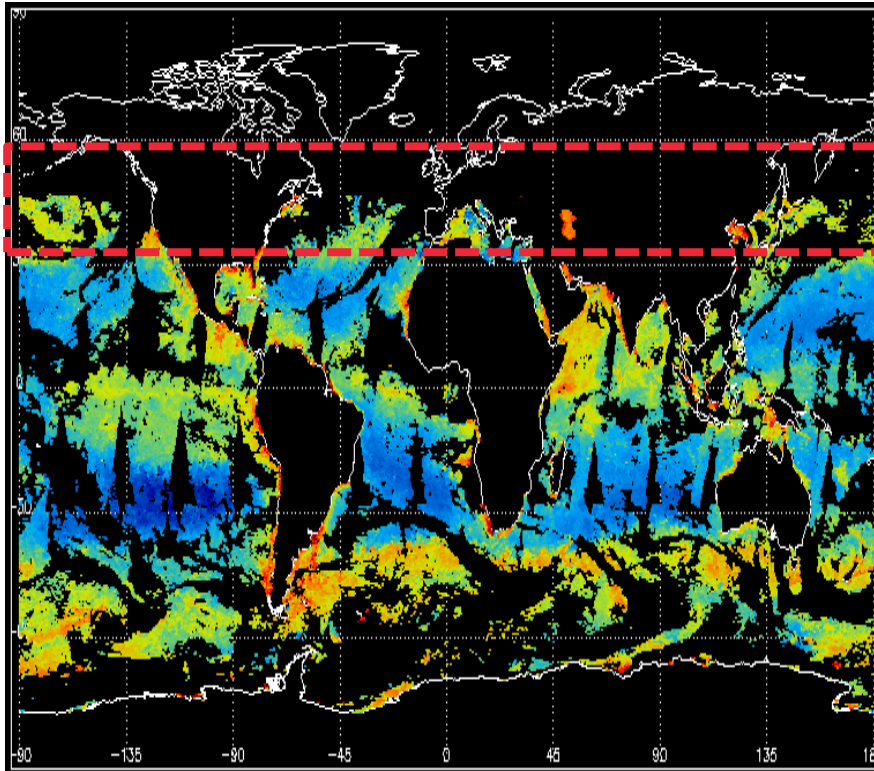
*What is the value of assimilating ocean colour in an operational system like this?*

# Emergent ocean colour applications

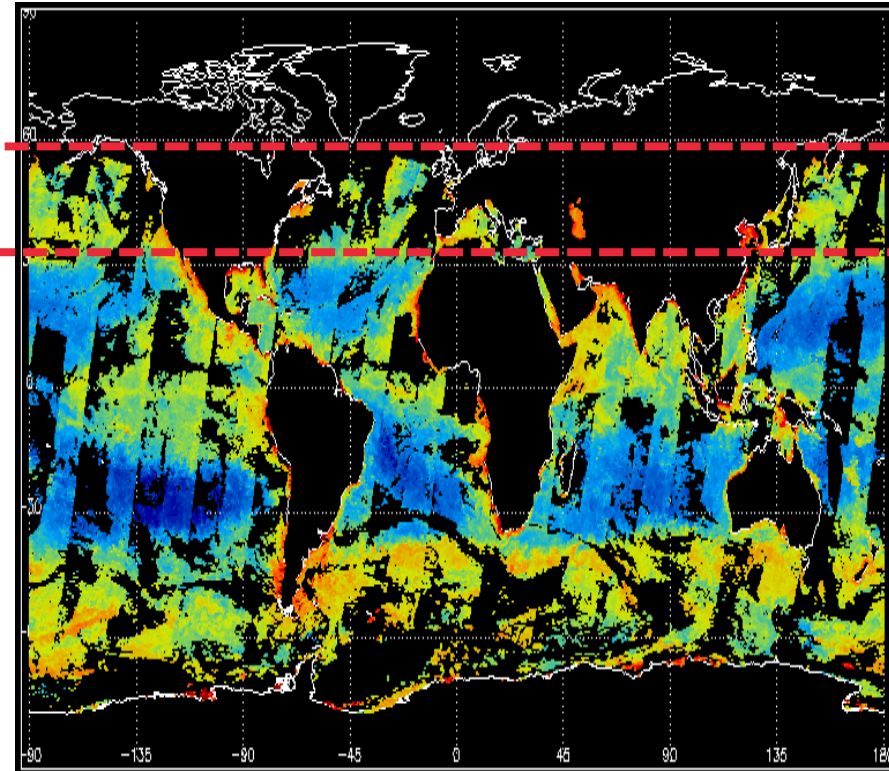
## *Research Push*

### Biological Data Assimilation of Ocean Colour in an Operational Framework

GlobColour



ESA CCI OC

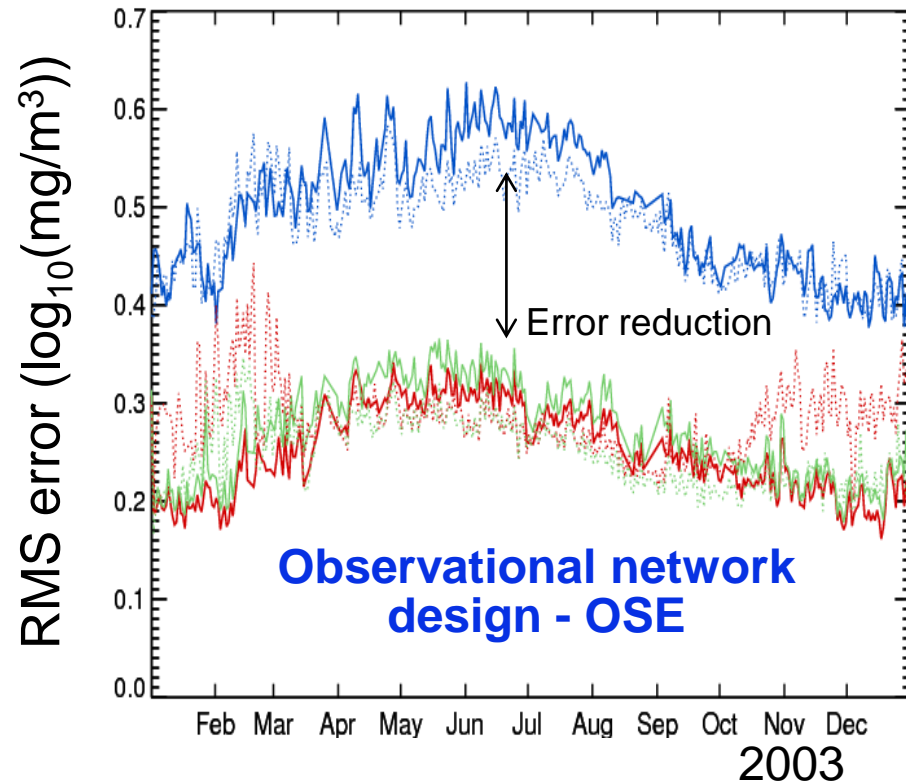


1<sup>st</sup> Jan 2003

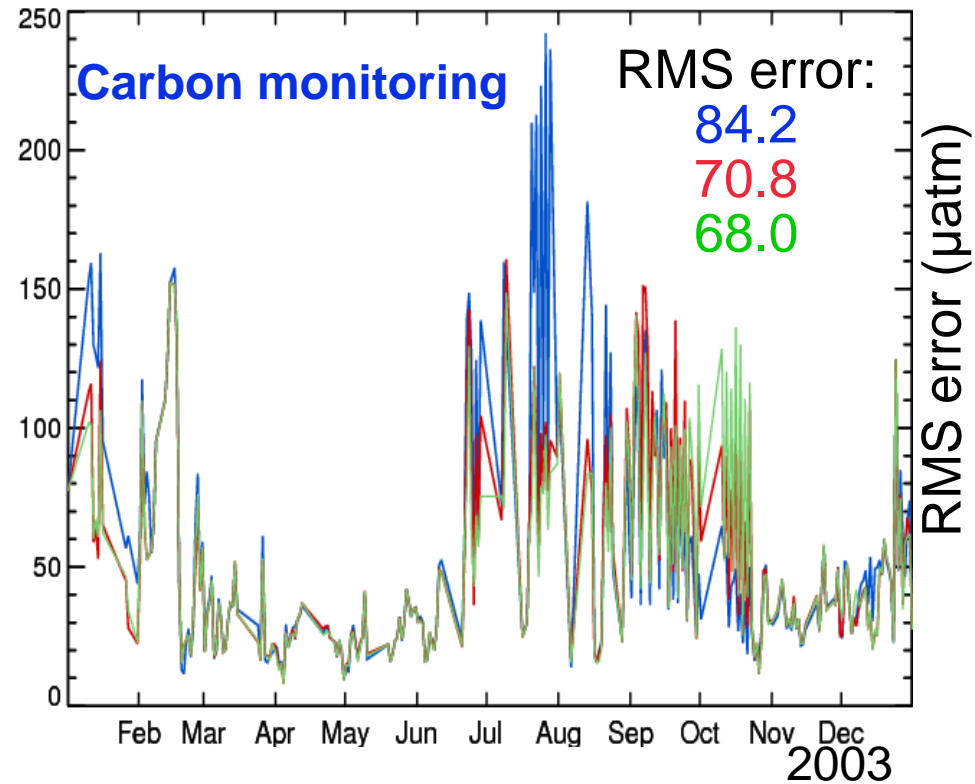


# Impact of data assimilation

## $\log_{10}$ (chlorophyll) error North Atlantic

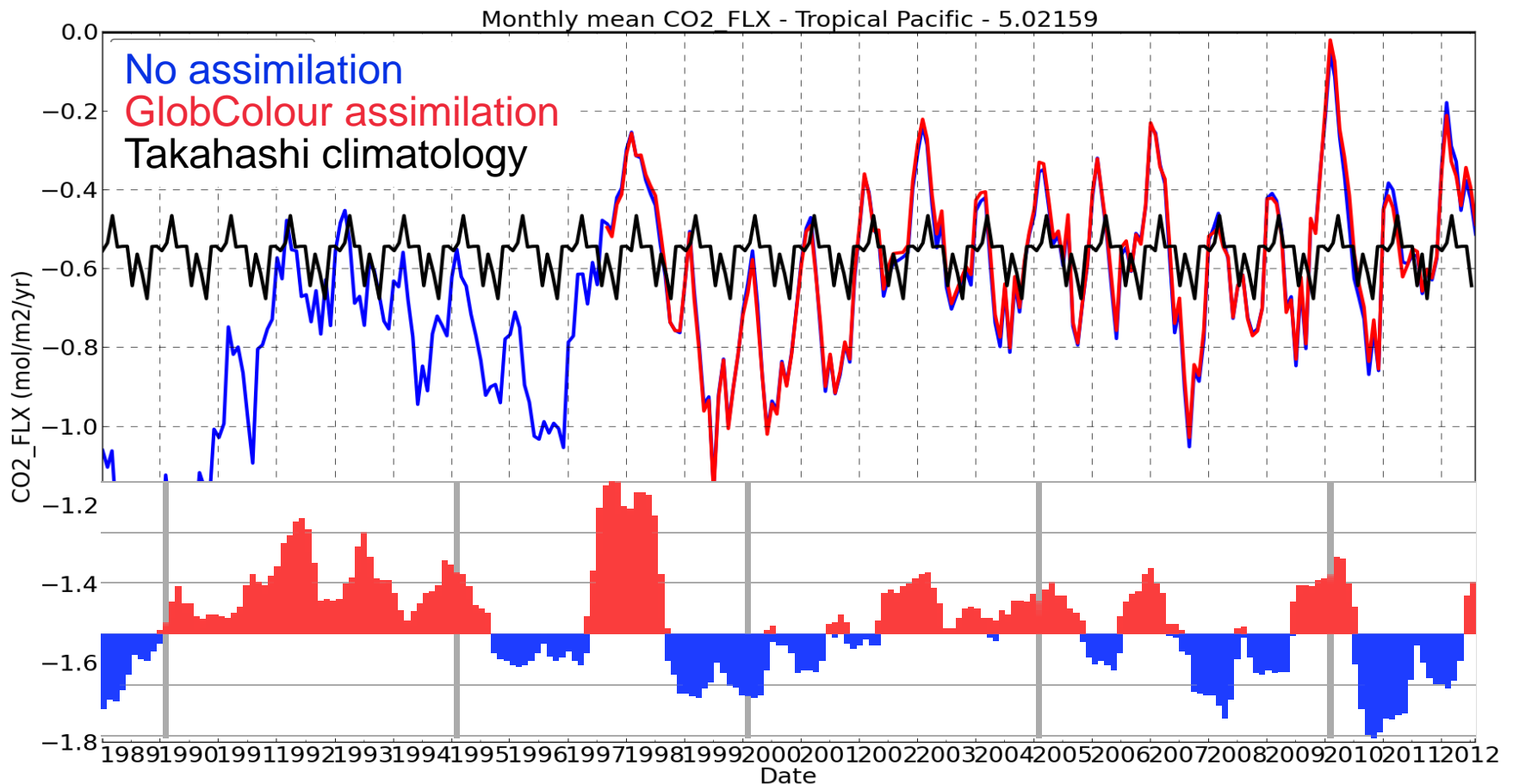


## Global $\text{pCO}_2$ RMS error *versus in situ obs*



# Air-sea CO<sub>2</sub> flux (delayed mode assimilation)

## Tropical Pacific mean





ICES Working Group on  
Operational Oceanographic  
Products for Fisheries and the  
Environment.



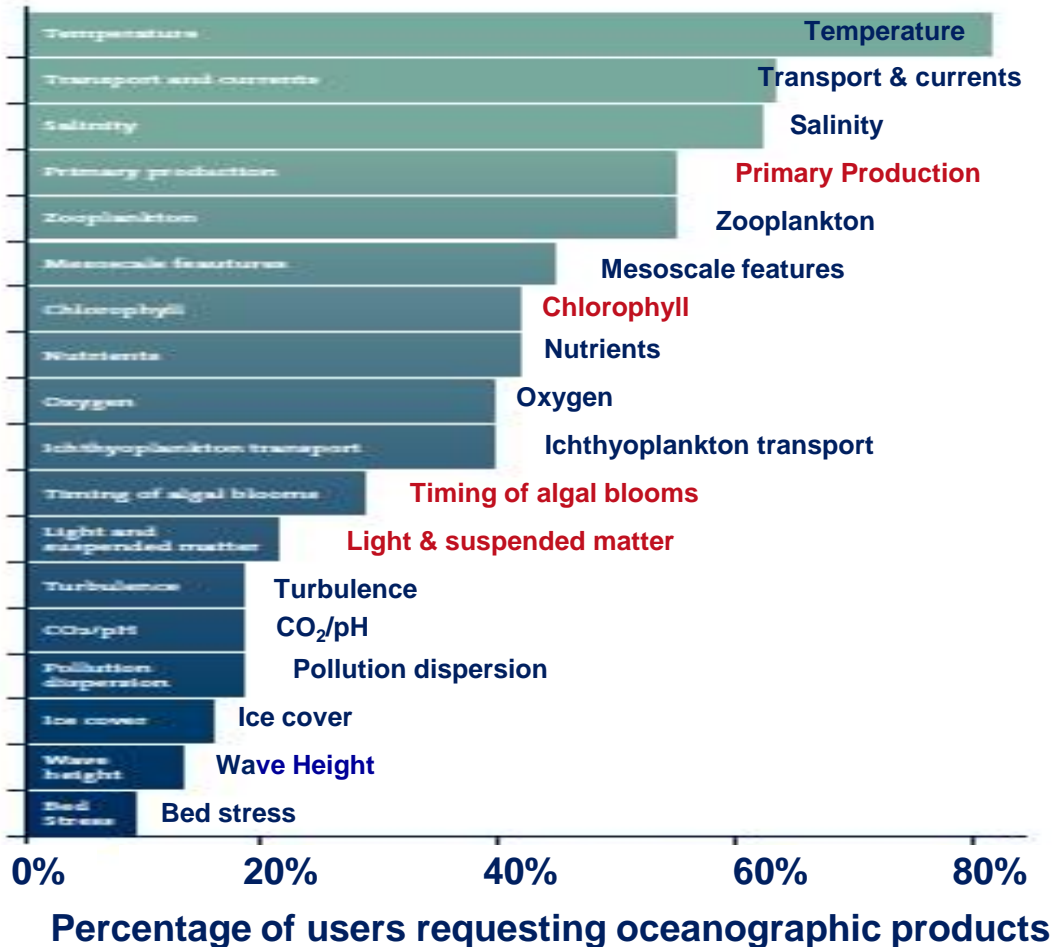
ICES Insight Sept 2010.





# Responses from fisheries managers (commercially exploited species and ecosystems)

Oceanographic data products requested by the ICES community of marine researchers, in order of importance.



### Delivery of data products

- **Data access.** Data should be free and operationally available to all. Registration prior to data access should be avoided.
- **Time scale.** Two-thirds of users highlighted monthly average data as important. All other time-scales were requested by less than 50% of users.
- **Data type.** More than 90% of ICES users requested access to historical data. This forms a stark contrast to the move in operational oceanography to develop forecast, nowcast, and real-time systems.
- **Data updates.** Regular on an annual basis; quarterly and monthly updates were also requested by a large proportion of users.
- **Data format.** An overwhelming majority requested that data values be available for download in ASCII format. Graphical outputs were seen as a good way to characterize the data, but the users wanted access to data that they could manipulate.
- **Meta data.** Users want a description of the methodology accompanying the data.

Free & No Registration

Monthly averages

> 90% historical data

Annual updates

ASCII

Methodology

Berx et al.(2010)

<http://groupsites.ices.dk/sites/wgoofe>





# Ocean Colour Requirements?

(Modellers: chl, **PFTs**, SPM, IOPs,  $K_{d490}$ , **CARBON**)

(WGOOFE users: PP, chl, phenology, SPM)

**Uninterrupted, long-term provision** of data in a timely manner in order to understand and differentiate natural variability from climate trends.

**Validation** against *in situ* data and across biogeochemical regions. Large biases in the merged product corrected by *in situ* data

**Sustainability** in product delivery is key as significant investment is required to use the data.

# Opportunities for improvement

- Research **push** *versus* user **pull**.
- **Lack** the truly operational **exploitation** by “real” as opposed to “research” users: a potential problem, which may jeopardise future missions.
- **Value** of ocean colour data has not been fully capitalised on, despite its potential:
  - Data assimilation, model assessment , initialisation and development.
  - Monitoring (e.g. OSE) and future-proofing climate services and predictions.
- Ocean colour community has to pause and reflect:
  - How is the community is today? How should it be in the future?
  - Lessons to be learnt from the **GHRSSST model**?



**Met Office**  
Hadley Centre

*Thank you!*



# Research Push vs. User Pull (daily, seasonal, decadal)

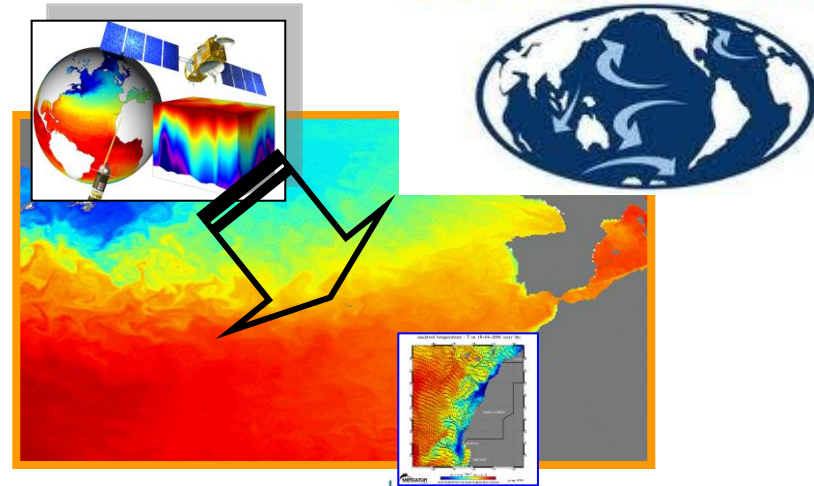
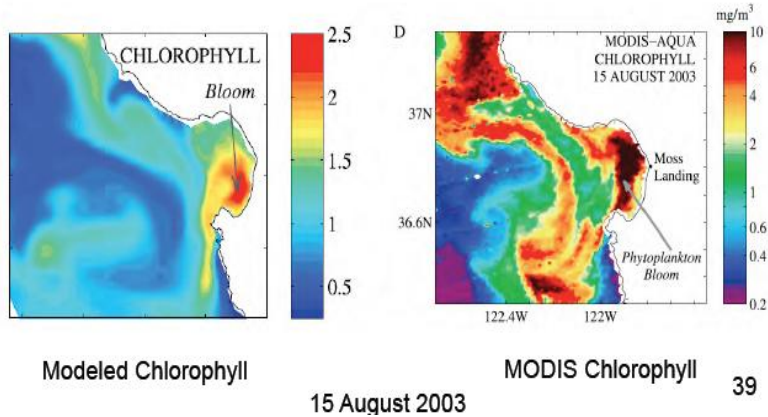
Observed and modeled bio-optical, bioluminescent, and physical properties during a coastal upwelling event in Monterey Bay, California

Igor Shulman,<sup>1</sup> Mark A. Moline,<sup>2</sup> Bradley Penta,<sup>1</sup> Stephanie Anderson,<sup>1</sup> Matthew Oliver,<sup>3</sup> and Steven H. D. Haddock<sup>4</sup>

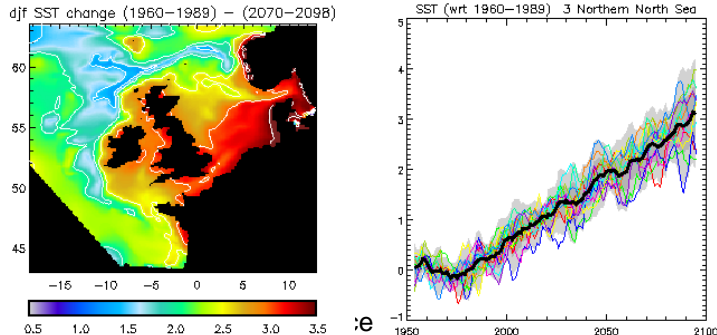
JGR, VOL. 116, 2011

## Observing System Evaluation

## GODAE OceanView



## ESM models - Projecting the future



European GMES  
Marine Core Service  
[www.myocean.eu.org](http://www.myocean.eu.org)