



**Ocean-climate interactions at regional level:**

**An opportunity for  
CLIVAR-IMBER cooperation**

**Bernard Avril (IMBER IPO) & Liuming Hu (IMBER RPO)**

13 Sept. 2012, Nanjing, China

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2. Collaborations between IMBER and CLIVAR
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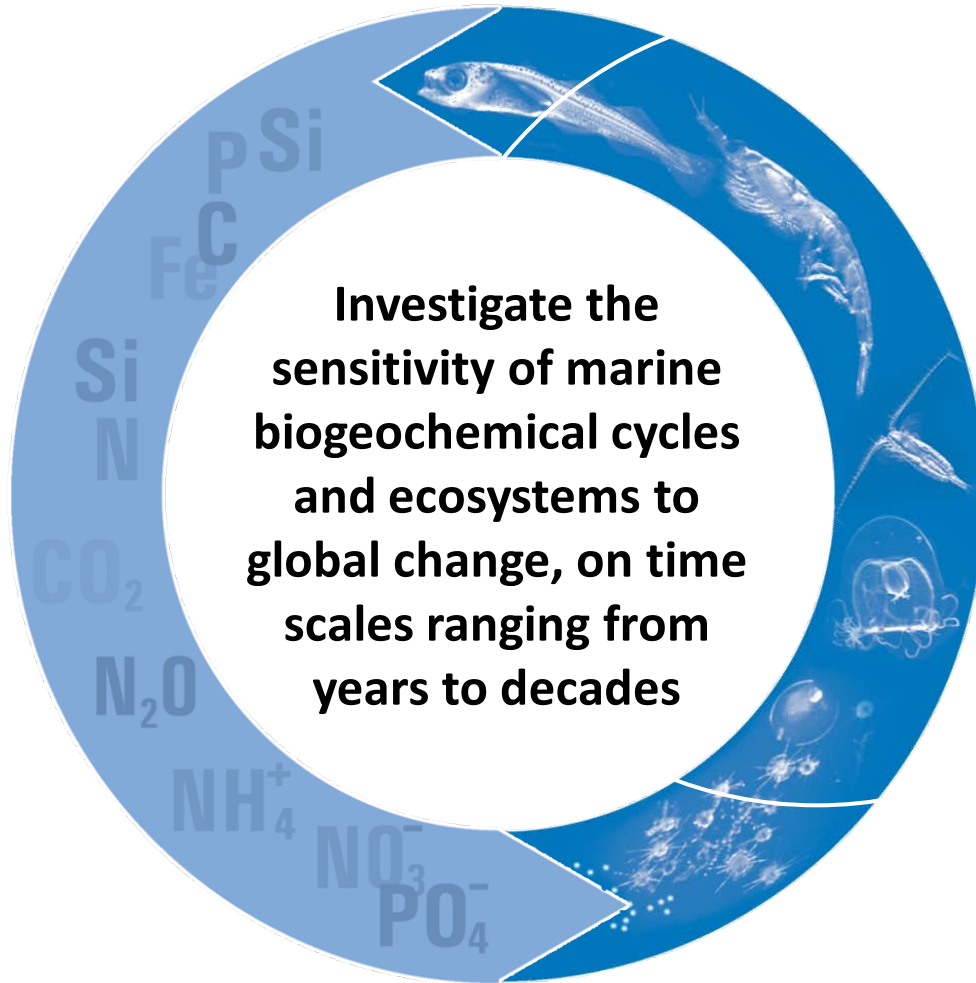




# Integrated **M**arine **B**iogeochemistry and **E**cosystem **R**esearch

“...to provide a comprehensive understanding of, and accurate predictive capacity for, **ocean responses to accelerating global change and the consequent effects on the Earth System and human society**”

# IMBER RESEARCH FOCUS



## FOUR RESEARCH THEMES

- Interactions between biogeochemical cycles and marine food webs
- Sensitivity to global change
- Feedbacks to the Earth System
- Responses of society

## IMBER Research Theme 1 – Interactions Between Biogeochemical Cycles and Marine Food Webs

*What are the key marine biogeochemical **cycles** and related ecosystem **processes** that will be impacted by global change?*

Understanding how the transformation and transport of elements involved in biogeochemical cycles relates to foodweb dynamics, is a major intellectual challenge for marine science and IMBER

- **Transformation** of organic matter in marine food webs
- **Transfers** of matter across ocean interfaces
- **Material flows** in end-to-end food webs

## IMBER Research Theme 2 – Sensitivity to Global Change

***What are the **responses** of key marine biogeochemical cycles, ecosystems and their interactions with global change?***

IMBER focuses on observation and analysis of current marine biogeochemical cycles and ecosystems and on understanding and predicting how these respond to the complex forcings associated with global change

- Impacts of climate-induced changes through physical forcing and variability
- Effects of increasing anthropogenic CO<sub>2</sub> and changing pH on marine biogeochemical cycles, ecosystems and their interactions
- Effects of changing supplies of macro- and micronutrients
- Impacts of harvesting on end-to-end food webs and biogeochemical cycles

### *What are the **role** of ocean biogeochemistry and ecosystems in regulating climate?*

IMBER focuses on the present and future capacity of the ocean to control the climate system via atmospheric composition and ocean heat storage.

### **Oceanic Storage of Anthropogenic CO<sub>2</sub>**

- What are the spatial and temporal scales of storage of CO<sub>2</sub> in the ocean interior?
- What is the role of the continental margins in ocean carbon storage under global change?

### **Feedback to Ocean Physics and Climate**

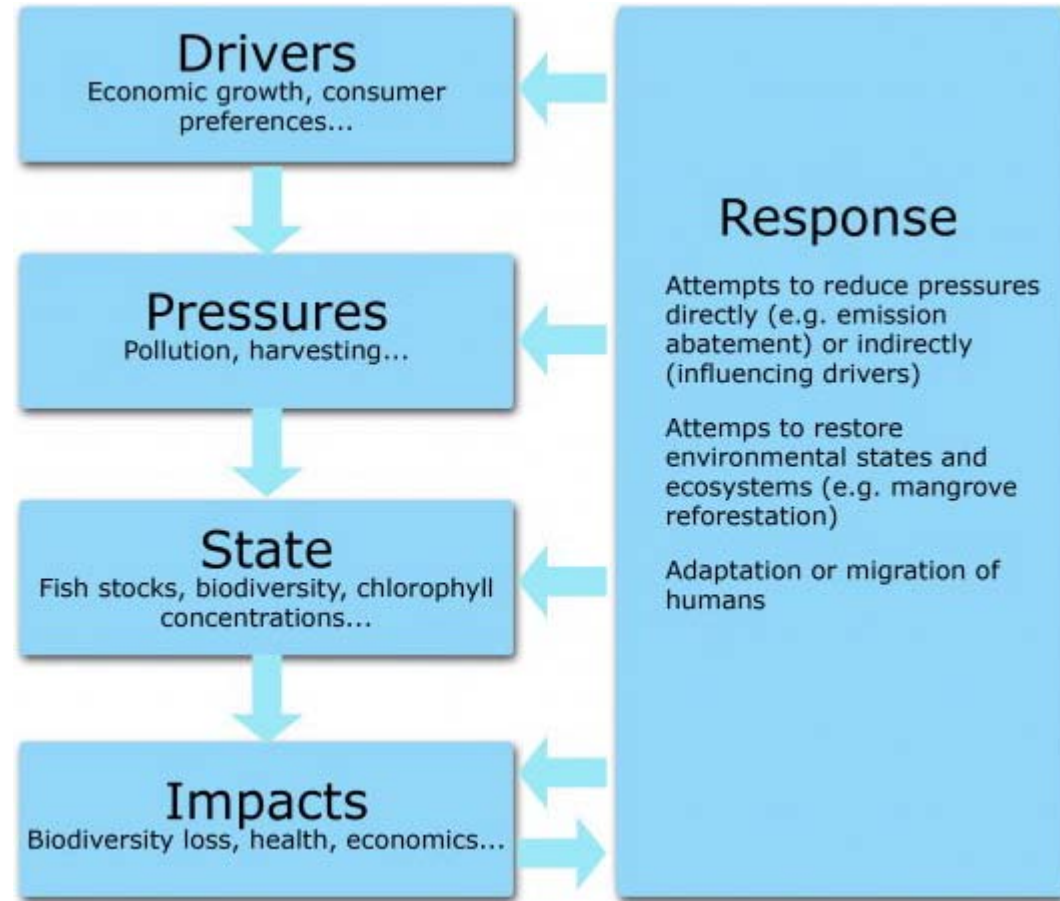
- How do marine food web structure and variability affect ocean and ice physics, and large-scale climate and its variability, via the upper ocean heat budget?
- What will be the effect of global changes in oxygen minimum zones on sources, transport and out gassing of N<sub>2</sub>O?

## IMBER Research Theme 4 – Responses to Society

*What are the **relationships** between marine biogeochemical cycles, ecosystems, and human society?*

IMBER focuses on understanding the multiple interactions and feedback loops between human and ocean systems.

- Promote an understanding of the multiple feedbacks between human and ocean systems
- Clarify what human institutions can do, either to mitigate anthropogenic perturbations of the ocean system, or to adapt to such changes





**SPONSORS**



**IMBER Scientific Steering Committee**

**IPO, Norway**



**RPO, China  
National contacts**



**Working Groups  
Task Teams**

Human Dimensions  
Carbon Research   
Continental Margins   
Data Management  
Capacity Building

**Regional Programs**

ICED   
SIBER   
CLIOTOP   
ESSAS 

**Contributing Projects**

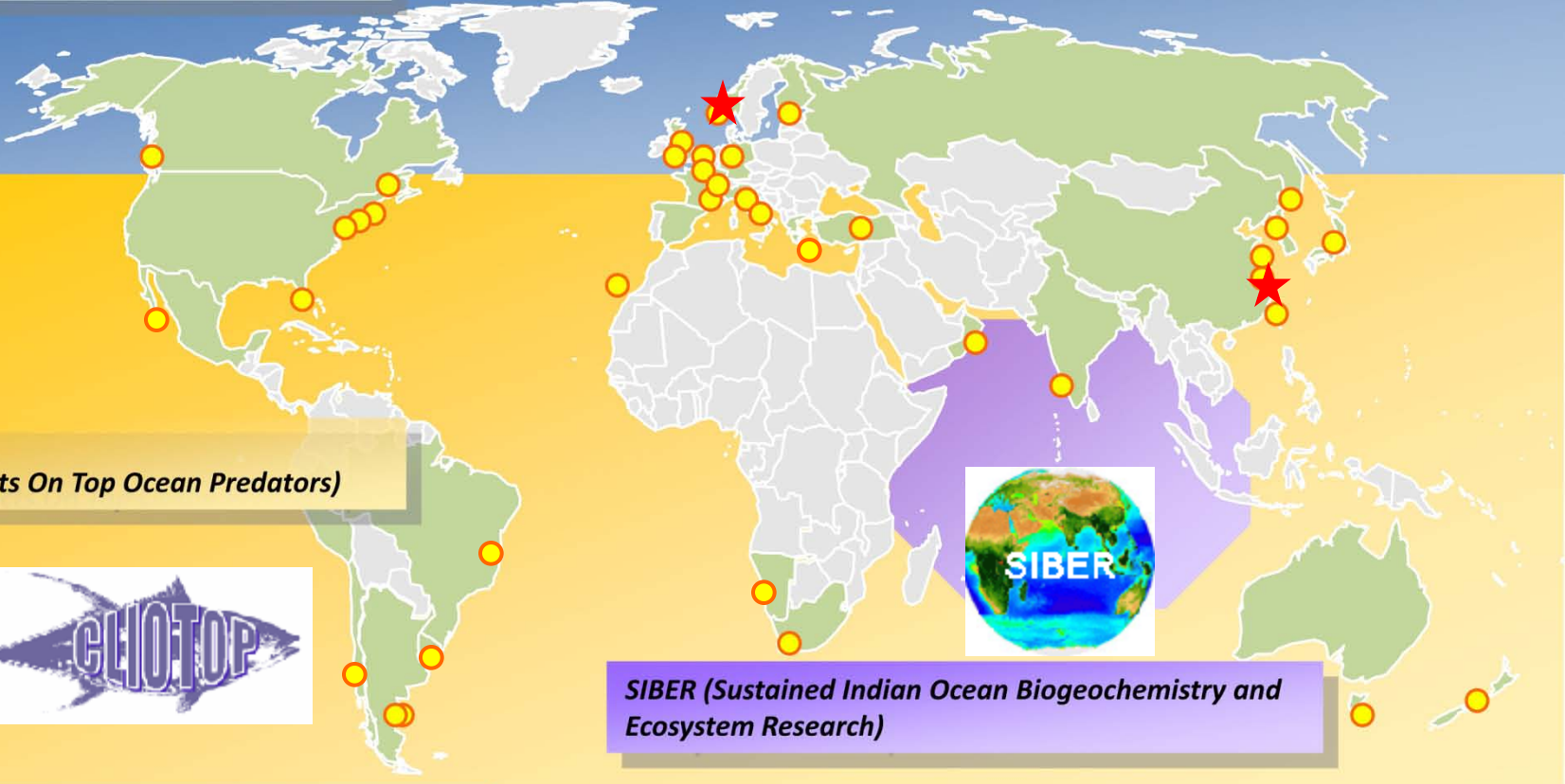
EUR-OCEANS  
CARBOOCEAN



**IMBER Scientists**

# IMBER Regional Programmes and International Network

**ESSAS (Ecosystem Studies of Sub-Arctic Seas)**



**CLIOTOP (Climate Impacts On Top Ocean Predators)**



**SIBER (Sustained Indian Ocean Biogeochemistry and Ecosystem Research)**

**ICED (Integrating Climate and Ecosystem Dynamics)**



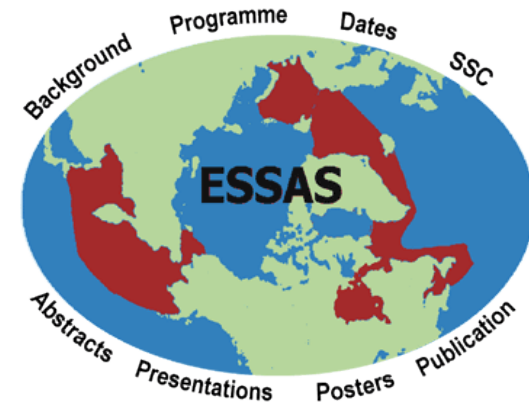
**IMBER Endorsed Projects**

**IMBER National Contacts**

# Ecosystem Studies of Sub-Arctic Seas (ESSAS)

[www.imr.no/essas](http://www.imr.no/essas)

Chairs: K. Drinkwater and F. J. Mueter



**ESSAS** addresses the need to understand **how climate change affect the marine ecosystems of the Sub-Arctic Seas and their sustainability**. **ESSAS** conducts research to compare, quantify, and predict the impact of **climate variability and global change** on the productivity and sustainability of Sub-Arctic marine ecosystems.

**WGs:** Regional Climate Prediction; Biophysical Coupling; Modeling Ecosystem Response; Gadoid-Crustacean Interactions

# Ecosystem Studies of Sub-Arctic Seas (ESSAS) [www.imr.no/essas](http://www.imr.no/essas)

Chairs: K. Drinkwater and F. J. Mueter



## Perspectives

- provide quantitative estimates and uncertainty of **future climate change** for the ESSAS regions,
- develop conceptual, mechanistic/process, statistical/empirical, and simulation models to facilitate comparison of ESSAS ecosystems and to forecast the **impacts of climate change on ecosystem structure and function.**
- assess the **effects of ocean climate variation and fishing** on the interactions between gadoid fishes and crustaceans through a comparative study across multiple sub-arctic marine ecosystems.

# Climate Impacts on Oceanic Top Predators (CLIOTOP)

Chairs: A. Hobday and O. Maury



<http://tinyurl.com/CLIOTOP>

**CLIOTOP** organises a large-scale global comparative effort at elucidating the **key processes and impact of both climate variability and fishing on the structure and function of open pelagic ecosystems and their top predator species**. The ultimate objective is to develop a reliable **predictive capability** for the dynamics of top predator populations and oceanic ecosystems that combine both **fishing and climate effects**.

# Climate Impacts on Oceanic Top Predators (CLIOTOP)

Chairs: A. Hobday and O. Maury



<http://tinyurl.com/CLIOTOP>

## Perspectives

→ emphasis on **developing scenarios** of the evolution of higher trophic levels in the oceanic ecosystems under **anthropogenic and natural forcings** in the 21<sup>st</sup> century, in support of international oceanic **ecosystem governance**.

**WGs:** Early Life History of Top Predators; Physiology, Behaviour and Distribution; Tropic Pathways in Open Ocean Pelagic Ecosystems; Synthesis and Modelling; Socio-Economic Aspects and Management Strategies; Mid-trophic Automatic Acoustic Sampling

# Integrating Climate and Ecosystem Dynamics in the Southern Ocean (ICED)

Chair: E. Murphy

[www.iced.ac.uk](http://www.iced.ac.uk)



## Perspectives

- develop a coordinated circumpolar approach to better understand **climate interactions in the Southern Ocean**
- the implications for ecosystem dynamics
- the impacts of biogeochemical cycles
- development of sustainable management procedures.

# Integrating Climate and Ecosystem Dynamics in the Southern Ocean (ICED)

Chair: E. Murphy

[www.iced.ac.uk](http://www.iced.ac.uk)



## Key Themes

- 1) Key physical processes affecting the Southern Ocean
- 2) Interaction of physical and biological processes and their effects on nutrient dynamics and biogeochemical cycles in the Southern Ocean
- 3) Structure of Southern Ocean ecosystems
- 4) Southern Ocean ecosystem structure and dynamics in the context of sustainable management plans
- 5) Circumpolar models



# Sustained Indian Ocean Biogeochemical and Ecological Research (SIBER)

Chairs: R. Hood and W. Naqvi

[www.incois.gov.in/Incois/siber/siber.jsp](http://www.incois.gov.in/Incois/siber/siber.jsp)



## Perspectives

→ Develop an understanding of the role of the Indian Ocean in **global biogeochemical cycles** and the interaction between these cycles and **marine ecosystem dynamics**.

# Sustained Indian Ocean Biogeochemical and Ecological Research (SIBER)

Chairs: R. Hood and W. Naqvi

[www.incois.gov.in/Incois/siber/siber.jsp](http://www.incois.gov.in/Incois/siber/siber.jsp)



**Themes:** Boundary current dynamics, interactions and impacts; Variability of the equatorial zone, southern tropics and Indonesian through-flow and their impacts on ecosystems and biogeochemical cycles; **Physical, biogeochemical and ecological contrasts** between the Arabian Sea and the Bay of Bengal; **Controls and fates** of phytoplankton and benthic production in the Indian Ocean; **Climate** and anthropogenic impacts; The role of high trophic levels in ecological processes and biogeochemical cycles.

# IMBER Working Groups

## Capacity Building

To enhance research capabilities in less developed countries and to strengthen graduate education in ocean sciences. Leader: **Jing Zhang**

## SOLAS/IMBER Carbon

Coordinate and synthesize ocean carbon research in surface ocean (**Andrew Lenton**), interior ocean (**Niki Gruber**) and ocean acidification (**Jean-Pierre Gattuso**).

## IMBER/LOICZ Continental Margins

To finalise the Continental Margins Implementation Plan to coordinate research in these areas. Leaders: **Kon Kee Liu** (IMBER) and **Helmuth Thomas** (LOICZ)

## Data Management

Encourages the use of good data management practices in all aspects of IMBER science. Leader: **Alberto Piola**

## Human Dimensions

To understand the feedbacks between human and ocean systems, and to clarify what human institutions can do to mitigate anthropogenic perturbations of the ocean system, or to adapt to such changes. Leaders: **Alida Bundy**, **Marie Badjeck** and **Moenieba Isaacs**

# IMBER

## Major Activities





# IMBER Summer Schools



IMBER Summer School

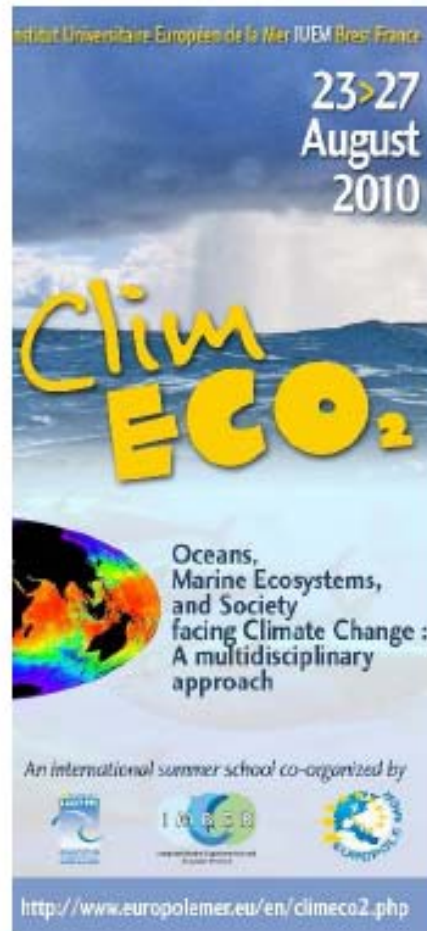
## ClimECO<sub>3</sub>

23 - 28 July 2012  
Ankara, Turkey

A view towards integrated Earth System models – human-nature interactions in the marine world

*IMBER is a project of the European Union under the leadership of the Institut Universitaire Européen de la Mer (IUEM) Brest, France.*

2012



Institut Universitaire Européen de la Mer IUEM Brest France

23 > 27  
August  
2010

## ClimECO<sub>2</sub>

Oceans, Marine Ecosystems, and Society facing Climate Change: A multidisciplinary approach

An international summer school co-organized by

<http://www.europolemer.eu/en/climeco2.php>

2010



## climECO

Climate driving of marine ecosystem changes  
... Training for young marine scientists

Institut Universitaire Européen de la Mer  
Brest - FRANCE  
21-24 April 08

Deadline for registration: 15 January 2008

Co-organizers:  
W. Haverkamp (IUEM, The Netherlands)  
M. Huelbe (IUEM, Germany)  
E. Orlowski (Linköping, Sweden)  
R. Sanders (NOEC, UK)  
D. Sunstein (IUEM, France)

<http://www.imber.info/CLIMECO/home.html>

WORLD CLIMATE OCEANS

2008

# IMBER 主要出版物 (Major Publications 2009-2010):

特刊



Surface Ocean CO<sub>2</sub> Variability and Vulnerabilities  
Deep-Sea Research Part II,  
volume 56, numbers 8-10,  
(2009)



Eastern boundary upwelling ecosystems: integrative and comparative approaches  
Progress in Oceanography,  
volume 83, issues 1-4 (2009)



Parameterisation of Trophic Interactions in Ecosystem Modelling  
Progress in Oceanography,  
Volume 84, Issues 1-2 (2010)

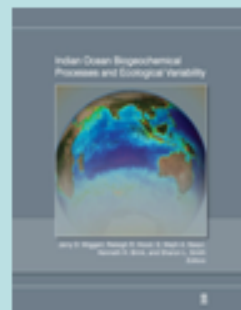


Ecological and Biogeochemical Interactions in the Dark Ocean  
Deep-Sea Research Part II,  
Volume 57, Issue 16 (2010)

图书



Carbon and Nutrient Fluxes in Continental Margins: A Global Synthesis  
2010, IGBP Book Series,  
Springer, Berlin, 744p.



Indian Ocean Biogeochemical Processes and Ecological Variability,  
2009, AGU Monograph Series,  
Volume 185, 350 p.



IMBER (2010) Supplement to the Science Plan and Implementation Strategy.  
IGBP Report No. 52A, IGBP Secretariat, Stockholm, 36p.



Integrating Climate and Ecosystem Dynamics (ICED):  
Report of the Southern Ocean Food Web Modelling Workshop,  
16-18 April 2008, USA, 2010

报告

# IMBER E-News and Newsletters

Issue n° 20 - May 2012

## IMBER Update

### 1 - Review of the past and look forward to the future

[Return to TOC](#)

The IMBER International Project Office (IPO) is based in Brest, France.

This issue of the IMBER Update reports on the progress of IMBER activities, scientific highlights and announcements relevant to the environmental impacts, the IMBER Update is published online.

### 1.1 - How the IPO came into being

A brief story of the establishment of the IMBER International Project Office (IPO) in Brest, France.

Issue n° 19 - December 2011



### 1 - Welcome to SIBER!



Elken E. Hofmann (IMBER Chair), Center for Coastal Physical Oceanography, University of Tromsø, Norway  
Nick D'Adamo, Perth Regional Programme Office of the IMBER International Project Office

Issue n° 18 - September 2011

## IMBER Update

### 1 - Editorial: The Human Dimension in IMBER

This issue of the IMBER Update focuses primarily on how the human dimensions aspect is being addressed by the various components of IMBER.

## IMBER Newsletters

IMBER Update reports on the progress of IMBER activities, scientific highlights and announcements relevant to the environmental impacts, the IMBER Update is published online.

If you wish to receive this newsletter, please click [HERE](#) and register.

[IMBER Update](#)

Issue n°20 - May 2012

[IMBER Update](#)

Issue n°19 - December 2011

[IMBER Update](#)

Issue n°18 - September 2011

[IMBER Update](#)

Issue n°17 - April 2011

## Monthly IMBER e-News

n° 54 - August 2012	n° 53 - July 2012	n° 52 - June 2012
n° 51 - May 2012	n° 50 - April 2012	n° 49 - March 2012
n° 48 - February 2012	n° 47 - January 2012	n° 46 - December 2011
n° 45 - November 2011	n° 44 - October 2011	n° 43 - September 2011
n° 42 - August 2011	n° 41 - July 2011	n° 40 - June 2011
n° 39 - May 2011	n° 36 - October 2010	n° 35 - July 2010
n° 34 - June 2010	n° 33 - April 2010	n° 32 - March 2010
n° 31 - February 2010	n° 30 - January 2010	n° 29 - December 2009
n° 28 - November 2009	n° 27 - October 2009	n° 26 - September 2009
n° 25 - August 2009	n° 24 - July 2009	n° 23 - May 2009
n° 22 - April 2009	n° 21 - March 2009	n° 20 - February 2009

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### What is IMBER?

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Marine Science (IUEM) in Brest, France. However, IMBER size of these endeavours varies from a few individuals in a multi-institutional research programmes. IMBER currently 24 IMBER endorsed projects hail from 13 countries.

Teams of individuals with specific expertise help to facilitate answer key science questions. Read about the new Human

research programmes currently operating under IMBER advance our understanding of marine biogeochemical cycles and help to answer key science questions. Read about the new Human

dimensions aspect is being addressed by the various components of IMBER.





# Existing Collaborations between IMBER and CLIVAR



- **SIBER** (Indian Ocean) Regional Programme of IMBER and IO-GOOS is strongly connected to the Indian Ocean Panel of CLIVAR
- **ICED** (Antarctic) Regional Programme of IMBER and Southern Ocean Panel of CLIVAR are communicating on joint work
- **Summer Schools**
  - **ClimEco2**: Oceans, Marine Ecosystems, and Society facing Climate Change: A multidisciplinary approach (Brest, France, 23-27 August, 2010)
  - **ClimEco3**: A view to integrated Earth System models Human-nature interactions in the Marine World (Ankara, Turkey, 23-28 July, 2012)

# Joint CLIVAR-IMBER session in Mexico, June 2012

- Introduction to the CLIVAR-IMBER joint session (**Drinkwater**)
- Introduction to CLIVAR (**Visbeck, Hurrell**)
- Introduction to IMBER (**Hofmann**)
- Linking biogeochemistry and food webs to climate (**Roman**)
- The role of biology in climate models (**Rintoul**)
- Decadal climate prediction and the role of ocean biology (**Hood**)
- Decadal climate prediction: where are we? (**Danabasoglu**)
- Responses to future climate change: biogeochemistry (**Gattuso**)
- Responses to future climate change: humans (**Bundy**)
- Status of climate change modelling at global to regional scales (**Kumar**)

→ Break-out discussions on:

- ❖ “Decadal variability”
- ❖ “Marine ecosystems and climate”



# Joint CLIVAR-IMBER session in Mexico, June 2012

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## Draft Conclusions

- Consider links at the international, regional and national level
  - *thanks for this opportunity in the Asia-Pacific region*
- IMBER and CLIVAR are considering how to evolve in the context of the “Future Earth” initiative
  - *ideal opportunity to form stronger collaborations*
- Form a task team???
  - *come up with some cooperative approaches looking at the longer term*



# Recent IMBER activities organised in the Asia-Pacific region



1. **5th China-Japan-Korea (CJK) IMBER Symposium** and training course (Nov. 2011, Shanghai, China)
  - (1) the impact of climate change on physicochemical and biological properties of marginal seas,
  - (2) the impact of anthropogenic activities on marine biogeochemistry and ecosystem dynamics,
  - (3) the development of biological indicators to detect and evaluate changes in marine ecosystem structure and function
  - (4) the application of end-to-end food web models
2. **Capacity building needs assessment for marine science in the Asia-Pacific region** (July-Aug. 2012, Shanghai, China)

(14 countries – 10 of them are Asia-Pacific countries, with representatives from IMBER, APN, SCOR, IOC/WESTPAC, POGO)

# IMBER networking in the Asia-Pacific region



- **PICES** (North Pacific Marine Science Organization)
- **APN** (Asia-Pacific Network for Global Change Research)
- **IOC/WESTPAC** (Intergovernmental Oceanographic Commission /Sub-commission for the Western Pacific)
- **IOC Perth** Regional Programme Office
- **LOICZ** (Land-Ocean interaction at coastal zone)-East Asia Regional Node
- **SCOR** (Scientific Committee on Oceanic Research) – China
- **IGBP** (International Geosphere-Biosphere Programme) – China



**Few recent and forthcoming IMBER activities  
relevant to CLIVAR-AAMP**





Summer School  
23-28 July 2012 in Ankara, Turkey

# ClimECO<sub>3</sub>

A View Towards Integrated Earth System Models  
Human-nature Interactions in the Marine World

IMBER focuses on the interactions and linkages between biogeochemical cycles and food webs with a view towards improving predictive capability for marine ecosystems. It is now apparent that the human dimension is an important component of marine ecosystems. Inclusion of the human aspects into marine ecosystem research is only beginning and considerable development is still required to allow meaningful interfacing of food web, biogeochemical and socio-economic systems. The inclusion of human impacts in Earth System models will allow the development of more accurate scenarios under future climate change.

## Participants

This is an interdisciplinary summer school. We welcome applications from both natural and social scientists working on topics related to oceans and climate change who are interested in the challenge of crossing the barriers between disciplines.

## Programme

The programme will focus on the interface between marine ecosystem biogeochemistry, physical drivers, food webs and socio-economic systems; with lectures on modelling all of these system processes, as well as model coupling and Earth System models. To help understanding there will be daily "hands-on" sessions with example models that can be usefully explored in the time available.

## Conveners

Jacopo Baggio (UEA, UK)  
Laurent Bopp (LSCE, France)  
Elizabeth Fulton (CSIRO, Australia)  
Hezi Gildor (The Hebrew University, Israel)  
Eileen Hofmann (Old Dominion University, USA)  
Markus Jochum (NCAR, USA)  
Raghu Murtugudde (University of Maryland, USA)  
Baris Salihoglu (Middle East Technical University, Turkey)  
Michael St John (DTU, Denmark)  
Rashid Sumaila (University of British Columbia, Canada)  
Ingrid Van Putten (CSIRO, Australia)

## Registration fees

Students €250, others €350  
Free registration for EURO-BASIN early career scientists  
Limited funding is available

### Overview of Earth System and socio-economic models

Integrated Earth System models  
Physical-biological-chemical interactions in the Earth System  
Earth System models and feedbacks  
Global/regional socio-economic models  
Coupling the realms

### Modelling low trophic level processes and human interactions

Earth, life and sustainability  
The microbial web and plankton  
Benthic invertebrates and human impacts  
Human interactions with biogeochemical cycles

### Modelling high trophic level processes and human interactions

Modelling vertebrates - population dynamics vs Individual-Based Models  
Simple fisheries models  
Overview of Ecopath and Ecosim models

### Putting people into Earth System models

Human sectors of interest for Earth System models  
Representing fisheries using predictive fleet dynamics models  
The basics of economics  
Policy analysis using tools like Ecosim  
Ecospace models - making a spatial model  
Ecospace models - exploring spatial management and fleet dynamics

### Modelling approaches for marine populations and social networks

Representing synthetic populations and social networks  
Overview of impact models and agent-based approaches  
Hybrid models and model coupling

Apply before 1<sup>st</sup> March 2012  
[www.imber.info](http://www.imber.info)



EURO-BASIN KORDI

PICES

# Interdisciplinary ClimEco3 summer school "A View towards Integrated Earth System Models. Human-nature Interactions in the Marine World"

- Overview of Earth System and socio-economic models
- Modelling low and high trophic level processes and human interactions
- Putting people into Earth System models
- Modelling approaches for marine populations and social networks

(23-28 July 2012)



# 2ND CLIOTOP Symposium

Noumea, New Caledonia, 11-15 February 2013

## Conference theme

**Certainty of change in pelagic systems - detection, attribution, prediction**

## Symposium sessions

### Working group themes

WG 1: Early life history of pelagic species

WG 2: Behaviour physiology and distribution

WG 3: Trophic pathways in open ocean ecosystems

WG 4: Synthesis and modelling

WG 5: Socio-economic aspects and management strategies

WG 6: Characterising mid-trophic level biomass

### Cross cutting themes

Blue economy - what role for pelagic species and ecosystems?

Pelagic conservation-fisheries

management conflicts - maximising dual objectives

Pelagic-coastal linkages - food and conservation

The general objective of CLIOTOP is to organise a large-scale worldwide comparative effort aimed at elucidating the key processes involved in the impact of both climate variability (at various scales) and fishing on the structure and function

and fishing on the structure and function of open ocean pelagic ecosystems and their top predator species. The ultimate objective is the development of a reliable predictive capability for the dynamics of top predator populations and oceanic ecosystems that combines both fishing and climate (i.e. environmental) effects.

### Organising committee

Alistair Hobday - Chair (CSIRO)  
 Haritz Arrizabalaga (AZTI Tecnalia)  
 Johann Bell (SPC)  
 Karen Evans (CSIRO)  
 Joel Llopiz (Woods Hole Oceanographic Institution)  
 Lisa Maddison (IMBER)  
 Christophe Menkes (IRD)  
 Kevin Weng (PIRP and Univ of Hawaii)  
 Jock Young (CSIRO)

### Scientific committee

Dan Costa (USA)  
 Robert Cowan (USA)  
 Maria Gasalla (Brazil)  
 Patrick Lehodey (France)  
 Olivier Maury (France)  
 Hideki Nakano (Japan)  
 Sung Kwon Soh (South Korea)

Registration & abstracts open ..... 10 July 2012  
 Deadline for abstracts ..... 1 Oct 2012  
 Acceptance of abstracts ..... 1 Nov 2012  
 Registration close ..... 1 Dec 2012  
 Late registration close ..... 1 Feb 2013

**Registration fees**  
 Students: 200 Euros  
 Normal: 250 Euros  
 Late: 330 Euros

To register and submit an abstract please see:

## and adaptation

We invite contributions that address this question from physical, biological and social perspectives and from integrated perspectives. Related issues such as maximising ecosystem services from the pelagic ocean- conservation, fisheries, and livelihoods are also relevant.



# Certainty of change in pelagic systems – detection, attribution, and prediction

The inter-annual and decadal variability caused by climate oscillations (e.g., El Niño Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO), North Atlantic Oscillation (NAO)) is clearly affecting the ocean realm. However, the food webs that support oceanic species, fisheries and regional economies are already altered by the effects of climate change in the oceans. Well-designed adaptations is required immediately to reduce the threats and capitalize on the opportunities to increase long-term resilience of oceanic systems.

**(11-15 Feb. 2013, Noumea, New Caledonia)**





**IMBiZO III**  
**The future of marine biogeochemistry, ecosystems and societies**  
**28-31 Jan 2013** \_\_\_\_\_ **Goa, India**

**Future of marine biogeochemistry, ecosystems and societies**

***Multi-dimensional approaches to the challenges of global change in continental margins and open ocean systems***

→ To explore multi-dimensional approaches to the challenges of global change and to move beyond the initial focus of IMBER (biogeochemistry and ecosystems) to include: **climate, the human dimension, open oceans and the continental margins**

**(28-31 Jan. 2013, Goa, India)**




**Workshops**

ng continental margin ecosystems and biogeochemistry  
 mpacts and the biological carbon pump  
 ocean interactions and global change

Alida Bundy - Kon-Kee Liu - Julie Hall - Eileen Hofmann  
 on - Liana McManus - Wajih Naqvi - Helmuth Thomas

Changing  
 Human i  
 Human-

Conveners :  
 Lisa Maddis

Funded as a  conference



# Three parallel but interacting Workshops and other related activities

- **Biogeochemistry-ecosystem interactions on changing continental margins**
  - **The impact of anthropogenic perturbations on open ocean carbon sequestration via the dissolved and particulate phases of the biological carbon pump**
  - **Understanding and forecasting human-ocean-human interactions, drivers, pressures and responses with respect to global change**
- + **IMBIZO 3 Human Dimension WG Workshop (Jan. 24-26)**
- + **IMBIZO 3 Data Management Workshop (Jan. 27)**
- + Other joint activities with the **IMBER Continental Margings** Task Team and the **SOLAS-IMBER Carbon** Working Groups

# Possible topics for CLIVAR-IMBER cooperation

- Ocean carbon uptake: observations and specific/regional modelling as contributions in global climate models (links with SIC)
- Decadal variability in the ocean and climate systems, with proxies coming from biogeochemistry and fisheries research (eg., Pacific Decadal Oscillation (PDO))
- Upwelling regions: coupled models, possible joint activities (also with SOLAS?)
- Monsoon variability and predictability (eg., Indian Ocean Dipole (IOD)): coupled ocean-atmosphere observations and models; downscaling of models)
- *Possible links with the Expert Team on Climate Change Detection and Indices (ETCCDI) and the Global Synthesis and Observations Panel (GSOP)*
- *Possible links with the Data Management Committee?*
- Cooperation, especially on observations and modelling activities, with respect to the “Future Earth” initiative development and implementation, especially taking into account the human dimension



**Thank you!**