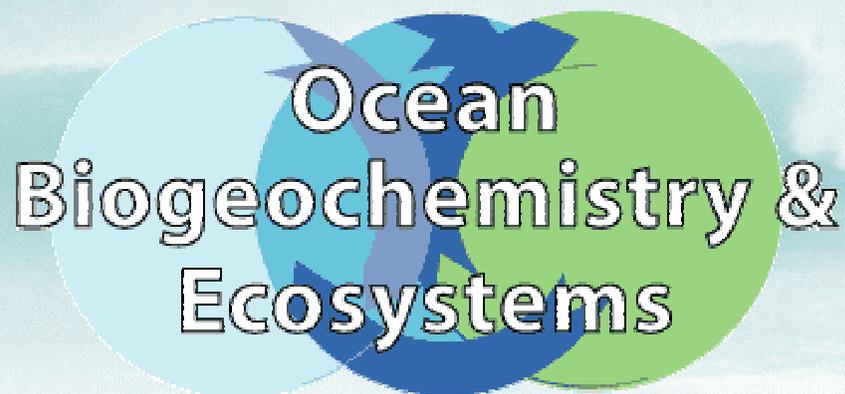


Ocean Biogeochemistry and Ecosystems



- 
- History
 - Development
 - How to contribute

- A need for biogeochemical and ecosystem research in relation to global change
- Plymouth Workshop September 2000

IGBP/SCOR Ocean Futures Planning Committee

Identify the most important science issues related to biological and chemical aspects of the oceans's role in global change and effects of global change on the ocean.

Ocean Biogeochemistry and Ecosystems Project

Transition Team charged with developing a

Science Plan and Implementation Strategy by the
end of 2003.

Transition Team

Julie Hall (New Zealand), Chair

Patrick Monfray (France), Vice Chair

Ann Bucklin (USA)

Dennis Hansell (USA)

Carlo Heip (Netherlands)

Richard Jahnke (USA)

Arne Kortzinger (Germany)

S. Prasanna Kumar (India)

Wajih Naqvi (India)

William Miller (Canada),

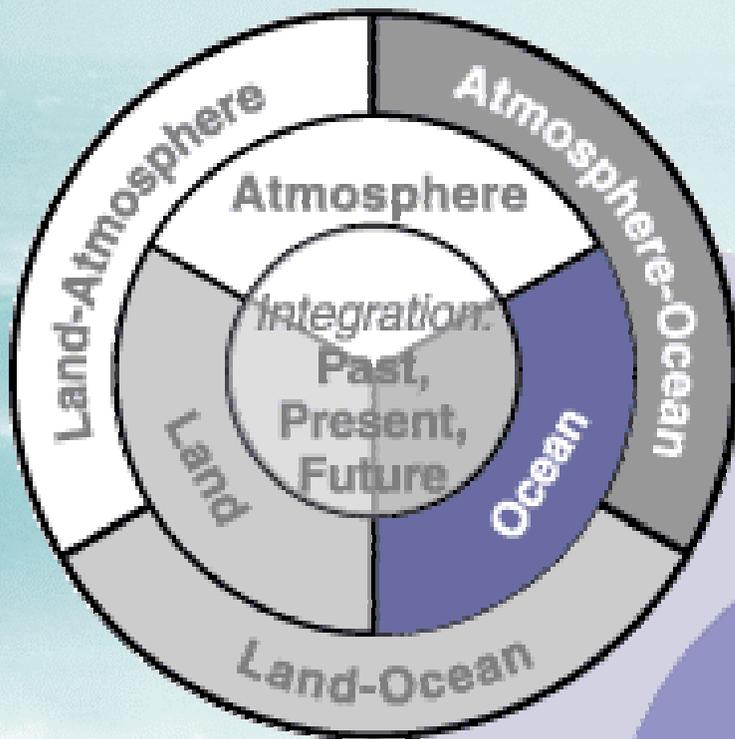
Raghu Murtugudde (USA)

Hiroaki Saito (Japan)

Svein Sundby (Norway)

Ein-Fen Yu (China- Taipei)

Ocean Projects in IGBP II



Steps in development of the Science Plan/Implementation Strategy

- Discussion document
- Open Science Conference – Paris, January 2003

Open Science Conference

Conference aim:

Gather input from the scientific community into the development of the Science Plan and Implementation Strategy for the project

Open Science Conference

- Plenary presentations
- Poster session
- Working group discussions

Working Groups

Within each group, participants were asked to:

- Key science questions
- Approaches to research

Working Groups – Processes

1. Trace elements in ecological and biogeochemical processes
2. Physical forcing of biogeochemical cycling and marine food webs
3. Climatic modulation of organic matter fluxes
4. Direct effects of anthropogenic CO₂ on biogeochemical cycles and ecosystems
5. Integrating food web dynamics from end to end

Working Groups – Domains and Modelling

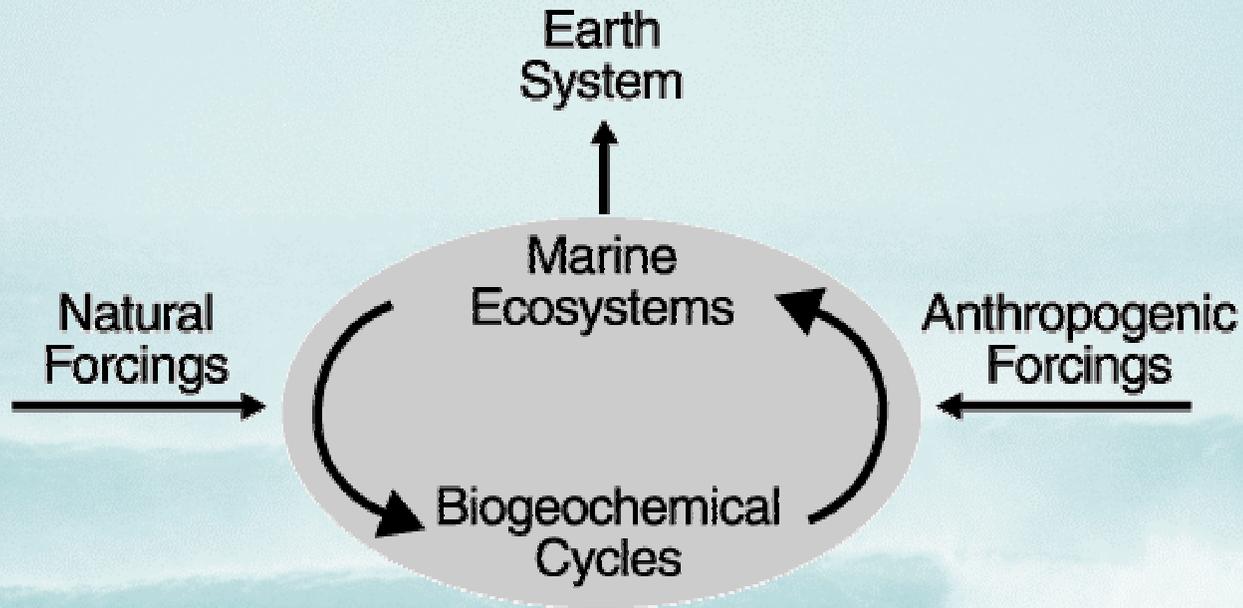
6. Continental margins
7. The mesopelagic layer
8. Biogeochemical hotspots, choke points, triggers, switches and non-linear responses
9. Feedbacks to the Earth System
10. Coupled models of biogeochemical cycles and ecosystems

The background of the slide is a photograph of ocean waves. The water is a light blue-green color, and the waves are breaking, creating white foam. The sky is a pale, hazy blue. The overall tone is calm and serene.

New Project

Scope

Themes and Issues



Overarching question

How do marine ecosystems, biogeochemical cycles and their interactions respond to global change and, in turn, feed back to the Earth System?

Project Scope

- End-to-end food webs in collaboration with GLOBEC

- Euphotic zone

plus emphasis on

- Continental Margins
- Mesopelagic
- High latitude regions

Continental Margins

- Most directly impacted by and directly affect human influences
- Sediment/water interface
- Critical boundary for understanding ocean processes
- Provide the boundary conditions for open ocean modelling

Mesopelagic Layer

- Important ocean region for decomposition of organic matter and the recycling of nutrients
- Controls the remineralisation of organic matter and biominerals
- Vertical migration of many species
- Understudied region of the ocean

High Latitude regions

- Predicted to be first regions to be impacted by climate change
- Regions of Intermediate/deep water mass formation and sea ice
- Provide major storage reservoirs for anthropogenic CO₂

Overarching question

How do marine ecosystems, biogeochemical cycles and their interactions respond to global change and, in turn, feed back to the Earth System?

Ocean Biogeochemistry and Ecosystems - Themes

- Interactions between marine biogeochemical cycles and ecosystems
- Sensitivity of ecosystems, biogeochemical cycles and their interaction, to global change
- Feedbacks from biogeochemical cycles, ecosystems and their interactions to the Earth System

Interactions between marine biogeochemical cycles and ecosystems

Issues

1. Sources and sinks in biogeochemical cycles, and macro/micro nutrient stoichiometry
2. Role of macro/micro nutrient availability, assimilation and cycling in controlling food web structure and function
3. Relationships between biodiversity, structure, function and stability of marine ecosystems
4. Role of species composition, ecological functional groups and organism physiology in regulating biogeochemical cycles

Sensitivity of ecosystems, biogeochemical cycles and their interaction, to global change

Issues

1. The impact of climate-induced changes in circulation, ventilation, and stratification on biogeochemical cycles and ecosystems
2. Response of biogeochemical cycles, ecosystems, and their interactions, to increasing anthropogenic CO₂ and changing pH
3. Response of biogeochemical cycles, ecosystems, and their interactions, to changes in the fluxes of macro/micro nutrients into the marine environment from land and air

Feedbacks from biogeochemical cycles, ecosystems and their interactions to the Earth System

Issues

1. Regional manifestations of global change on biogeochemical cycles and ecosystems, and the resulting feedbacks to the Earth System
2. Oceanic regulation of atmospheric CO₂ concentration
3. Human dimension

Development of Science Plan/Implementation Strategy

- Project Scope
- Themes and Issues identified
- Implementation strategies

Collaboration with IGBP projects

- Global Ocean Ecosystem Dynamics - GLOBEC
- Land-Ocean Interactions in the Coastal Zone - LOICZ
- Surface Ocean-Lower Atmosphere Study - SOLAS
- Past Global Changes – PAGES
- Global Analysis, Integration and Modelling - GAIM

Collaboration with other programmes

- WCRP, Climate Variability and Predictability - CLIVAR
- International Programme of Biodiversity Science – DIVERSITAS
- International Human Dimensions Programme - IHDP

Name of project



New name

How you can contribute to the development of the Ocean Biogeochemistry and Ecosystems project?

- Comment on the draft Science Plan/Implementation Strategy posted on the web site in October 2003
- www.igbp.kva.se/obe/

