SOLAS Update Overview:

- Brief Program Overview
- Cooperation with GEOTRACES
- Carbon coordination (with IMBER, IOCCP, *OCB, NACP*)
- New initiatives, planning with coordination

surface.ocean solas lower.atmosphere.study

Sponsors:

WCRP World Climate Research Programm

GLOBAL CHANGE IGBP

iCACGP

International Council for Science

Scientific Committee on Oceanic Research

SOLAS IPO sponsor:

NATURAL ENVIRONMENT RESEARCH COUNCIL

Doug Wallace
Chair, International SOLAS

Dr Emilie Brévière,
SOLAS Executive Officer
SOLAS International Project Office
School of Environmental Sciences
University of East Anglia
Norwich UK
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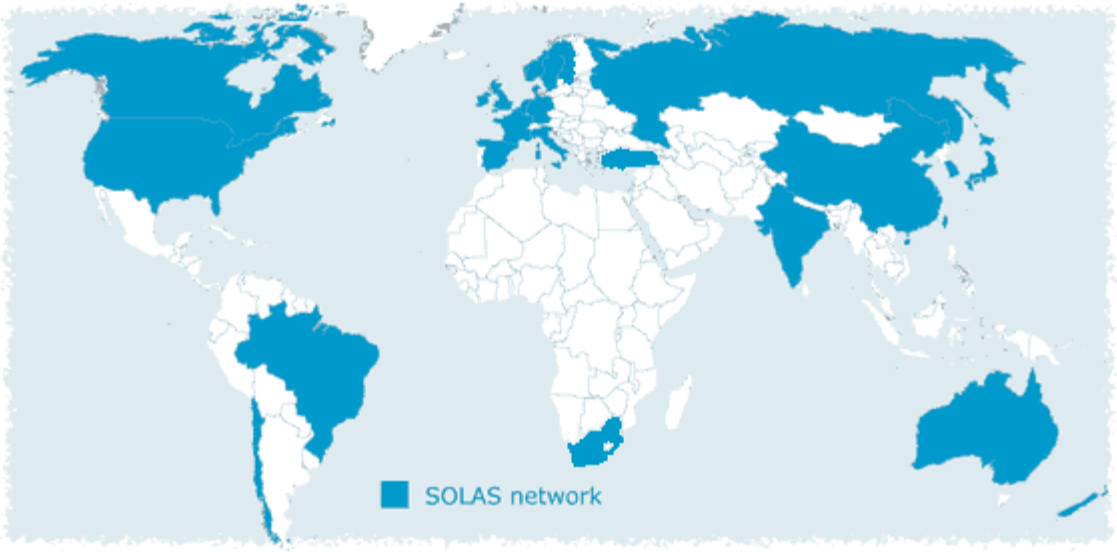
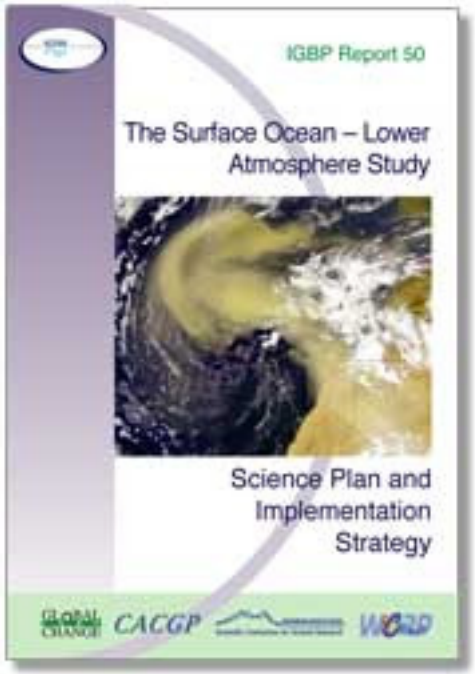
SOLAS Community

- SOLAS Network from 26 countries
- National representatives and/or national coordinators
- SSC members from 12 countries
- SOLAS Science Plan published 2004.

  10 year program

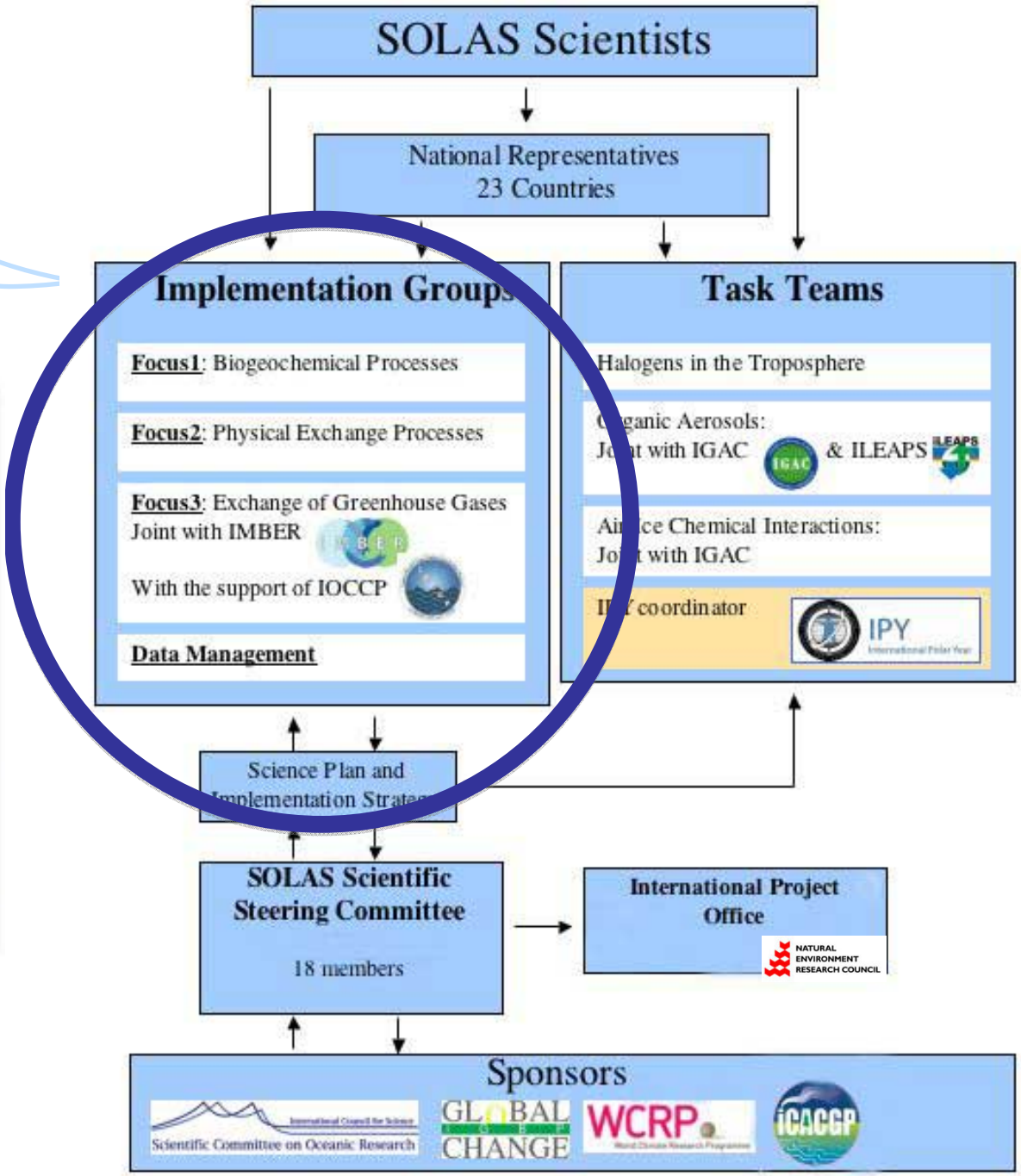


Implementation Groups



SOLAS Science Plan published 2004.

10 year program



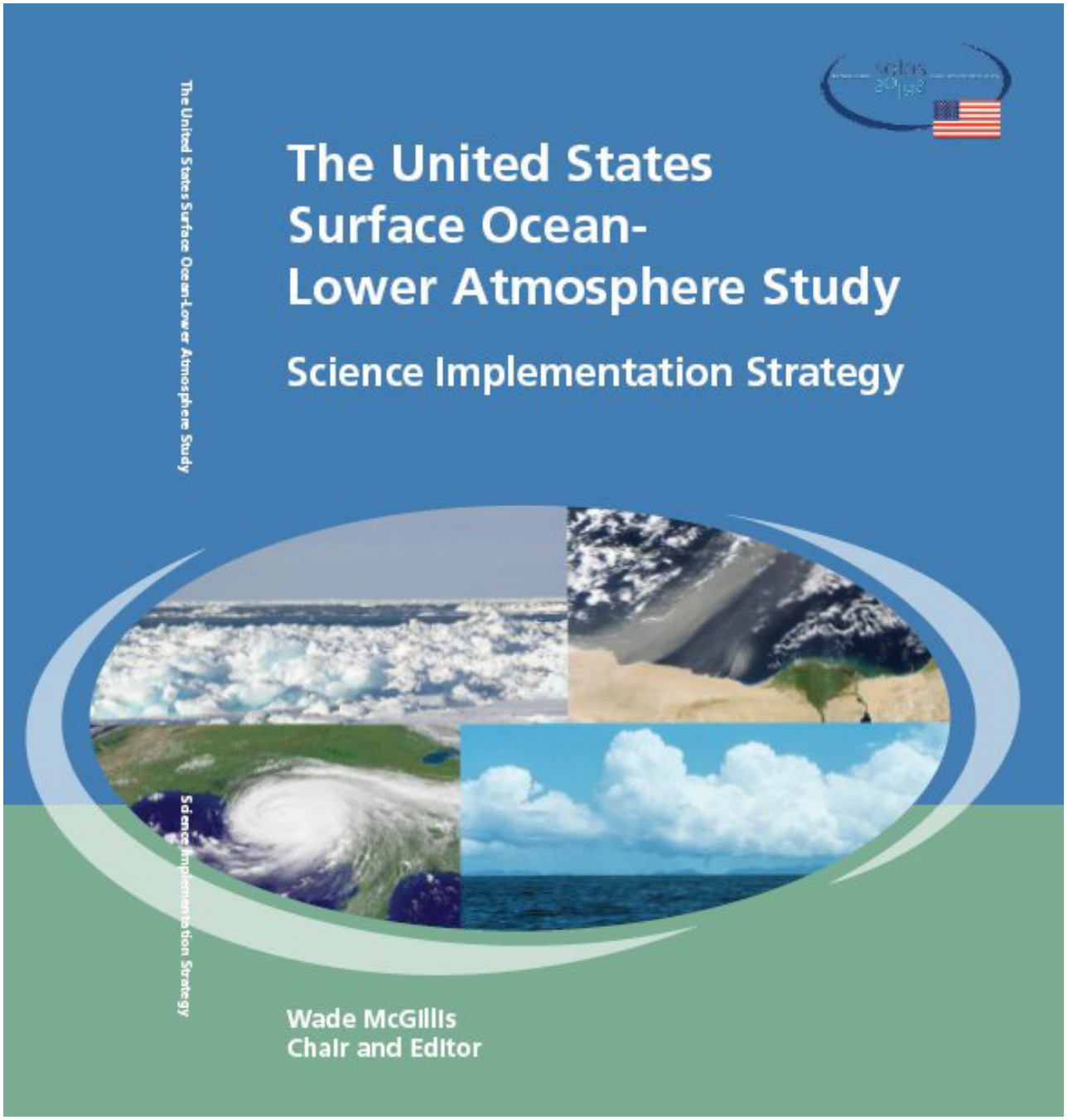
Joint SOLAS–IMBER Carbon Group

in close collaboration with the International Ocean Carbon Coordination Project (IOCCP)

1. **Surface ocean systems**
   Chair: Nicolas Metzl

2. **Interior ocean**
   Chair: Niki Gruber

3. **Ocean Acidification**
   Chair: Jean-Pierre Gattuso


The United States Surface Ocean-Lower Atmosphere Study
The United States Surface Ocean-Lower Atmosphere Study
Science Implementation Strategy
Wade McGillis
Chair and Editor

US SOLAS Science and Implementation Strategy

1.1 Global Ocean Trace Gas Surveys

1.2 The North-Atlantic African Dust-Aerosol Experiment (NafDAE)

1.3 Ocean-Atmosphere-Sea-Ice-Snowpack (OASIS)

1.4 Climate Modeling in SOLAS (CLIMAS)

2.1 World Ocean Gas Exchange Process Studies

2.2 Surface Spray *In-Situ* and Modeling Studies

2.3 Halogens in the Troposphere - US-SOLAS (HiT-US)

2.4 Cape Verde Air-Sea Interaction Time-series Station

3.1 Air-Water CO_2/Volatile Carbon Compounds in the Coastal Margins

3.2 Southern Ocean Carbon Dioxide Studies

3.3 Global Surface Ocean Carbon Concentration Surveys

3.4 Perturbation Experiments in Ocean-Atmosphere CO_2 Studies

4.1 Autonomous and Lagrangian Platforms (ALPS) for SOLAS

4.2 Diagnostic Modeling and Remote Sensing

4.3 US-SOLAS Linkages to the United States Ocean Carbon and Biogeochemistry (OCB) Program and the (OOI)

4.4 Data Management for US-SOLAS

US SOLAS Science and Implementation Strategy

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SOLAS Mid-Term Strategic Planning (underway)

Coordinated, Cross-Cutting Issues suited to
Coordinated International Research

Surface Ocean Lower Atmosphere Observations

Atmospheric control on nutrient cycling/productivity

Air-sea gas fluxes at Eastern boundary upwelling systems

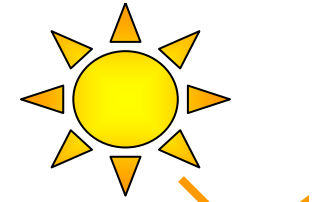
Sea ice as a habitat, reaction surface and barrier

Marine aerosol formation

Ship plumes

Large scale experiments for hypothesis testing

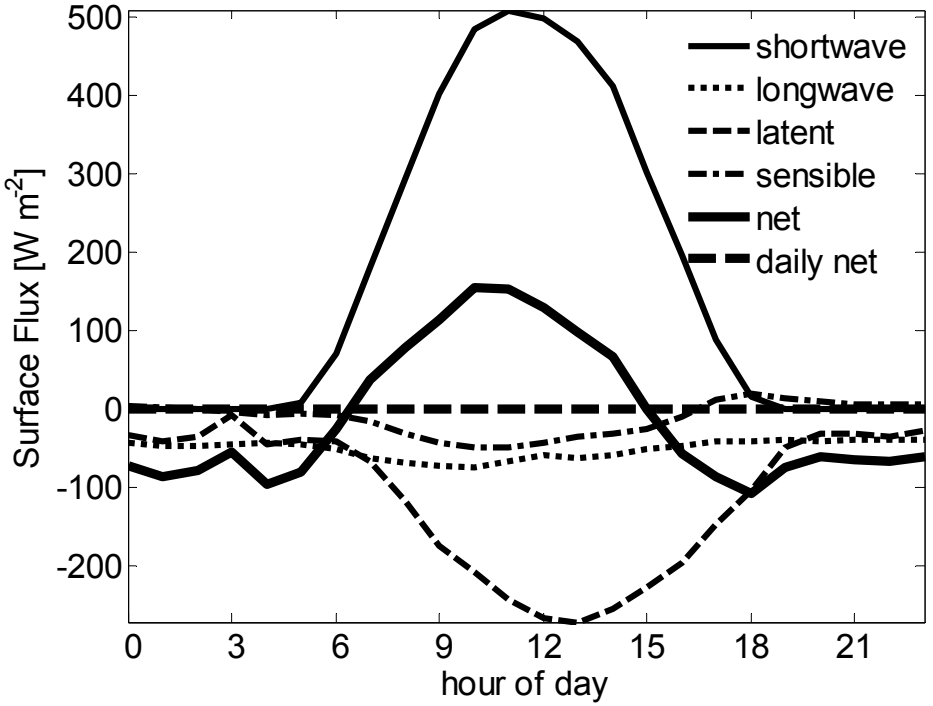
Ocean-Derived Aerosols: Production, Evolution, and Impact



Radiative Forci

CCN

Organic Ae



Charlson et al. (1987)

???

DMS

Algal DMSP

Sea ice biogeochemistry

a habitat, reaction surface, source, sink and barrier for gas exchange

Background:

Main properties of sea ice in models:

- reflective surface
- deep water formation
- prevents gas exchange from water

Increased attention to biogeochemical cycles:

- Impact of biology on climate relevant gases
- Impact of biology on ice structure: porosity, energy absorption
- Strong precipitation/dissolution processes of CO_2 in brines
- Photochemistry and optical properties
- Source for major and minor nutrients

Call for potential "Large-scale SOLAS field experiments"

Why large-scale?

- time/space scales of observation
- survey/process studies – multiplatform, multi-PI
- need to leverage resources from mutiple nations/agencies.

Key Issues:

- Atmospheric nutrient input/ocean response
- Imprint of ocean emissions on atmospheric aerosol/cloud properties
- Impact of ocean emissions on atmospheric reactivity

“Aerosols, climate, ecosystem experiments”

Background and Relevance:

- Evidence for connection between seasonally-driven phytoplankton blooms, atmospheric aerosol, and cloud properties.
- Chemical/physical mechanisms not understood.
- Regional experiments proposed to investigate major blooms on scales where significant atmospheric perturbation occurs.
- North Atlantic bloom, North Pacific Asian outflow region, Southern ocean.
- Goal: to improve GCM’s and distinguish between anthropogenic radiative forcing and ecosystem/climate feedbacks.

SOLAS Open Science Conference

Barcelona, Spain

16th – 19th November 2009

www.solas-int.org

'Connecting Horizons... Connectant Horitzons'

Present your new findings in biogeochemical and physical feedbacks between the ocean and the atmosphere

Confirmed speakers:

- **Cécile Guieu** (France)
- **Mary Ann Moran** (USA)
- **Carles Pelejero** (Spain)
- **John Plane** (UK)
- **Ulf Riebesell** (Germany)
- **Mitsuo Uematsu** (Japan)
- **Rik Wanninkhof** (USA)

Organised by:

Isabel Cacho
(University of Barcelona, Barcelona)
Rafel Simó
(Consejo Superior de Investigaciones Científicas, Barcelona)
SOLAS International Project Office
(University of East Anglia, Norwich, UK)

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DEADLINES

Poster abstracts:
31 July 2009

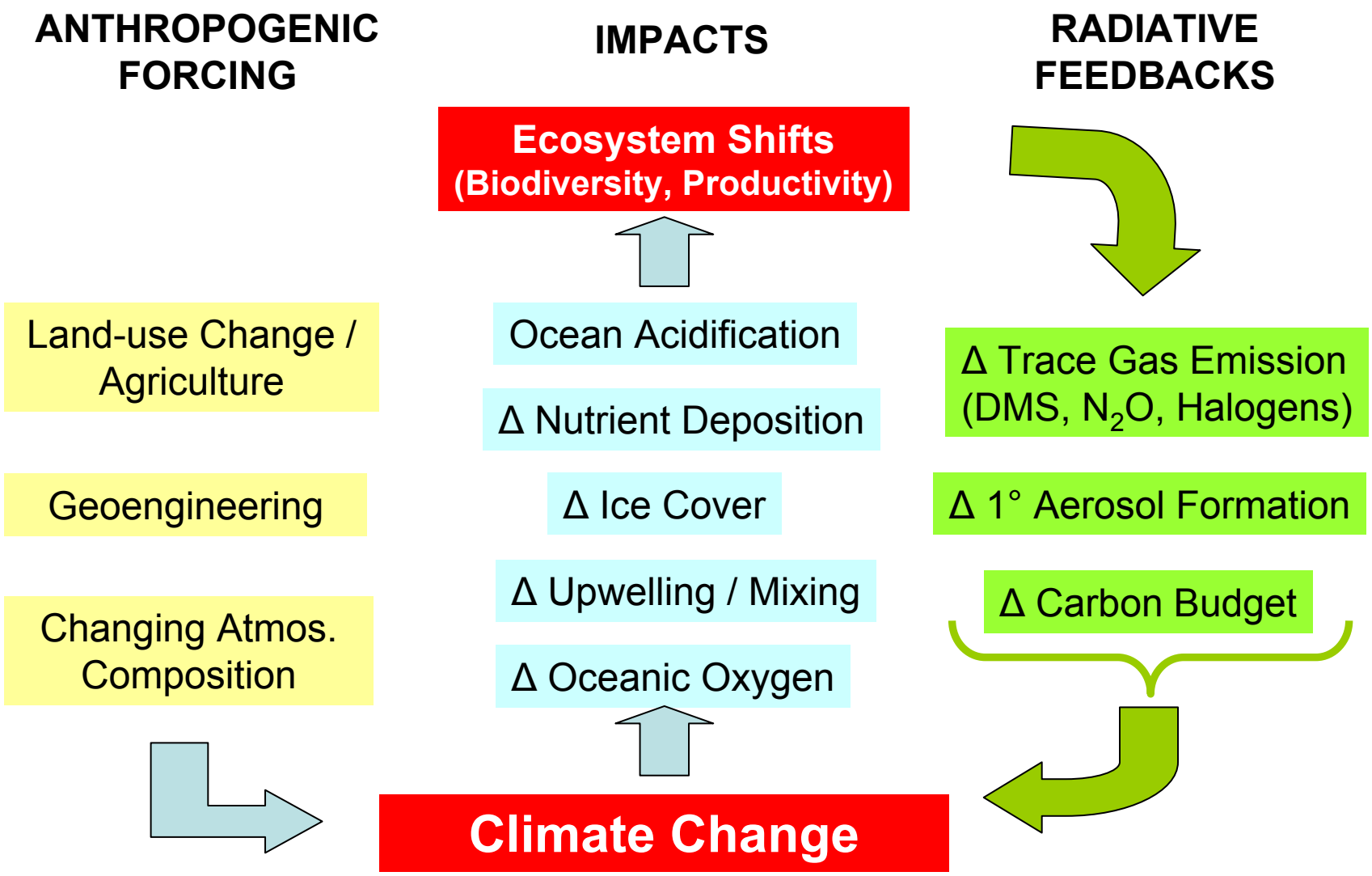
Discussion session proposals:
31 July 2009

Early registration closes:
15 September 2009

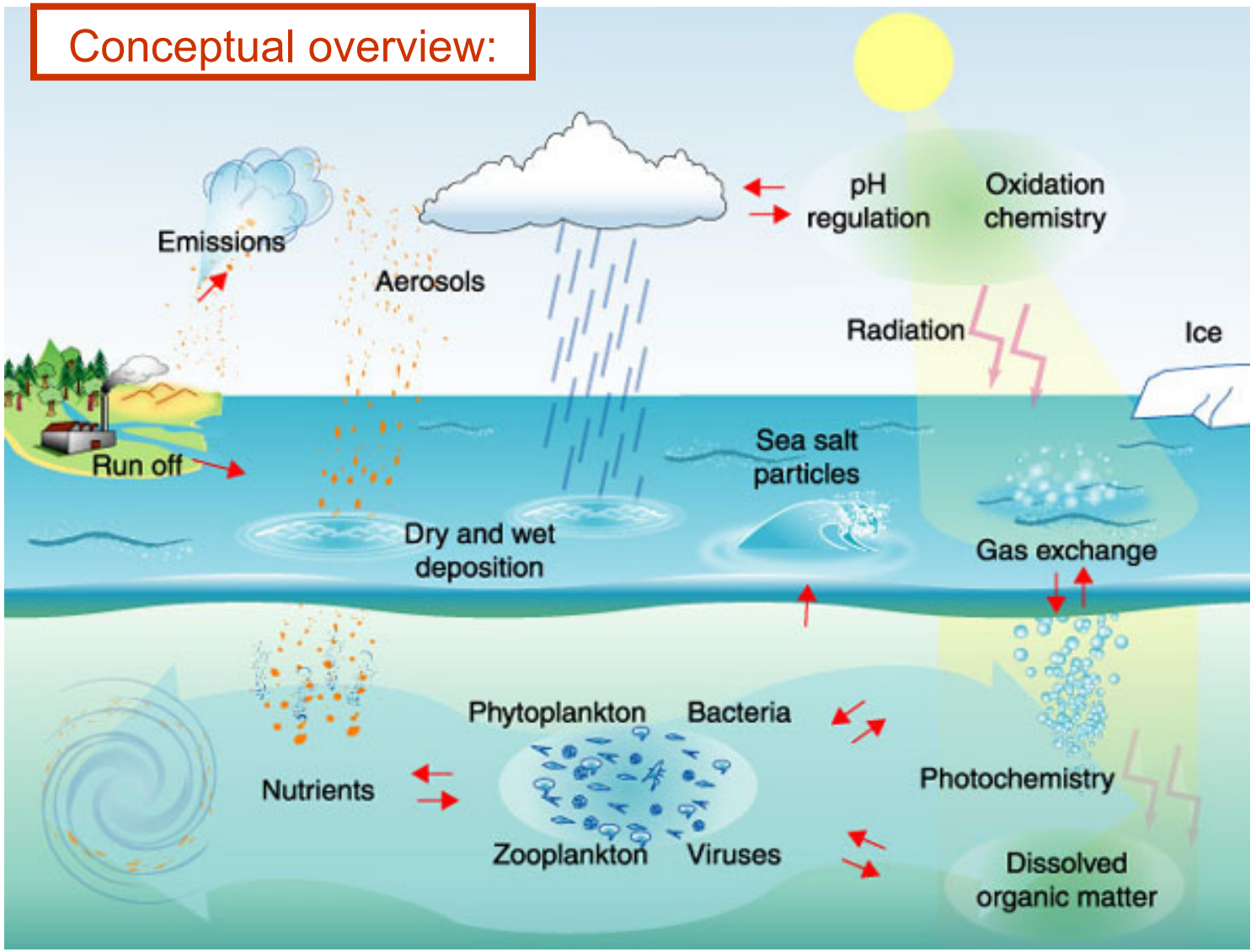
Hotel booking:
1 October 2009

Las Ramblas, Barcelona

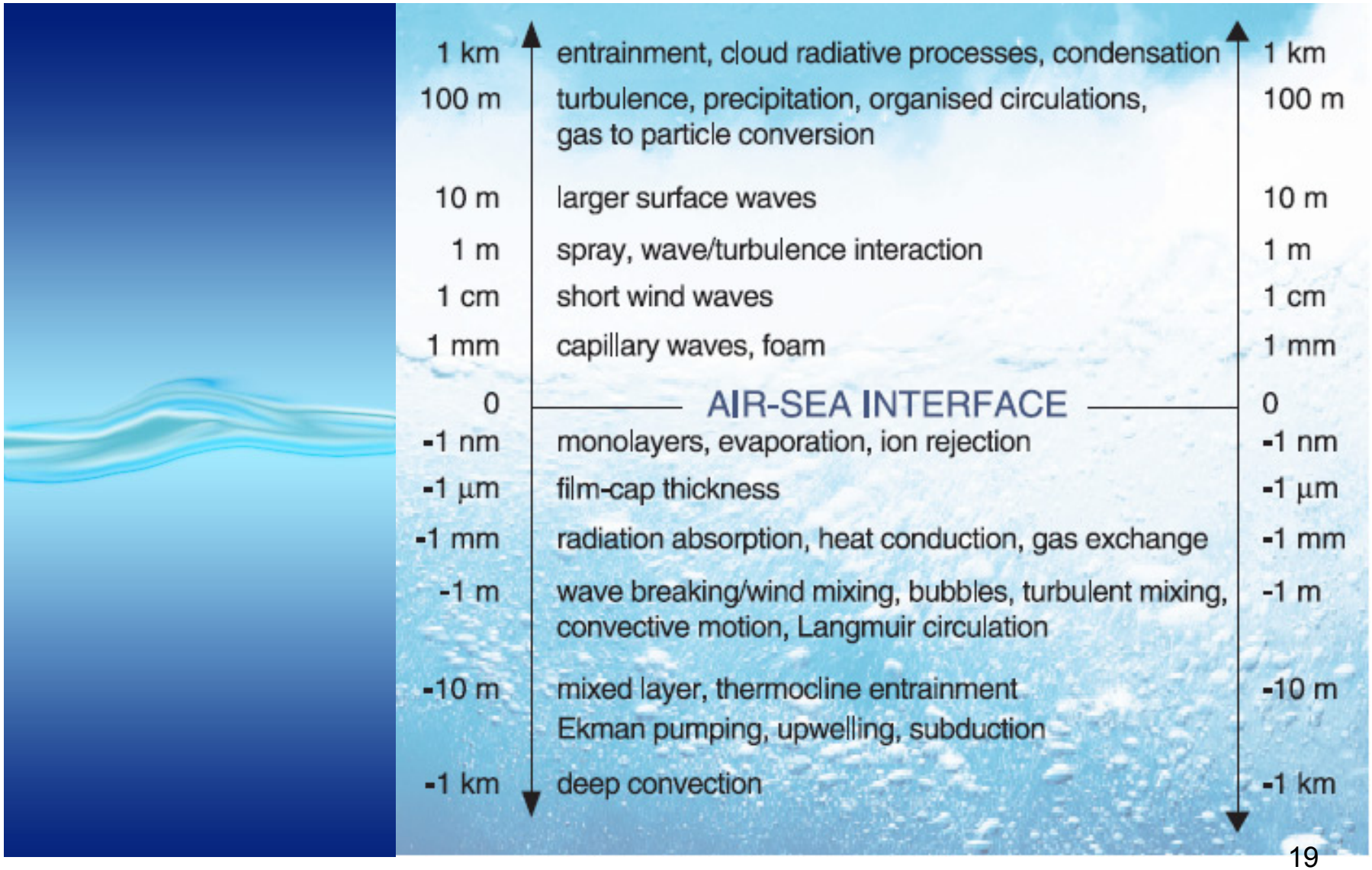
31 JULY 2009


ANTHROPOGENIC FORCING
IMPACTS
RADIATIVE FEEDBACKS
Ecosystem Shifts (Biodiversity, Productivity)
Land-use Change / Agriculture
Ocean Acidification
Δ Trace Gas Emission (DMS, N_2O, Halogens)
Δ Nutrient Deposition
Geoengineering
Δ Ice Cover
Δ 1° Aerosol Formation
Δ Upwelling / Mixing
Changing Atmos. Composition
Δ Carbon Budget
Δ Oceanic Oxygen
Climate Change

SOLAS Science Domain



SOLAS Science Domain

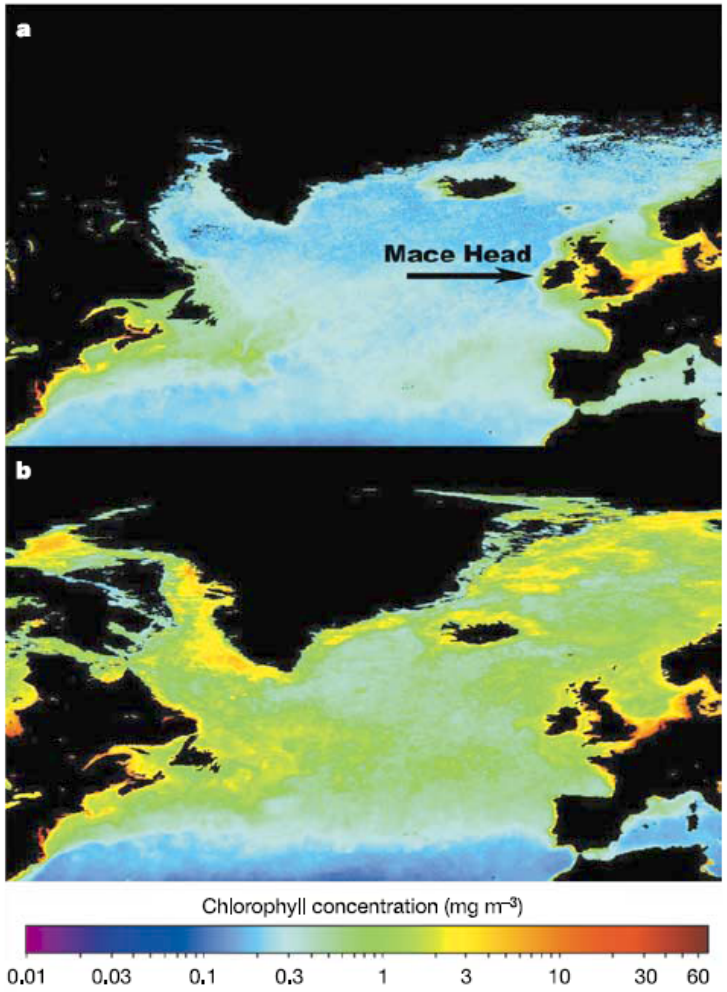


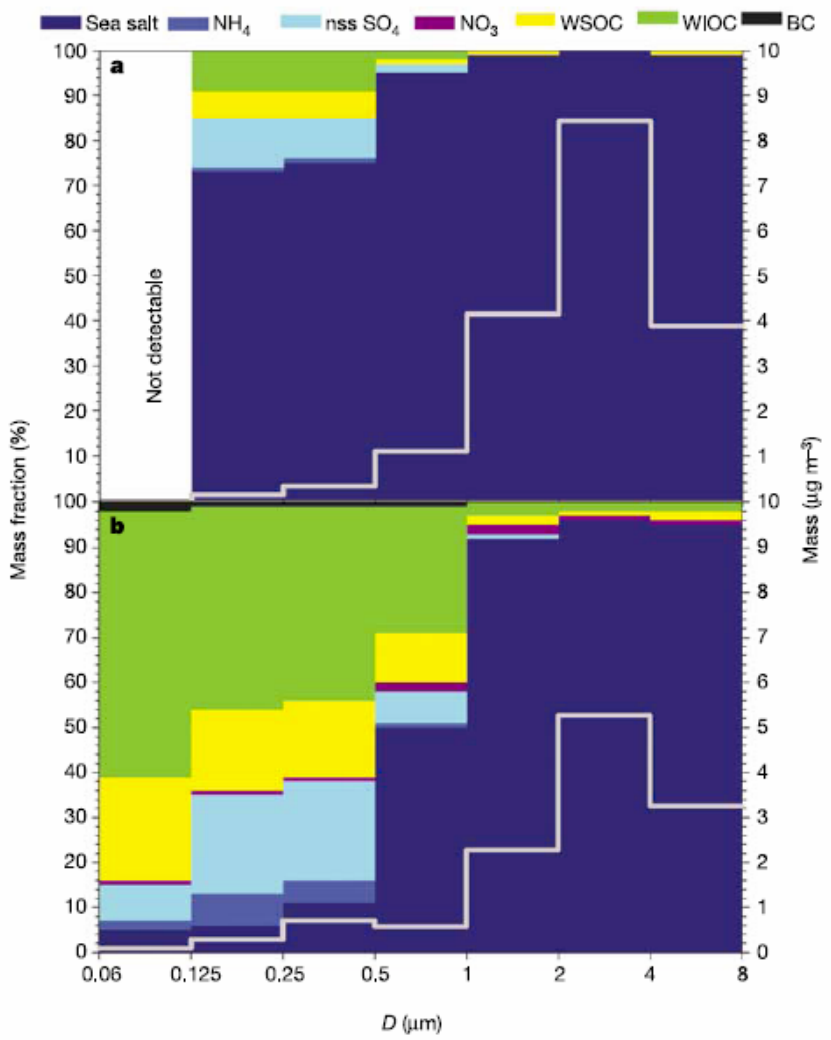
“Large-scale SOLAS field experiments”

Next steps...

- discussions at SOLAS Open Science conference
- International/national workshops
- agency discussions ...white papers...proposals

“Aerosols, climate, ecosystem experiments”





O’Dowd et al., Nature, 2004

SOLAS Science Goal

‘To achieve quantitative understanding of the **key biogeochemical-physical interactions and feedbacks between the ocean and atmosphere**, and how this coupled system affects and is affected by climate and environmental change.’

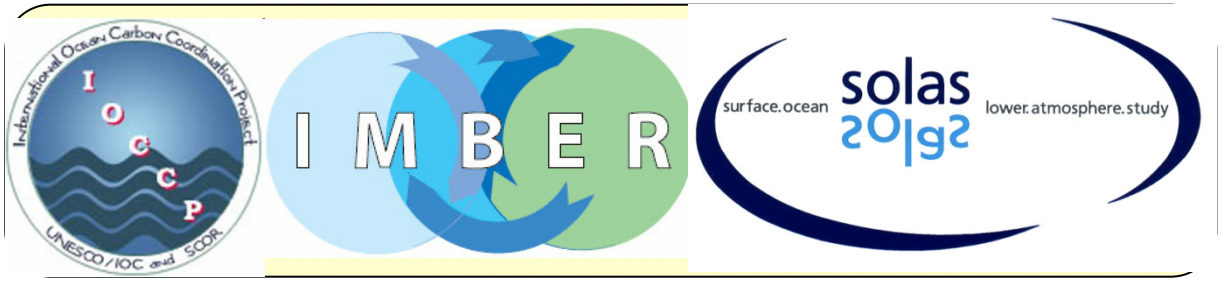
SOLAS SSC

Focus 1: Biogeochemical Interactions and Feedbacks Between Ocean and Atmosphere

Focus 2: Exchange Processes at the Air-Sea Interface and the Role of Transport and Transformation in the Atmospheric and Oceanic Boundary Layers

Focus 3: Air-Sea Flux of CO_2 and Other Long-lived Radiatively Active Gases

Ocean Carbon Research Coordination:



“Aerosols, climate, ecosystem experiments”

Key Questions:

- Is DMS the major aerosol precursor...what role do organics play?
- Does phytoplankton speciation/physiology exert a major influence on the emitted flux?
- To what extent do atmospheric inputs (natural or anthropogenic) influence the atmospheric imprint?
- Can we observe a bloom–induced perturbation in CN, CCN, CDN, and cloud albedo?