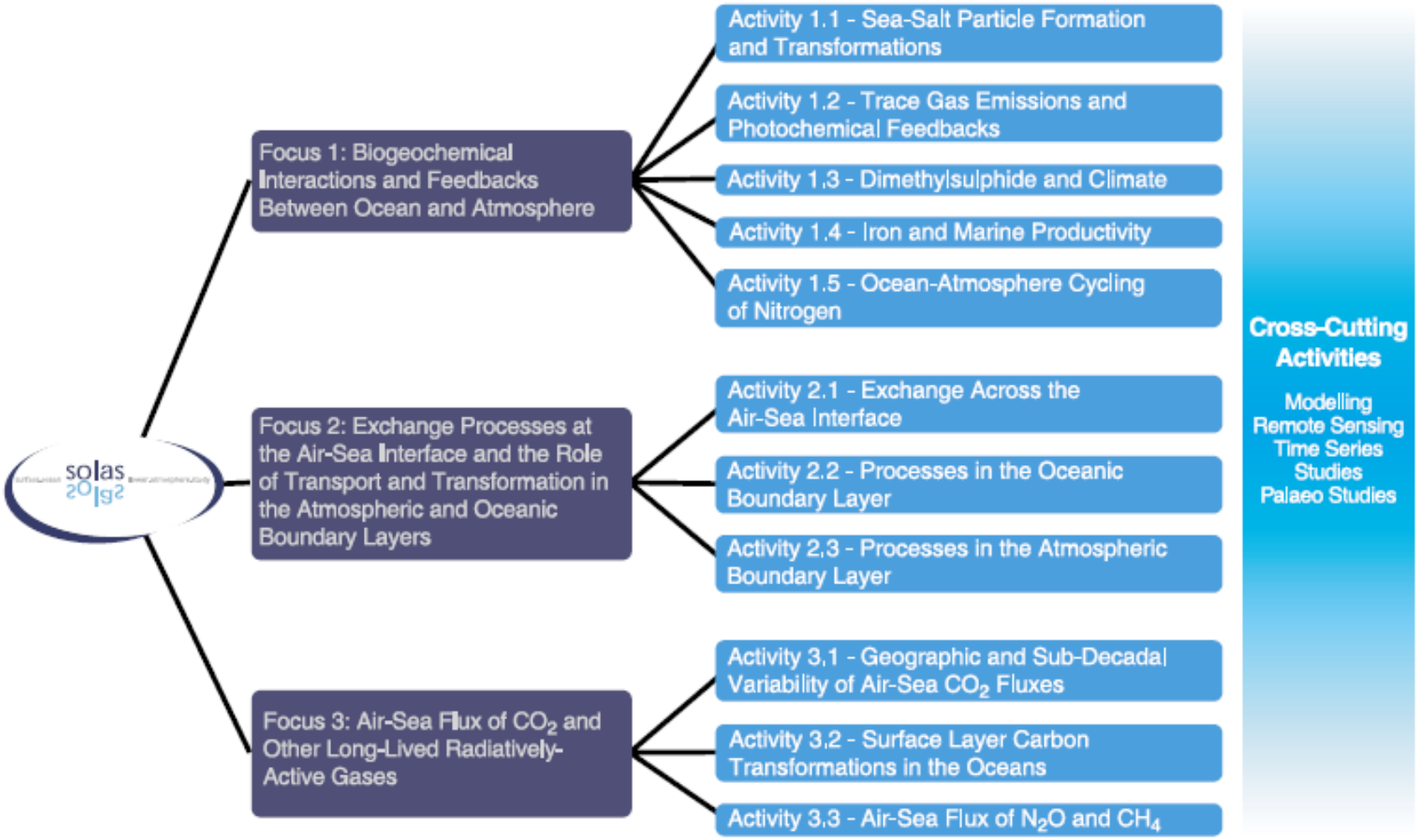
SOLAS-ESA OceanFlux
IFREMER
Brest, France
May, 2013

SOLAS Vision

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

SOLAS Science Plan and Implementation Strategy, 2004



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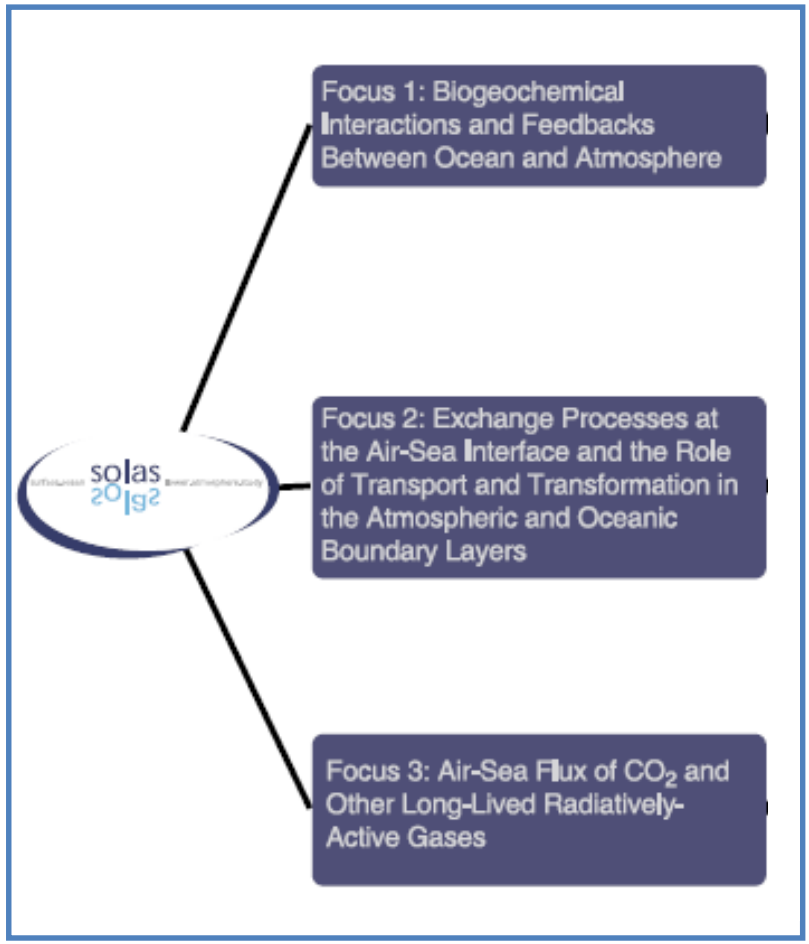


Mid-term strategy themes

Sea-ice biogeochemistry and interactions with the atmosphere
Co-ordinator Jacqueline Stefels
(j.stefels@rug.nl)

Ocean-derived aerosols: production, evolution and impacts
Co-ordinator David Kieber
(djkieber@mailbox.syr.edu)

Air-sea gas fluxes at Eastern boundary upwelling and Oxygen Minimum Zone (OMZ) systems
Co-ordinator Véronique Garçon
(veronique.garcon@legos.obs-mip.fr)

Atmospheric control of nutrient cycling and production in the surface ocean
Co-ordinator Cécile Guieu
(guieu@obs-vlfr.fr)

SOLAS observatory and MOIN: the Minimalist OceanSITES Interdisciplinary Network
Co-ordinator Doug Wallace
(dwallace@ifm-geomar.de)

Ship plumes: impacts on atmospheric chemistry, climate and nutrient supply to the oceans
Co-ordinator Roland von Glasow
(R.Von-Glasow@uea.ac.uk)

SOLAS large-scale field experiments - a compendium of proposals
Co-ordinators Eric Saltzman (esaltzma@uci.edu) and Peter Liss (P.Liss@uea.ac.uk)

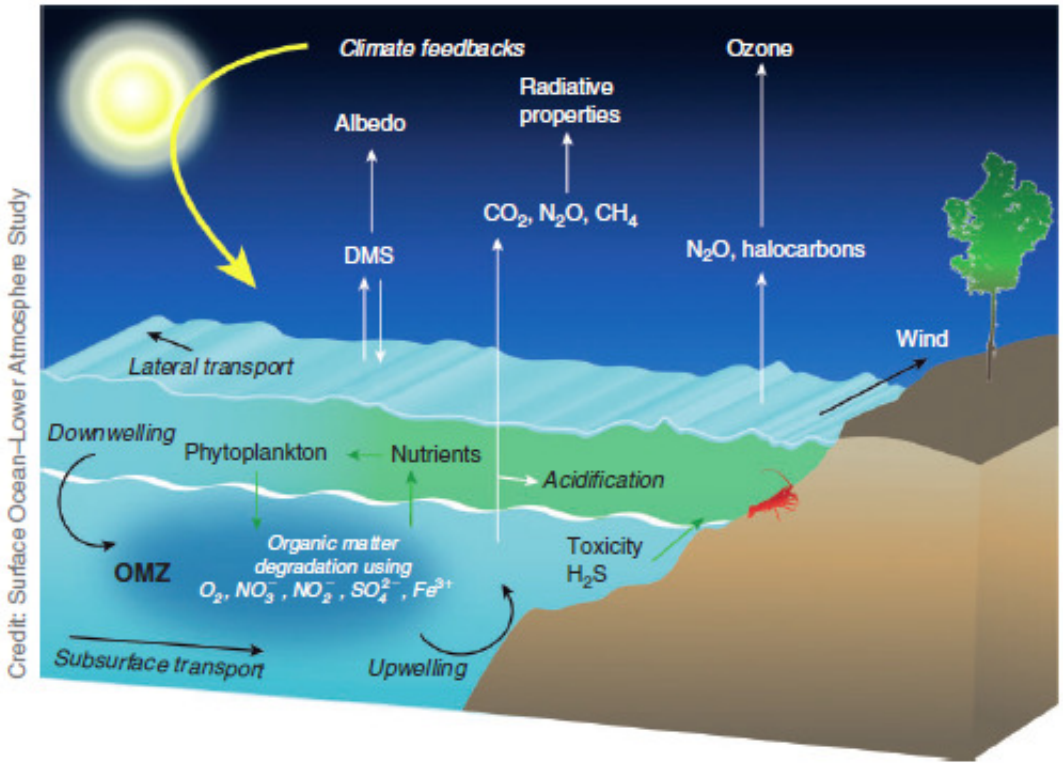
Joint SOLAS/IMBER Carbon Working Groups:

- WG1: Surface Ocean Systems
- WG2: Interior Ocean
- WG3: Ocean Acidification (OA-ICC)

Evolving Research Directions in Surface Ocean-Lower Atmosphere (SOLAS) Science

Law et al. 2013, Env. Chem

Eastern boundary upwelling systems and oxygen minimum zones



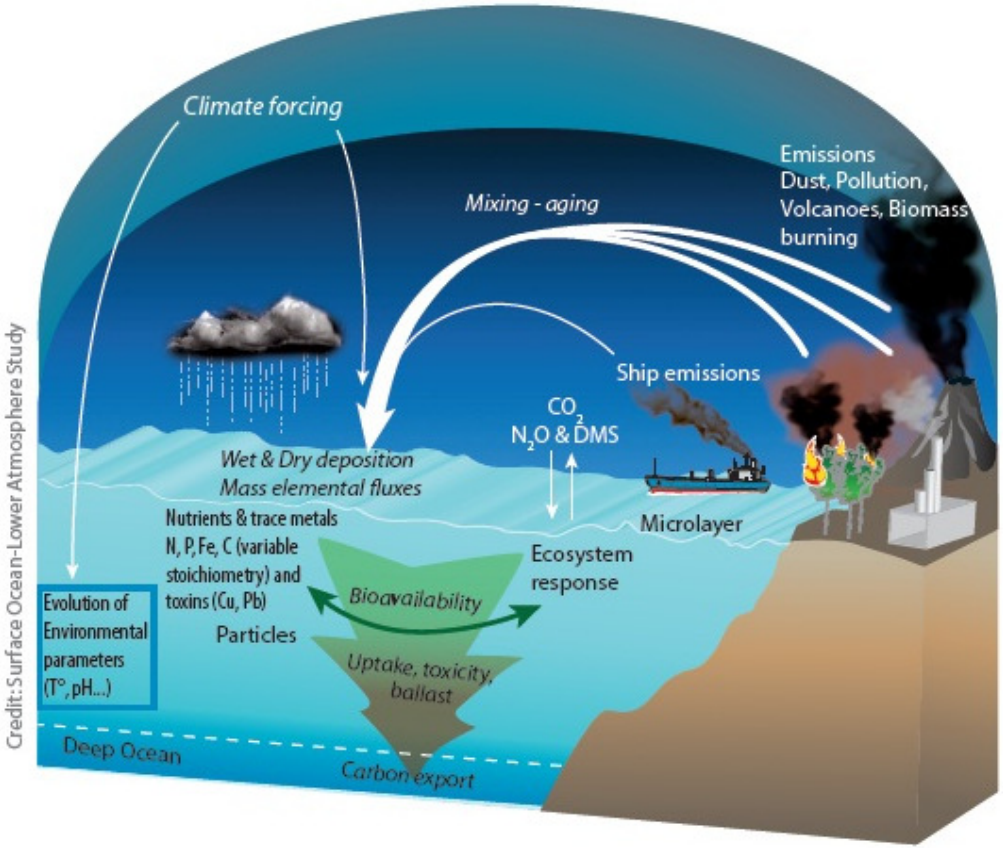
Complex coupled biogeochemistry/dynamics

What is net impact on Earth's radiation budget?

How are these regions changing under the multiple stressors of warming, stratification, acidification, etc.?

Evolving Research Directions in Surface Ocean-Lower Atmosphere (SOLAS) Science Law et al. 2013, Env. Chem

Atmospheric nutrient supply to the ocean



Macronutrients: N, P, C, Si

Micronutrients: Fe

Toxic metals: Cu, Pb

Dust, Pollutants (and interactions)

Volcanic ash

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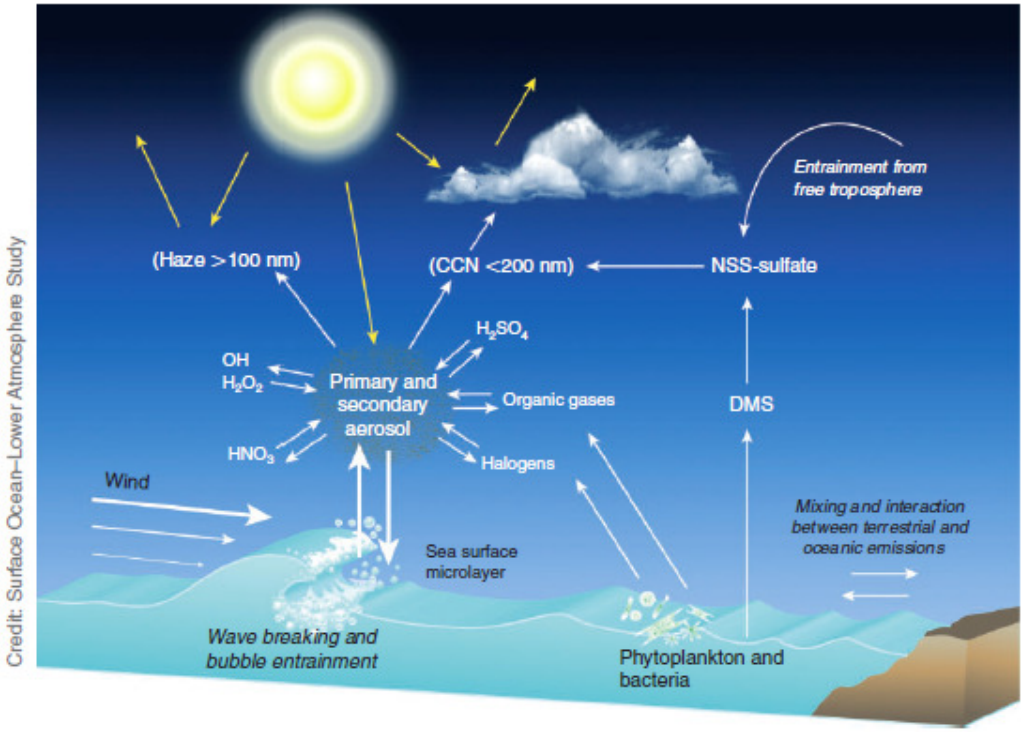
Marine aerosols – what controls ocean albedo?



Aerosol/clouds/ecosystems

What controls marine CCN?

DMS vs primary vs. secondary organics

Polysaccharides, gels, TEP

New chemistry for the atmospheric chemists, new questions for the marine chemists

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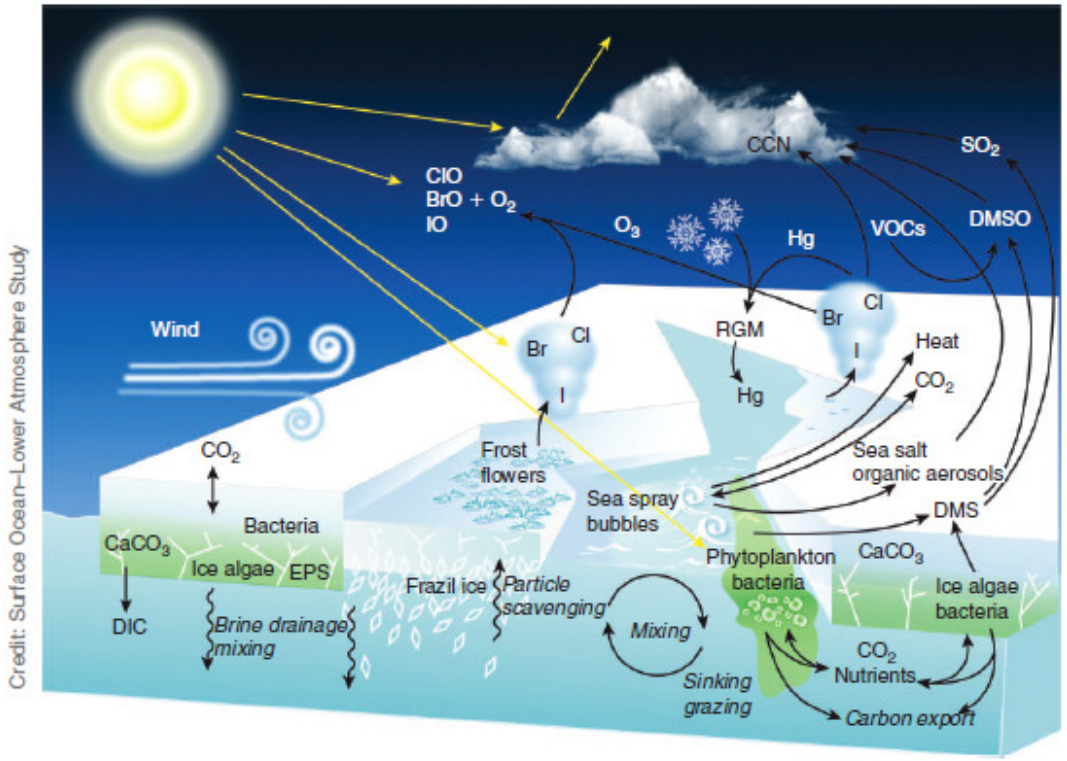
Sea ice biogeochemistry and interactions with the atmosphere



Complex coupled biogeochemistry/dynamics

Many possible interactions with the climate system

Rapidly changing environment

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Some examples of SOLAS research with societal relevance

Joint SOLAS-IMBER
Ocean Carbon Research

Ocean Acidification

Megacities and the coastal zone: air-sea interactions (IGBP)

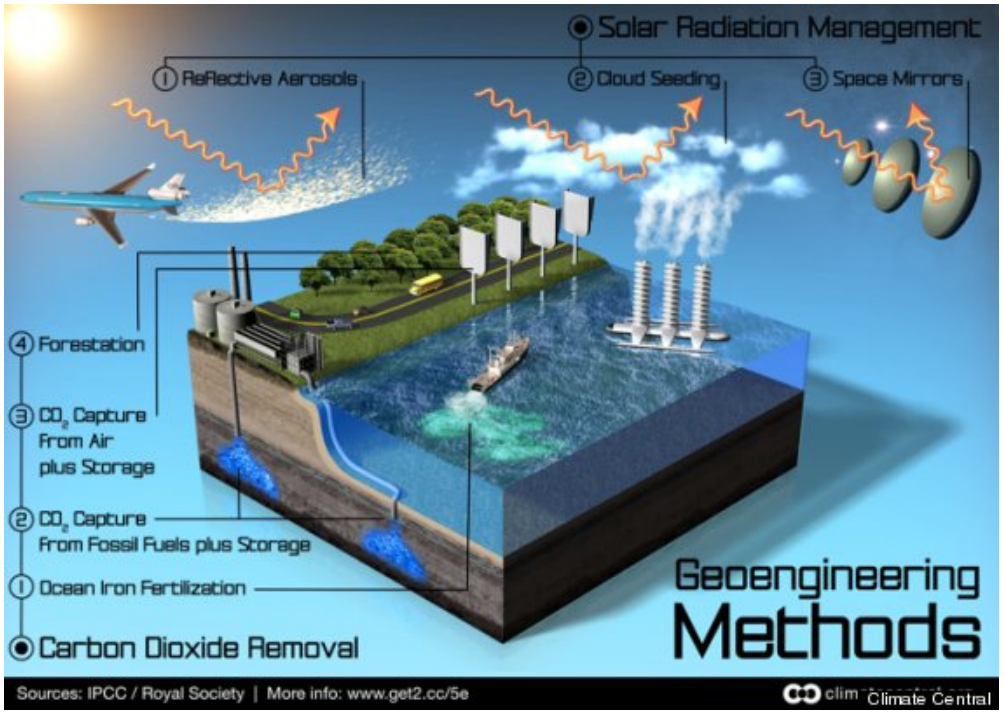
The urgent need for SOLAS research

Increasing stress on ocean/atmosphere systems

Warming/stratification/nutrient inputs/acidification/deoxygenation/ resource utilization

Increasing demand for policy/ engineering solutions to global change

= Increasing need for predictive capability (i.e. SOLAS research)



Where can I find SOLAS science? www.solas-int.org

Some SOLAS synthesis publications:

Law et al. (2013) Evolving Research Directions in Surface Ocean-Lower Atmosphere (SOLAS) Science, Environmental Chemistry, 10, 1-16, doi:10.1071/EN12159

Liss, P. S. and Johnson, M. T. (2013?) Ocean-Atmosphere Interactions of Gases and Particles. Springer, Heidelberg

Moore et al. (2013) Processes and patterns of oceanic nutrient limitation, Nature Geoscience. doi:10.1038/NGE01765

von Glasow et al. (2012) Megacities and Large Urban Agglomerations in the Coastal Zone: Interactions Between Atmosphere, Land, and Marine Ecosystems. AMBIO, doi: 10.1007/s13280-012-0343-9

Boyd, P.W., D.C.E. Bakker, and C. Chandler (2012) A new database to explore the findings from large-scale ocean iron enrichment experiments. Oceanography 25(4):64–71, doi:10.5670/oceanog.2012.104

What does the SOLAS organization itself actually do?

Bring international ocean/atmosphere scientists together to:

1. *Maintain a network of >2000 SOLAS scientists*
2. *Share data/ideas/develop a common vocabulary – OVERCOME INSTITUTIONAL BARRIERS*
3. *Develop new research questions and implementation strategies*
4. *Help train the next generation of SOLAS scientists*

How? Through national and international committees, workshops, conferences, summer schools, synthesis papers ….

Where do all the great ideas, energy, and scientific discoveries come from? YOU! (PARTICULARLY YOUNG SCIENTISTS!)

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A change in the landscape of Global Change science coordination

GLOBAL CHANGE IGBP International Geosphere-Biosphere Programme

GEC programs winding down
Diversitas, IGBP, ESSP, IHDP…

futureearth
research for global sustainability

Future Earth spinning up

New emphasis on societal impact and solutions

- *Understanding/prediction*
- *Sustainability science*
- *Governance*

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SOLAS v2.0 2015-2025?

Steps forward:

A proposal to sponsors, June 2014

- *Research themes, integrative activities*
- *Linkages to societal issues*
- *Capacity-building*
- *Partnerships - natural and social science*

Process:

- *White papers, call for community input*
- *Young scientist workshop*
- *Proposal writing…*

futureearth
research for global sustainability

International Council for Science
SCOR
Scientific Committee on Oceanic Research

WCRP
World Climate Research Programme

iCACGP

SOLAS v2.0 White papers

Greenhouse gases and the oceans
The air-sea interface and fluxes of mass and energy
Atmospheric nutrient/particle supply to the surface ocean
Aerosols, clouds, and ecosystems
Multiple stressors and ocean ecosystems
Regional process studies in high sensitivity systems
Ocean emissions and tropospheric photochemistry
Ocean emissions and stratospheric ozone

CONTRIBUTE TO THESE OR SUBMIT YOUR OWN

OPPORTUNITY TO START OR JOIN INTERDISCIPLINARY PARTNERSHIPS