

# Ocean Surface CO<sub>2</sub> Variability and Vulnerabilities Workshop

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Co-sponsored by IOCCP, SOLAS, IMBER, and GCP

## Draft Agenda

### DAY 1 Vulnerabilities in the Ocean Carbon-Climate System

- Welcome and meeting outline
- State of knowledge on vulnerability of the oceanic CO<sub>2</sub> sink
- What do ocean models suggest for the recent past and the future?
- Historical perspective and emerging modeling methods.
- Results from coupled carbon-climate models.
- What are the maximum impacts of projected environmental changes on marine biology and the carbon cycle?
- Potential impact of changes in marine ecosystems from laboratory/mesocosm experiments.
- Potential impact of changes in marine ecosystems from model simulations.
- Lessons from the geological past.

Short contributions are solicited from meeting participants.

### Ocean Carbon Sources and Sinks

- Decadal Changes in Chlorophyll a.
- Decadal Changes in Ecosystems
- Ocean CO<sub>2</sub> inversions on pre-industrial / contemporary air-sea flux estimates

6x10 minutes activities overview presentations based on the national program written reports (note these are to be technical, not scientific)

- North Atlantic and Arctic Seas
- South Atlantic
- North Pacific
- Equatorial and South Pacific
- Indian and Southern Ocean
- Coastal

### DAY 2 Ocean Carbon Sources and Sinks continued

- Global Climatology of Air-Sea Fluxes
- Regional View 1: North and South Atlantic
- Regional View 2: Arctic
- Regional View 3: North Pacific
- Regional View 4: Equatorial and South Pacific
- Regional View 5: Southern and Indian Oceans
- Surface CO<sub>2</sub> in shelf and marginal seas
- Simulating interannual/decadal CO<sub>2</sub> flux variability; underlying mechanisms and agreement with observations.
- Estimating decadal variability of carbon budget from atmospheric inversions

- DAY 2 (cont.)**
- Estimating ocean-atmosphere carbon fluxes from atmospheric oxygen measurements

**Open Discussion:**

Can we identify from field observations and model outputs the most likely regions of the ocean where the large-scale air-sea CO<sub>2</sub> fluxes have changed in the recent past and are most susceptible to change in the future (i.e. most vulnerable)? Can we identify the underlying processes? Can we assess the content and quality of the models that are used to quantify the observed and projected changes? (*Plenary discussion to guide Working Group I*).

**Poster Session**

**DAY 3 Strategies to Estimate Air-Sea Fluxes of CO<sub>2</sub>**

- What do we learn from the use and/or assimilation of ocean CO<sub>2</sub> data in coupled models
- Moorings: New results and new technology overview
- Overview of gas exchange parameterizations
- Overview of proxy techniques for data extrapolation and interpolation
- Neural network approaches to data extrapolation and interpolation for surface pCO<sub>2</sub>
- Combining satellite observations and in situ CO<sub>2</sub> data with models to quantify air-sea flux (CASIX work)
- Using surface pCO<sub>2</sub> decorrelation length scales to determine sampling resolution
- Using biogeochemical models to develop sampling strategies
- Overview of current global ocean pCO<sub>2</sub> observations, new data releases, and data center / data flow issues.
- pCO<sub>2</sub> Data base and synthesis efforts

**Open Discussion:**

Part I: Considering our largest unknowns, data and gas exchange uncertainties, interpolation / extrapolation techniques, new measurement technology, and observing system experiments, what have we learned and where do we go from here to develop observation strategies to meet research objectives? (*Plenary discussion to guide WG II*).

Part II:

Considering existing projects, new results, and recent data releases, what needs are there for coordination and data synthesis activities? Should we begin developing a “GlobalView Ocean CO<sub>2</sub>” database? Should we develop scientific synthesis groups? (*Plenary discussion to guide WG 3*).

**DAY 4 Working Groups and Summaries**

- Working Group 1
- Working Group 2
- Working Group 3