



# RECCAP2

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OCB Carbon Gaps Working Group  
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# Objectives

The objectives of RECCAP2 are:

- (i) to quantify anthropogenic greenhouse gas emissions
- (ii) to develop robust observation-based estimates of changes in carbon storage and greenhouse gas emissions and sinks by the oceans and terrestrial ecosystems, distinguishing whenever possible anthropogenic vs. natural fluxes and their driving processes
- (iii) to gain science-based evidence of the response of marine, freshwater and terrestrial regional GHG budgets to climate change and direct anthropogenic drivers.

The ocean-specific objectives are:

- (i) quantify and assess the ocean carbon sources and sinks and the changes in the ocean's interior carbon stocks for the past 3 decades using a combination of observations and model-based constraints
- (ii) determine and assess the magnitude of the variability of the ocean carbon sink and storage including the processes driving these variations
- (iii) quantify the fluxes and discuss the processes associated with the biological carbon pump (including DOC) in the ocean from the regional scale to the globe

RECCAP2 analysis period: 1980-2018

# Planned Papers

## **Global ocean: Mean and variability of ocean carbon sink (*Tim DeVries, Rik Wanninkhof*)**

Scope: Mean ocean carbon sink, comparison of methods (pCO<sub>2</sub>-based reconstructions, ocean inverse models, DIC-based reconstructions, ocean biogeochemical models.), natural vs. anthropogenic CO<sub>2</sub>, variability of ocean CO<sub>2</sub> sink

## **The seasonal cycle in the global ocean: a window into the future (*Keith Rodgers, Jorg Schwinger*)**

Scope: Observed pCO<sub>2</sub> amplitude and phasing, amplitude change, components of variability and attribution of changes, analysis of drivers, connections to longer modes of variability

## **Global ocean: The biological pump and the ocean carbon cycle (*Scott Doney, Stephanie Henson*)**

Scope: NPP, community structure, carbon export and transport to depth, biological pump efficiency, ocean acidification

## **The global coastal ocean (*Goulven Laruelle, Pierre Regnier, Minhui Dai*)**

Scope: Quantifying terrestrial carbon inputs to the coastal ocean, air-sea CO<sub>2</sub> fluxes into the coastal ocean over the RECCAP2 period, fate of carbon in the LOAC

## **Regional changes: Southern Ocean (*Luke Gregor, Judith Hauck*)**

## **Regional changes: Pacific Ocean (*Masao Ishii, Brendan Carter*)**

## **Regional changes: Arctic (*Sayaka Yasunaka, Manfredi Manizza*)**

## **Regional changes: Atlantic (*Fiz Perez, Marion Gehlen*)**

## **Regional changes: Indian (*Vedula Sarma, Zouhair Lachkar*)**

# Timeline

March 2019: Initial all-RECCAP2 meeting (Gotemba, Japan): Identify scope, chapter authors

Feb 2020: Ad-hoc ocean-RECCAP2 meeting (Ocean Sciences)

April 2020: Finalize data protocols and policies

May 2020: Author teams assembled, draft outlines, preliminary authorship table

July 2020: Data submission deadline for all data providers

Summer 2020: Initial analyses and first drafts

Sometime 2020-2021: Second all-RECCAP2 meeting

Spring 2021: Submission of papers

# Data Sets

**Ocean biogeochemical models:** Simulations will be run with ocean biogeochemical models using reanalysis forcing (e.g. models used for Global Carbon Budget). Each group will run 4 simulations: (i) variable climate forcing, increasing  $p\text{CO}_2$ , (ii) constant climate forcing, constant  $p\text{CO}_2$ , (iii) constant climate forcing, increasing  $p\text{CO}_2$ , (iv) variable climate forcing, constant  $p\text{CO}_2$

**Inverse models:** Typically resolving the anthropogenic  $\text{CO}_2$  uptake by the ocean e.g. transit time-distribution (Vaugh et al, 2006) and maximum entropy (e.g. Khatiwala et al, 2009) inversions, OCIM (DeVries et al, 2014, 2017), OceanInversion (Gruber et al, 2009)

**Surface ocean  $p\text{CO}_2$  products:** Products that use surface ocean  $p\text{CO}_2$  observations from the SOCAT database and interpolation methods (e.g. statistical or regression models) to fill in the gaps to create (typically) monthly maps (e.g. SOCOM products)

**Ocean interior products:** GLODAPv2, DeltaC\* anthropogenic  $\text{CO}_2$  (Sabine et al., 2004), eMLR(C\*) anthropogenic  $\text{CO}_2$  1994-2007 (Gruber et al., 2019)

# People

If you have data products to contribute, or otherwise want to be involved with RECCAP2, please contact us!

**RECCAPv2 Ocean steering committee:** Nicolas Gruber, Judith Hauck and Masao Ishii

**Data policies & Analysis framework:** Nicolas Gruber & Judith Hauck

**River fluxes:** Laure Resplandy & Pierre Regnier

**Model protocols:** Judith Hauck

**Data storage:** Jim Orr, Nicolas Gruber & Roland Séférian

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