

Key Uncertainties in the Global Carbon-Cycle:

Perspectives across terrestrial and ocean ecosystems

ASP Researcher Workshop, Aug 6-10th 2013

Hour talks will provide both an overview of the topic and details on the speaker's research: speakers should aim for ~45 minutes with ~15 minutes of discussion.

40 min talks will be focus on cutting edge research: speakers should aim for ~30 minutes with ~10 minutes of discussion.

***We wish to acknowledge the support of our sponsors:
NCAR ASP, U.S. CLIVAR (NASA, NOAA, NSF, DoE), OCB (NSF, NASA), and
USGCRP's Carbon Cycle Interagency Working Group (CCIWG) - U.S. Carbon
Cycle Science Program/USDA-NIFA
for making this workshop possible.***

Tuesday

- 19:00 Reception
- 19:30 Introduction of organizers and objectives of the workshop

Wednesday

- 8:00 Welcome (*Quinn Thomas*)

Carbon Cycle Overview

- 8:15 The state of the carbon cycle in CMIP5 models: Processes, feedbacks, and future research directions – *Jim Randerson, UC Irvine*
- 9:15 The changing seasonal cycle of atmospheric CO₂ – *Ning Zeng, Univ. of Maryland*
- 10:15 Coffee Break
- 10:45 Physical and biological controls on the ocean carbon storage – *Taka Ito, Georgia Institute of Technology*
- 11:45 Effects of nutrient limitation on land carbon uptake and its implications on climate change prediction and mitigation – *Ying Ping Wang, CSIRO*
- 12:45 Lunch

13:45 Challenges in soil carbon modeling and links to the river carbon cycle –
Phillipe Ciais, IPSL-LSCE

Nutrient cycling controls and impacts on carbon cycling

14:45 Climate regulation of the oceanic N cycle – *Curtis Deutsch, Univ. of Washington*

15:45 Coffee Break

16:15 Nutrient availability determines forests' carbon sequestration – a global synthesis – *Sara Vicca, University of Antwerp*

16:55 Southern Ocean response to climate change in the CMIP5 models –
Anna Cabre, Univ. of Pennsylvania

17:35 **Poster session I:**

- Remineralization and nutrient cycling controls
- Carbon cycle I – CMIP5 and continental to global carbon flux estimates

Thursday

Remineralization pathways and controls

8:00 The fate of particulate organic material in the oceans – *Adrian Burd, Univ. of Georgia*

9:00 Terrestrial Ecosystem Carbon Dynamics: Effects of Heterotrophic Respiration – *Serita Frey, Univ. of New Hampshire*

10:00 Coffee Break

10:30 Dissolved organic matter (DOM) - microbe interactions – *Christian Lønborg, Swansea University*

11:10 Towards modeling global soil erosion and its importance for the terrestrial carbon cycle – *Tom Vanwalleghem, Univ. of Cordoba*

11:50 Lunch

Role of individuals in ecosystem dynamics

13:00 Competition, co-existence and diversity in vegetation models– *Rosie Fisher, NCAR*

- 14:00 Capturing evolution and ecology in a global ocean model – *Tim Lenton, Univ. of Exeter*
- 15:00 Modeling tropical forest dynamics using an individual-based forest simulator – *Sophie Fauset, Univ. of Leeds*
- 15:40 Coffee Break
- 16:10 A cellular allocation modeling approach for representing the ecophysiology of marine primary producers – *David Nicholson, WHOI*
- 16:50 Breakout groups to plan out synthesis paper (1 group per paper section, students as note takers)
- 19:00 Group reception/dinner

Friday

Data to constrain carbon cycle feedbacks: assimilation, metrics, parameter estimation, inverse methods etc.

- 8:00 Using data to elucidate feedback mechanisms in the ocean carbon cycle – *Galen McKinley, Univ. of Wisconsin-Madison*
- 9:00 The NASA Carbon Monitoring System – *Kevin Bowman, JPL*
- 9:40 Strategies for applying individual-based models of forest dynamics at regional to continental scales – *Kiona Ogle, Arizona State Univ.*
- 10:40 Coffee Break

Role of physical climate variability

- 11:00 Tree mortality and forest-atmosphere interactions under a warming climate – *Jeff Chambers, LBNL*
- 12:00 Modeling terrestrial carbon-climate dynamics in the northern high latitudes – *Charles Koven, LBNL*
- 12:40 Lunch
- 13:40 Carbon in the Southern Ocean: Known knowns and known unknowns – *Nicole Lovenduski, Univ. of Colorado-Boulder*

14:40 Representation of the Indian Ocean biophysical interannual variability in the CMIP5-ESM models – *Rondrotiana Barimalala, Georgia Institute of Technology*

15:20 Coffee Break

Ecosystem dynamics new horizons

15:40 Role of zooplankton in marine ecosystems and modeling perspectives – *Tom Anderson, University of Southampton*

16:40 The role of biotic disturbance agents in carbon-climate connections – *Jeff Hicke, Univ. of Idaho*

17:40 **Poster session II:**

- Carbon cycle II – local processes and regional flux estimates
- New modeling approaches and the use of data to constrain carbon cycle feedbacks

Saturday

8:30 Breakout groups

10:30 Planning next steps

11:30 Concluding remarks

12:00 End

Poster Session I

* denotes ASP Colloquium Student

Remineralization and nutrient cycling controls

Marcia DeLonge, UC Berkeley – *Impacts of compost and manure applications on soil C in managed grasslands*

Michelle Johnson, University of Leeds – *Improving predictions of Amazon forest dynamics with a new phosphorus cycle model*

Marguerite Mauritz*, San Diego State University – *Invasion of a semi-arid shrubland by annual grasses increases autotrophic and heterotrophic soil respiration rates due to altered soil moisture and temperature patterns.*

Levin Nickelsen*, Helmholtz Centre for Ocean Research Kiel – *Iron-light colimitation increases sensitivity of oceanic CO₂ drawdown to dust deposition*

Darren Pilcher*, University of Wisconsin – *Modeled Seasonality of the Biogeochemistry of Pre-Dreissena Mussel Lake Michigan*

Katherine Powell*, University of Colorado – *Links between soil water availability and soil respiration in semi-arid ecosystems along the Colorado Front Range*

Alexis Santos*, University of Wisconsin – *Distinguishing Nutrient and Light Drivers of Productivity Trends In the North Atlantic Intergyre Region*

Christina Schädel, University of Florida – *Circumpolar assessment of permafrost C quality and its vulnerability over time using long-term incubation studies*

Elliot Sherman*, UC Irvine – *Assessment of iron cycling in the CESM-BEC model using high resolution CLIVAR data*

Jennifer Soong*, Colorado State – *How do microarthropods impact soil carbon sequestration during litter decomposition in a tallgrass prairie?*

Claire Treat*, University of New Hampshire – *Controls on soil carbon losses in Alaskan permafrost peatlands*

Julie Wolf, University of Maryland – *Refining expectations of soil organic carbon storage under future climate change with observational studies*

Carbon Cycle I – CMIP5 and continental to global carbon flux estimates

Ana Bastos*, Universidade de Lisboa – *The global NPP dependence on ENSO: La-Niña and the extraordinary year of 2011*

Heather Graven, Scripps Institution of Oceanography – *Large-scale increase in seasonal CO₂ exchange by northern terrestrial ecosystems since 1960*

ChuanLi Jiang, Earth and Space Research – *Drake Passage oceanic pCO₂: Evaluating CMIP5 Coupled Carbon/Climate Models using in-situ observations*

Mati Kahru, Scripps Institution of Oceanography – *Improved estimates of primary production in the Arctic Ocean*

Emma Littleton*, University of East Anglia – *The Carbon Balance of the Terrestrial Biosphere under Climate Change*

Joseph Majkut, Princeton University – *Historical Changes to Ocean Fluxes of CO₂*

Juan Muglia*, Oregon State University – *Ocean Circulation During the Last Glacial Maximum Simulated by PMIP3 Climate Models*

Caroline Normile*, Penn State University – *Steps Towards a Multi-year Continental Inversion: Comparing Simulated CO₂ Mixing Ratios in ABL to the North American Tower Network*

Andreas Schmittner, Oregon State University – *Millennial variability of ocean circulation and biogeochemical cycles during the last ice age*

Lori Sentman, NOAA/GFDL – *Reducing Uncertainty in the Global Carbon Cycle from Land Use Application of Earth System Model Initialization*

Britton Stephens, NCAR – *Strong Observational Constraints on Seasonal Northern Extratropical CO₂ Exchange*

Shoichi Taguchi, National Institute of Advanced Industrial Science and Technology, Japan – *Surface CO₂ flux in weekly temporal resolution over the globe inferred from the CONTRAIL dataset*

David Turner, Oregon State University – *Bottom-up Scaling of Net Ecosystem Exchange over North America and Evaluation with an Atmospheric Inversion Setup*

John Worden, JPL and Caltech – *CH₄ Emissions from Tropical Fires*

Poster Session II

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Carbon Cycle II – local processes and regional flux estimates

Sarah Brody*, Duke University – *Changes in dominant mixing length scales drive phytoplankton bloom initiation in the subpolar North Atlantic*

Kimberly Carlson, University of Minnesota – *Committed carbon emissions from oil palm plantation expansion onto Kalimantan peatlands*

Christopher Conrad*, University of Colorado – *The Relationship Between Wind Stress and Surface Carbonate Chemistry in the Southern Ocean*

Elizabeth Drenkard*, Woods Hole Oceanographic Institute – *Observed strengthening of the Pacific Equatorial Undercurrent in the SODA record: coupled mechanisms, ocean dynamics, and implications*

Maheteme Gebremedhin, SEA/NEON – *Carbon Balance of No-Till Soybean with Winter Wheat Cover Crop in the Southeastern United States*

Leah Johnson*, University of Washington – *The Role of Lateral Processes on Mixed Layer Spring Stratification*

Angela Kuhn*, Dalhousie University – *Re-thinking spring blooms using optimized NPZD models*

Brett Raczka*, Penn State University – *Identifying Sources of Uncertainty to Improve the Simulation of Long Term Carbon Sequestration in Northern Wisconsin*

Kay Steinkamp, NIWA – *Regional footprints and transport regimes for CO₂ measurement sites in New Zealand from backward Lagrangian dispersion modeling*

Brandon Stephens*, UC San Diego – *Production and Accumulation of Organic Carbon in the Southern California Current Region*

Yogesh Tiwari, Indian Institute of Tropical Meteorology – *Carbon Climate Interactions in India*

Carl Trettin, US Forest Service – *Changes in Carbon Pools 50 Years after Reversion of a Landscape Dominated by Agriculture to Managed Forests in the Southeastern Atlantic Coastal Plain*

Fan Zhang*, Georgia Institute of Technology – *Changing seasonality of convective events in the Labrador Sea*

New modeling approaches and the use of data to constrain carbon cycle feedbacks

Bassil El Masri, University of Illinois at Champaign-Urbana – *Implementation of Dynamic Leaf Area Index in a Land Surface Model to Improve Water, Energy and Carbon Fluxes*

Yuanyuan Fang, Carnegie Institution for Science – *Can biospheric models reproduce spatiotemporal variability of CO₂ fluxes as observed through atmospheric measurements?*

Corinne Hartin, Joint Global Change Research Institute – *The Inorganic Carbon Cycle in a Simple Box Model*

Tihomir Kostadinov, University of Richmond – *Carbon-based phytoplankton functional types via remote retrievals of the particle size distribution*

Jaclyn Matthes, Boston University – *Improving long-term forecasts of ecosystem-climate dynamics through community-based model-data fusion*

Maosheng Zhao, University of Maryland – *Linking High Resolution Lidar Data and Ecosystem Model for a Robust Carbon Monitoring System*

ASP Colloquium Student Attendees

Caroline Alden, *University of Colorado*
Ana Bastos, *Universidade de Lisboa*
Sarah Brody, *Duke University*
Benjamin Bronselaer, *University of Oxford*
Christopher Conrad, *University of Colorado*
Elizabeth Drenkard, *Woods Hole Oceanographic Institute*
Yassir Eddebbar, *UC San Diego*
Yujie He, *Purdue University*
Leah Johnson, *University of Washington*
Angela Kuhn, *Dalhousie University*
Emma Littleton, *University of East Anglia*
Marguerite Mauritz, *San Diego State University and UC Davis*
Juan Muglia, *Oregon State University*
Levin Nickelsen, *Helmholtz Centre for Ocean Research Kiel*
Caroline Normile, *Penn State University*
Darren Pilcher, *University of Wisconsin*
Katherine Powell, *University of Colorado*
Brett Raczka, *Penn State University*
Alexis Santos, *University of Wisconsin*
Elliot Sherman, *UC Irvine*
Carlos Silva, *University of Maryland*
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