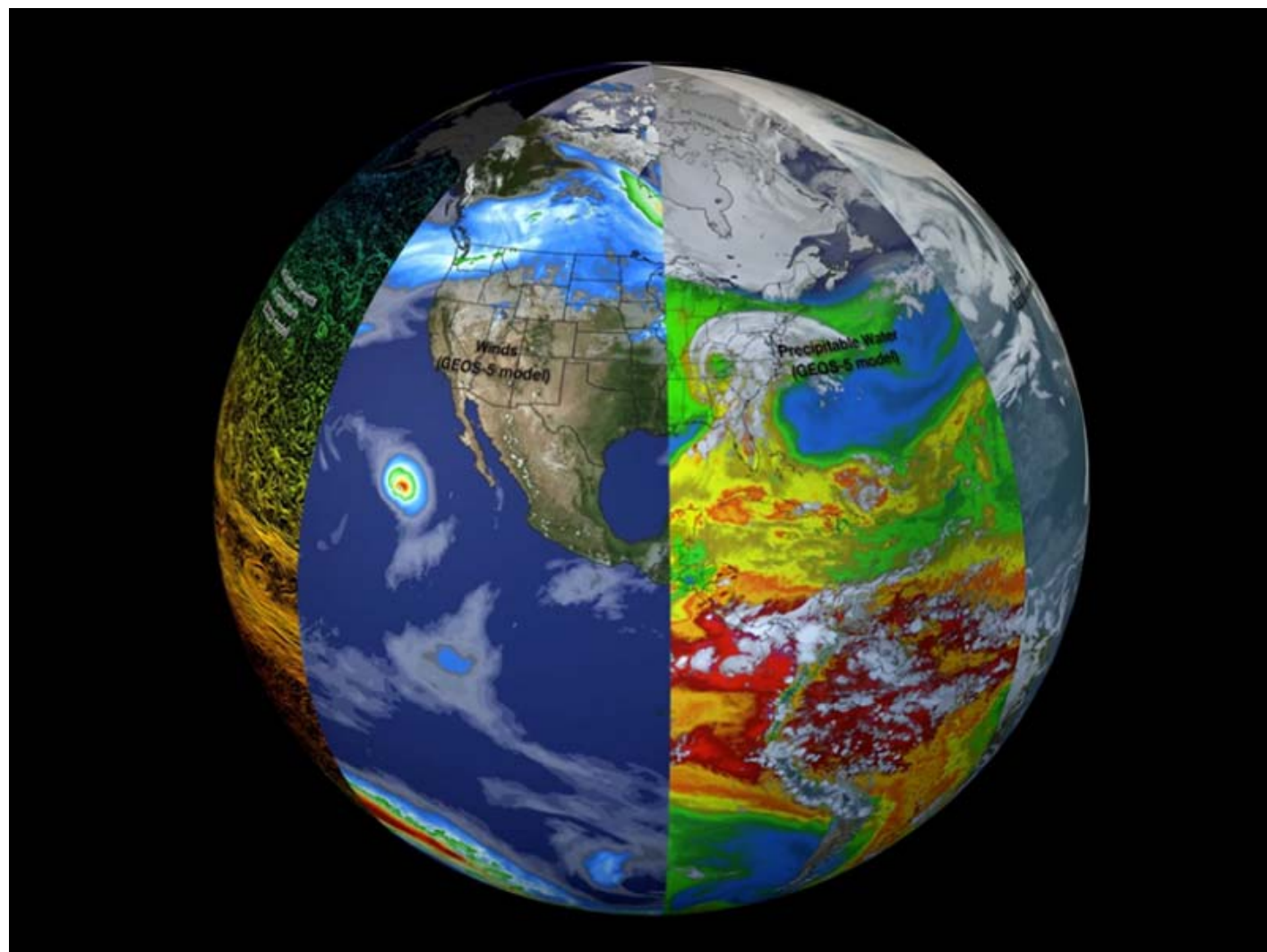



Coordinating and Communicating Carbon Cycle Research

2017 Joint NACP and AmeriFlux Principal Investigators Meeting;
Bethesda, Maryland, 27–30 March 2017



Earth is a system of systems. Multidisciplinary observations and models shed light on the interactions among these systems and improve understanding and predictions of carbon dynamics and processes. Pictured here, from left to right, are models showing sea surface currents and temperature (from the Estimating the Circulation and Climate of the Ocean, Phase II (ECCO₂) model), wind speeds (from the Goddard Earth Observing System Model, Version 5 (GEOS-5)), precipitable water (also from GEOS-5), and clouds (GEOS-5). A joint meeting brought together a diverse group of attendees from the United States, Canada, and Mexico to discuss carbon cycle

issues and sustainable carbon management in the context of this system of systems. Credit: NASA GSFC

By [Maria Tzortziou](#), Marcy Litvak, and Gyami Shrestha  7 September 2017

All living things are made of carbon. Through exchanges and transformations within and between Earth's oceans, land, atmosphere, and biosphere, the cycling of carbon fundamentally affects—and is affected by—environmental change, aquatic and terrestrial ecosystems, and human activities. Last March, a multidisciplinary group of researchers and stakeholders gathered to discuss the progress, challenges, and future research priorities in carbon cycle research across North America. Since their establishment in 1996, 1999, and 2005, respectively, [AmeriFlux](http://ameriflux.lbl.gov/) (<http://ameriflux.lbl.gov/>), the [U.S. Carbon Cycle Science Program](https://www.carbonecyclescience.us/) (<https://www.carbonecyclescience.us/>), and the North American Carbon Program (NACP (<https://www.nacarbon.org/nacp/index.html?>)) have focused on developing quantitative scientific knowledge, robust observations, models, and decision-making tools relevant to carbon cycling and sustainable carbon management. The 2017 joint meeting brought together almost 300 scientists, policy makers, industry representatives, economists, and government program managers from the United States, Canada, and Mexico. It included 15 science sessions with 61 plenary talks, 180 posters, numerous student speed talks, and 15 breakout sessions. The meeting was designed to foster collaboration, synthesis, and multiagency coordination of interdisciplinary, integrated carbon cycle research in North America and adjacent ocean regions.

Crossing the Disciplinary Divides

The meeting provided a forum for discussions at the intersection of carbon science, social science, and [carbon management](https://eos.org/research-spotlights/conservation-farming-shown-to-protect-carbon-in-soil) (<https://eos.org/research-spotlights/conservation-farming-shown-to-protect-carbon-in-soil>). Topics included linking the carbon cycle to decision-making, [low-carbon future scenarios](https://eos.org/meeting-reports/achieving-a-near-zero-carbon-emissions-energy-system) (<https://eos.org/meeting-reports/achieving-a-near-zero-carbon-emissions-energy-system>), trilateral advances in carbon monitoring and reporting, carbon science communication, and making carbon data products more accessible and relevant to societal needs.

Invited keynote speakers discussed current infrastructure and capacity needs in carbon cycle research.

Invited keynote speakers discussed current infrastructure and capacity needs in carbon cycle research, and they offered insights and useful guidelines to more effectively communicate the science to stakeholders and policy makers across all levels of government. A 1-day workshop, primarily intended for early-career scientists, provided guidance on fundamental data management practices. The workshop emphasized that investigators should perform these practices during the

course of data collection to improve the usability of their data sets.

Moving the Science Forward

Meeting participants discussed the role of natural and anthropogenic disturbances in carbon cycling, including fire, deforestation, insect and disease outbreaks, and anthropogenic nitrogen loading. They also discussed studies in critical regions from the Arctic to the tropics and field activities and intensive field campaigns in terrestrial and aquatic environments. Such field activities include the AmeriFlux (<https://eos.org/project-updates/a-new-data-set-to-keep-a-sharper-eye-on-land-air-exchanges>) network, the National Science Foundation's National Ecological Observatory Network (NEON (https://www.nsf.gov/funding/pgm_summ.jsp?displayFullSite=true&orgAbbr=NSF&pims_id=13440)), and NASA's Arctic-Coastal Land Ocean Interactions (Arctic-COLORS (<https://arctic-colors.gsfc.nasa.gov/>)) and Arctic-Boreal Vulnerability Experiment (ABOVE (<https://above.nasa.gov/>)) programs.

Participants revealed significant recent progress on linkages between aquatic and terrestrial carbon cycles.

In the sessions, participants revealed significant recent progress on linkages between aquatic and terrestrial carbon cycles, and they highlighted emerging technologies for reducing carbon measurement and model uncertainties (<https://eos.org/features/assessing-a-new-clue-to-how-much-carbon-plants-take-up>). They also discussed where and how expanded ground-, airborne-, and space-based measurements can fill gaps in scientists' current ability to infer regional to continental ecosystem-atmosphere carbon fluxes.

Integrative discussions on multisystem carbon cycle studies and assessments included the upcoming special report of the Sustained National Climate Assessment, the Second State of the Carbon Cycle Report (SOCCR-2 (<https://www.carboncyclescience.us/news/federal-register-notice-2nd-state-carbon-cycle-report-soccr-2>)), and global methane budget (<https://eos.org/articles/greenhouse-gas-patterns-offer-promise-puzzlement>) and measurements. Meeting participants called for more synthesis studies and collaborative activities among the NACP and AmeriFlux communities. The meeting underscored the need for sustained interagency coordination and new collaborations among researchers, practitioners, and decision-makers, as well as stronger connections between research and application, the natural and social sciences, and science and policy.

Further information about the meeting, a list of participants, and presentation abstracts can be found on the meeting's website (https://www.nacarbon.org/cgi-bin/meeting_2017/mtg2017_ab_detagenda.pl).

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