



A Core Element of the U.S. Global Change Research Program

NORTH AMERICAN CARBON PROGRAM

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CONTINENTAL CARBON BUDGETS • PROCESSES • MANAGEMENT

NASA Terrestrial Ecology Meeting 2019



The North American Carbon Program

- Founded in 2002, first Implementation Plan in 2005
- Multi-agency, multidisciplinary community of practice focused on carbon sources and sinks in North America and its adjacent oceans
- Observations, experiments, modeling and syntheses
 - Terrestrial
 - Aquatic/oceanic
 - Atmosphere
 - Human dimensions
- 75+ current projects funded by NASA, DOE, USDA, USGS, NSF, NOAA, NIST
 - 32 are NASA Terrestrial Ecology projects



Science Leadership Group (SLG)

Andrew Fox (co-chair), JCSDA/UCAR

Chris Williams (co-chair), Clark Univ.

Simone Alin, NOAA PMEL

Iris Anderson, VIMS

Alison Boyer, ORNL

Róisín Commane, Columbia U.

Sarah Cooley, Ocean Conservancy

Grant Domke, USDA Forest Service

Judith Drexler, USGS

Christian Frankenberg, JPL

Deborah Huntzinger, Northern Arizona U.

Lucy Hutyra, Boston U.

Robert Kennedy, Oregon State U.

John Lin, U. of Utah

Yiqi Luo, Northern Arizona U.

Ray Najjar, Penn State U.

Erika Podest, JPL

Benjamin Poulter, NASA GSFC

Benjamin Ruddell, Northern Arizona U.

Kevin Schaefer, NSIDC

Rob Streigl, USGS

Maria Tzortziou, CCNY

Rodrigo Vargas, U. of Delaware

Meets via telecon quarterly, 1 in-person meeting /year



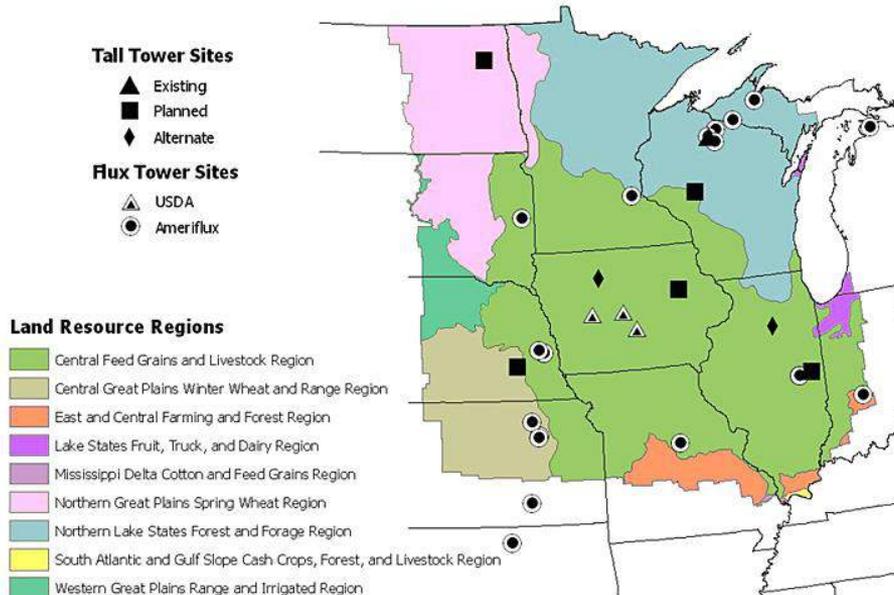
Mid-Continent Intensive Campaign (MCI)

2003 – 2007

- Test-bed for methodologies to determine carbon flux between land and atmosphere
- Essential for understanding and reconciling top-down vs. bottom up estimates
- Multi-agency funding: DOE, NASA, NOAA, NSF, USDA ARS, USDA FS, USGS

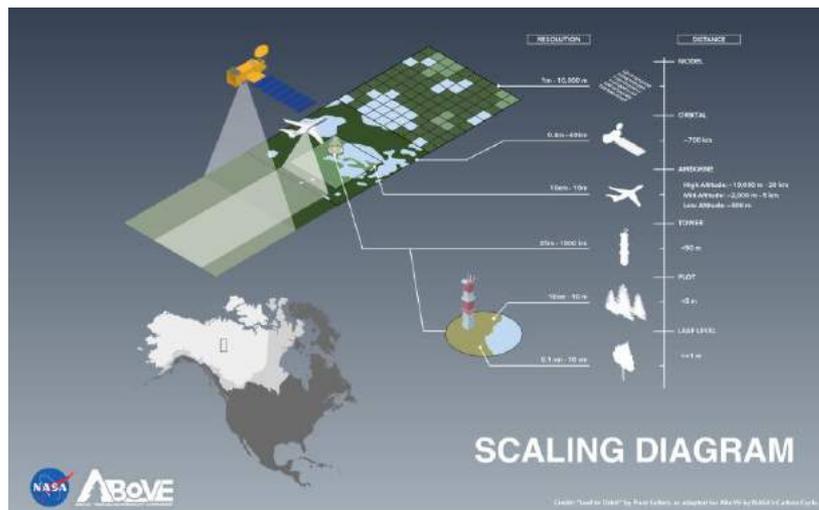
Mid-Continent Intensive Campaign Study Region

Tall Tower and Eddy Covariance Flux Tower Locations

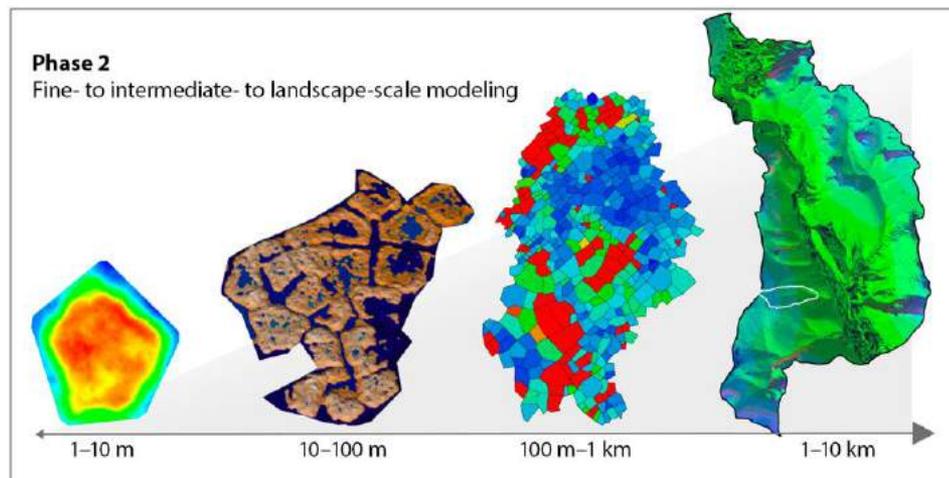




Arctic Intensive



NASA's Arctic-Boreal Vulnerability Experiment (ABOVE) est. 2014



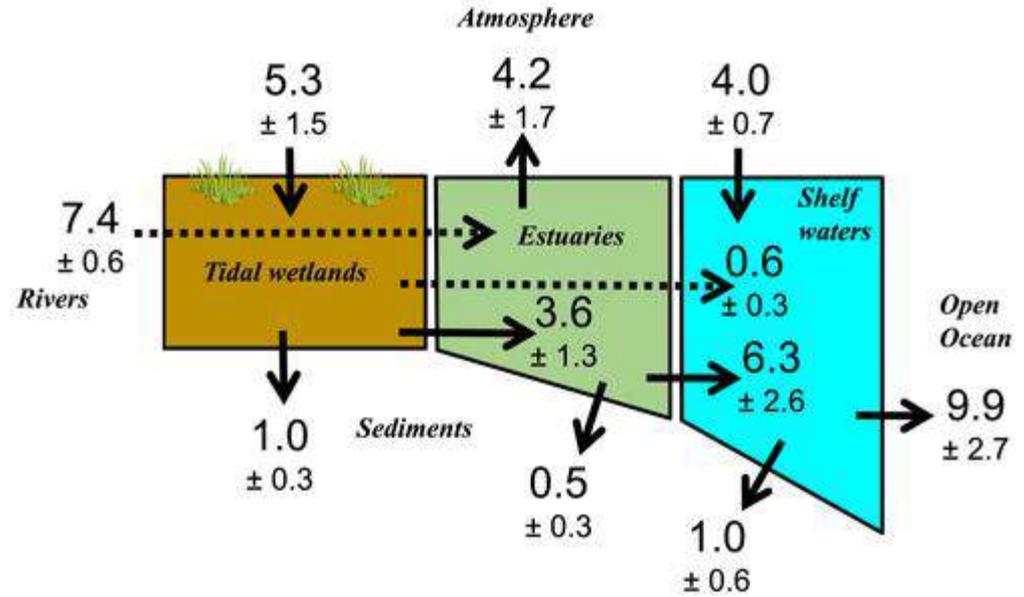
DOE's Next-Generation Ecosystem Experiment (NGEE-Arctic) est. 2012



Syntheses

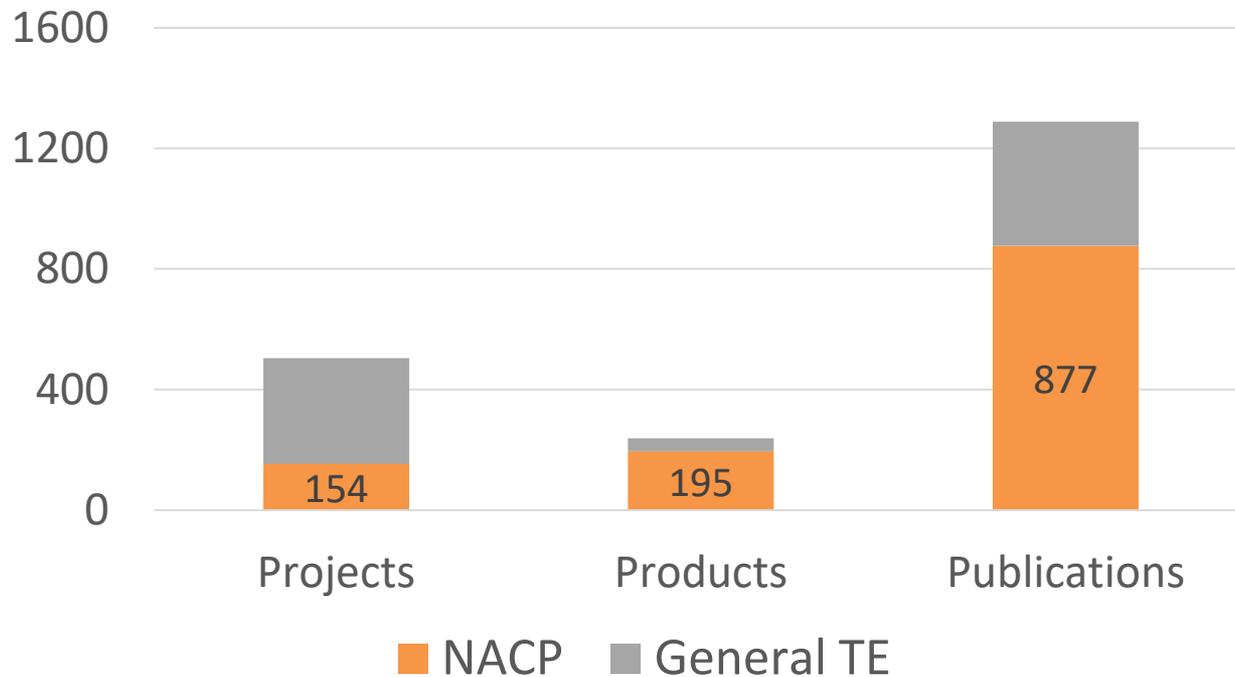
- Coastal Carbon Synthesis (CCARS) 2012 – 2015 **in collaboration with OCB**
- Multi-scale Synthesis and Terrestrial Model Intercomparison Project (MsTMIP) 2014 – 2017
- Regional-Continental 2012 – 2015
- Site-level 2008 – 2013
- Disturbance 2009 – 2013

Total carbon budget (Tg C yr⁻¹) of ENA coastal waters





NACP and NASA's Terrestrial Ecology Program





NACP Terrestrial Ecology Citation Classics

- Hansen et al. 2013. High-Resolution Global Maps of 21st-Century Forest Cover Change. *Science*. 342(6160), 850-853. doi: 10.1126/science.1244693 (**2921 citations**)
- van Vuuren et al. 2011. The representative concentration pathways: an overview. *Climatic Change*. 109(1-2), 5-31. doi: 10.1007/s10584-011-0148-z (**2564 citations**)
- Pan et al. 2011. A Large and Persistent Carbon Sink in the World's Forests. *Science*. 333(6045), 988-993. doi: 10.1126/science.1201609 (**2350 citations**)
- Entekhabi et al. 2010. The Soil Moisture Active Passive (SMAP) Mission. *Proceedings of the IEEE*. 98(5), 704-716. doi: 10.1109/JPROC.2010.2043918 (**1166 citations**)
- Le Quere et al. 2009. Trends in the sources and sinks of carbon dioxide. *Nature Geoscience*. 2(12), 831-836. doi: 10.1038/ngeo689 (**1086 citations**)



@NACP_Carbon

Monthly Newsletter



In this issue:

- [Highlight of the fifth chapter of the Second State of the Carbon Cycle Report \(SOCCR2\)](#)
- [What We Are Reading](#)
- [New Feature — Researcher Spotlight](#)
- [Community Events/Announcements](#)
- [Job Highlight](#)
- [Contribute to the NACP Newsletter!](#)

Researcher Spotlight



David Moore

Associate Professor in the School of Natural Resources and the Environment
University of Arizona

Dave Moore is an Associate Professor in the School of Natural Resources and the Environment at the University of Arizona.

He studies how ecosystems work. He uses both whole ecosystem measurements of carbon, water and energy exchange as well as smaller scale measurements – from tree growth to leaf level photosynthesis to soil microbial functions and nutrient cycling – to study how ecosystem processes respond to change. He uses models and airborne or satellite remote sensing data to integrate these... [view more](#)

[View contact information and participation in North American Carbon Program activities >>](#)

[View Researcher Spotlight Archive >>](#)



Developing a New Science Implementation Plan!

- **Sustained and Expanded Observations** Arlyn Andrews
- **Assessment and Integration** Eric Sundquist
- **Processes and Attribution** Chris Williams
- **Prediction** Ken Davis, Ben Poulter, Forrest Hoffman
- **Communication & Decision Support** Molly Brown

➤ Also seeking community input on **ideas for new synthesis activities**



7th NACP Open Science Meeting!

***“The Future is Here: North American Carbon Cycle
Science for a Changed Climate”***



7th NACP Open Science Meeting

Meeting Planning Committee

Gretchen Keppel-Aleks (co-chair), U Michigan

Lisamarie Windham-Myers (co-chair), USGS

Simone Alin, NOAA

Altaf Arain, McMaster University

Cecilia Chapa-Balcorta, Universidad del Mar

Jessica Cross, NOAA

Scott Davidson, U of Waterloo

Debjani Deb, ORNL

Bassil El Masri, Murray State University

Andrew Fox, UCAR

Manuel Helbig, McMaster University

Trevor Keenan, LBNL

John Kim, USFS

John King, NCSU

Marcy Litvak, U New Mexico

Jiafu Mao, ORNL

Gregg Marland,

Appalachian State University

Guillermo Murray-Tortarolo, UNAM

Christopher Osburn, NCSU

Benjamin Poulter, NASA GSFC

Vinisa Saynes, Colegio Postgraduados

Christina Schaedel, NAU

Gyami Shrestha, US Carbon Cycle SP

Oliver Sonnentag, Université de Montréal

Maria Tzortziou, CCNY CUNY

Christopher Williams, Clark University

Xiangming Xiao, U Oklahoma

Enrico Yopez,

Instituto Tecnológico de Sonora



7th NACP Open Science Meeting

Keynote topics of interest to the broad community:

- A perspective from young scientists and non-traditional voices
- A panel from authors on the IPCC special reports
- A panel on green cities to discuss carbon management
- A panel on science needed for low carbon futures

Science Plenary Sessions (examples):

- Spatial and Temporal Extremes in Carbon Cycling
- Vulnerability, Resilience, Adaptation and Mitigation in the Context of Carbon-Climate Feedbacks
- Linkages among the Air-Land-Water Continuum
- From Manipulative Experiments to Models (and back)
- Diagnosis and Attribution of NA Carbon Cycle



7th NACP Open Science Meeting

Breakout Sessions proposed by community members:

- Product-oriented
- Parallel sessions
- Competitively selected by organizing committee

TIMELINE:

- Fall 2019: Planning Committee invites Keynote Speakers
- Fall 2019: Abstract submissions open for Science Plenary Sessions
- Fall 2019: Breakout Sessions proposals solicited
- December 2019/Jan 2020: Abstract submissions closes
- Jan – Feb 2020 : Planning Committee makes selections for talks, Breakout Sessions



The North American Carbon Program

Questions?

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