

# A New U.S. Carbon Cycle Science Plan



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# Fundamental Science Questions

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- 1999 U.S. Carbon Cycle Science Plan (2):
  - What has happened to the carbon dioxide that has already been emitted by human activities (past anthropogenic CO<sub>2</sub>)?
  - What will be the future atmospheric CO<sub>2</sub> concentration trajectory resulting from both past and future emissions?
- Current version for new Plan (3):
  - How do natural processes and human actions affect the carbon cycle, on land, in the atmosphere, and in the oceans?
  - How do policy and management decisions affect the levels of atmospheric carbon dioxide and methane?
  - How are ecosystems, species, and resources impacted by increasing greenhouse gas concentrations, the associated changes in climate, and carbon management decisions?

Comments / Updates: <http://www.carboncyclescience.gov/carbonplanning.php>

## Goals (6 – still preliminary)

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- ❑ Provide clear and timely explanation of past and current variations observed in atmospheric CO<sub>2</sub> and CH<sub>4</sub> - and the uncertainties surrounding them. (Q1, Q2)
- ❑ Quantify and verify anthropogenic carbon emissions and sequestration using methods that are transparent and relevant to policymakers. (Q1, Q2)
- ❑ Determine and evaluate the carbon stocks and flows that are most vulnerable to change - emphasizing potential positive feedbacks to sources or sinks that make climate stabilization more critical or more difficult. (Q1, Q2)

## Goals (6 – still preliminary)

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- ❑ Quantify how rising CO<sub>2</sub> and changing climate will separately or jointly affect ecosystems, biodiversity, and natural resources. (Q3)
- ❑ Determine the likelihood of success and the potential for unintended consequences of carbon-management pathways that might be undertaken to achieve a low carbon future. (Q1, Q2, Q3)
- ❑ Understand decision-maker needs for current and future carbon-cycle data and for sound projections of the behavior of the carbon cycle into the future; and provide information that is relevant, credible, and legitimate for their decisions. (Q1, Q2, Q3)

## Goals (possible 7<sup>th</sup> Goal?)

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- Develop an integrated monitoring system that commits to long-term monitoring of the essential atmospheric, oceanic, biological, demographic, and socioeconomic data that will be essential over time to establish baselines, evaluate change, understand processes, and monitor mitigation actions.

# Questions to consider

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- Where do we draw the boundaries for what is included and what is not included in the new US Carbon Cycle Science Plan?
- Does the inclusion of ecosystem changes due to rising CO<sub>2</sub> broaden the scope of the Science Plan too much?
- How can the ocean community provide better decision support?
- Is it important for the ocean community to engage the social sciences better?
- Is the level of specificity of the currently proposed goals appropriate or do we narrow the focus at the risk of excluding important science issues?
- What are the ocean priorities for carbon cycle research and are there any critical ocean carbon issues that are missing from the current plan that need to be added?
- How would OCCC/OCB need to change to better meet the proposed goals of the new science plan?

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# Working Group Membership

Rob Jackson – Co-lead (Duke U.)	Lisa Dilling (U. Colorado)	Brian O’Neill (NCAR)
Gregg Marland – Co-lead (ORNL)	Andy Jacobson (NOAA / U. Colorado)	Steve Pacala (Princeton)
Anna Michalak – Co-lead (U. Michigan)	Matthew Kahn (UCLA)	Jim Randerson (UC Irvine)
Chris Sabine – Co-lead (PMEL)	Steve Lohrenz (U. Mississippi)	Steve Running (U. Montana)
Bob Anderson (Columbia U.)	David McGuire (U. Alaska)	Brent Sohngen (Ohio State U.)
Deborah Bronk (Col. of William & Mary)	Galen McKinley (U. Wisconsin)	Pieter Tans (NOAA-ESRL)
Ken Davis (Penn State)	Charles Miller (JPL)	Peter Thornton (ORNL)
Ruth DeFries (Columbia U.)	Berrien Moore (Climate Central)	Steve Wofsy (Harvard)
Scott Denning (Colorado State U.)	Dennis Ojima (Heinz Center)	Ning Zeng (U. Maryland)

**Shaded: Members who are attending this workshop**

# Working Towards Program Elements

<b>Goals</b>	<b>Program Elements</b>			
	Sustained observations	Process studies and experiments	Modeling, prediction, synthesis	Communication dissemination
Explain observed variations	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Quantify anthropogenic emissions	<b>X</b>		<b>X</b>	<b>X</b>
Evaluate vulnerable stocks and flows	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Ecosystem impacts	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Evaluate carbon management options	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Decision support and information management	<b>X</b>		<b>X</b>	<b>X</b>
Integrated monitoring system	<b>X</b>			<b>X</b>

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# Resources

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- More information:

- <http://www.carboncyclescience.gov/carbonplanning.php>

- Input and comments:

- Blog: <http://carboncyclescience.blogspot.com/>
- Email: [CCSPlan@gmail.com](mailto:CCSPlan@gmail.com)

- Publications and resources:

- 1999 CCS Plan

[http://www.carboncyclescience.gov/documents/cc\\_sp\\_1999.pdf](http://www.carboncyclescience.gov/documents/cc_sp_1999.pdf)

- AGU EOS Vol. 90 No. 12, p. 102-103, 2009

<http://www.carboncyclescience.gov/documents/ccs-plan-eos-v90-n12-24Mar09.pdf>

- Scoping paper

<http://www.carboncyclescience.gov/documents/Carbon-Cycle-Scoping-Paper-27Mar09.pdf>

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