

Appendix A

Report Development Process

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Led by the Carbon Cycle Interagency Working Group (CCIWG), which leads the U.S. Carbon Cycle Science Program, the *Second State of the Carbon Cycle Report (SOCCR2)* was developed as a special report of the U.S. Global Change Research Program (USGCRP) Sustained Assessment process. Elaborating on information presented in SOCCR2's Preface, see p. 5, this appendix provides further details on the development background, team structure, and process of this report.

A.1 U.S. Global Change Research Program

Founded by a Presidential Initiative in 1989, USGCRP aims to build a knowledgebase that informs human responses to climate and global change through coordinated and integrated federal programs of research, education, communication, and decision support. Subsequently, the Global Change Research Act (1990) mandated USGCRP to develop and coordinate "a comprehensive and integrated United States research program which will assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change." CCIWG was established in 1998, and the U.S. Carbon Cycle

Science Program in 1999 under USGCRP auspices (see Interagency Context of U.S. Carbon Cycle Science, p. 18, in the Preface).

USGCRP Institutional Foundations. USGCRP encompasses 13 federal departments and agencies that collectively support the largest investment in climate and global change research in the world. These governmental departments and agencies maintain and develop the observational, monitoring, data management, analysis, and modeling capabilities that support U.S. responses to global change. Providing a platform for coordination of pertinent research activities across agencies, USGCRP provides congressionally mandated data and products to inform decisions. USGCRP's Strategic Plan (USGCRP 2012) and Update to the Strategic Plan 2012–2021 (USGCRP 2017a) focus on four goals: advance science, inform decisions, conduct sustained assessments, and communicate and educate. The USGCRP agencies are listed below:

- National Aeronautics and Space Administration (NASA)
- National Science Foundation (NSF)
- The Smithsonian Institution (SI)
- U.S. Agency for International Development (USAID)
- U.S. Department of Agriculture (USDA)
- U.S. Department of Commerce (DOC)
- U.S. Department of Defense (DOD)
- U.S. Department of Energy (DOE)
- U.S. Department of Health and Human Services (HHS)
- U.S. Department of the Interior (DOI)
- U.S. Department of State (DOS)
- U.S. Department of Transportation (DOT)
- U.S. Environmental Protection Agency (EPA)

A.2 Subcommittee on Global Change Research

The Subcommittee on Global Change Research (SGCR) oversees USGCRP's activities. SGCR operates under the direction of the National Science and Technology Council's (NSTC) Committee on the Environment and is overseen by the White House Office of Science and Technology Policy. SGCR coordinates interagency activities through the USGCRP National Coordination Office (NCO) and informal interagency working groups, such as CCIWG, which led the development of SOCCR2.

A.3 Carbon Cycle Interagency Working Group

Leading the development of SOCCR2, CCIWG comprises program managers from agencies and departments with carbon cycle-related research and funding portfolios. CCIWG developed the foundation of the report process starting circa 2014 to 2015 in response to needs identified and expressed by the North American carbon cycle science community. The working group oversaw the compilation and synthesis of report contributions from all the authors, from beginning to end. The lead CCIWG agency member for SOCCR2's administrative (legal) purposes is the USDA National Institute of Food and Agriculture (NIFA). The SOCCR2 agency co-leads are all the CCIWG member departments and agencies including the U.S. Geological Survey, DOE, the National Oceanic and Atmospheric Administration (NOAA), NASA, USDA Forest Service, USDA NIFA, National Institute of Standards and Technology, EPA and NSF. Figure A.1, p. 812, and the sections that follow describe the core SOCCR2 team and the processes it has undertaken under CCIWG auspices.

A.4 SOCCR2 Federal Steering Committee

The SOCCR2 Federal Steering Committee was established in early 2015 to provide guidance and coordination to the report staff and authors. This Steering Committee comprises a subset of

CCIWG members, who scheduled sessions, town halls, presentations at relevant conferences, and webinars to further engage the community of experts and the public. The Steering Committee established the scope of the SOCCR2 process and products, ensuring the inclusion of pertinent Global Change Research Act (1990) topics and a scope responsive to several documents and reports, including 1) *A U.S. Carbon Cycle Science Plan* (Michalak et al., 2011), 2) the 2012–2021 USGCRP Strategic Plan (USGCRP 2012), and 3) other documents highlighted in the SOCCR2 Prospectus. The Steering Committee developed the Prospectus between February and May 2015, and SGCR approved it in May 2015. The Federal Steering Committee also was the primary decision-making body for SOCCR2's timeline, process, procedural matters, and guidelines and approved draft versions prior to reviews by SGCR; the public; and the National Academies of Sciences, Engineering, and Medicine (2018).

A.4.1 Lead Agency, Legal Oversight, and Federal Register Notices

USDA, specifically USDA NIFA, assumed the primary responsibility for legal oversight and legal support of the assessment process, including submission of Federal Register Notices (FRNs). USDA NIFA issued the first public FRN announcing SOCCR2 on February 12, 2016, and sought submissions of 1) nominations for contributors, 2) comments on the draft Prospectus, and 3) technical input. After completion of a public review of SOCCR2's "Fourth Order Draft," USDA, on behalf of USGCRP, issued a second FRN to announce the draft report's public comment period that started November 3, 2017.

A.4.2 U.S. Carbon Cycle Science Program Office

The U.S. Carbon Cycle Science Program Office, located at the USGCRP NCO, handled assessment coordinating functions. These functions included 1) providing leadership, support, facilitation, and technical advice for the formulation of the

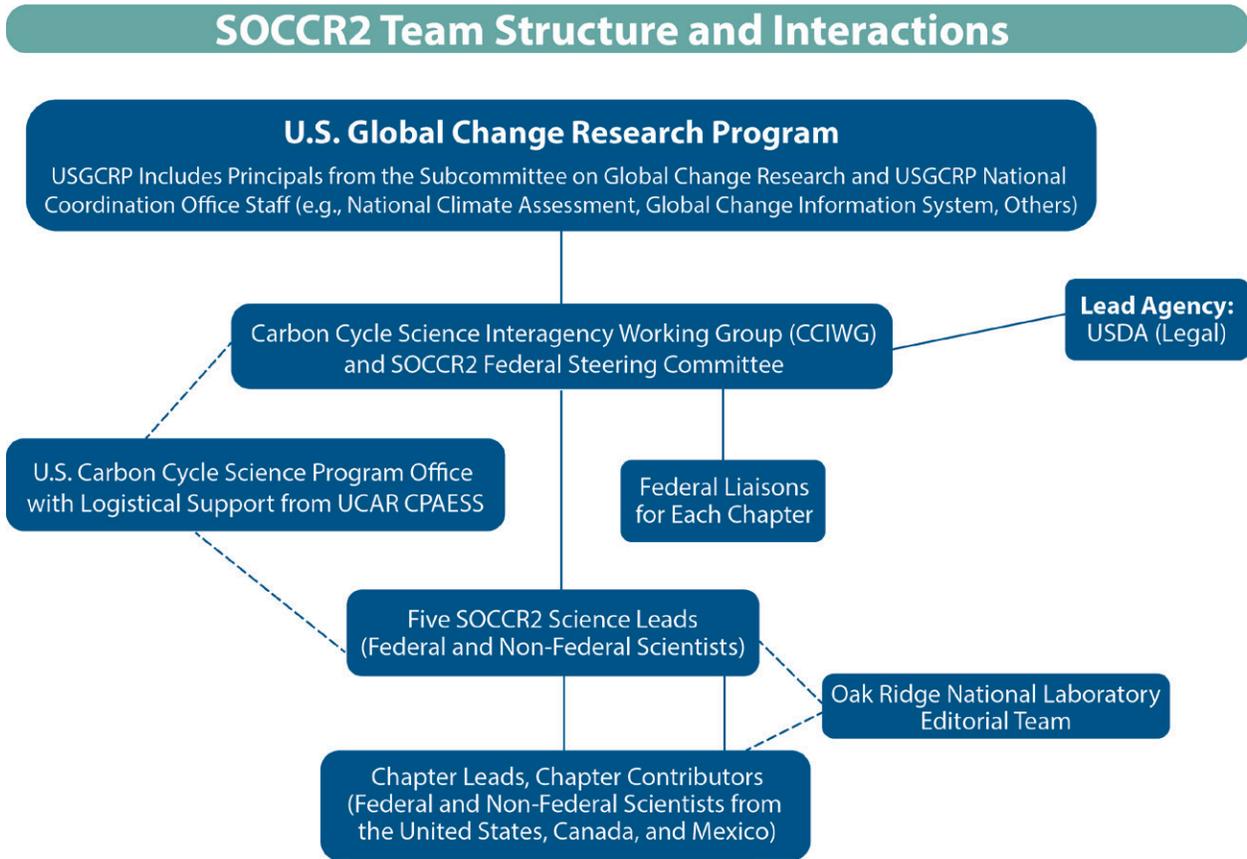


Figure A.1. The Second State of the Carbon Cycle Report (SOCCR2) Team Structure and Interactions. The SOCCR2 Federal Steering Committee, as a subset of the Carbon Cycle Interagency Working Group (CCIWG) under the auspices of the U.S. Global Change Research Program (USGCRP), oversaw the SOCCR2 team. The lead administrative agency was the U.S. Department of Agriculture (USDA). More than 200 governmental and non-governmental team members from the United States, Canada, and Mexico interacted iteratively during multiple drafting, reviews, revisions, and other report development processes from 2015 to 2018. [Key: UCAR CPAESS, University Corporation for Atmospheric Research’s Cooperative Programs for the Advancement of Earth System Science.]

Prospectus, assessment guidelines, report content, FRNs, workshops, and engagement activities and 2) assembling federal agency experts and non-federal experts during the report development process. As needed, USGCRP staff provided technical advice, the decision tree for Information Quality, and support for reviews conducted via review.globalchange.gov. SOCCR2 workshops and other engagement activities facilitated the scoping and development of report outlines and drafts. The U.S. Carbon Cycle Science Program

Office organized weekly teleconference calls for the SOCCR2 federal Steering Committee and provided the Steering Committee, CCIWG, USGCRP, and associated federal and community partners with regular progress (weekly and monthly) updates. The U.S. Carbon Cycle Science Program Office Director served as primary point of contact, liaison, and manager for SOCCR2 development, oversight, communications, and pertinent operations, as part of the SOCCR2 Federal Steering Committee and ex officio CCIWG member.

A.5 SOCCR2 Chapter Federal Liaisons

At least one member of either CCIWG or the SOCCR2 Federal Steering Committee served as a Federal Liaison for each chapter's writing team. These Federal Liaisons oversaw the development of their respective chapters in close coordination with the SOCCR2 Federal Steering Committee, regularly reporting to it on chapter progress and needs and also providing feedback to the chapter teams. Some Federal Liaisons also served as authors in their respective chapters but did not coordinate the chapter writing process. The primary responsibility for coordinating chapter authors and chapter content was that of the Chapter Lead(s), as described below. Federal Liaisons worked closely with the Chapter Leads to facilitate communication with the SOCCR2 Federal Steering Committee and CCIWG, as well as to ensure adherence to SOCCR2 guidelines provided by the SOCCR2 Steering Committee for scope, structure, and process.

A.6 Science Leads

The team of five Science Leads represented pertinent fields of carbon cycle science. The team's responsibilities included:

- Ensure balance and consistency of information across and within topics and chapters;
- Ensure emphasis on new information since the *First State of the Carbon Cycle Report* (SOCCR1; CCSP 2007);
- Ensure clear organization of the report, with a unified structure and narrative;
- Develop higher-level synthesis and overarching Key Findings, ensuring the report covers broad understanding of what is known, not known, and associated uncertainties;
- Respond to, for example, review comments on scope, emphasis, balance, and overarching Key Findings, coordinating response to specific content with chapter authors;

- Produce guidance for author teams by establishing foundational assumptions, such as for scenarios and data, and ensure that the report meets Information Quality Act requirements; and
- Organize the chapters and develop the Executive Summary and related high-level summary documentation of the report.

A.7 Chapter Teams

Within the chapter teams are Chapter Leads and Contributing Authors from the broad carbon cycle science research community. The Chapter Leads and Co-Leads (Lead authors) included a selection of federal employees and affiliates identified through existing agency collaborations and networks as well as via the February 12, 2016, FRN issued by USDA NIFA (see Section A.9, p. 814, for a description of this process). Chapter Leads and Co-Leads decided how best to organize their respective chapter teams, including division of responsibility and time requirements among Contributing Authors and Chapter Leads. The Chapter Leads and Co-Leads provided intellectual and scientific leadership for their designated chapters and were responsible for producing the chapter and addressing items of the Prospectus based on the best available scientific, technical, and socioeconomic information. They coordinated their respective chapter author team, ensuring that major sections of the chapter were completed to a high standard, were collated and delivered to the SOCCR2 Science Leads and Federal Liaisons in a timely manner, and conformed to the document's overall standards of style. They also coordinated chapter revisions with the Oak Ridge National Laboratory (ORNL) editorial team, SOCCR2 Science Leads, Federal Liaisons, and Review Editors. The ORNL editorial team provided technical support to all the SOCCR2 chapter teams. This support included formatting, text editing, graphics, design, layout, and resource site management support for graphics metadata and coordination for integration of this information with the USGCRP Global Change Information System. The editorial team also helped evaluate end-to-end content and supported

report development, identifying gaps and providing feedback and recommendations as needed.

A.8 Contributing Authors

Contributing Authors included scientists with relevant subject matter expertise nominated by Lead Authors, CCIWG or other interagency members, and the general public (through the February 12, 2016, public FRN calling for Contributing Author nominations). Where needed to fill gaps in expertise, additional subject matter experts were later invited by individual chapter teams to be Contributing Authors, based on their expertise as shown in peer-reviewed publications and other pertinent criteria.

In some instances, author teams invited special ad hoc reviews from peers (referred to as Expert Reviewers in SOCCR2) who were not authors on their chapter. Such reviews of draft chapters helped to improve the report prior to formal reviews by SGCR, the public, and the National Academies of Science, Engineering, and Medicine (NASEM). Additionally, Review Editors were involved in the process following the NASEM and public review phases, as described in Section A.9.4, p. 815.

A.9 Creating SOCCR2

A.9.1 Process for SOCCR2 and USGCRP Special Assessment Reports

Information provided in SOCCR2 updates carbon cycle science across North America and informs several chapters in USGCRP'S *Fourth National Climate Assessment* (NCA4). As described in the Preface, p. 5, a number of federally produced interagency USGCRP scientific assessment reports, including SOCCR2, are part of the USGCRP Sustained Assessment process, contributing to the robust scientific foundation of the congressionally mandated quadrennial National Climate Assessments:

1. The *Climate Science Special Report* (USGCRP 2017b), released in November 2017, is Volume I of NCA4. It provides the scientific underpinnings for NCA4 and serves as an update of the

physical science presented in the *Third National Climate Assessment* (NCA3; Melillo et al., 2014).

2. The *Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (USGCRP 2016), released in April 2016, strengthens understanding of the linkages between climate change and health.
3. The NCA3, released in 2014, covered many of the same sectors and geographical regions of the United States as NCA4, providing a foundation for NCA4 sectors and regions. Additionally, NCA4 includes several new topical chapters of national and regional interest as a result of public feedback for such information.
4. The *Climate Change, Global Food Security, and the U.S. Food System* assessment (Brown et al., 2015), released in December 2015, identifies climate change impacts on global food security.

SOCCR2 followed the information quality standards, process, and review procedures for the first, second, and third formal USGCRP Sustained Assessment products above.

A.9.2 SOCCR2 Process Initiation and Author Selection

Following a January 2015 regular monthly meeting of the Carbon Cycle Interagency Working Group and discussions on the assessment development processes with the erstwhile NCA Chief of Staff, a preliminary CCIWG sub-team was assembled to start developing the SOCCR2 Prospectus. This sub-team led to the establishment of the SOCCR2 Federal Steering Committee, which would lead the organization of the first meeting with community scientists to scope SOCCR2 in May 2015, shortly after approval of the Prospectus by SGCR the same month.

The U.S. Carbon Cycle Science Program Office led the development of author guidance documents and the Prospectus for use during SOCCR2 development. These documents included 1) templates for chapters and Supporting Evidence (or Traceable Accounts)—with technical support from staff of

the USGCRP NCO and NOAA Technical Support Unit—and 2) style guides and information quality guidelines based on recent USGCRP assessments (e.g., NCA3). Authors had access throughout the process to scientific resources and writing guidance materials on a web-based platform that served as an online collaboration space and repository of SOCCR2 documents and drafts. Following the February 12, 2016, public FRN (FRN 2016) for author nominations, technical input, and comments on the SOCCR2 Prospectus, the CCIWG selected Chapter Leads for 19 chapters, also selecting more than 100 additional Contributing Authors. This writing team comprises scientists and technical experts representing U.S. agencies, national laboratories, universities, and the private sector. Later, additional Contributing Authors were invited by Chapter Leads to provide special input on select areas of the assessment. A team of five Science Leads also was selected from U.S. federal agencies, national laboratories, and academia to provide high-level scientific expertise and assistance, specifically to ensure consistency in scientific information across the report.

A.9.3 Author Training and Drafting

All 19 SOCCR2 author teams met multiple times by phone, web, and in person and produced various iterations of their chapters after beginning work in May 2016. Supporting Evidence sections (i.e., Traceable Accounts) at the end of each chapter provide transparent information about the authors' deliberations to arrive at their expert judgment regarding the level of certainty related to the Key Findings of their chapters.

Author training webinars, which were available to Chapter Leads and other interested authors, built on previously shared written guidance and included the following topics:

- Report development process and requirements
- Development of Key Findings and Supporting Evidence (i.e., Traceable Accounts accompanying each Key Finding)

- Graphics metadata requirements and the Global Change Information System

Author training webinars were recorded and archived on the SOCCR2 online drive, which was created on a free, open-access document storage, synchronization, and sharing platform that allows collaborative editing of documents. Drafts, author guidelines, and pertinent materials were also posted on that platform for access at team members' convenience throughout the report development process.

A.9.4 Review Editor Selection and Role

The SOCCR2 Federal Steering Committee selected Review Editors from a slate of candidates nominated through a public open call¹ from July 18 to August 2, 2017. For their assigned chapter(s), the Review Editors were responsible for ensuring that all substantive comments received during the public comment period and from the NASEM review were appropriately addressed, providing guidance on issues noted by reviewers and ensuring that significant scientific uncertainties were adequately reflected in the subsequent revised text. Review Editors did not provide additional comments on assigned draft chapters but instead focused on the materials derived from the public comment period and NASEM review. They also ensured that author teams considered and appropriately addressed each and every comment within the SOCCR2 scope.

A.9.5 All Author Meeting

On April 3–5, 2018, all Chapter Leads and representatives were invited to participate in a 2.5-day workshop at USDA NIFA in Washington, D.C., to finalize cross-chapter references, resolve remaining inconsistencies, and implement revisions in response to both public and NASEM reviews.

A.9.6 Review Processes

Multiple formal and internal reviews of consecutive SOCCR2 drafts have taken place (see Figure P.1,

¹ www.carboncyclescience.us/news/soccr-2-review-editors-nominations/

p. 10, in the Preface), including the following six reviews.

1. Interagency review of the “Second Order Draft” by the Subcommittee on Global Change Research (SGCR) (November 8–23, 2016).
2. Interagency review of the “Third Order Draft” by SGCR (June 23 to July 21, 2017).
3. NASEM committee review of the “Fourth Order Draft” (November 3, 2017, to March 12, 2018).
4. Public comment period for the “Fourth Order Draft” (November 3, 2017, to January 12, 2018).
5. Iterative internal reviews of multiple drafts by the Carbon Cycle Interagency Working Group, SOCCR2 Federal Steering Committee members, five Science Leads, SOCCR2 Chapter Leads, Expert Reviewers, ORNL technical editors, and federal experts from different agencies (September 2016 to July 2018). For example, prior to SGCR’s review of the “Third Order Draft,” several additional layers of input, reviews, and revisions (February to May 2017) were provided by 1) USDA (i.e., the administrative agency lead for SOCCR2), 2) SOCCR2 Federal Liaisons (e.g., representatives from EPA and other CCIWG agencies and departments), 3) external Expert Reviewers, 4) USGCRP leadership, and 5) SOCCR2 writing teams.
6. Following the public comment period and a formal review by NASEM experts, the writing team further revised the report, which subsequently was reviewed and approved for final publication by USGCRP member agencies as part of the interagency clearance process: Final Interagency Clearance of the “Fifth Order Draft” by SGCR (July 31 to August 20, 2018).

A.9.7 Engagement Activities

Since early 2015, the SOCCR2 Federal Steering Committee convened by phone weekly, as needed, and in person at the USGCRP NCO in Washington, D.C., as part of the regular CCIWG meetings. Regular updates were provided to SGCR. Updates on the

activities and progress of SOCCR2— starting May 2015, when its development was first approved by SGCR—were posted on carboncyclescience.us. The U.S. Carbon Cycle Science Program Office provided substantive updates on the report’s process and development directly to SOCCR2 Chapter Leads and Contributing Authors via emails and teleconferences. In addition, USGCRP, the North American Carbon Program (NACP), Ocean Carbon and Biogeochemistry Program (OCB), and the U.S. Carbon Cycle Science Program provided regular updates to the community via periodic newsletters and list-servs.

The first SOCCR2 scoping workshop convened with community scientists in May 2015, and the first SOCCR2 Public Forum convened at NOAA National Weather Service, College Park, in February 2016. Also conducted from 2015 to 2018 were a plethora of domestic and international in-person symposia, sessions, town halls, gatherings at meetings of professional societies (e.g., the American Geophysical Union and Ecological Society of America), and online teleconferences and webinars. These meetings involved Federal Steering Committee and other SOCCR2 team members, who solicited technical input from subject matter experts and discussed SOCCR2 processes and progress with the science community and the SOCCR2 author team. The opportunity for the public to review the SOCCR2 “Fourth Order Draft” was promoted via social media (#SOCCR2, #NCA4) and newsletters of USGCRP, NACP, and OCB, as well as the NCAnet (i.e., a “network of networks” started in 2012 to support NCAs; ncanet.usgcrp.gov). One public joint informational webinar of NACP and OCB was conducted during the SOCCR2 public comment period (November 2017 to January 2018). The SOCCR2 report dissemination includes two website versions. The SOCCR2 website 1.0, produced by the U.S. Geological Survey and launched with the public release of the final report, is a static site with downloadable PDFs of each chapter. The SOCCR2 website 2.0, to be produced by NOAA in 2019, includes an interactive interface emulating the USGCRP NCA4 capabilities, including Global Change Information System and meta-data documentation.

REFERENCES

- Brown, M.E., J. M. Antle, P. Backlund, E. R. Carr, W. E. Easterling, M. K. Walsh, C. Ammann, W. Attavanich, C. B. Barrett, M. F., Bellemare, V. Dancheck, C. Funk, K. Grace, J. S. I. Ingram, H. Jiang, H. Maletta, T. Mata, A. Murray, M. Ngugi, D. Ojima, B O'Neill, and C. Tebaldi, 2015: *Climate Change, Global Food Security, and the U.S. Food System*. 146 pp. [http://www.usda.gov/oce/climate_change/FoodSecurity2015Assessment/FullAssessment.pdf]
- CCSP, 2007: *First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research*. [A. W. King, L. Dilling, G. P. Zimmerman, D. M. Fairman, R. A. Houghton, G. Marland, A. Z. Rose, and T. J. Wilbanks (eds.)]. National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, USA, 242 pp.
- FRN, 2016: Request for Public Engagement in the Interagency Special Report '2nd State of the Carbon Cycle Report (SOCCR-2)'. A notice by the National Institute of Food and Agriculture. *Federal Register*, 81FR7497, 7497-7499, Document Number: 2016-02927. [<https://www.federalregister.gov/documents/2016/02/12/2016-02927/request-for-public-engagement-in-the-interagency-special-report-2nd-state-of-the-carbon-cycle-report>]
- Global Change Research Act, 1990: Global Change Research Act: Public Law 101-606 (11/16/90) 104 stat. 3096-3104. Signed on November 16, 1990. [<http://www.gpo.gov/fdsys/pkg/STATUTE-104/pdf/STATUTE-104-Pg3096.pdf>]
- Melillo, J. M., T. Richmond, and G. W. Yohe (eds.), 2014: *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program, 841 pp. [<http://nca2014.globalchange.gov>]
- Michalak, A. M., R. Jackson, G. Marland, C. Sabine, and Carbon Cycle Science Working Group, 2011: *A U.S. Carbon Cycle Science Plan*. University Corporation for Atmospheric Research.
- National Academies of Sciences, Engineering, and Medicine, 2018: *Review of the Draft Fourth National Climate Assessment*. Washington, DC: The National Academies Press. doi:10.17226/25013.
- USGCRP, 2012: *The National Global Change Research Plan 2012-2021: A Strategic Plan for the U.S. Global Change Research Program*. U.S. Global Change Research Program. [<https://downloads.globalchange.gov/strategic-plan/2012/usgcrp-strategic-plan-2012.pdf>]
- USGCRP, 2016: *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. U.S. Global Change Research Program. [A. Crimmins, J. Balbus, J. L. Gamble, C. B. Beard, J. E. Bell, D. Dodgen, R. J. Eisen, N. Fann, M. D. Hawkins, S. C. Herring, L. Jantarasami, D. M. Mills, S. Saha, M. C. Sarofim, J. Trtanj, and L. Ziska, (eds.)]. U.S. Global Change Research Program, Washington, DC, 312 pp., doi:10.7930/JOR49NQX
- USGCRP, 2017a. *The National Global Change Research Plan 2012-2021. A Triennial Update*. U.S. Global Change Research Program. Washington, DC. [<https://www.globalchange.gov/browse/reports/national-global-change-research-plan-2012-2021-triennial-update>]
- USGCRP, 2017b: *Climate Science Special Report: Fourth National Climate Assessment, Volume I*. [D. J. Wuebbles, D. W. Fahey, K. A. Hibbard, D. J. Dokken, B. C. Stewart, and T. K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, 666 pp. [<https://science2017.globalchange.gov>]