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Special Issue from the 4th USDA Greenhouse Gas Symposium

Jerry L. Hatfield
USDA-ARS, jerry.hatfield@ars.usda.gov

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Greenhouse gases emitted from agricultural and forest systems continue to be a topic of interest because of their potential role in the global climate and the potential monetary return in the form of carbon credits from the adoption of mitigation strategies. There has been a history of excellent conferences as part of the USDA Greenhouse Gas Symposium effort sponsored by the USDA Global Change office with cooperation from different agencies and organizations. Rice (2006) described the contribution of agricultural and forest systems to greenhouse gas emissions and how these inventories serve as a baseline for how we regard the potential impacts of these systems. The continuing increase in worldwide concentrations of CO_2 has implications for plant growth and climate feedbacks. Understanding the implications of these changes lead to the theme of the 4th USDA Greenhouse Gas Symposium "Positioning Agriculture and Forestry to meet the Challenges of Climate Change" at the conference held in Baltimore, Maryland from 6–8 Feb. 2007.

There are several challenges in the science and policy of greenhouse gases. One of the critical pieces in the greenhouse gas puzzle is the development of inventory methods that characterize the sources of greenhouse gases and quantify the amounts emitted from each source and the registries that provide this information for potential users. Understanding the spatial and temporal aspects of the inventory components was a central theme in many different reports from forest and agricultural systems. These were coupled with studies that reported on trace gas emissions from different systems that encompassed forest, agricultural crops, livestock, and native ecosystems. Within agricultural systems there is a growing interest in soil carbon and the effect of different soil management systems on changes in soil carbon. These are the foundations of the development of management practices that enhance the soil, increase the productive capacity of the soil and efficiency of crop production, and provide a potential carbon credit for producers.

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*Corresponding author (jerry.hatfield@ars.usda.gov).

677 S. Segoe Rd., Madison, WI 53711 USA

Agronomic crops are produced across a variety of landscapes and climates and changes in climate impact their production efficiency and potential greenhouse gas emissions and sequestration. Studies that reported the response of crops to climate change demonstrated the variation in response, the challenges that need to be addressed in evaluating these responses, and the interactions among natural resource components, e.g., water, soil, and temperature, that determine the degree of the response. Similar research efforts in forestry systems are needed to provide a baseline for how these systems respond to climate change. Increasing our understanding of the response of agricultural and forestry systems to climate change is providing valuable information to help address the information needs to help guide decision making. The focus of building on our information base to guide decisions has been a hallmark of this conference and the previous conferences.

A critical component of this conference is the description of technologies with a potential of reducing greenhouse gas emissions and discussion of the effectiveness of these technologies. Without the development and evaluation of technologies these efforts will not progress in terms of being potentially applied to different systems. However, technologies and science have to be linked with public policy to evaluate the economic and social implications of different emission scenarios and technologies. Without the continued exchange of information, it will be impossible to continue to make progress in reducing greenhouse gas emissions.

This special issue represents a cross-section of papers presented at the 4th USDA Greenhouse Gas Conference. These papers have been peer-reviewed by outstanding reviewers and are presented as part of the cutting edge efforts that are typical of all of the papers presented at this conference. This special issue would not have been possible without the dedication and hard work by John Baker and Tim Parkin who served as Associate Editors in this process and guided the review process and revisions for these papers. Without their efforts, this special issue would not be possible.

The conference requires the efforts of many individuals and a special thanks goes to the Symposium Steering Committee of William Holenstein, USDA Global Change Program Office; Jan Lewandrowski, USDA Global Change Program Office; Charles Walthall, USDA ARS; Carolyn Olson, USDA NRCS; Cheryl Butler, USDA Farm Services Agency; Luis Tupas, USDA CSREES; Allen Solomon, USDA Forest Service; Chris Farley, USDA Forest Service; Charles Rice,

Symposium Chair, USDA ARS National Soil Tilth Lab., Ames, IA. 84322-4105.

Kansas State University; and Jerry Hatfield, USDA ARS. The Program Committee was comprised of John Baker, USDA ARS (Co-chair), Tim Parkin, USDA ARS (Co-chair); Linda Heath, USDA Forest Service; Michele Schoeneberger, USDA Forest Service; and Mahdi Al Kaisi, Iowa State University. The symposium organizers were the USDA Agricultural Research Service, American Society of Agronomy, and Soil Science Society of America with sponsorship provided by the United States Department of Agriculture with agencies represented by Agricultural Research Service, Cooperative State Research, Education, and Extension Service, Farm Service Agency, Forest Service, Global Change Program Office, and Natural Resource Conservation Service. Without the efforts of these individuals and the support from all of these agencies the continued progress toward understanding the dynamics of greenhouse gas emissions would not be possible. All of the participants are grateful for these opportunities to present their research results and potential technologies.

Reference

Rice, C.W. 2006. Introduction to special section on greenhouse gases and carbon sequestration in agriculture and forestry. J. Environ. Qual. 35:1338–1340.