

## **Report for LTER ASM Workgroup**

### **Ecosystem Modifications of Terrestrial Carbon Sequestration across LTER Sites**

Saturday, September 23, 2006

Hobbs Room  
Estes Park, CO

This workshop attracted 37 LTER Scientists for the two-sessions of brief reports and extensive discussions. The attached program outlines the four major topics and discussions by 8 presenters from across 6 LTER sites, Appendix A. Listings of interested collaborators for future collaboration of manuscript preparations and submissions are attached in Appendix B.

Goals for this workshop included:

1. Discuss strategic components missing from our understanding of the biogeochemical mechanisms, models and spatial variability of terrestrial C sequestration.
2. Identify best management approaches that maximize terrestrial C sequestration rates.
3. Outline collaborative cross-site research approaches for monitoring change of soil C at LTER and nonLTER sites as well as the location of future NEON monitoring stations.
4. Assemble and publish collaborative synthesis efforts of spatial and temporal soil C research from as many LTER and nonLTER sites as possible.

Intellectual products generated by the presentations and follow up discussions included:

- Identify soil C data sets at all LTER sites and develop sampling protocols for future soil C studies (potential manuscript or book chapter for next edition of LTER sampling methods book)
- Synthesis of terrestrial C among LTER and non LTER sites using the DAYSTAT model to assemble and compare biomass production, soil C, and GHG emissions (potential for at least 2 manuscripts)
- Expand and compare the spatial variability estimates that include and exclude soil volume, among soil C levels at LTER and non LTER sites (potential manuscript)
- Develop a model that predicts spatial and temporal transitional changes in soil C following conversions among forest to grassland or to agriculture management practices and visa versa (potential for at least 2 manuscripts)

Volunteers are being selected to take the lead with the assembly of data from multiple sites which will be published on the LTER website and further compiled into specific manuscripts.

The Colorado Team, led by Dennis Ojima, has volunteered to incorporate these collected soil C data, along with numerous metadata, including primary climate information, several soil properties and current and recent historic land use inputs required for the successful modeling of predictive outputs by the DAYSAT model. This effort, combined

with the identification of soil C data at all cooperating LTER and non LTER sites will be the first compilation of land use and management controls of C sequestration available to the LTER and the scientific community. Workshop participants agreed the above and belowground inventory and synthesis of vegetation responsible for soil C alterations are essential before more time and major funding is requested to accomplish all five of the questions proposed for the LTER Planning Grant. Furthermore, the synthesis and modeling of these data will contribute directly to all five questions, with specific contributions to Question 2 of the Planning Grant: *“How do long-term press disturbances and short-term pulse disturbances interact to alter ecosystem structure and function?”* Expanding the knowledge base of management system modifications of soil C and associated GHG emissions affecting climate change, proposed by the Terrestrial C Working Group will bring greater understanding of how specific bio-geophysical templates control identifiable ecosystem services which have the greatest impact on human outcome and behavior.

Short-term contributions of this Working Group include the development of an outline for specific methods for sampling, analyses, and associated metadata required for prediction of specific sequestration rates of soil C. A team of coauthors is being constructed by Alvin Smucker. This outline will be developed into a book chapter and published. Second, under the direction of Chuck Rice, the Working Group is compiling a list of potential LTER and nonLTER research locations to serve as contributors to the data files which will be placed on the LTER intranet. Third, a modeling team, led by Dennis Ojima and Chuck Rice will assemble the necessary data sets which facilitate the synthesis of soil C data into both absolute values for cross-site comparisons and to predict the C sequestration potentials of current land uses currently at each participating LTER site. Fourth, a competitive proposal for LTER support of these ambitious goals is coauthored by several collaborators from within the Working Group.

Limitations to the success of this ambitious Working Group is the financial glue that will expedite communication during the comprehensive collection of specific soil C data and metadata from as many LTER and nonLTER sites as possible during the next 8-12 months. There is excellent leadership and substantial enthusiasm among the participants of this Terrestrial C Working Group to complete these defined goals including highly accurate and essential information for the successful proposal outlined in the Planning Grant and the location of future NEON sites.

## Appendix A

**LTER ASM Conference at Estes Park, CO  
September 20-24, 2006  
Program for Terrestrial C Sequestration Workshop  
September 23, 2006  
Hobbs Room**

Session one: 2:00 to 3:30

*Introduction and Goals for Workshop - Alvin Smucker*

*Biogeochemical Mechanisms of Terrestrial C Sequestration:*

- **Alvin Smucker and Chuck Rice**, Biophysical Mechanisms of Terrestrial C Sequestration

*Modeling of Terrestrial C Sequestration Rates*

- **Dennis Ojima**, Predictive modeling of C sequestration

*Spatial Variability of Soil C*

- **Sasha Kravchenko**, Spatial variability of soil C
- **Jeb Barrett**, Spatial variability in soil organic matter in the McMurdo Dry Valleys, in Antarctica
- **Nancy Harris**, Spatial patterns of carbon exchange along an elevation gradient in the Luquillo Mountains in Puerto Rico

Session two: 4:00 to 5:30

*Agricultural, Forest, and Grassland Modifications of Soil C*

- **Kurt Thelen**, Agroecosystem Controls of Terrestrial Carbon Deposition
- **Frank Day**, Root System Deposition of C by Woody Species in Coastal Sand Dunes
- **Chuck Rice**, Disturbance Modifications of Soil C Sequestration

*Discussion and Planning for Cross-site Collaboration – Alvin Smucker and Chuck Rice*

## Appendix B

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