Version 1
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ORGANIZATION OF DISTURBANCE SYNTHESIS WORKING GROUPS

1. Introduction

Since the circulation of the initial disturbance synthesis white paper in late February and the synthesis organization proposal in early April, 66 individuals have expressed an interest in participating in this activity. An additional 14 individual have been identified who have the potential to make significant contributions to this activity – they should be contacted at some point in the near future. A list of these people, their organizations, and email addresses are contained in that attached EXCEL spreadsheet.

Based on responses to the initial documents that were distributed, eleven different sub-working groups have been identified to address specific issues and topics related to the effects of disturbance on terrestrial carbon cycling in North America. While most of these sub-working groups will focus on impacts of disturbance on forests (Working Groups 1 to 3), several will consider the topics of woody encroachment and the vulnerability soil carbon in High Northern Hemisphere (HNH) ecosystems (Working Group 4) (Table 1). While specific areas for synthesis have been proposed for Working Groups 1, 2, and 4 (Table 1), specific synthesis activities/areas for Working Group 3 (on Modeling) need to be defined

I realize that this represents a large number of activities, and there is the likelihood that not all of the proposed synthesis activities will achieve the same level of success. This success will ultimately depend on the efforts put forth by those who have expressed interest in participating in this synthesis effort. However, I also believe in the saying "nothing ventured, nothing gained". So, this document represents the next step in the process of organizing the synthesis activity, with the hope that all the proposed activities will come to fruition at sometime in the future.

This Organization and Planning document for the Disturbance Synthesis Working Groups contains 3 sections, including this Introduction. Section 2 presents suggestions for the next steps that need to be taken to initiate the activities of the various working groups and sub-working groups. Section 3 then presents a summary of the ***proposed topics/terms of reference*** for each sub-working group. One of the first steps proposed for the working groups is to finalize these topics/terms of reference, as discussed in the following section.

Table 1. Summary of proposed working groups.

Working Group	Area	Number of Participants
WG 1a	Quantifying forest clearing/conversion	14
WG 1b	Quantifying fire	16
WG 1c	Quantifying storm damage	6
WG 1d	Quantifying insect, disease, tree mortality	9
WG 2a	Estimation of pyrogenic emissions	13
WG 2b	Effects of disturbance on heterotrophic respiration	3
WG 2c	Assessment of disturbance impacts using eddy covariance	9
WG 2d	Synthesis of multiple observations of the impacts of disturbance	27
WG 3	Modeling	34
WG 4a	Woody encroachment	1
WG 4b	Vulnerability of HNH soil carbon	6

2. Next Steps to Organize the Working/Sub-Working Groups

Up until this point, the focus of the synthesis effort has been on developing a list of topics that could be considered in this synthesis activity, and identifying individuals and groups who are interested in participating in syntheses associated with topic areas. Now is the time for the next step, i.e., ***for individuals to step forward, join specific sub-working groups, become actively involved in finalizing the actual activities that each sub-working group will carry out, and participate in these activities.*** In addition, the success of this activity will be dependent on identifying individuals who are will to serve as coordinator (or co-coordinator) of each sub-working group. In the attached EXCEL spreadsheet, individuals who have expressed an interest in serving as a Sub-Working Group Coordinator have been identified.

So, what are the next steps?

1. In the attached EXCEL spreadsheet, I have placed each person within the sub-working group(s) where I believe her/his research interests lie. However, with this many individuals and with the large number of sub-working groups, misplacements are likely to have occurred. Please contact me (ekasisch@umd.edu) with any changes you would like made.

2. While several people who have indicated they would be willing to coordinate the activities of a specific sub-working group, leadership is still needed for several of the sub-working groups. If you would be willing to serve as a sub-working group coordinator, could you please contact me (ekasisch@umd.edu).

3. While I feel several of the topic areas being considered by the different working groups are fairly well defined, others require further discussion among the participants. In particular, I believe that the focus areas for Sub-Working Groups 2b and 2d need to be discussed and finalized. The topic areas and the need for Sub-Working Groups in Area 3 (Modeling) needs to be discussed by the participants interested in modeling. These topics are further discussed in Section 3 below.

4. Those agreeing to serve as coordinators should contact the members of their sub-working groups, and finalize the terms of reference for that group (e.g., what specific activities will be carried out during the synthesis). The coordinators should also review the members of their sub-working group and contact additional scientists and researchers who could participate in the synthesis (some who have been identified in the attached spreadsheet). Specific activities for the participants should be identified and a schedule for the completion of these activities should be developed.

3. Sub-working group topics/terms of reference

Working Group 1 – Quantifying forest disturbances

Central question: How well can the timing, extent, and severity (or impacts) of the primary disturbances that affect carbon cycling in forests be quantified?

This working group will have four sub-working groups that focus on the primary forest disturbances:

Working Group 1a: Forest conversion from land management activities – Huang - Mesek
Working Group 1b: Fires
Working Group 1c: Storm damage
Working Group 1d: Forest health (insects, pathogens and tree mortality aside from fires and storm damage)

Topics that could be covered for each disturbance type include:

a. A comparison of the approaches and data sets available to quantify the spatial extent and temporal characteristics of the disturbance across the different regions of NA where it occurs. This will include an assessment of the uncertainties that are associated with each of the available data sets.
b. An assessment of different approaches that have been developed to quantify the severity or impacts of the disturbance
c. The best estimates of the annual rates of the disturbance (and where possible, the seasonal variations in the disturbance) over the past 2 decades, half century, century.
d. The current understanding of the factors that regulate the disturbance regime and the capabilities to predict future disturbances
e. The role that anthropogenic activities play in regulating the disturbance and its impacts
f. Methods or systems that need to be developed or implemented to systematically monitor, quantify, and assess the characteristics of the disturbance regime

Working Group 2 – Assessing the impacts of forest disturbances on carbon cycling

Central question: How well can the impacts of disturbance on the processes regulating carbon exchange between forest ecosystems and the atmosphere be quantified for the major forest carbon pools (live biomass, dead woody debris, soil carbon)?

The primary processes to be considered include:

a. Pyrogenic carbon emissions
b. Post-disturbance vegetation/ecosystem recovery
c. Net primary production and net ecosystem production
d. Heterotrophic respiration – dead woody debris
e. Heterotrophic respiration – soil carbon

Topics to be covered for each process:

a. Review of recent research or observations that have improved the ability to quantify the impacts (including the use of satellite data for all areas except fire emissions)
b. Estimates of the impacts disturbance has had for the specific process over the past 20-100 years (or whatever time period is appropriate based upon available data)
c. The major uncertainties that presently exist that constrain the ability to quantify the impacts of disturbance

To address these synthesis topics, four sub-working groups are proposed:

Working Group 2a: Estimation of pyrogenic emissions

The focus of this sub-working group will be to synthesize research on estimating direct emissions from forest fires across North America, and to make comparison between estimates that have been generated at regional and continental scales.

Working Group 2b: Effects of disturbance on heterotrophic respiration

The focus of this working group will be to focus on how disturbance impacts the temporal and spatial rates of heterotrophic respiration. Issues that could be addressed by this sub-working group include: (a) the rates of generation of different categories of dead organic matters from different forest disturbances (this may represent an area of collaboration with scientists from Working Group 1 working on issues related to disturbance severity); (b) factors that control patterns of heterotrophic respiration in different DOM pools; (c) the current understanding of the rates of heterotrophic respiration that occur in the different DOM pools; and (b) estimates of how disturbances have impacted rates of heterotrophic respiration over various time periods (over the past 2 decades, half century, century).

Working Group 2c: Assessment of disturbance impacts using eddy covariance

There have a significant number of eddy covariance towers that have been collecting data in disturbed forests in North America. This sub-working group would focus on comparing measurements and results from these different efforts, in particular focusing on how carbon flux from forests vary as a function of time since disturbance, and comparing the post-disturbance patterns of carbon flux as a function of forest and disturbance types.

Working Group 2d: Synthesis of multiple observations of the impacts of disturbance

In addition to eddy covariance flux measurements, other methods provide information on how forests are responding to variations in disturbance regimes and recovering from disturbances. In particular, a number of studies have been or are being conducted that are: (a) using satellite data to monitor patterns of post-disturbance recovery and in some cases to estimate variations in NPP/NEP; and (b) are using field-based studies of ecosystem structure and function to understand how variations in the disturbance regime impact post-disturbance recovery. This synthesis activity would focus on comparing results of observations of recovery from disturbance based on multiple lines of evidence, with the goal of determining if the integration of information provided by these different approaches provides an improved

understanding of how disturbance impacts carbon cycling in forests. I believe there has a significant base of research has been carried out in two different areas to support such a synthesis – post-fire recovery in boreal forests and forest recovery following land-clearing in temperate/sub-boreal forests.

Working Group 3 – Modeling the impacts of forest disturbances on carbon cycling

Central question: What are the best estimates of the integrated impact of disturbances on exchanges of carbon between forests and the atmosphere?

Topics to be covered could include:

a. Diagnostic approaches used to estimate the integrated impacts of historical disturbances on exchanges of carbon between forests and the atmosphere and a comparison of model estimates for the impacts of disturbance over the past 20-100 years (or whatever time period is appropriate based upon available data)
b. Prognostic approaches used to predict future impacts of disturbance on exchanges of carbon between forests and the atmosphere

This working group has a large number of participants, and in my mind, covers a very broad topic area. My feeling is that members of this group need to start a dialogue to determine how the activities of this group should be organized.

Working Group 4 – Assessing the impacts of long-term disturbances on terrestrial carbon cycling

Central questions: (1) What additional, longer-term impacts have human-caused disturbances had on exchanges between natural terrestrial ecosystems and the atmosphere? (2) How will human-caused changes to climate impact soil (organic and mineral) carbon pools?

A number of topic/issue areas were proposed for this working group. The participants who expressed an interest in this area fell into the following two groups.

Working Group 4a: Woody encroachment in the western U.S.

This working group will focus on a synthesis of activities that are studying patterns of carbon sequestration where shrubs are invading grasslands in the western U.S.

Working Group 4b: Vulnerability of HNH soil carbon

This working group will focus on how variations in climate impact carbon emissions from soils in high northern hemisphere ecosystems. In particular, this working group will focus on synthesizing research on: (a) how variations in the surface hydrology impact carbon cycling in boreal peatlands; (b) how variations in temperature are impacting carbon emissions in ecosystems with frozen soils; (c) how variations in temperature are regulated methane emissions from lakes.