Representation of forest disturbance in carbon cycle models: Data limitations, process uncertainty, and theoretical considerations

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Representing disturbances in models requires…

- Which disturbances? When? Where?
- What happened? (tree mortality rate, transfers between C pools)

Representing post-disturbance recovery requires…

- Age structure

Products

- **Today**: Prioritized list of recommended actions for Modeling and Data communities

- **6-12 months**: Review or Opinion paper

- **Years**: Improved representation of disturbances in models, including ESMs.

Part 1 (45 minutes)

- **Ben Poulter**: Data availability and definitions of forest age for carbon cycle models
- **Chris Williams**: State of understanding of forest carbon dynamics post-disturbance (disturbance legacies and key uncertainties)
- **Benjamin Sulman and Elena Shevliakova**: How disturbances are (or are not) represented in CMIP5 Earth system models

Part 2 (45 minutes)

- **Werner Kurz**: Representation of disturbances in the Carbon Budget Model of the Canadian Forest Sector
- **Jeff Hicke**: Representing insect outbreaks in the Community Land Model
- **Mike Dietze**: Representation of Disturbances in the Ecosystem Demography (ED) Model

Questions

- Why do some C-cycle models (especially ESMs) ignore disturbance?
- What key scales and disturbances are missing from current models?
- What disturbance data are available, and what are key data gaps?
- How should data on disturbance impacts (e.g., carbon transfers between different pools) be summarized to best serve the needs of a diverse modeling community, where carbon-pool definitions and spatial-temporal resolution vary between models?
- How can uncertainty in disturbance occurrence and impacts be quantified from multiple data sources (expert opinion?), and how should uncertainty be represented in models?
- What data are needs to validate post-disturbance recovery in models?
- How might including disturbances in models reduce (or increase) uncertainty in C budget estimates?