

Framing the Workshop and Charge to Participants

Background and Key concepts

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Presenting on behalf of the Planning Committee:

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Photo by Brian Stocks

Outline & Aim

- Set the Context for our Workshop
- Review Key Concepts and Terminology

Charge to Participants:

- *Identify gaps and opportunities in data and models, and changes in land stewardship, that can inform and enhance strategies to limit wildland fire greenhouse gas emissions and associated threats to 'net-zero' emissions targets.*

Process:

A 3-day agenda to:

- review the context (Day 1), data and tools (Day 2)
- discussing solutions (Day 3)
- **Requires your participation!**



Photo by Brian Stocks

Global to Local Scales



Biomass Burning
as an Integral
Force in the Earth
System

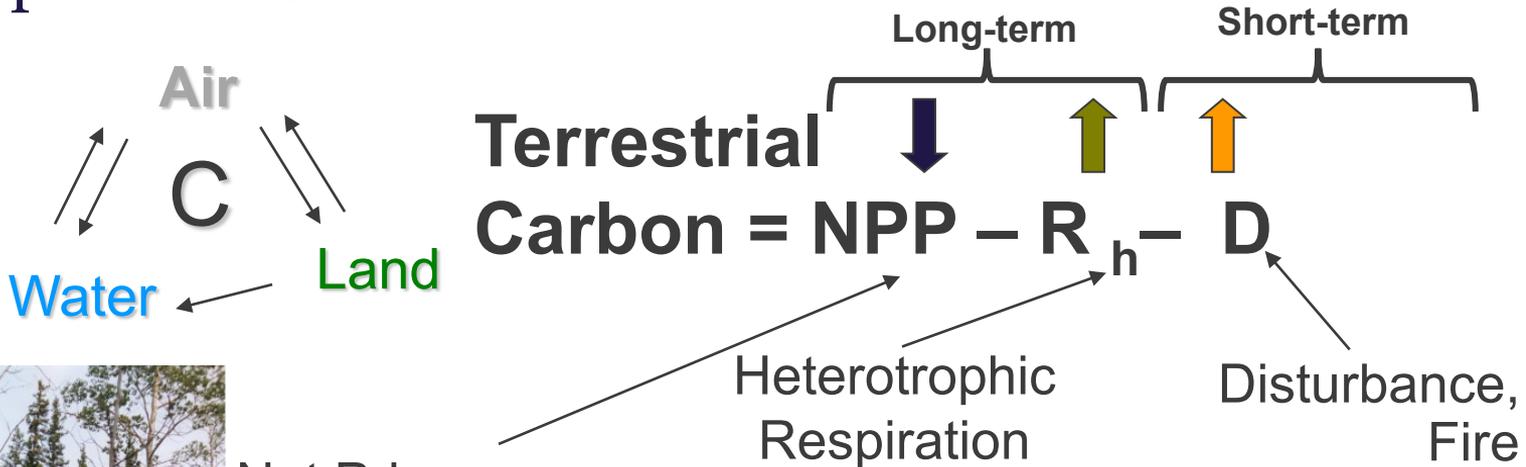
Our focus is on:

- ***All scales***
- ***Carbon & other GHG (rather than Air Quality)***
- ***Vulnerable ecosystems***

Managed Fire as
one Vital Tool for
Land Stewardship



Multiple Time Scales

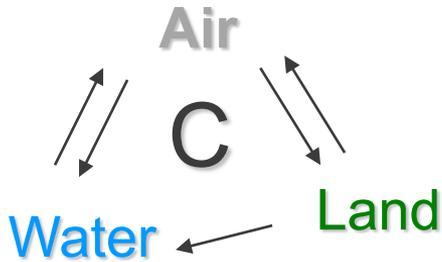


Net Primary Production
 ↓ photosynthesis
 ↑ plant respiration



& other disturbance (herbivory, forest pathogens, windthrow, erosion, and more, incl. climate changes)

Multiple Time Scales



Long-term

Short-term

Terrestrial Carbon = $NPP - R_h - D$

Direct emissions

↑

↑

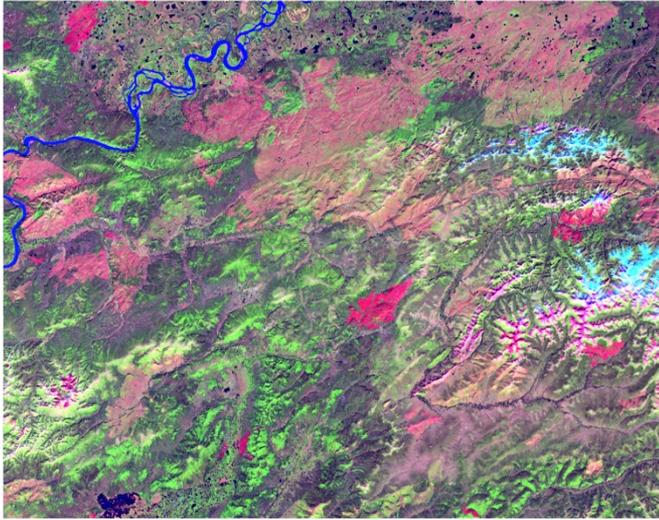
Net Primary Production
↓ photosynthesis
↑ plant respiration

Delayed Heterotrophic Respiration (decomposition)

Transformative Disturbance, Fire

& other disturbance (herbivory, forest pathogens, windthrow, erosion, and more, incl. climate changes)

Archetypes of Fire



A patchwork of fire history shown in a Landsat image of the Alaskan boreal forest

Discussions
of
Three Biomes:

Temperate

Arctic/Boreal

Tropical



Fire Regime

Consider

Fire Type & Impacts:

- *Managed open burning (ecological burns, fire use, cultural burning)*
- *Unmanaged (wild) fire*
- *Net carbon loss vs. sequestration*

Not a Focus,

- *Wood gathering/cookstove biomass burning*
- *Cropland burning*



Low intensity cultural burn in Cape York Peninsula during 2015 National Indigenous Fire Workshop



Fire in Canada in 2014 showing explosive smoke plume driven by very dry and windy conditions

Landscapes Past to Present

Keep in mind

Land-use Legacy:

- *Focus on landscapes that have had a disruption in fire regime*
- *Colonial vs. Indigenous land management/stewardship*
- *Changes in land use that drive fire occurrence and fire regime changes*



Photo by N. French

*Tussock tundra fire,
Noatak NP, Alaska*



*Indigenous fire-maintained
landscape Martu Country,
Western Australia*

Change as a Theme



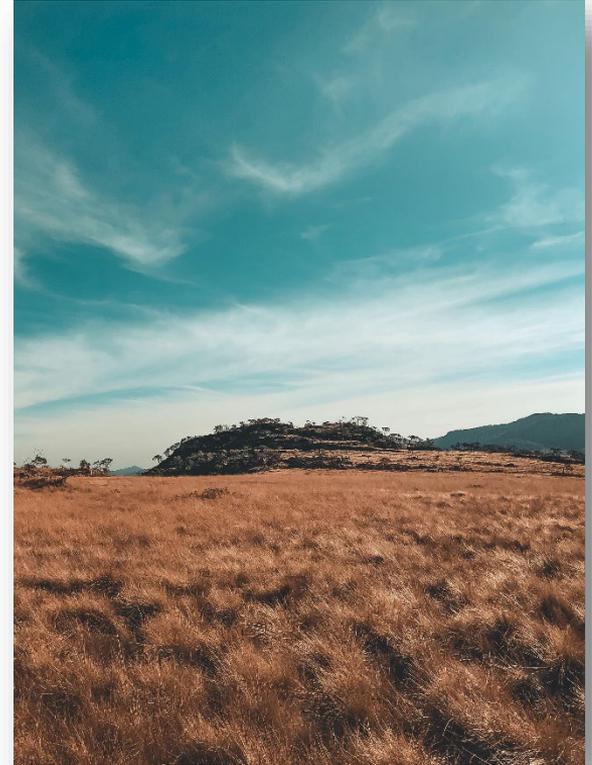
Photo by M. French

Black Spruce Forest, Alaska, has deep organic soil reserves.

- *Novel and extreme fire conditions and regimes vs. stable fire adapted ecosystems*
- *Old carbon reserves, rather than fast-turnover, young carbon*

Focus on Vulnerable Ecosystems

- *Ecosystems where the carbon cycle is being changed*



Grasslands feature fast-turnover carbon pools.

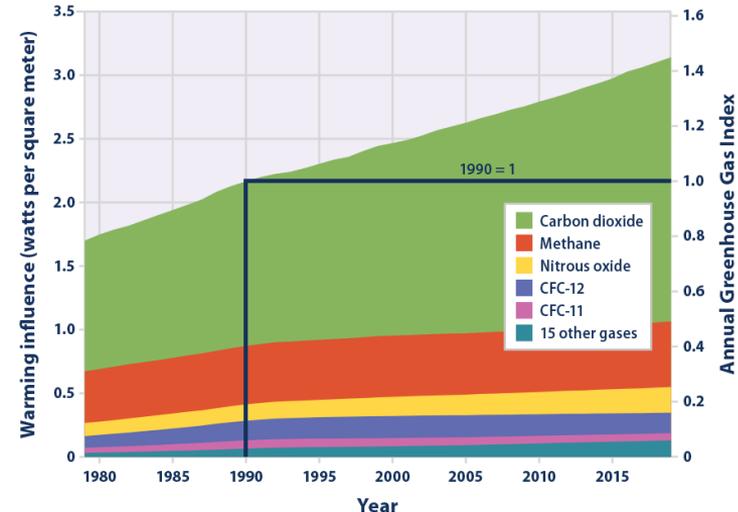
Key terminology

Greenhouse Gas (GHG):

- **Radiative forcing:** Perturbation to the earth's energy budget due to change in components of the earth-atmosphere system. Positive forcing suggests warming; negative forcing suggests cooling.
- **Carbon dioxide (CO₂):** long-lived and well-mixed GHG
- **Methane (CH₄):** short-lived GHG with lifetime of ~10 years
- **Other non-CO₂ gasses**
- **Particulates (PM) or aerosols** which are diverse, with generally short-lived (typically days-months) climate impacts.

Net Zero: “net zero means cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere”

– UN Climate Action



Radiative Forcing Caused by Major Greenhouse Gases, 1979-2019. <https://www.epa.gov/climate-indicators/climate-change-indicators-climate-forcing>

Key terminology

Wildland fires:

- Fires that originate in the “wildlands”, as opposed to structure fires and fires occurring in built environments
- Includes planned and unplanned burns: prescribed fire; cultural burning; management fire; wildfire; rangeland burning (planned and unplanned); as well as escaped agricultural and other planned burns
- Other similar terms: Biomass burning; landscape fire; brush fire; bushfire; others.

Wildland: Area in which development is essentially non-existent except for roads, railroads, power lines and similar transportation or utility structures – USDA Forest Service



Key terminology

Land stewardship and “Living with Fire”:

- **Land use legacy:** Land condition is a result of past land use and driven by both natural state factors and human land stewardship practices.
- **Fuels management:** Practices and strategies, including land management fires and cultural burning, used as a tool for achieving resilient ecosystems.
- Even in natural systems, humans impact the landscape, and therefore are in a position to practice environmental stewardship.

Environmental Stewardship: The responsible use and protection of the natural environment through conservation and sustainable practices to enhance ecosystem resilience and human well-being.

– Chapin et al., 2010*



*Chapin, F. S., et al. 2010.
<https://doi.org/10.1016/j.tree.2009.10.008>

Charge to Participants

Solution-based Discussions:

(ecosystem and context-dependent)

Q: What solutions could contribute to reduced wildfire emissions in the future?

Q: What solutions can collectively benefit ecological, carbon, and social perspectives? Is there inherently a tradeoff?

Q: What are the largest data and model gaps and challenges that are necessary to accurately assess solutions?

Q: At which scale would these solutions have to be implemented to be effective?

Q: What are the major barriers to implementation?

Identify gaps and opportunities in data and models, and changes in land stewardship, that can inform and enhance strategies to limit wildland fire greenhouse gas emissions and associated threats to 'net-zero' emissions targets.



Photos by Bob Gray

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Thank-You