Fire Regimes
IGBP Fast Track Initiative

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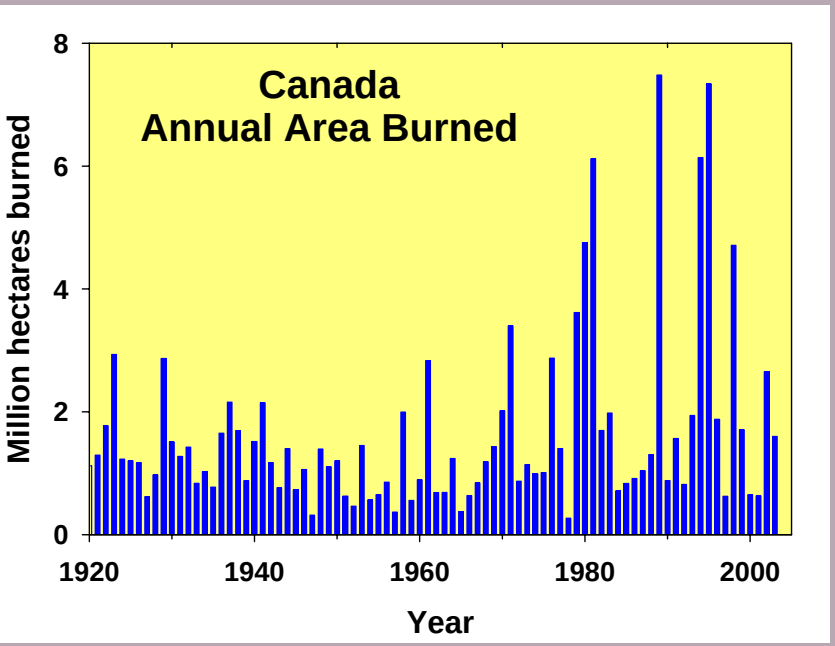
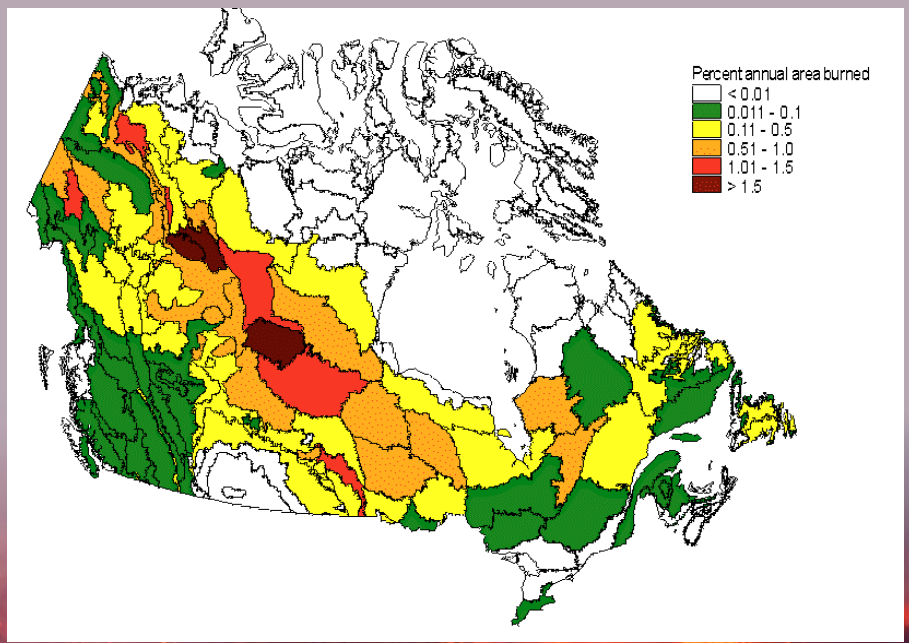
Outline

- **Fire background**
- **Climate change**
- **IGBP Fire Fast Track**

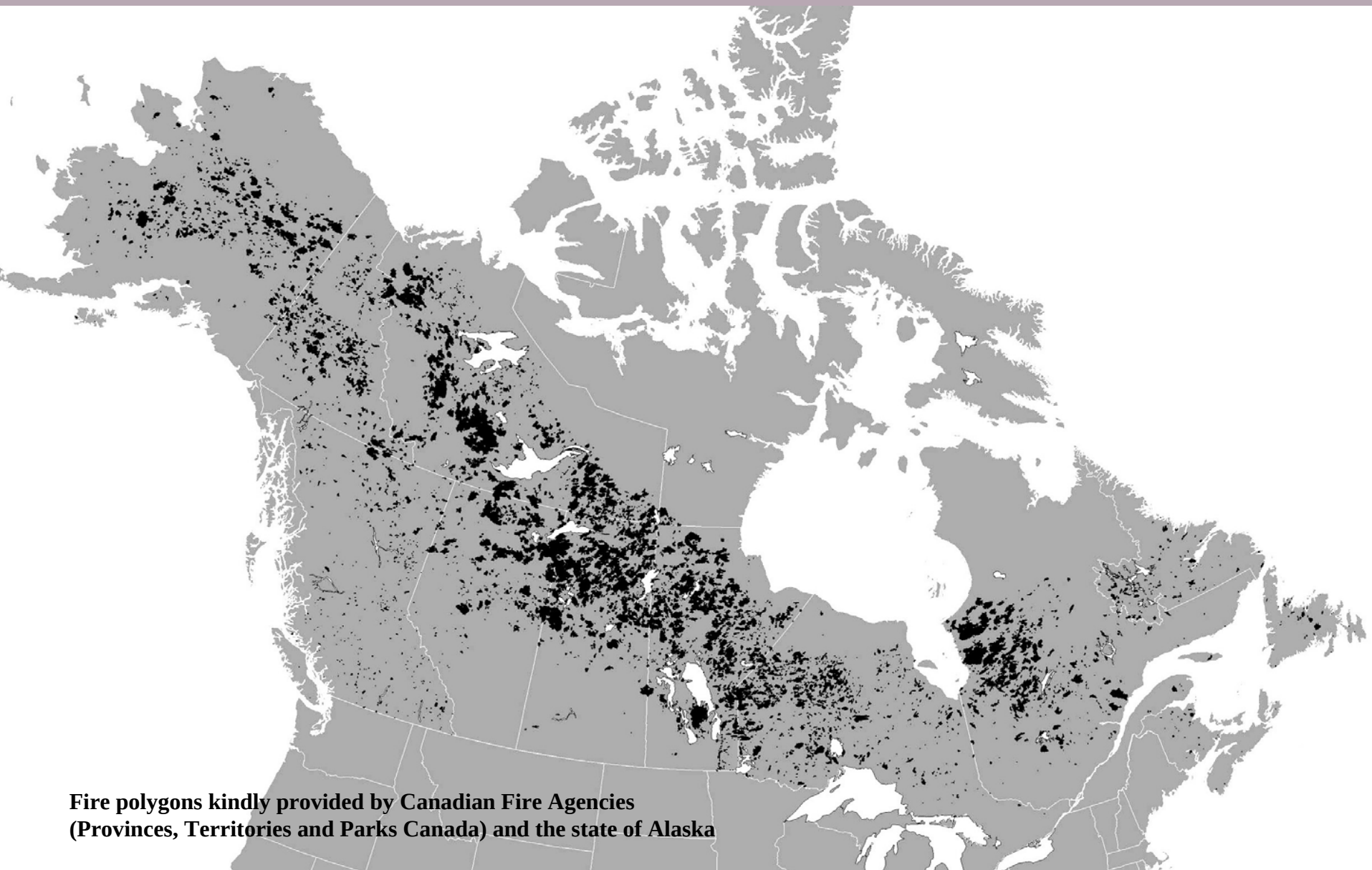
Canadian Fire Statistics



- Incomplete prior to 1970
- Currently - average of 9000 fires a year burn 2.6 million ha
- Area burned is highly episodic
  - 0.4 to 7.6 million ha
- Lightning fires
  - 35% of total fires
  - represent 85% of area burned
- Fire size
  - 3% of fires are >200 ha
  - represent 97% of area burned



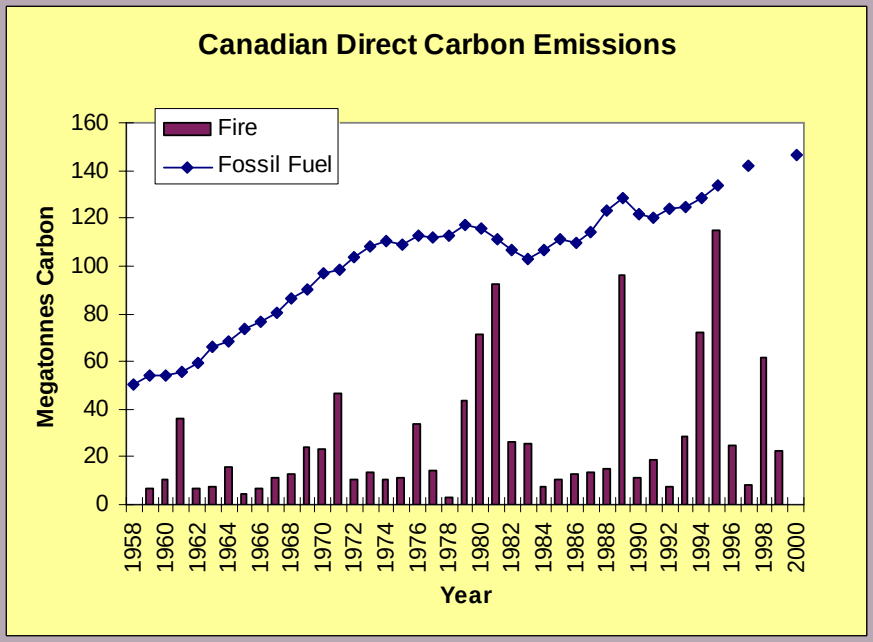
Large Fires in Alaska and Canada 1980-1999



Fire polygons kindly provided by Canadian Fire Agencies (Provinces, Territories and Parks Canada) and the state of Alaska

Forest Fires – 4 Key Factors

- **Fuel - loading, moisture, structure etc.**
- **Ignition - human and lightning**
- **Weather - temperature, precipitation atmospheric moisture and wind; upper atmospheric conditions (blocking ridges)**
- **Humans - land use, fragmentation, fire management etc.**



Fire and Carbon

~700 Pg carbon stored in the boreal forest ~30-35 % of the global terrestrial biosphere

Fire plays a major role in carbon dynamics: it can determine the magnitude of net biome productivity

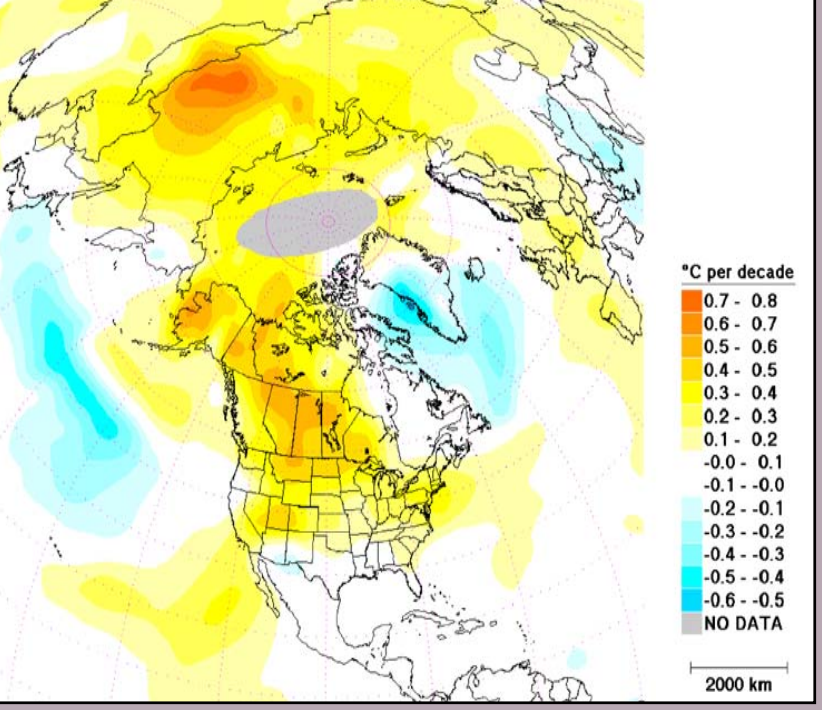
1) combustion: *direct loss*

2) decomposition of fire-killed vegetation

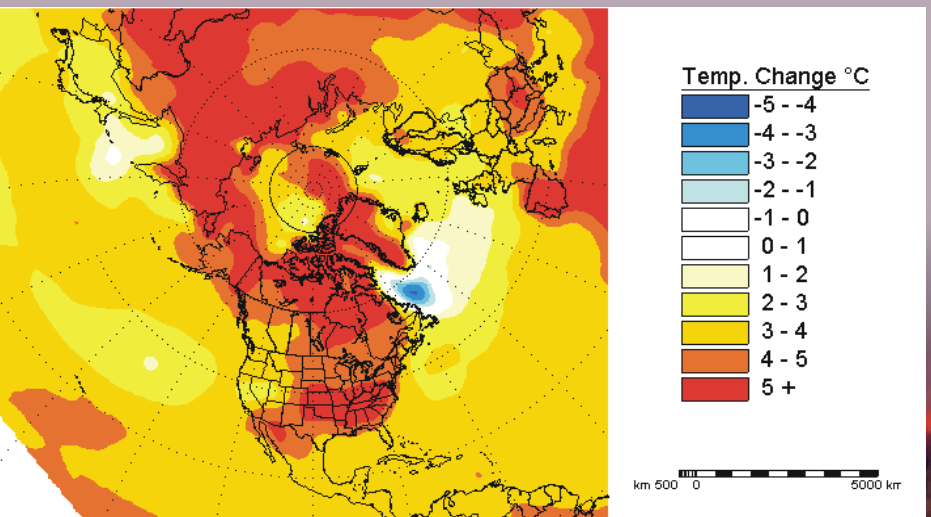
3) stand renewal: *young successional stands have potential to be greater sinks than mature stagnant forests*

Climate change – pessimist or optimist

Climate Change Projections

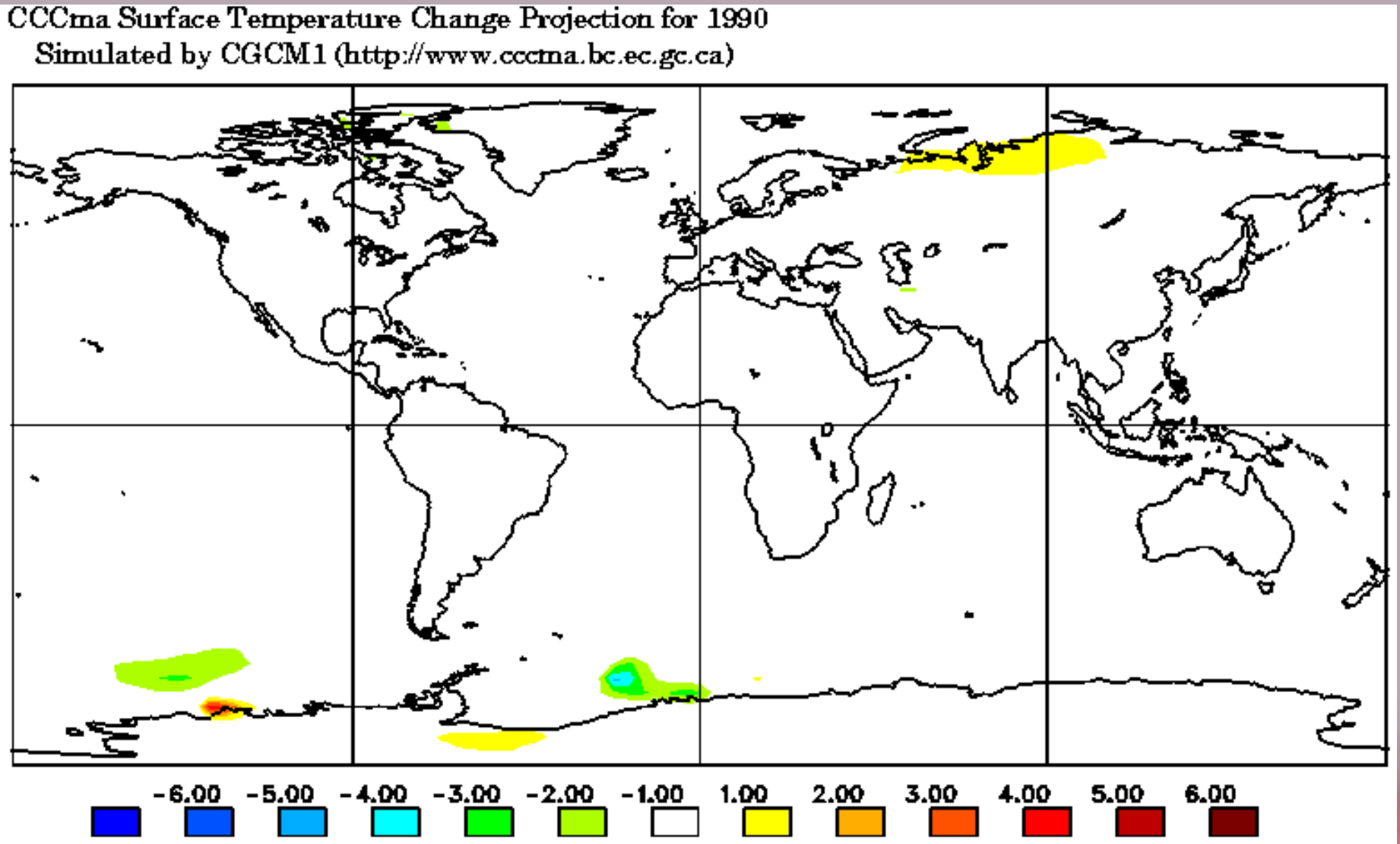


Observations above – summer temperature changes below 2080-2100

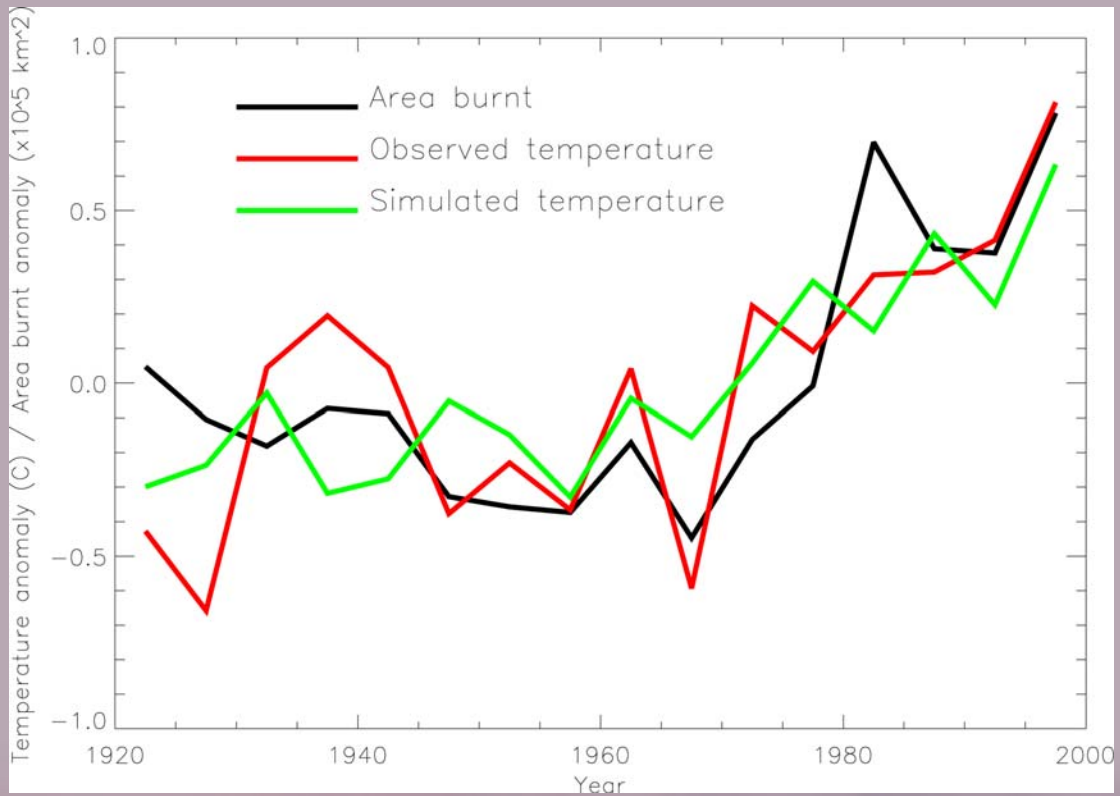


- GCMs project 1.4 – 5.8^0 C increase in global mean temperature by 2100
- Greatest increases will be at high latitudes, over land and winter/spring
- Projected increases in extreme weather(e.g., heat waves, drought, floods, wind storms and ice storms)
- Observed increases across west-central Canada and Siberia over past 40 years

Projected temperature changes vary considerably from year to year



A smoking gun?



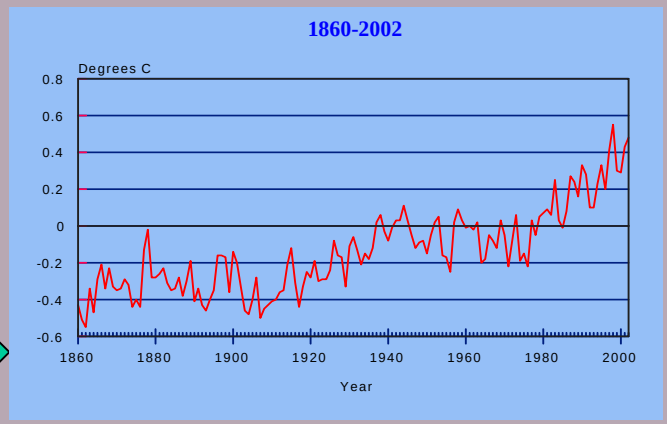
- Area burned in Canada is strongly related to human-caused warming
- Impacts of climate change are already here
- A warmer future means more fire in Canada

FTI Objectives

- Synthesize quantitative knowledge on impacts of changes in global fire regimes on a range of ecosystems services
- Assemble global and regional data for fire model development; this would be used to improve emission estimates of GHGs
- Future fire activity – impacts on vegetation, people, GHGs so adaptation /mitigation options can be explored

Fire and Weather Feedbacks: *potentially positive*

Fossil Fuel emissions: increase greenhouse gases



Cause warmer conditions

Weather becomes more conducive to fire: more fire

Carbon released from more fire enhances greenhouse gases further

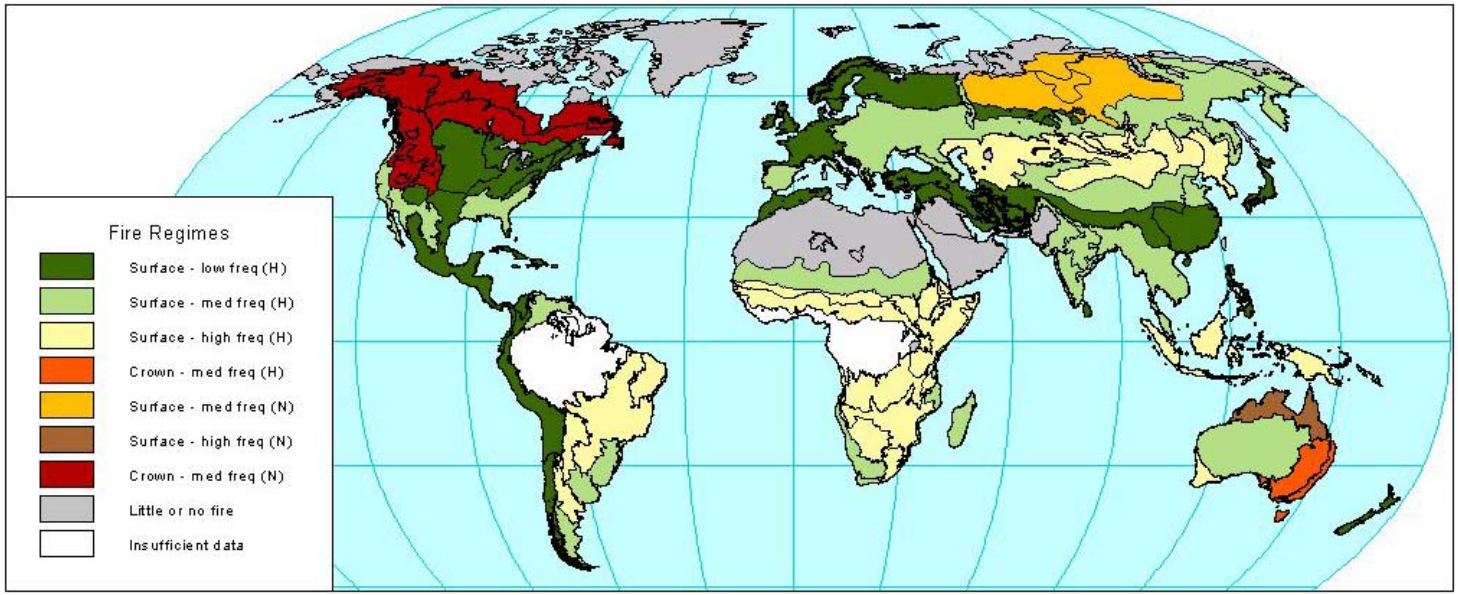
Fire Regimes

- **Global map of fire regimes – fire regime includes – frequency, intensity, severity, seasonality, size, cause, type…**
- **Two potential approaches**

- suite of landscape fire models to run over the globe (bottom up)

- fire is incorporated in DGVMs (Top down)

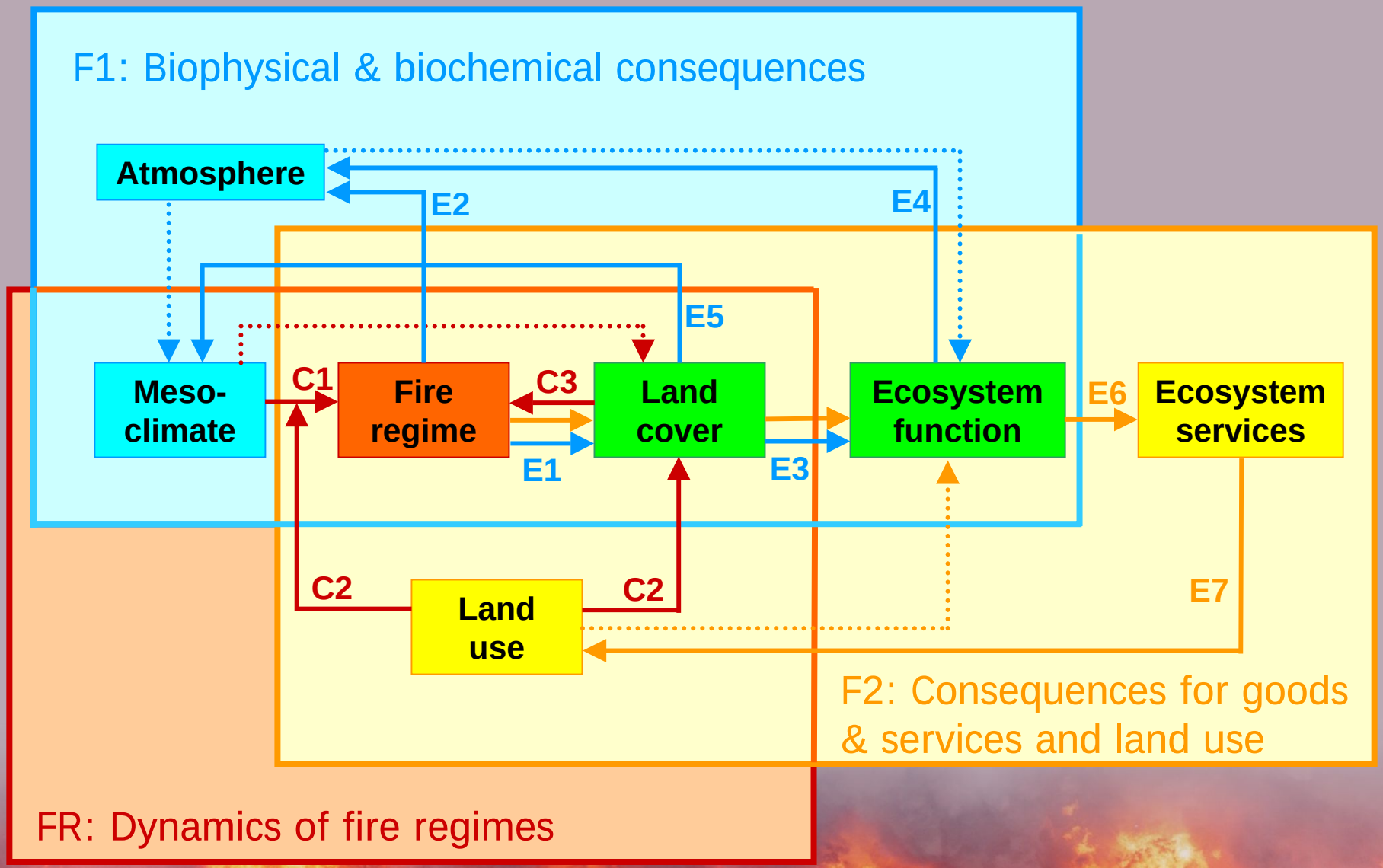
- **Identify vulnerable areas**
- **Past, present and future fire regime maps will be generated**



Why fire?

- Fire responds rapidly to changes in climate/weather
- Fire catalyst for vegetation change
- Fire important in terms of emissions of GHGs and a positive feedback cycle

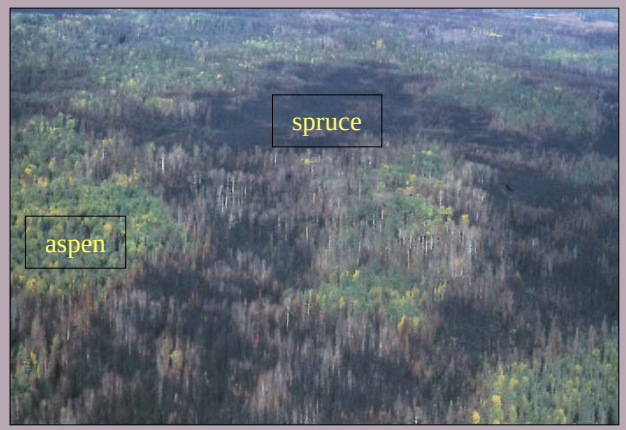
Integrated Fire Research Framework



What's next?

- To estimate future fire regimes we have to understand the linkages and interactions between fire, vegetation, climate/weather and people.
- One method is to look at past and present fire regimes and linkages between key factor
- Using DGVMs to address relative roles of
- Opportunity to tackle knowledge gaps

Fire Data Sets

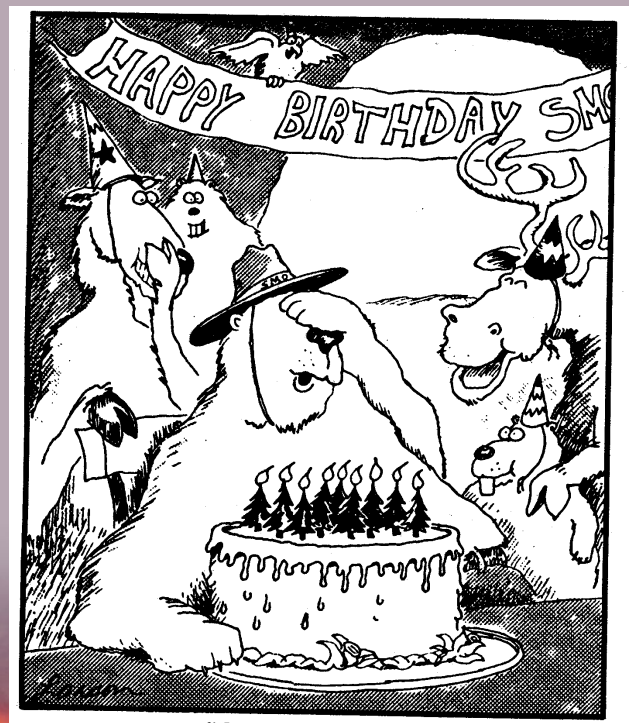


- Some countries/jurisdictions have excellent fire data going back around 100 years or more
- Some have data but of dubious quality
- Others have almost nothing
- Efforts to build Global fire data sets

Summary

- **Weather/Climate and fire are strongly linked**
- **Fire activity is likely to increase significantly with climate change although the response will have large temporal and spatial variability**

- **Integrated approaches will be required to adapt to climate-change altered fire activity in terms of social, economic and ecological policies and practices**



"Can I look now?"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