



# Fuel dynamics associated with recurrent fires in Amazonian transitional forests



Jennifer Balch  
Lisa Curran  
Paul LeFebvre

Dan Nepstad  
Paulo Brando  
Oswaldo de Carvalho Jr.

LBA – October 2006



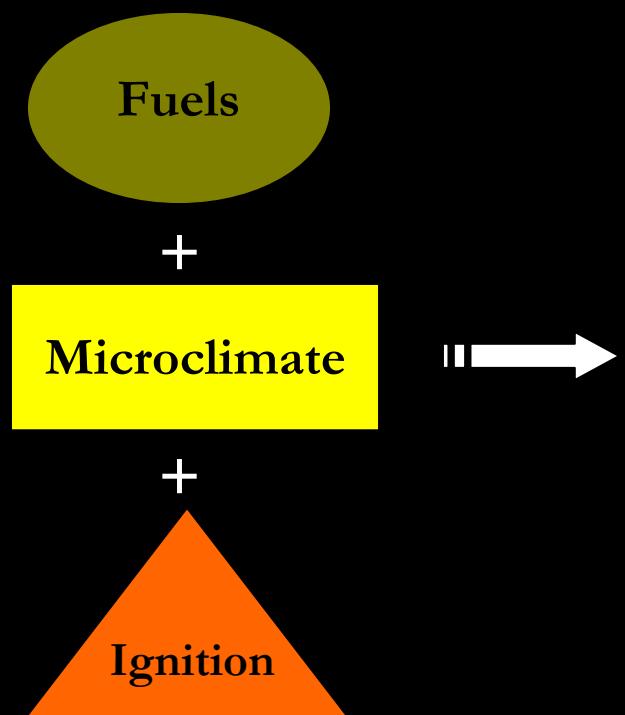
# Objectives

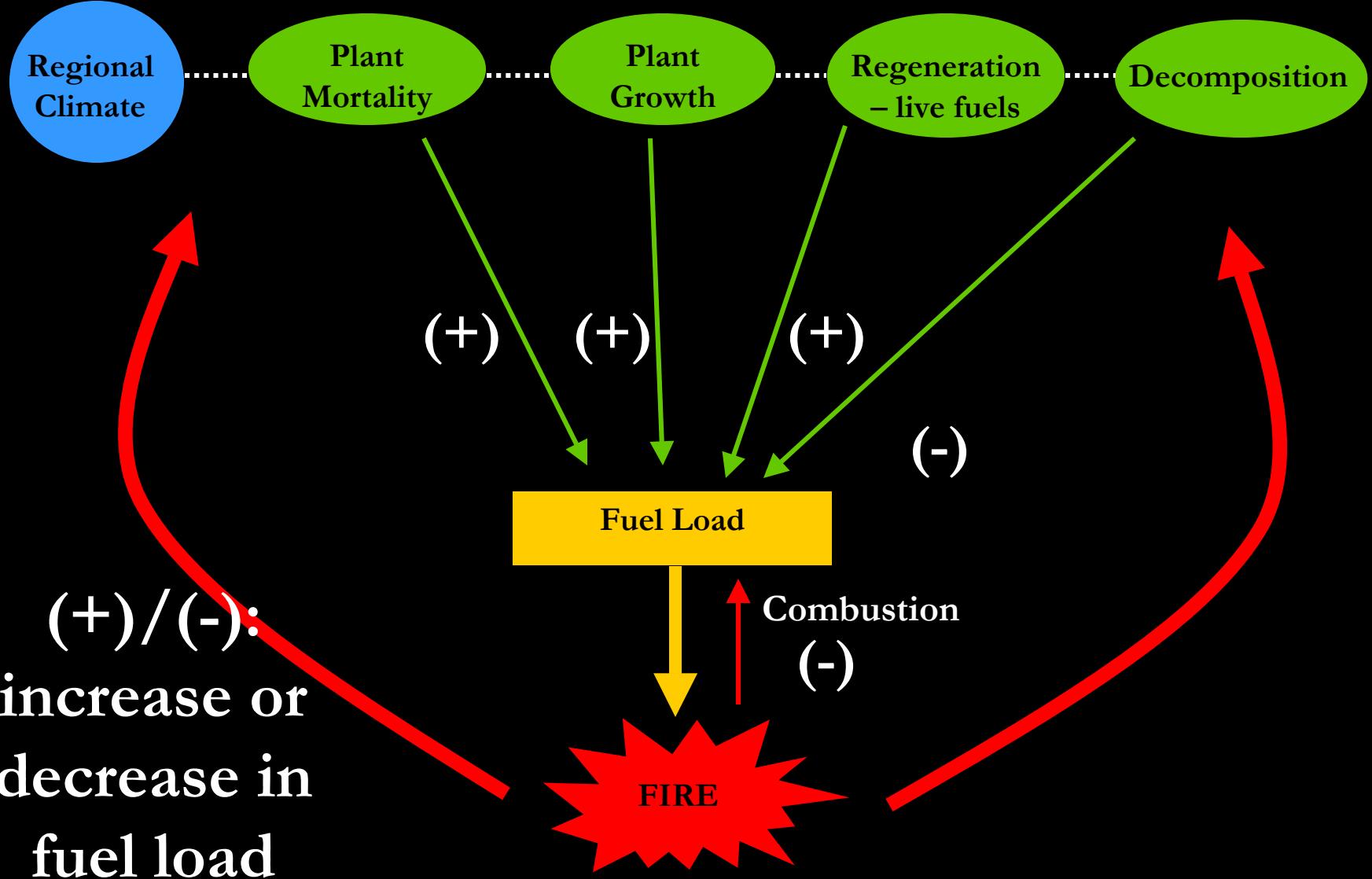
- Investigate the potential for recurrent fires to promote a fire-dependent system and potentially lead to savannization
- Quantify carbon emissions from understory fires
- Assess the fuel and microclimate determinants of fire behavior
- Predict transitional forest flammability on temporal/spatial scales

# Predominant paradigm...

An initial burn increases tropical  
forest flammability.

# Forest flammability:



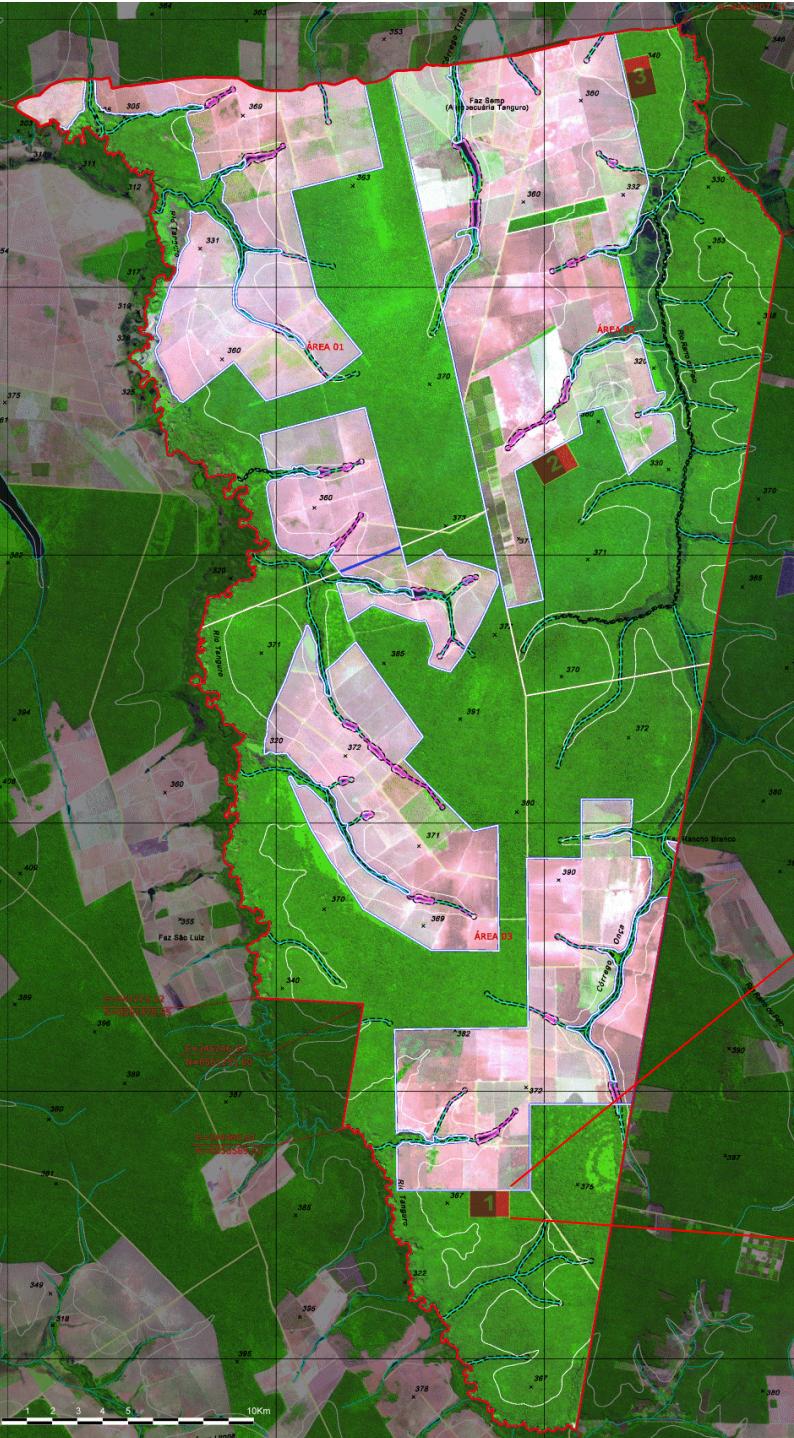


## Fuel hypothesis

After an initial burn fuel accumulation will exceed pre-fire levels, rendering the forest more susceptible to subsequent fires in the following dry season.





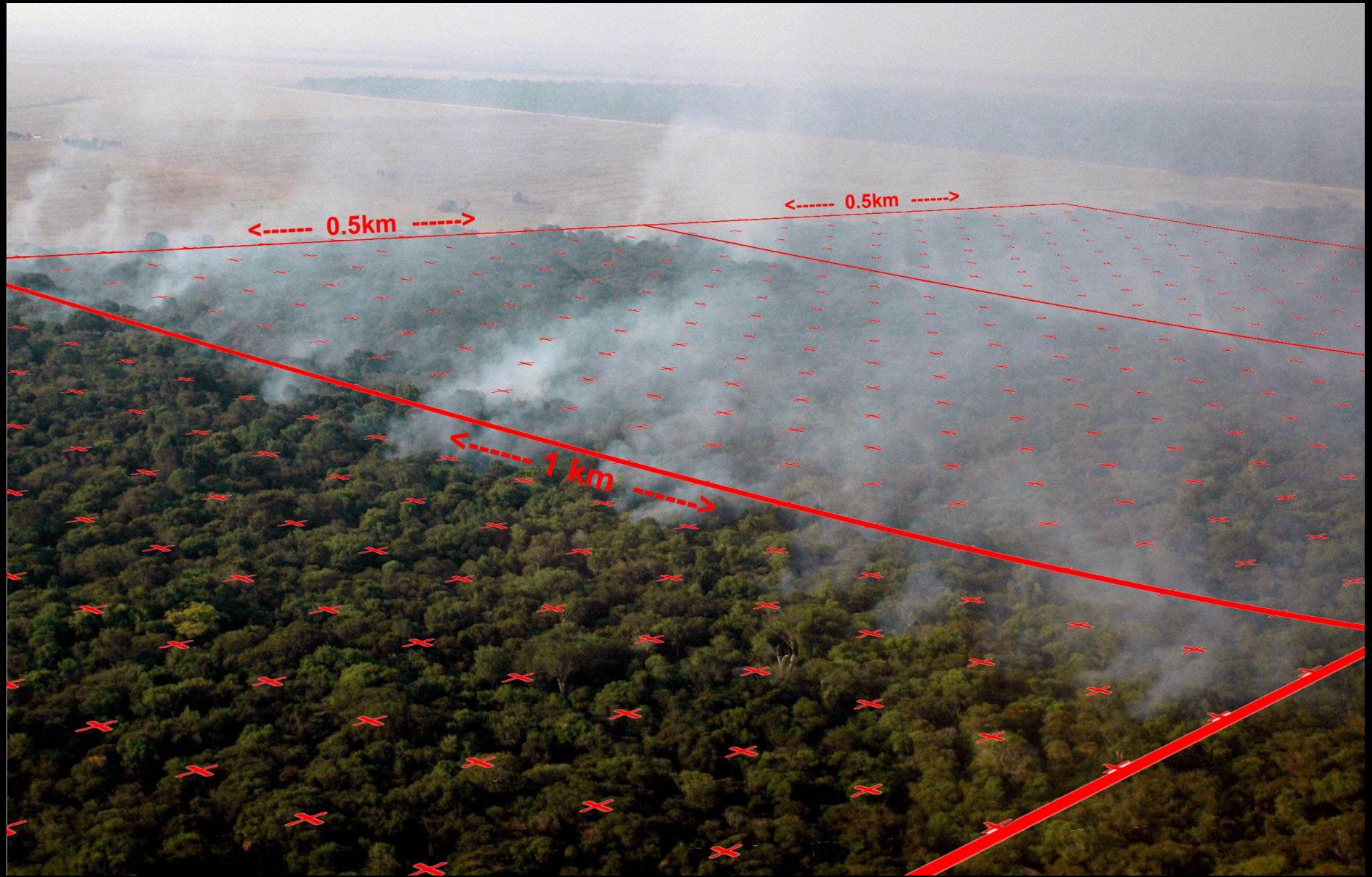


## Experimental Design:

- Two fire regimes
- 1<sup>st</sup> 100-ha burn August 2004
- 2<sup>nd</sup> 50-ha burn Sept. 2005
- 3<sup>rd</sup> 50-ha burn Aug/Sept. 2006







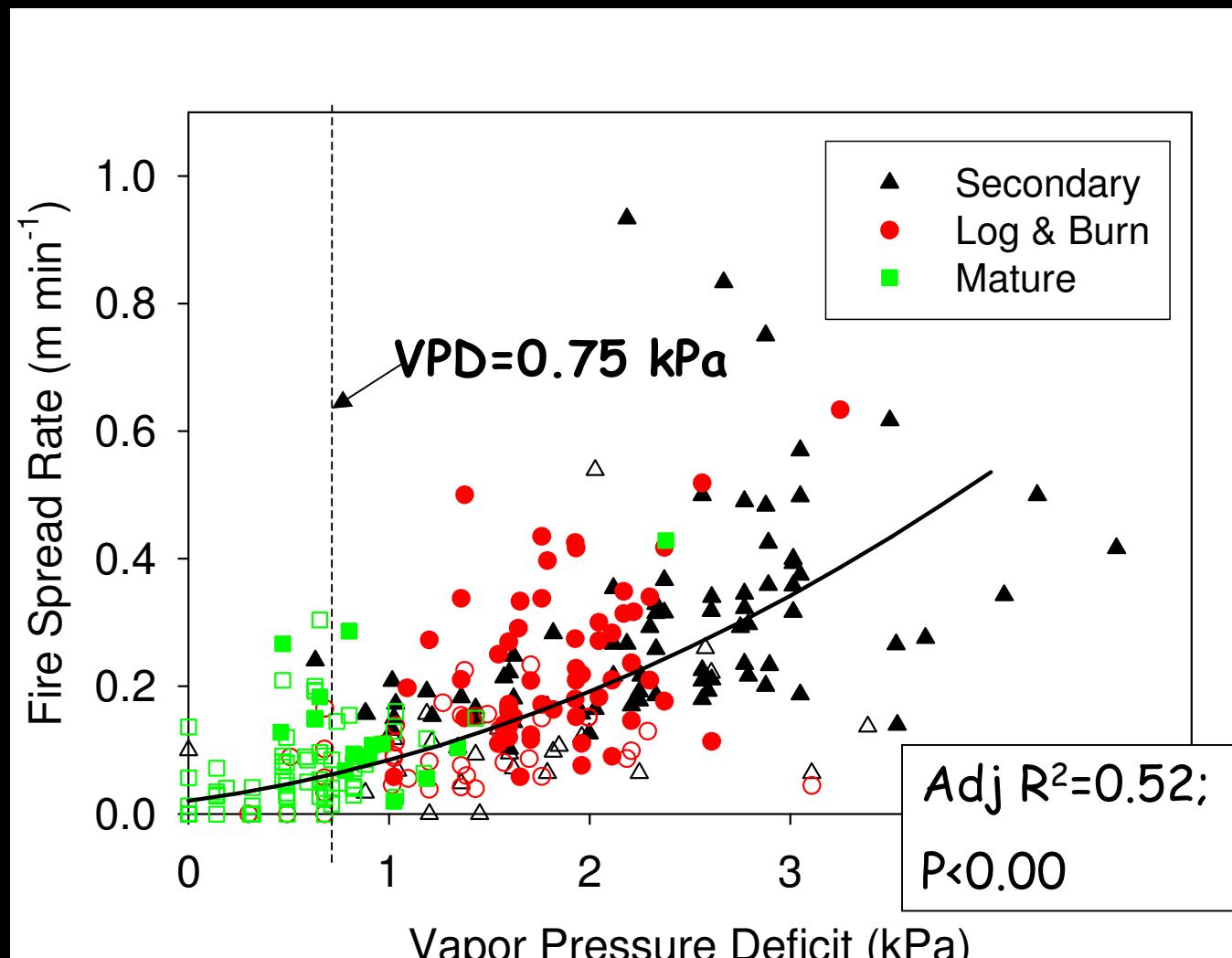
## Fuel results summary:

- Fuel combustion is nearly equal between the fire events of 2004 and 2005
- One year after the initial prescribed fire smaller fuels – 1-hr, 10-hr, and 100-hr – match pre-fire levels
- Replacement of 1000-hr fuels does not occur within 1 year
- Bank of standing dead fuels (10-20 cm dbh) not yet available to fire
- 3<sup>rd</sup> burn passes a threshold! Fuel replacement has not occurred! Half of total area burned!

Fuel dynamics important to consider in fire behavior prediction ...



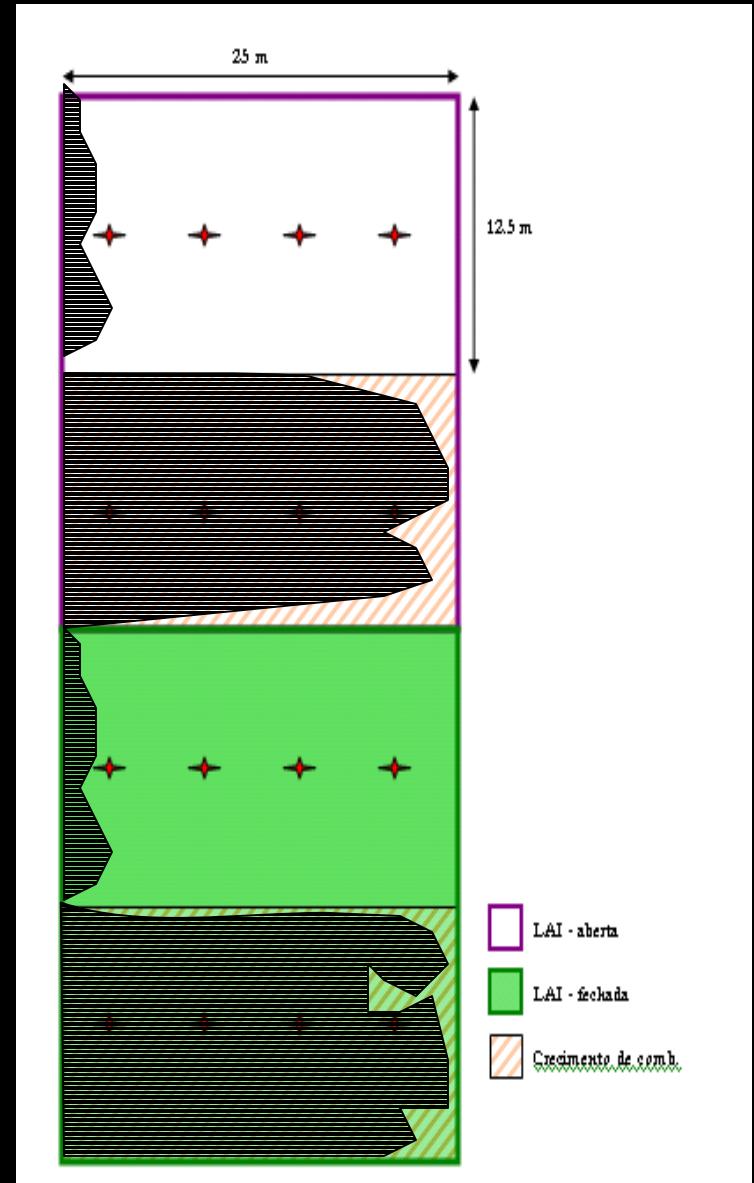
Vapor pressure deficit is best predictor of fire spread



Ray et al. 2005

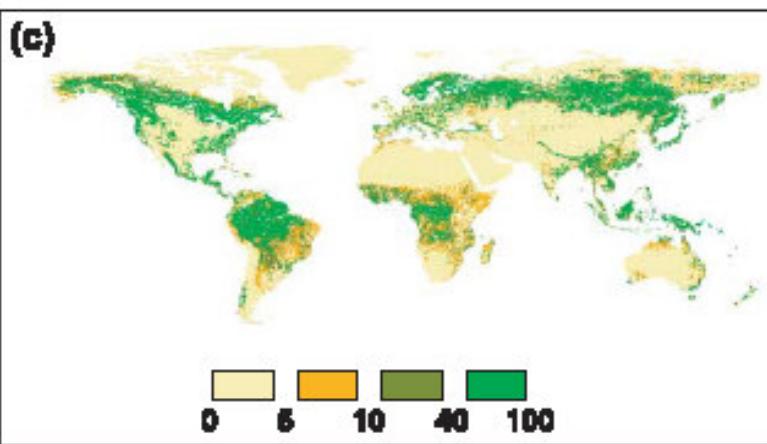
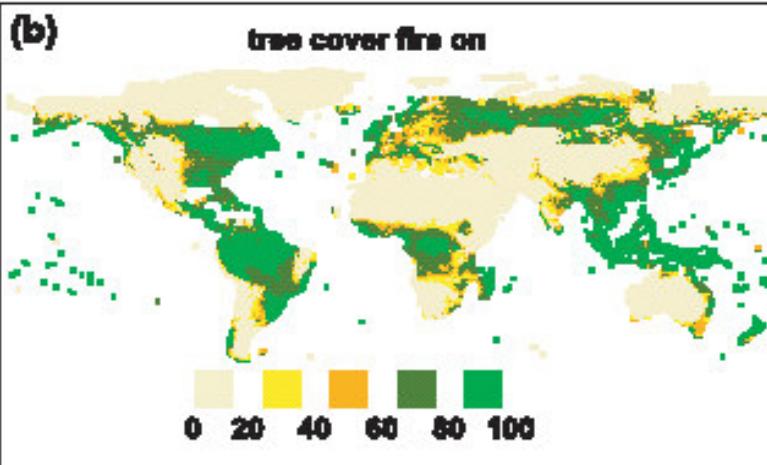
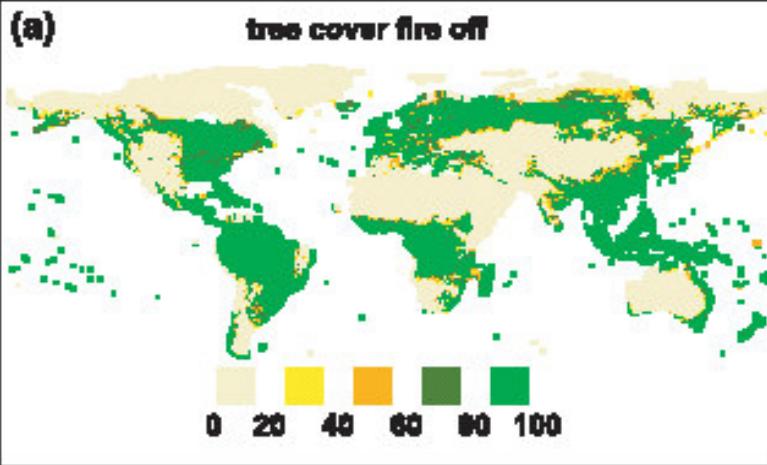


3 tons of leaves later....



# Conclusions...

- Must consider rates of fuel inputs/outputs –not necessarily a linear relationship between fire frequency and forest flammability
- Fine fuels appear to be controlling fire behavior in transitional forests
- Gaining a better understanding of the vulnerability of transitional ecotones to increasing fire frequency and whether they're more sensitive or resistant to change....



Bond et al. 2005





HEINZ



Packard Foundation



