

Smoldering Cypress Swamp Soils: Moisture Effects and Implications for Forest Structure

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Okefenokee Fire Burns 179,940 Acres

Blaze is expected to continue growing; number of active fires in Fla. drops.

By **RUSS BYNUM**
The Associated Press

Published: Saturday, May 12, 2007 at 3:43 a.m.
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FOLKSTON, Ga. - A wildfire that has raced through the Okefenokee Swamp in southeast Georgia and into northern Florida has charred at least 179,940 acres - or 281 square miles - since a lightning strike ignited it a week ago, firefighters said Friday.

Georgia

County Line Fire

—Jacksonville

Florida: County Line Fire grows to 35,000 acres

Posted on April 12, 2012 by Bill Gabbert



Russia's peatland fires seen burning for months

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By Alister Doyle, Environment Correspondent
OSLO | Thu Aug 12, 2010 3:30am EDT

(Reuters) - Some of Russia's smog-causing peatland fires are likely to burn for months, part of a global problem of drained marshes that emit climate-warming greenhouse gases, experts said on Wednesday.

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smoke

Wildfire Research Confirms Health Hazards of Peat Fire Smoke

An EPA-led study finds associations between peat wildfire smoke and increased emergency room visits.

It may be tempting to breathe a sigh of relief if a rampant wildfire strays wide of your home. But don't breathe too deep; even if you can avoid the flames, you are not out of harm's way.

A research paper recently published by EPA shows that peat wildfire smoke can increase risk of serious respiratory and cardiovascular effects. This paper is the first to show an association between wildfire smoke and increased emergency room visits for symptoms of heart failure.

Peat [EXIT Disclaimer](#) is partially decomposed vegetable matter commonly found in wetland areas. Peat wildfires can smolder in the ground for months and are notoriously difficult to extinguish.

"A peat fire differs significantly from a forest fire or grassland fire where the fuel is timber or grasses," says Wayne Cascio, director of EPA's Environmental Public Health Division. "Peat fires burn at lower temperature, produce more smoke, and generate chemicals that are more irritating to the eyes and airways."



Published on Monday, February 27, 2012 by [Common Dreams](#)

There Will Be Fire: The 'Carbon Bomb' 'Waiting to Be Ignited'

Scientist: With climate change fires will become more frequent, more intense and harder to stop.

- Common Dreams staff

"We are going to see more fire in (the) future, that's the bottom line." "A warmer world's going to see more fire."

This eery warning comes from Mike Flannigan, a senior research scientist with Natural Resources Canada and professor at the University of Alberta, at the annual meeting of the American Association for the Advancement of Science. He says that fires will become more frequent, more intense and harder to stop.



NASA Image

Indonesia Peat Fires May Fuel Global Warming, Experts Say

John Roach
for [National Geographic News](#)
November 11, 2004

As they have every dry season for the last 20 years, once lush tropical peatlands in Indonesia smoldered for weeks this year, leaving the region cloaked in a thick, carbon-rich haze.

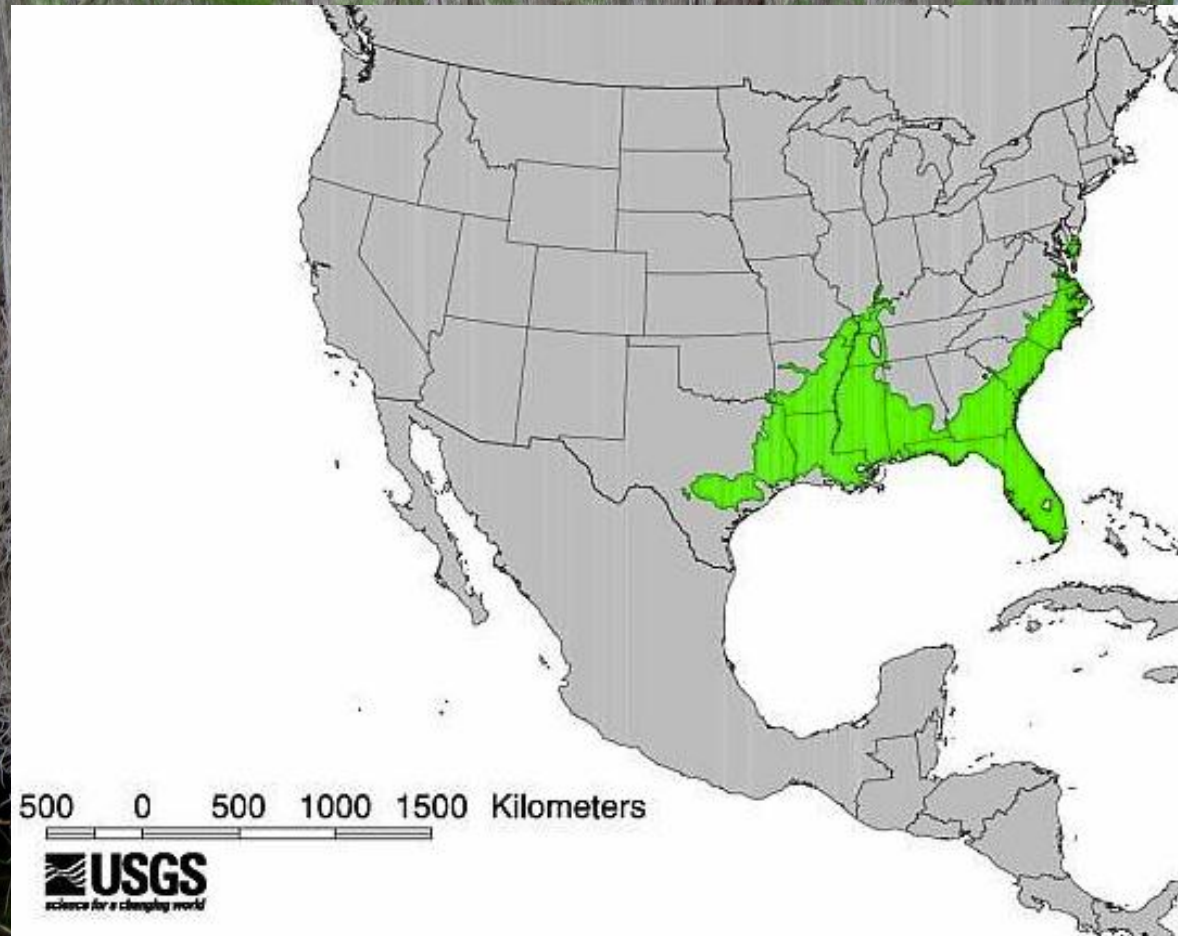






Occurrence of cypress swamps in US

(includes *Taxodium distichum* var. *distichum* and *T. Distichum* var. *imbricarium*)





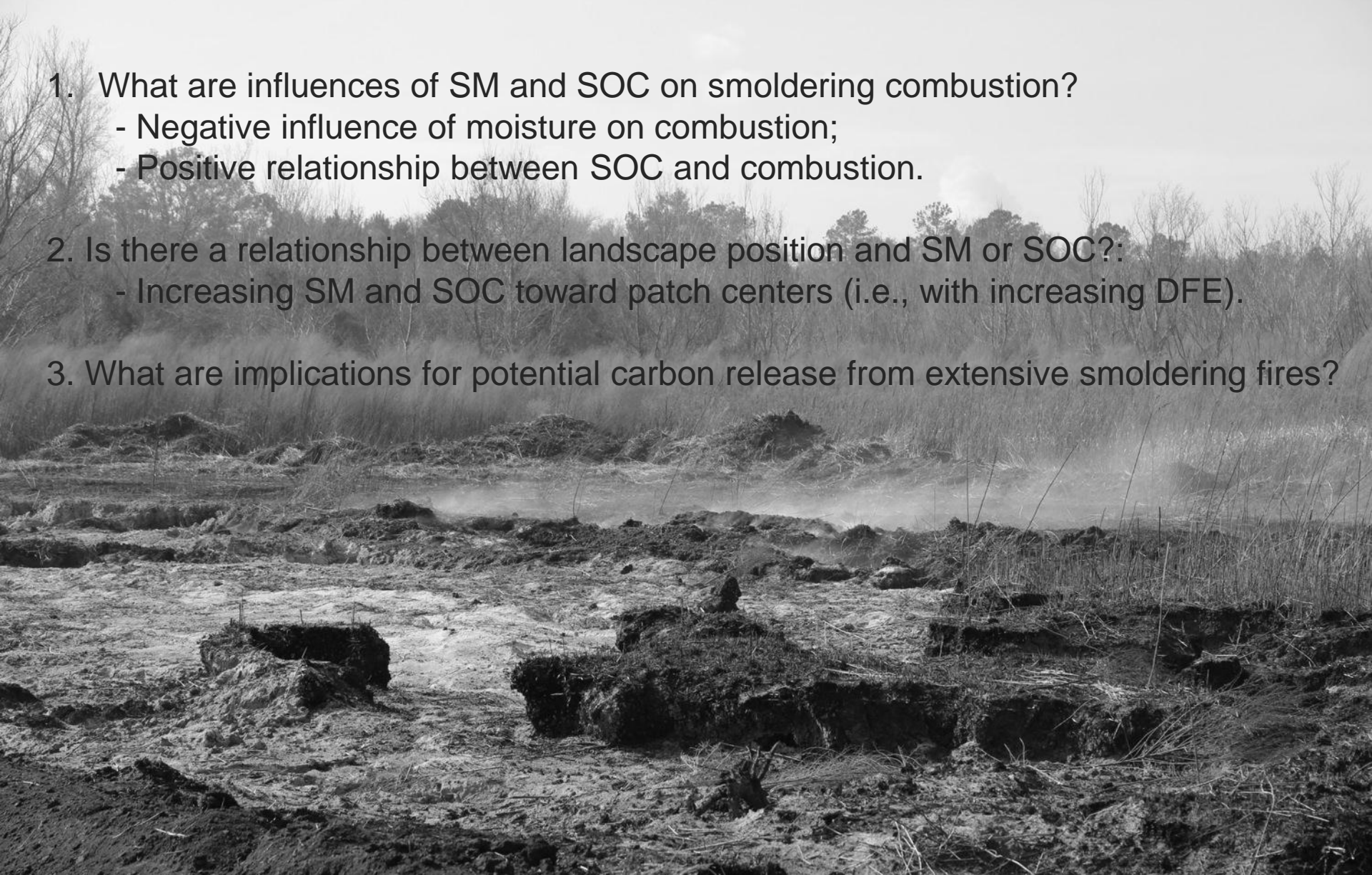






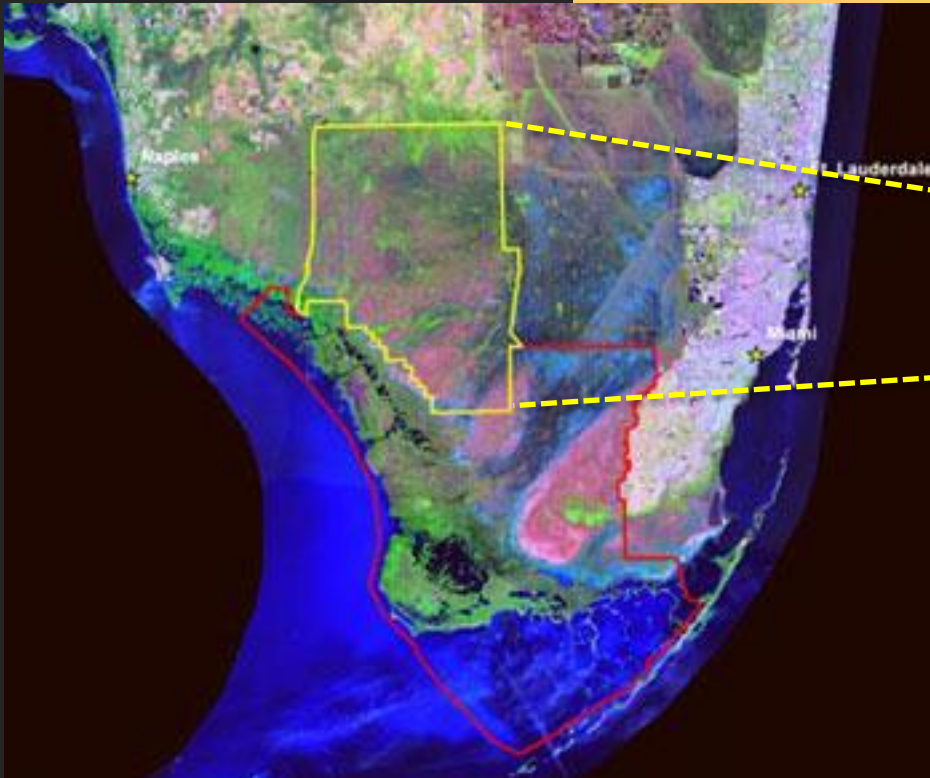
Objectives and Hypotheses:

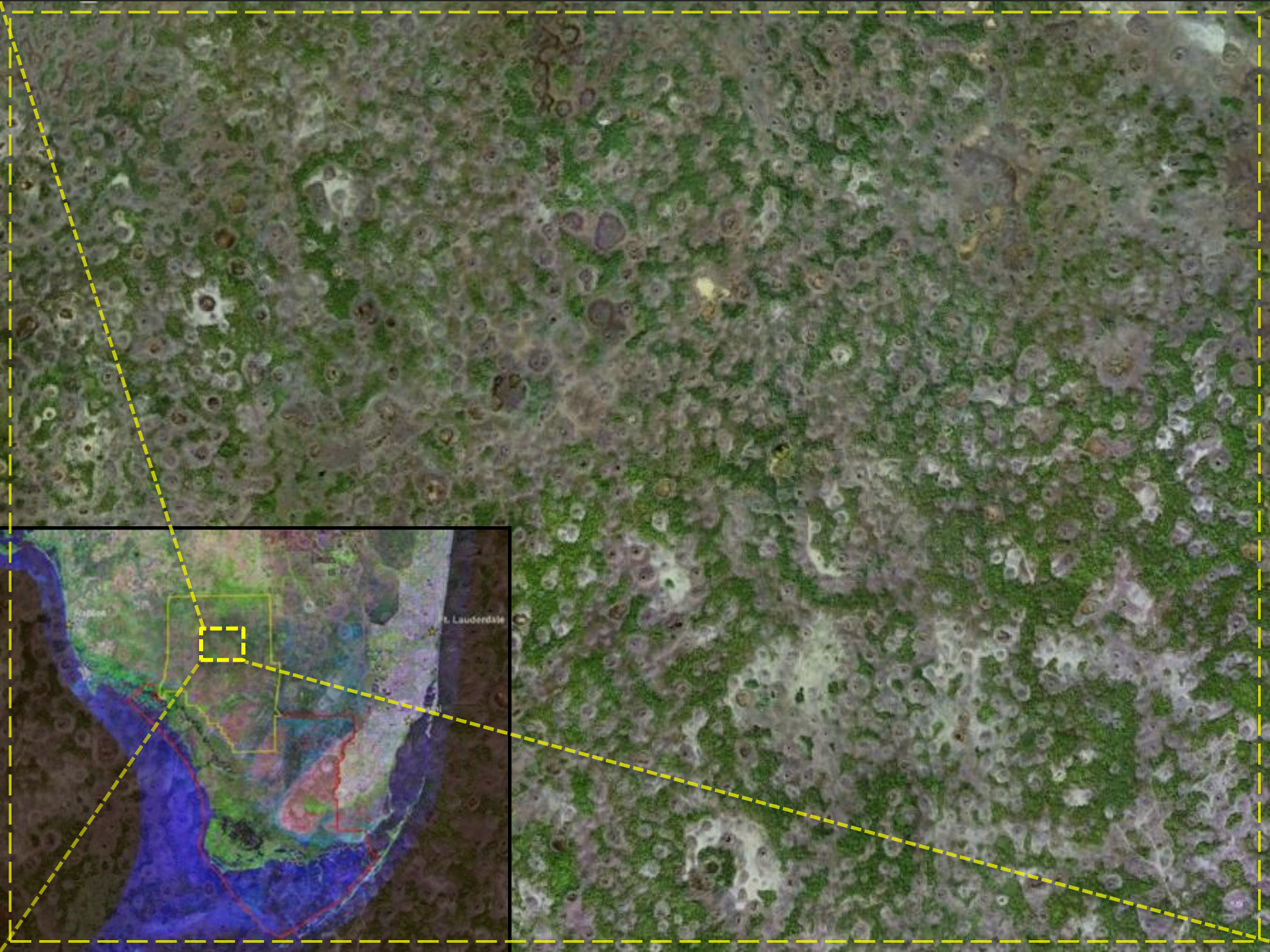
1. What are influences of SM and SOC on smoldering combustion?
 - Negative influence of moisture on combustion;
 - Positive relationship between SOC and combustion.
2. Is there a relationship between landscape position and SM or SOC?:
 - Increasing SM and SOC toward patch centers (i.e., with increasing DFE).
3. What are implications for potential carbon release from extensive smoldering fires?



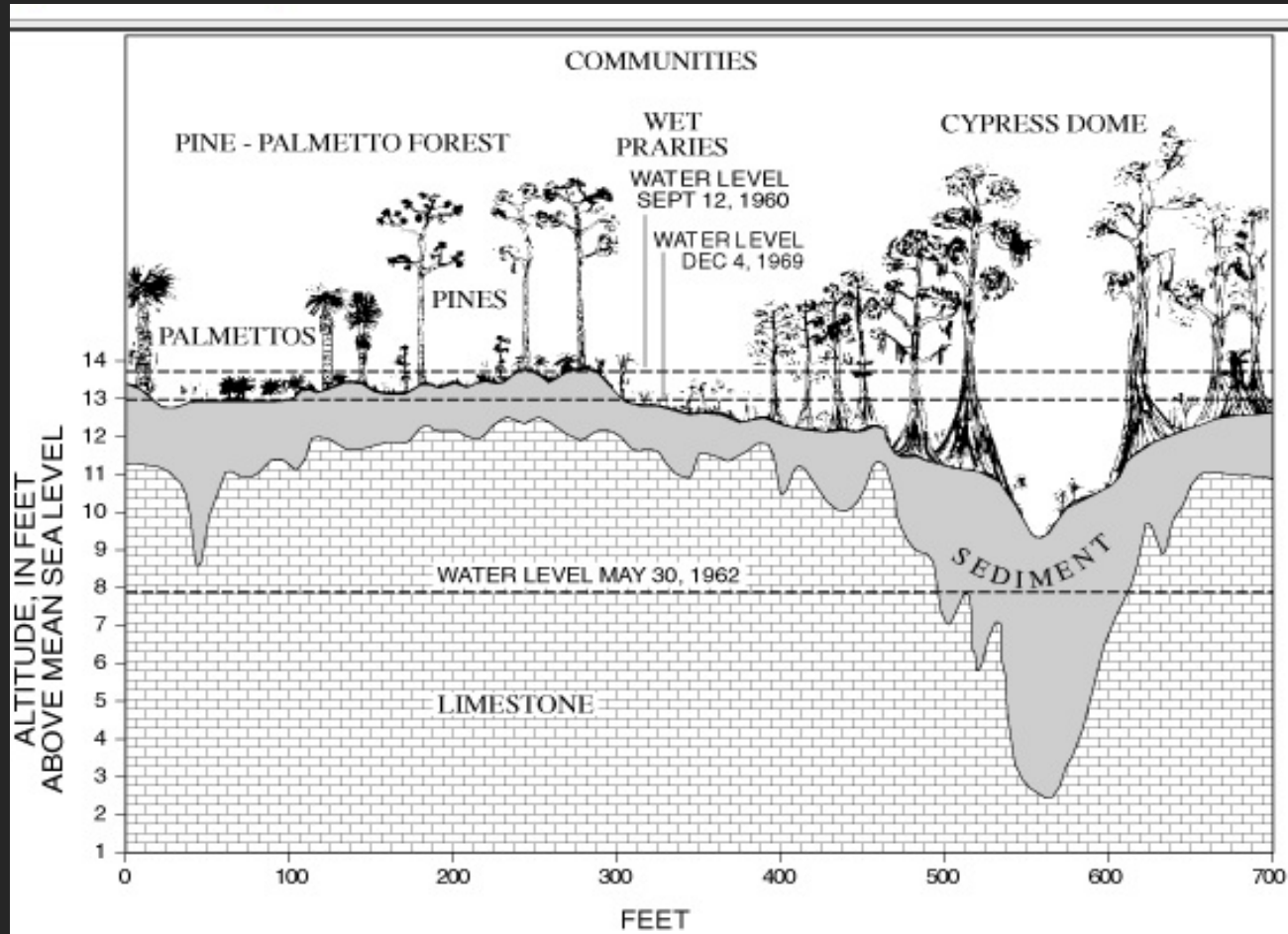
Big Cypress National Preserve

- 300,000 ha (720,000 ac)
- Range of habitat types (e.g., pine uplands, cypress swamps)
- Largest NPS Rx burn program



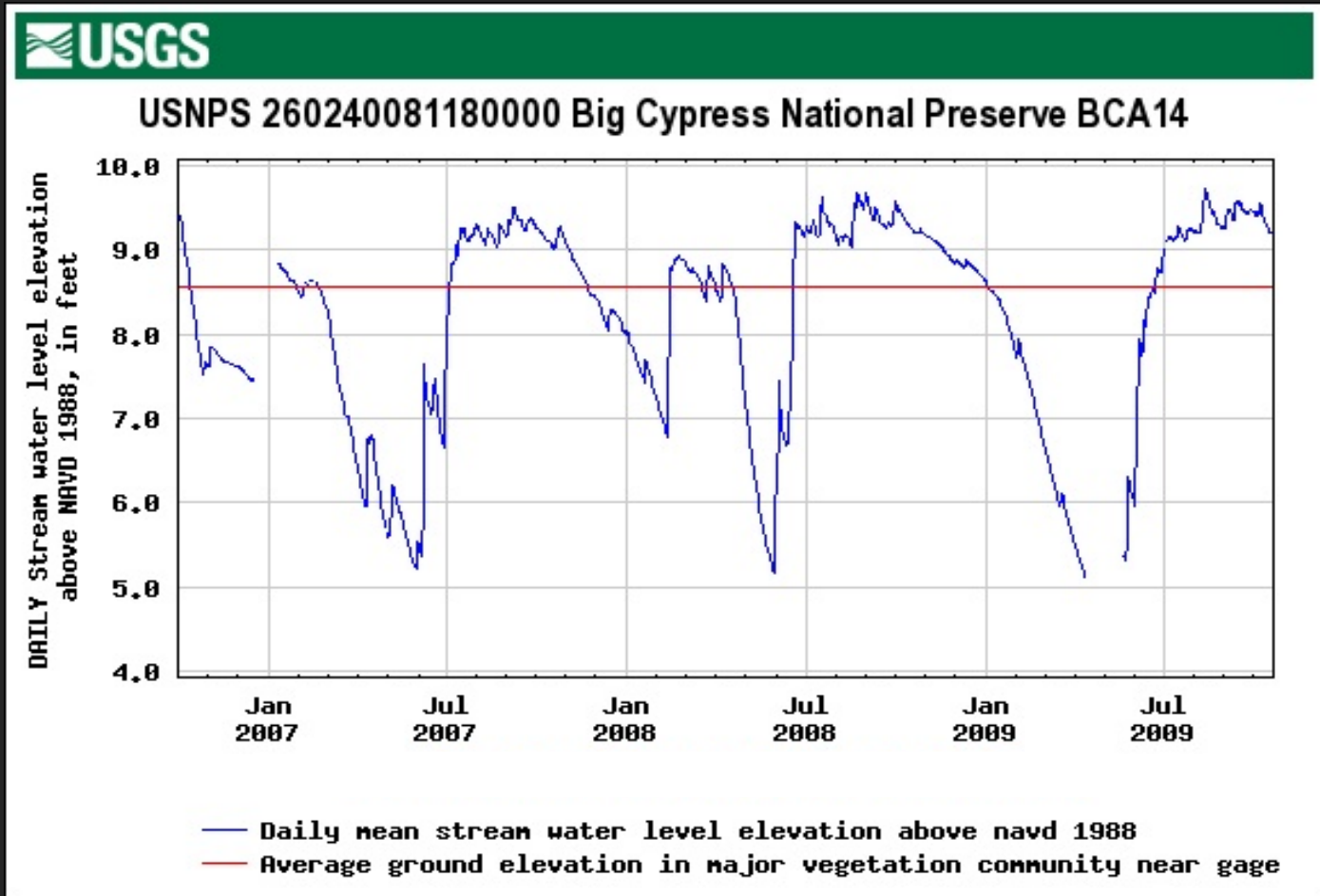


Typical cypress dome geomorphology, architecture



from Macpherson (1974)

Seasonal precipitation distribution: Rainy & Dry seasons



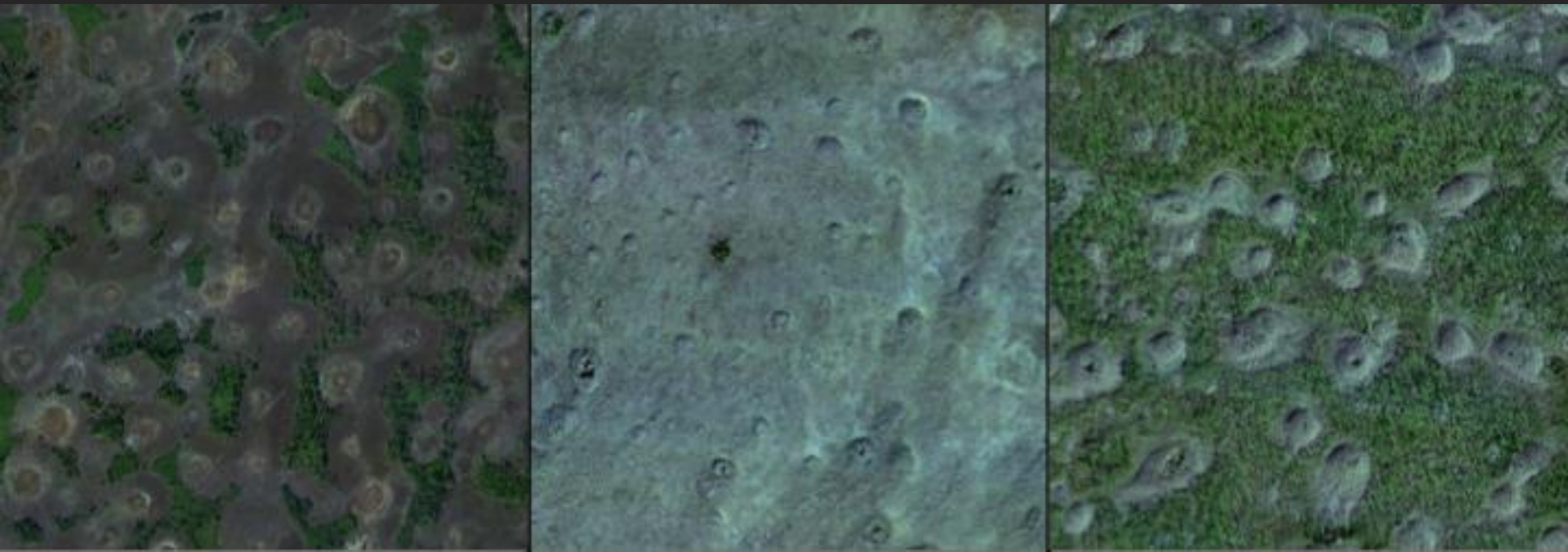
Methods

1. Lab combustion: 14 peat “monoliths.”
2. Landscape position and SM, SOC: 134 samples from 34 cypress domes.
3. Scaling-up: landscape blocks; volumetric samples.



Methods

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Results I.

-Little correlation between SM in upper and middle 10cm strata

-Strong correlation between middle and lower layers.

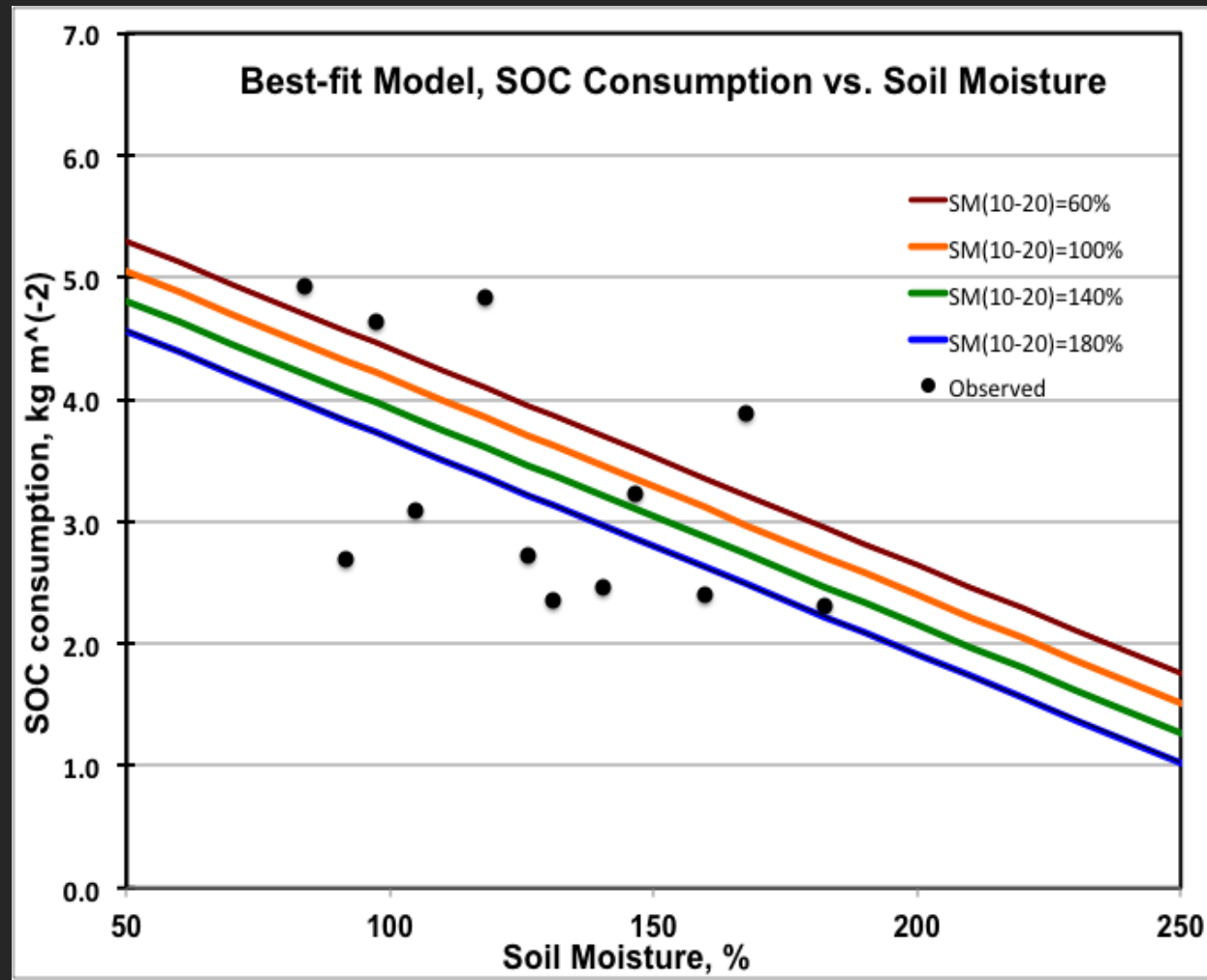
- No predictors of post-fire change in soil surface (DOB, “depth of burn”).

Soil Profile Depth	SM, %	SOC, %	Mineral Content, %	Combustion Depth, cm	SOC Loss, g cm ⁻¹
0 – 10 cm	131.2 (51.4)	29.8 (6.7)	22.7 (9.8)		
11 – 20 cm	134.9 (58.1)	19.7 (7.7)	51.2 (19.1)		
21 – 30 cm	96.2 (36.3)	13.1 (8.6)	67.4 (21.3)		
Overall				8.9 (5.2)	0.785 (0.092)

Results II.

- Negative relationship
between SM_{0-10} and SOC loss

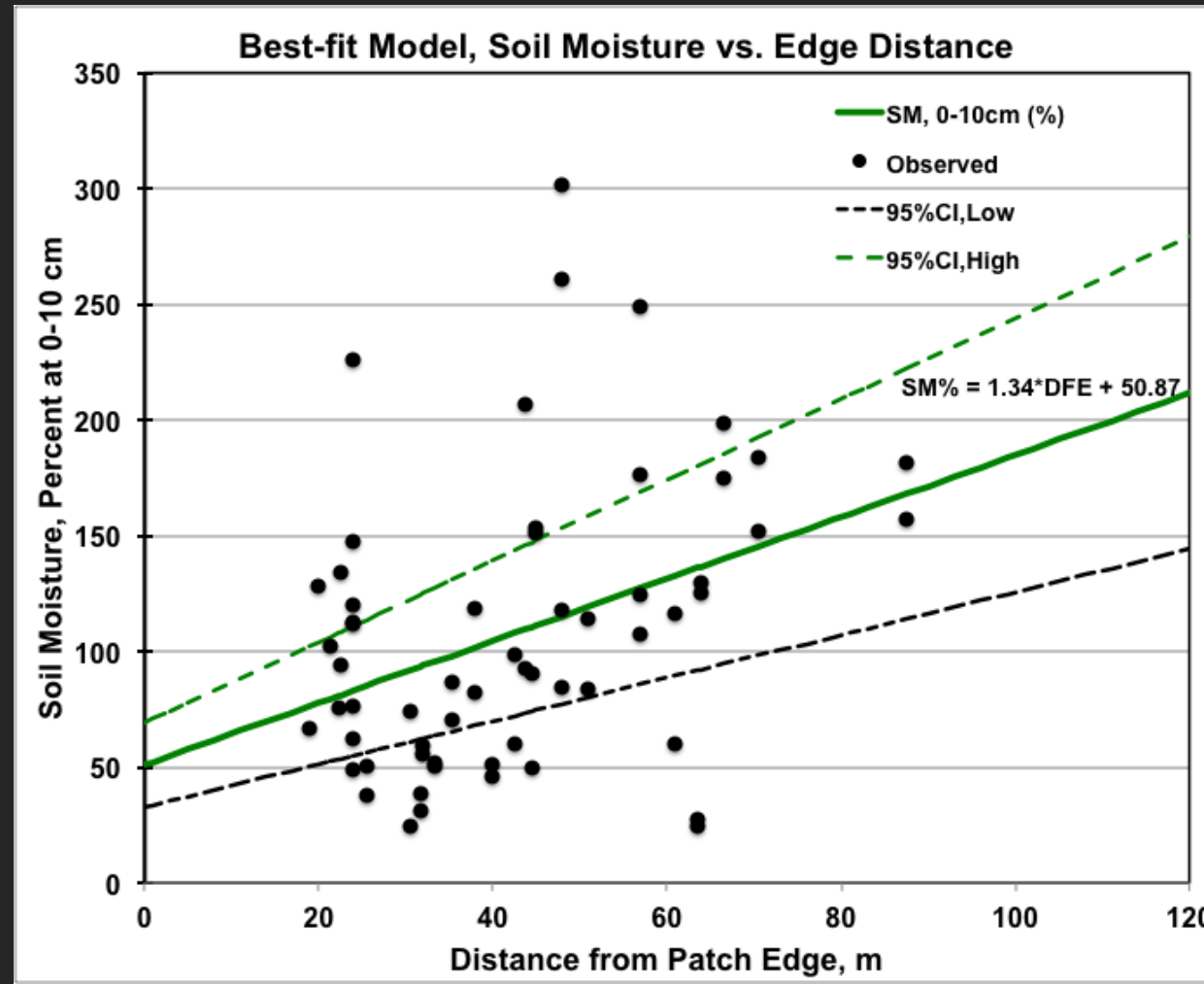
- SM_{11-20} improved model



Results III.

- Predictive relationship between DFE and SM_{0-10} .

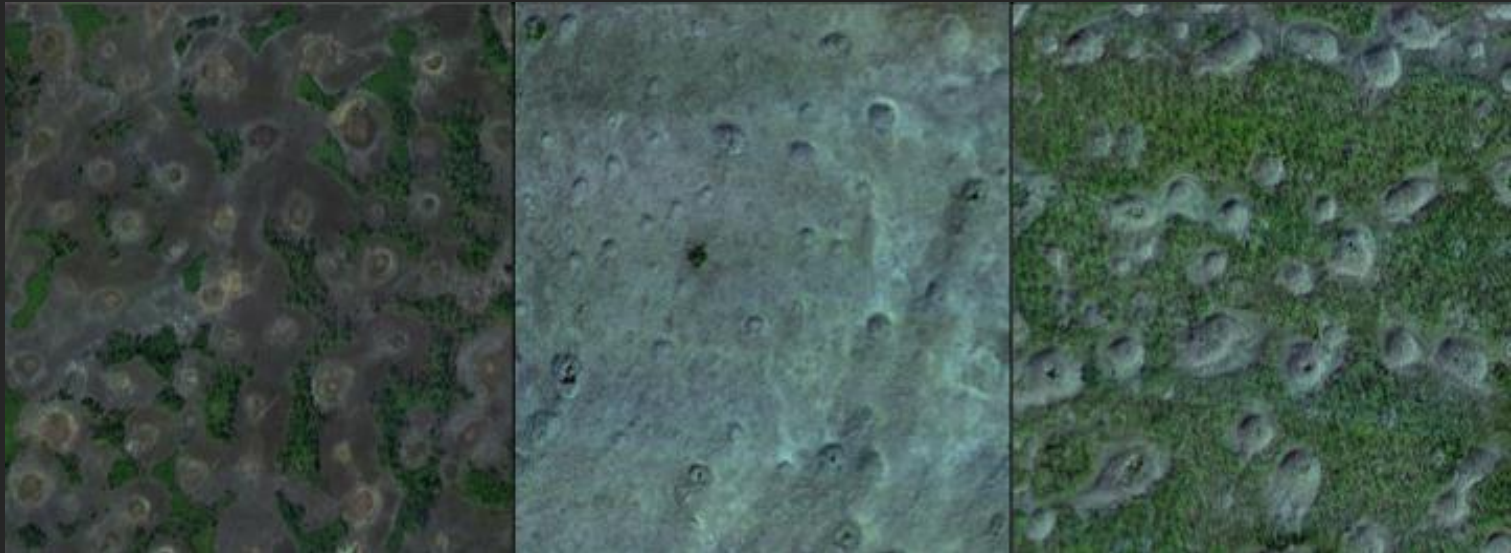
- No relationship between edge distance and SOC.



Results IV.

- High variation in organic-soil area among landscape blocks
- Emissions estimates of 2.8 – 5.6 kg m² (mean 4.18 kg m²).

Landscape Block	Number of Cypress Domes	Mean (s.d.) Dome size, ha	Depression area, ha (%)	Mean Estimated SOC Consumption, Mg
DL	60	0.47 (0.31)	28.11 (12.5%)	1175.0
LS	45	0.25 (0.35)	11.02 (4.9%)	460.6
RP	60	0.58 (0.42)	34.89 (15.5%)	1458.4





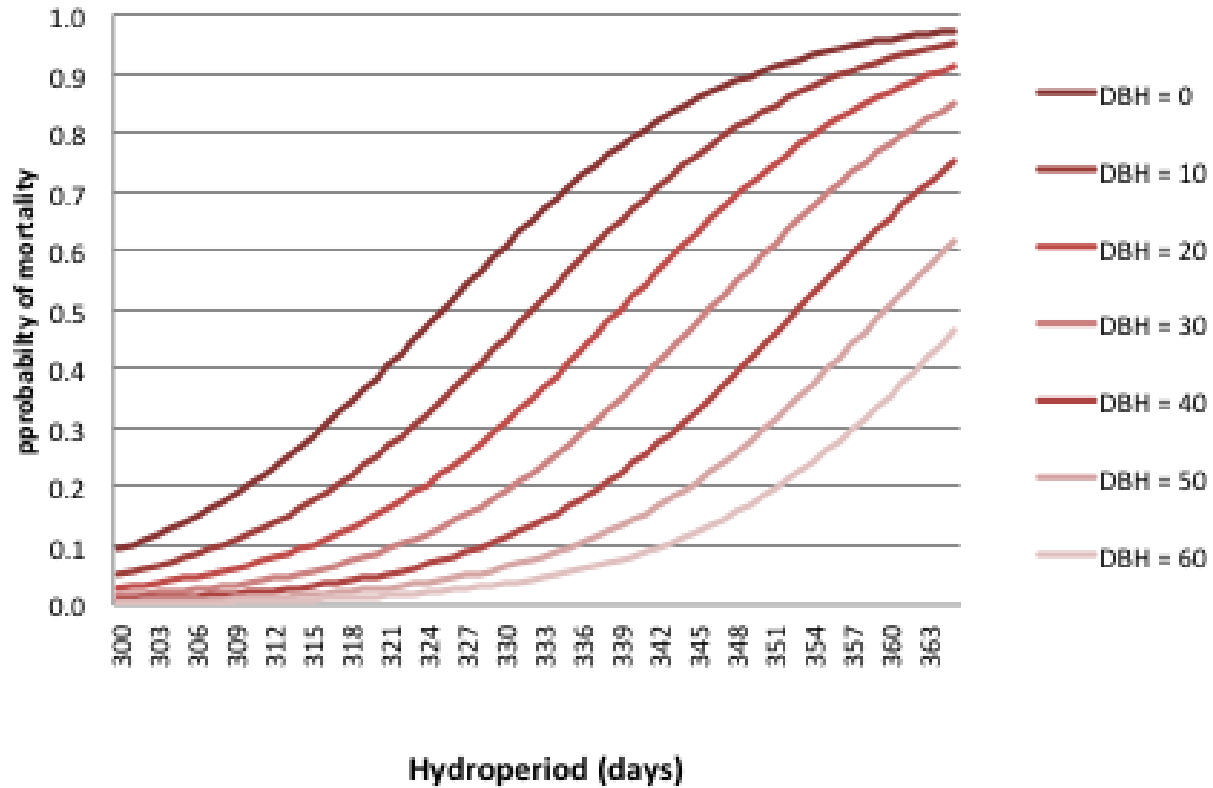
Conclusions.

- Cypress peat can smolder at SM over 200%.
- SOC consumption, rather than DOB, may be better measure of smoldering in cypress peat.
- SOC loss from cypress peats may be greater than 1997 Kalamantan fires in Indonesia.
- First attempt to measure smoldering and emissions in cypress soils.





Post-fire cypress mortality increases with hydroperiod



Watts et al. 2012, *Wetlands*



With Gratitude:



UF:

Alex Kattan, Marissa Streifel

USGS:

Ken Rice

NPS:

Bill Evans, John Nobles, Caroline Noble, Nate Benson

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