

# Multiscale Land Surface Breakout Report

## 4 Presentations

- Rachel McCrary - African Monsoon
- Erica McGrath-Spangler - PBL Entrainment
- Ian Schiach - Drought responses
- Anna Harper - Drought resilience in Amazon

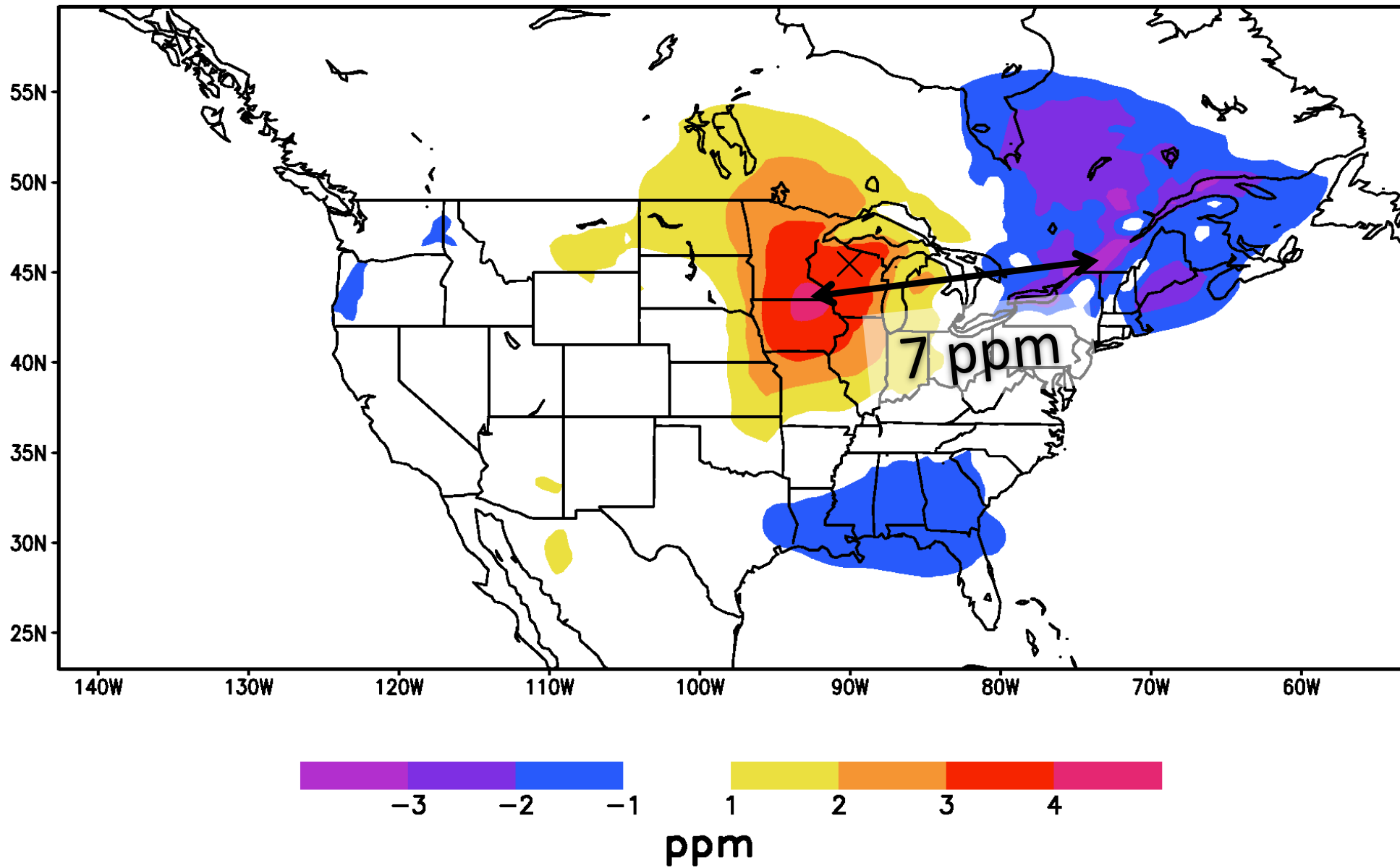
# Modeling the West African Monsoon

Rachel McCrary  
CMMAP team meeting

# Erica McGrath-Spangler

- PBL Entrainment and Remote Sensing

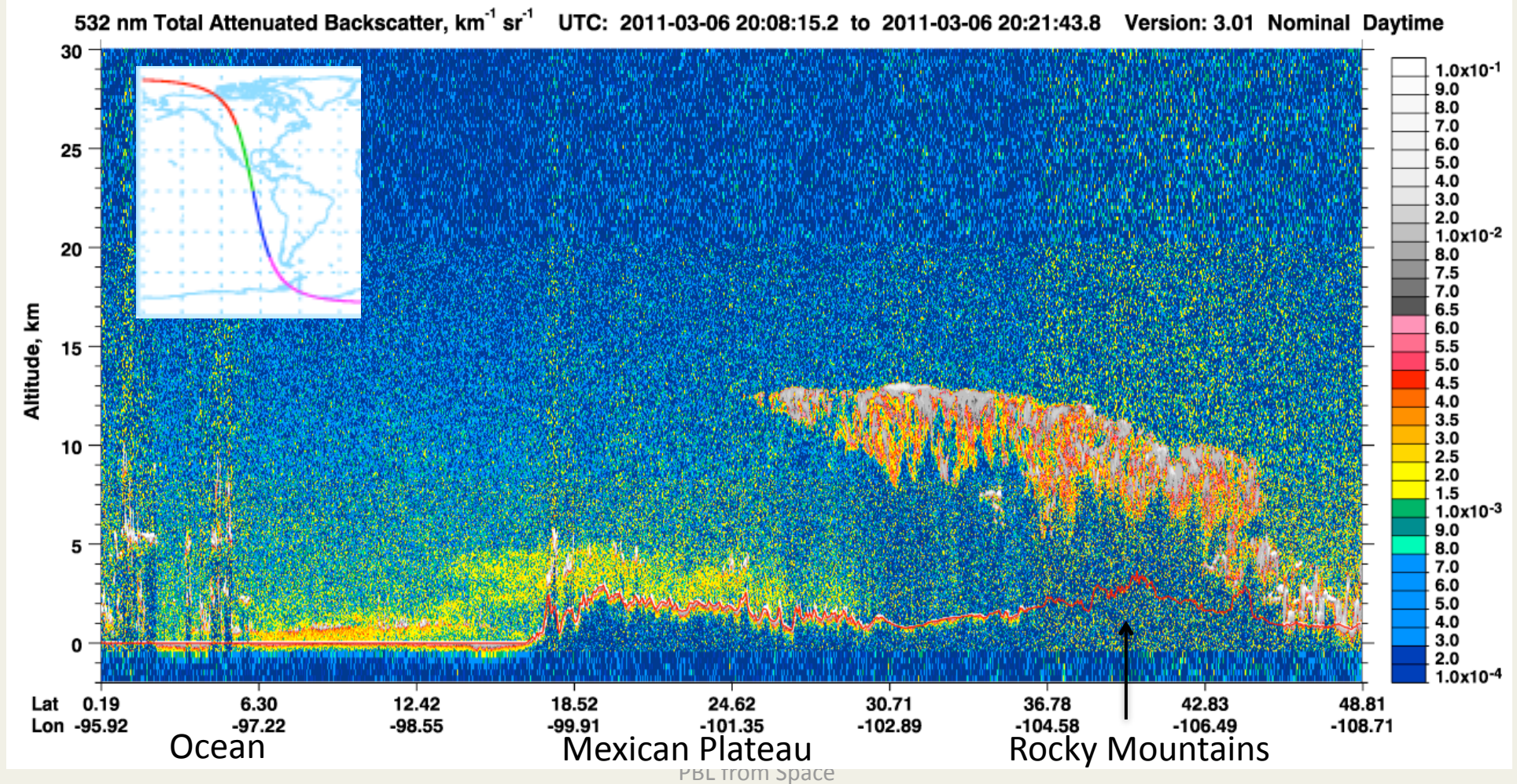
# CO<sub>2</sub>



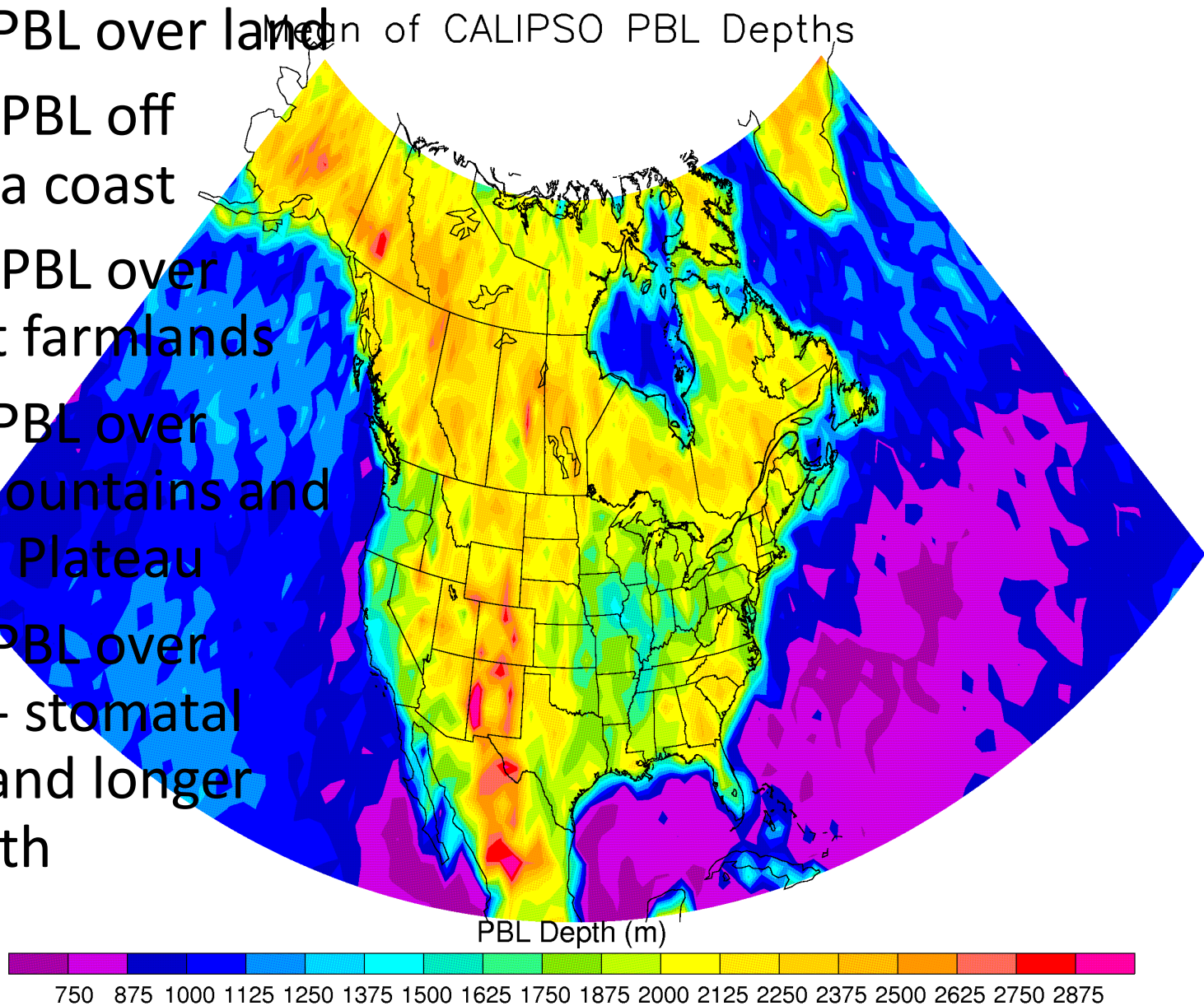
McGrath-Spangler and Denning, 2010



- CALIOP acquires 1.7 million laser shots every 24 hours



- Deeper PBL over land
- Shallow PBL off California coast
- Shallow PBL over Midwest farmlands
- Deeper PBL over Rocky Mountains and Mexican Plateau
- Deeper PBL over Canada - stomatal control and longer day length



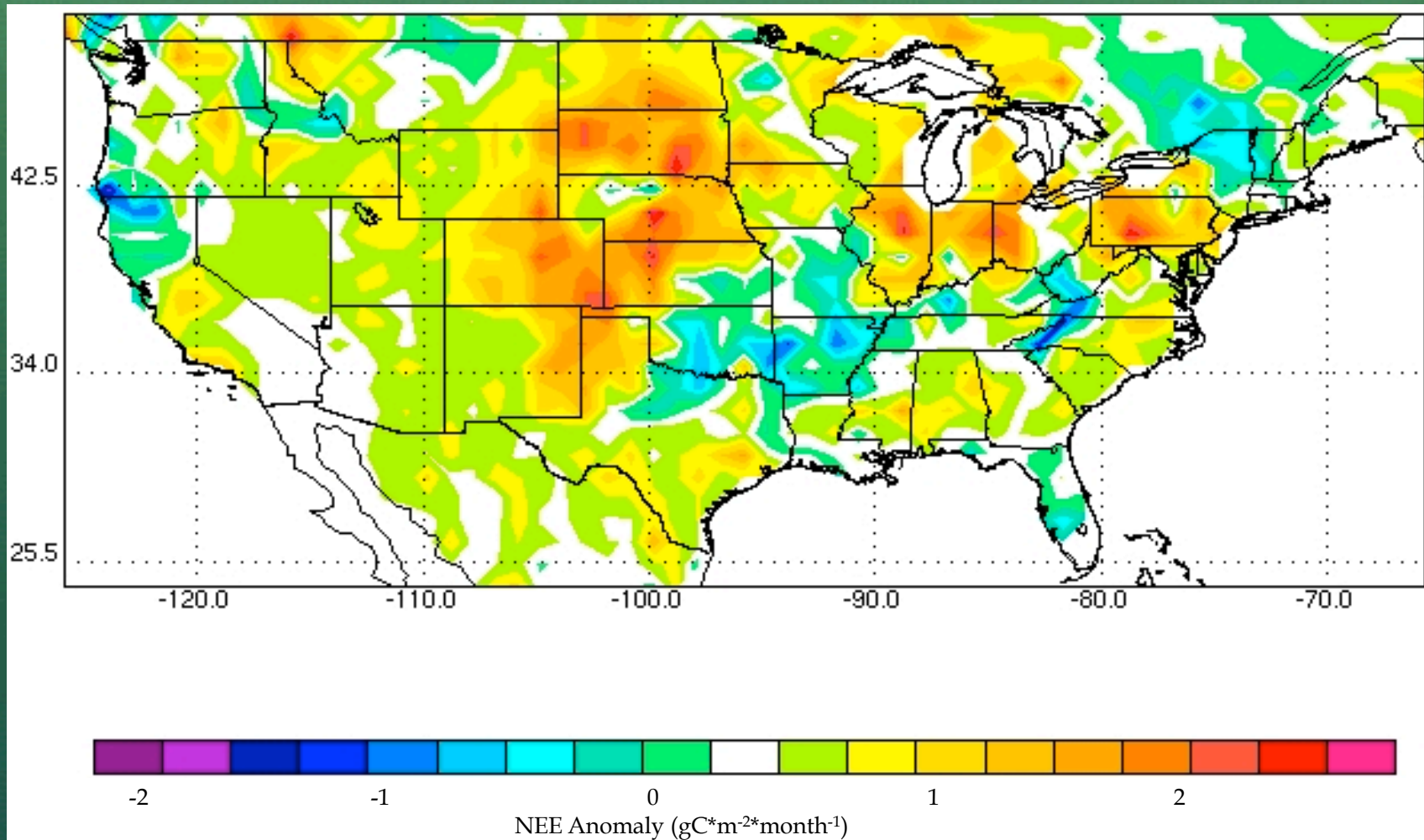
# Ian Schiach

- Carbon cycle responses to droughts



# Results: U.S. Southwest 2002

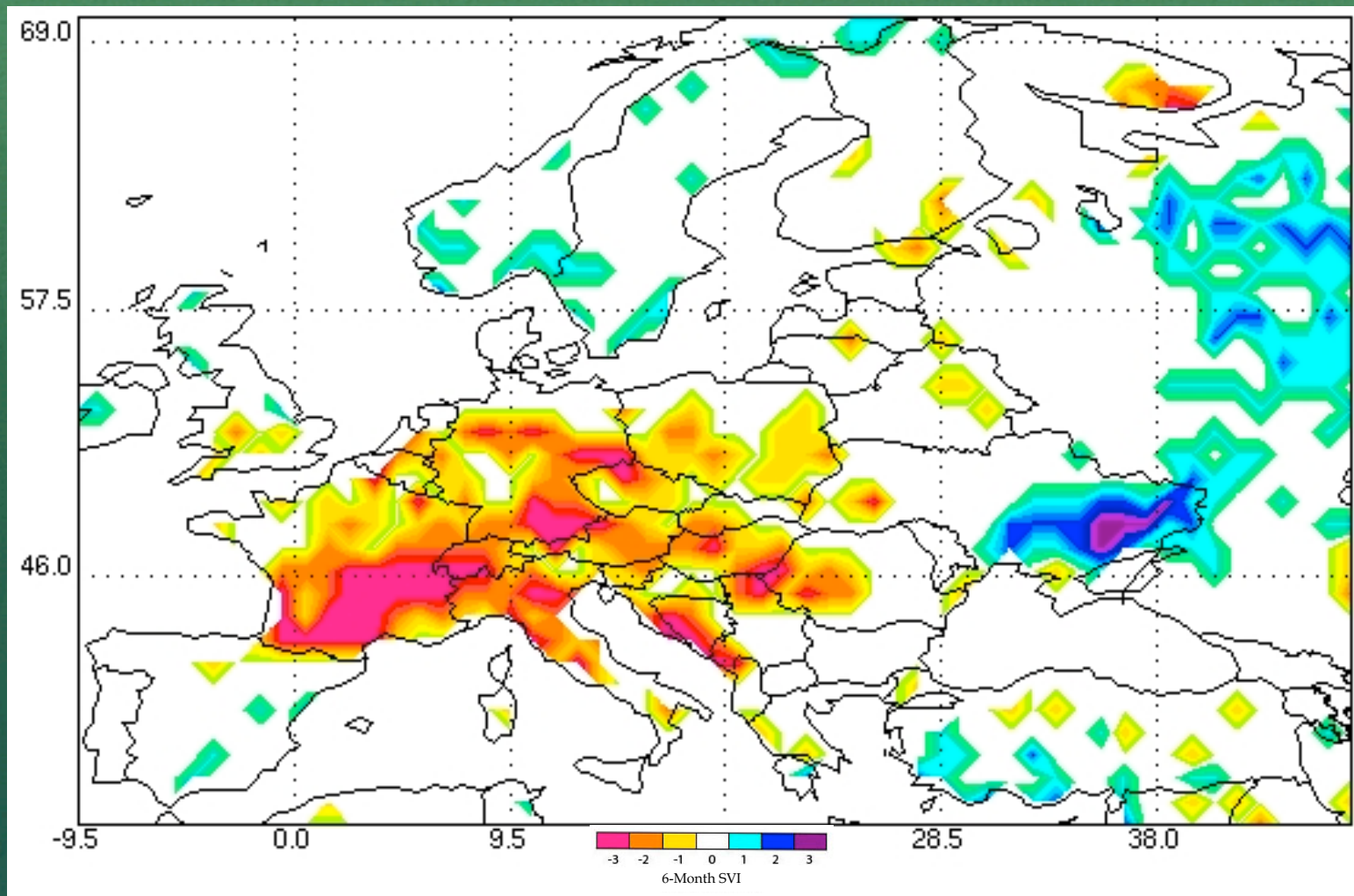
June 2002 SiB NEE Anomaly





# Results: Europe 2003

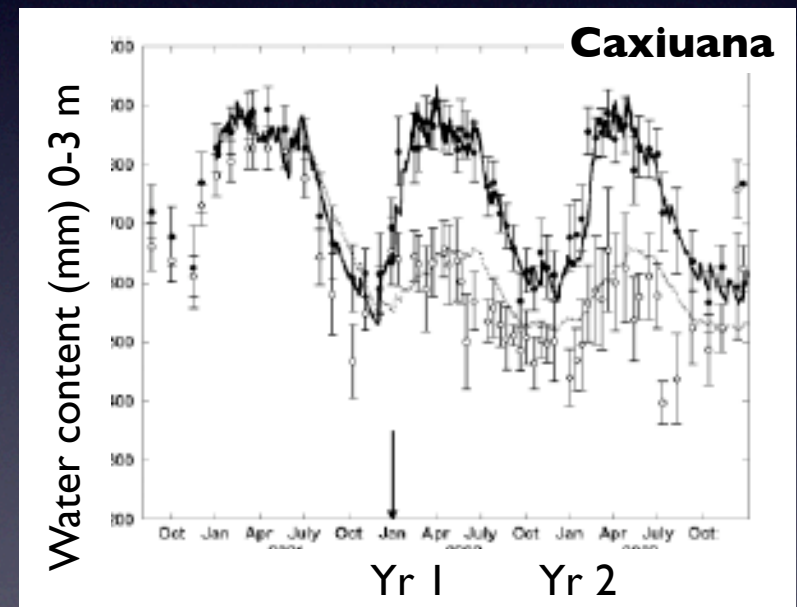
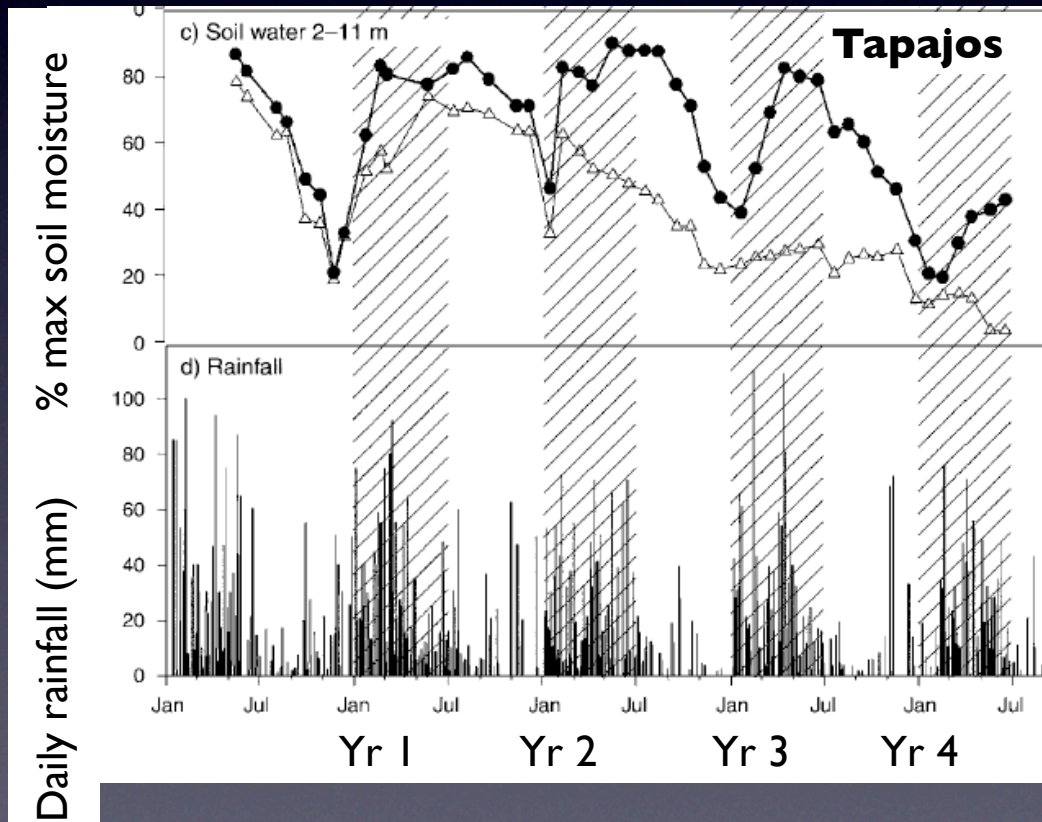
December 2003 SiB3 NCEP Reanalysis SVI 6-Month – GPP



# Anna Harper

- Drought and resilience in the Amazon

# Effects of multiyear drought

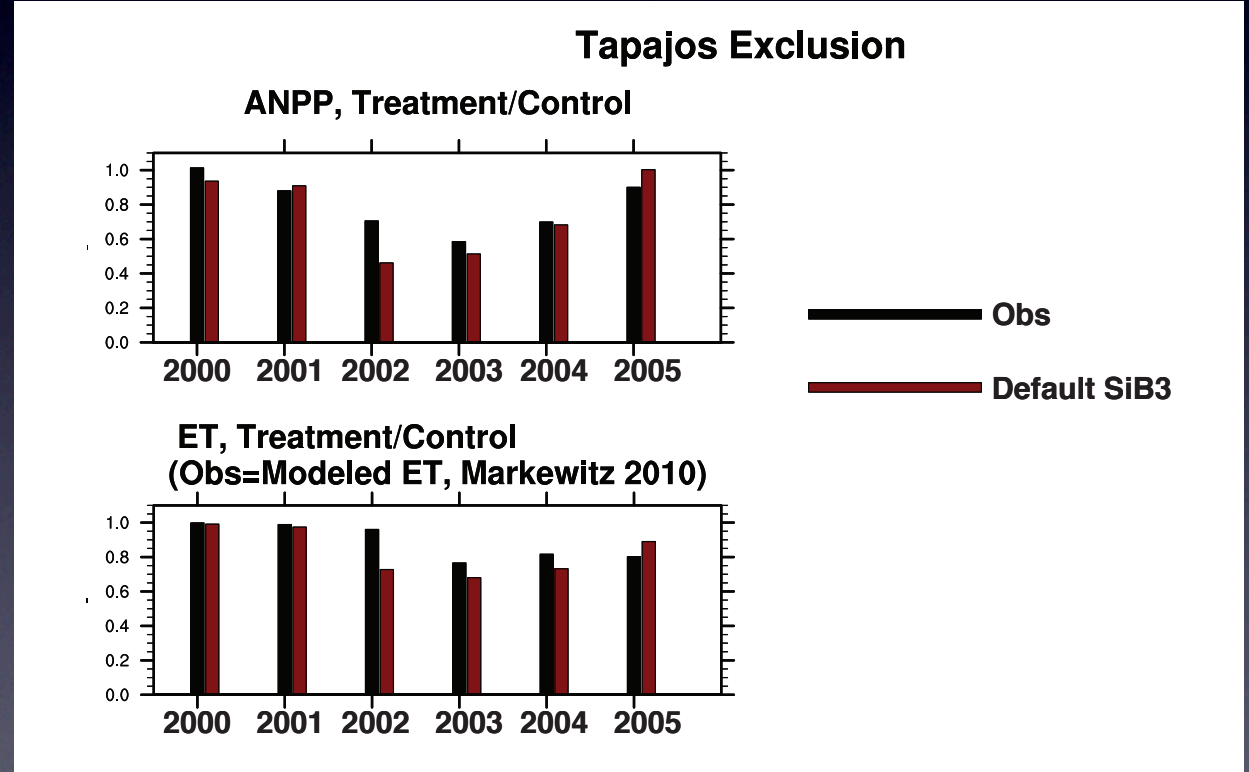


Nepstad et al. 2007 (left)  
Fisher et al. 2007 (right)



# Tapajos exclusion: SiB3

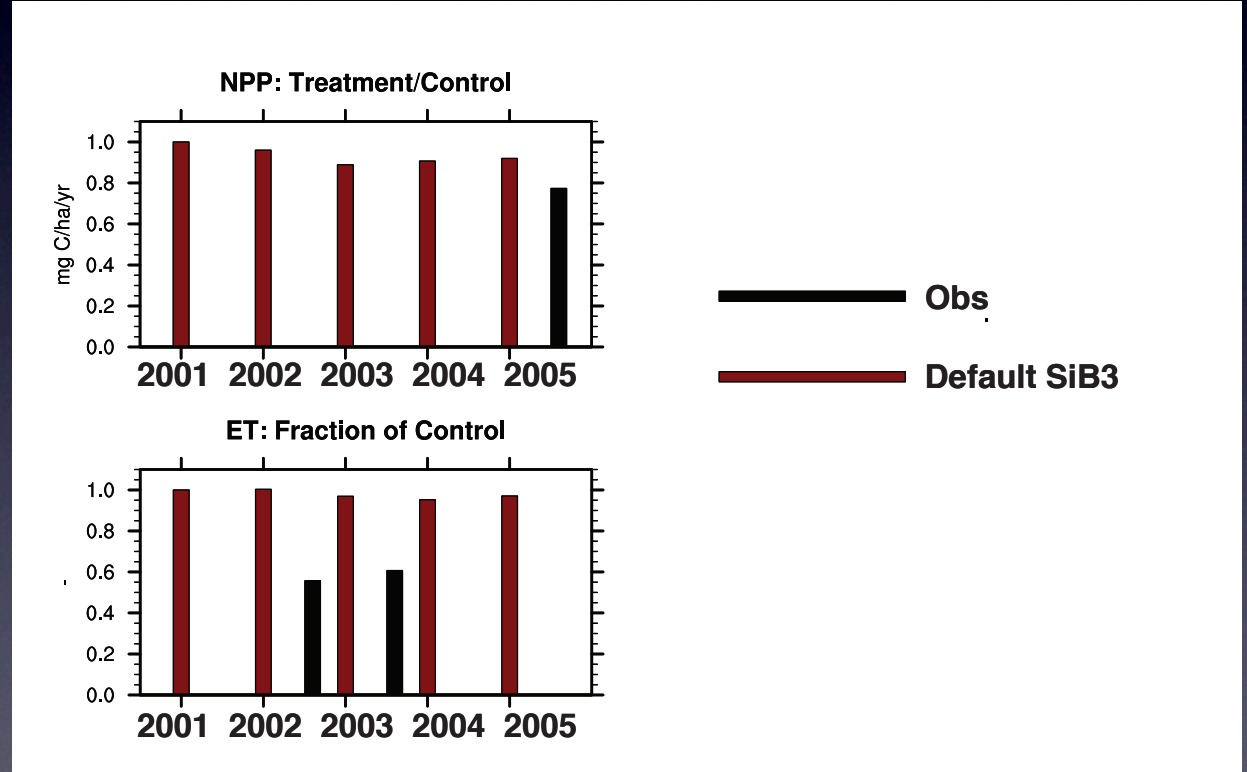
- SiB3 w/ 10 m soil overestimates drought
- Larger soil moisture reservoir (deeper roots) best capture response
- Improvements with observed LAI





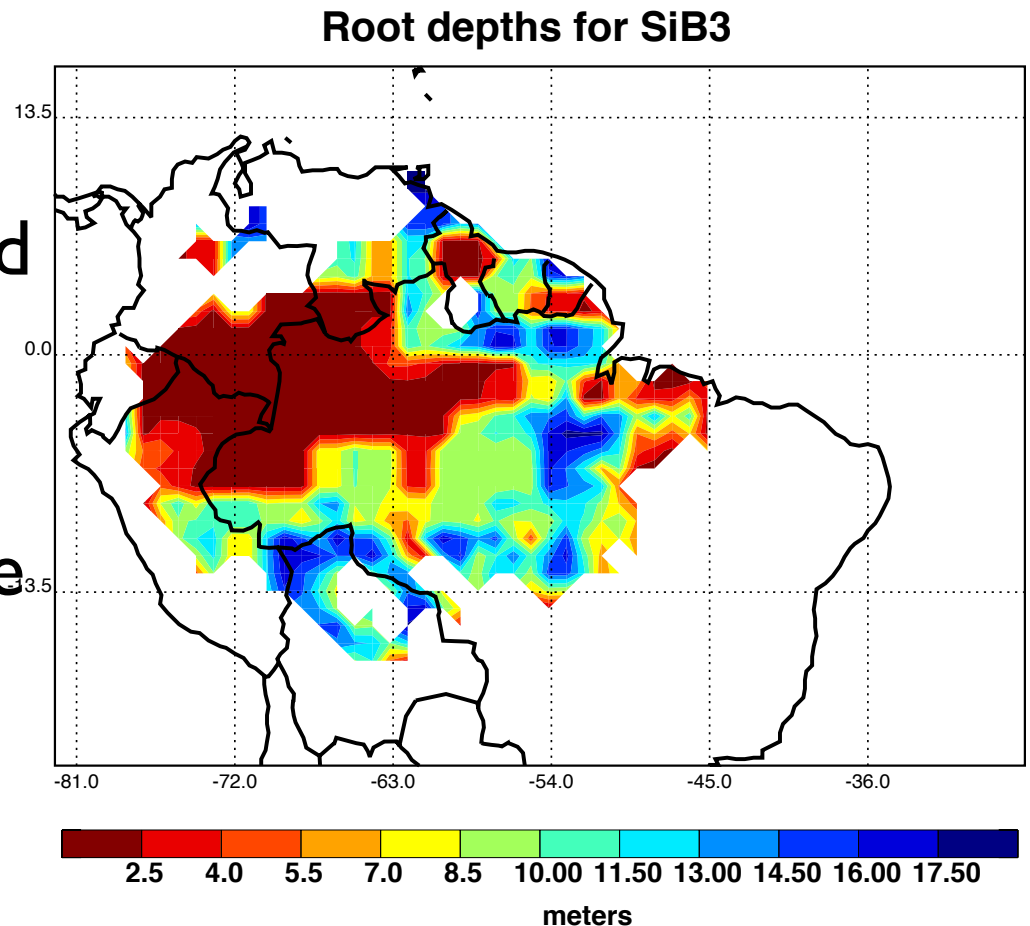
# Caxiuana Exclusion: SiB3

- SiB3 w/ 10 m soil underestimates drought
- Shallow roots best capture response
- Improvements with observed LAI & soil type

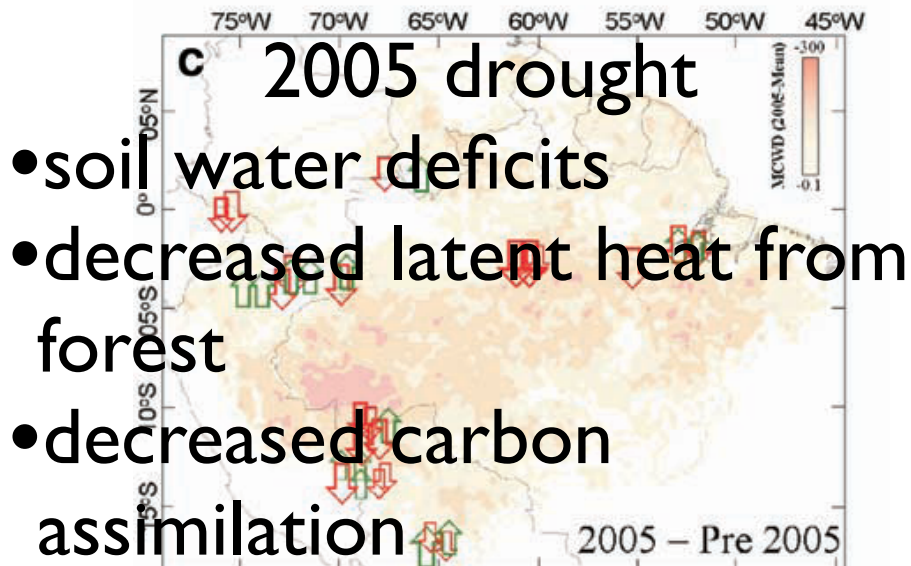
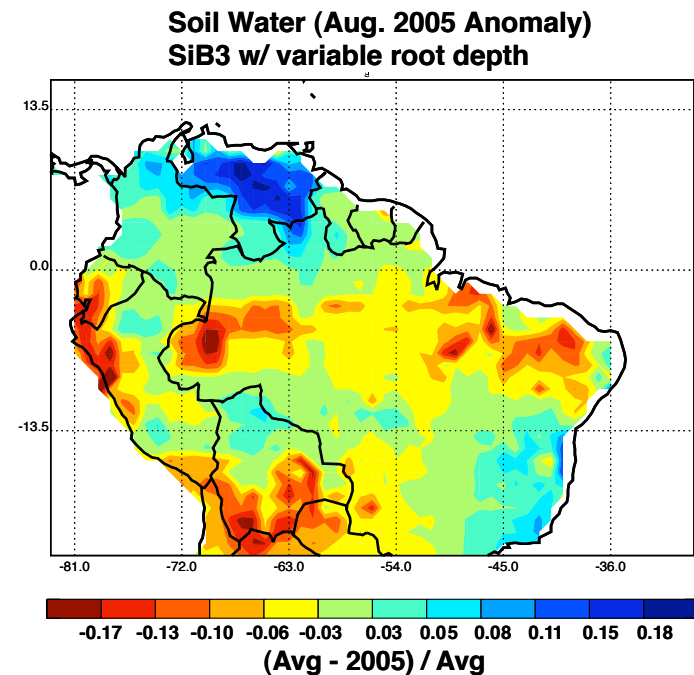
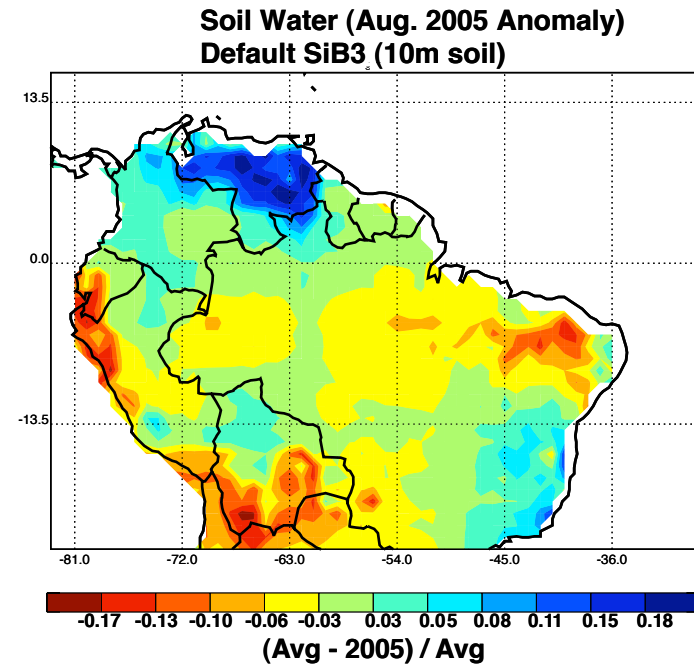
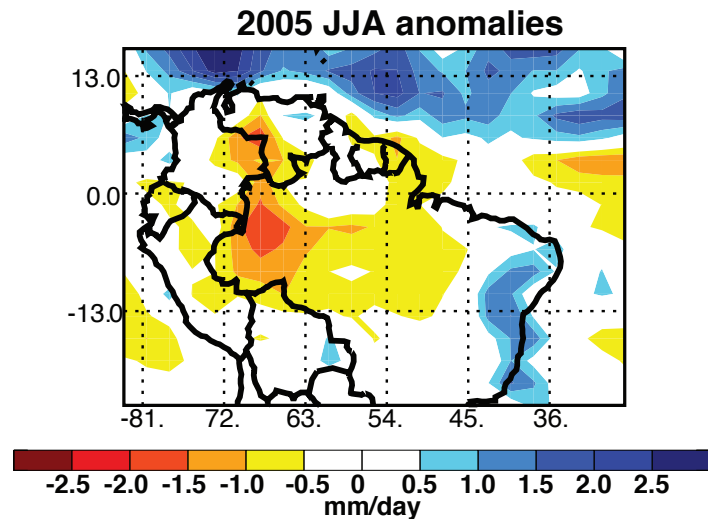


# Variable root depth

- Shallow roots where annual rainfall is high and dry seasons are less severe
- Deeper roots elsewhere
- Deforestation reduces root depth



# Results with varying root depth



Phillips et al. 2009: Drought sensitivity of the Amazon rainforest, *Science*