



Influences of Drought on Biogenic VOC Emissions

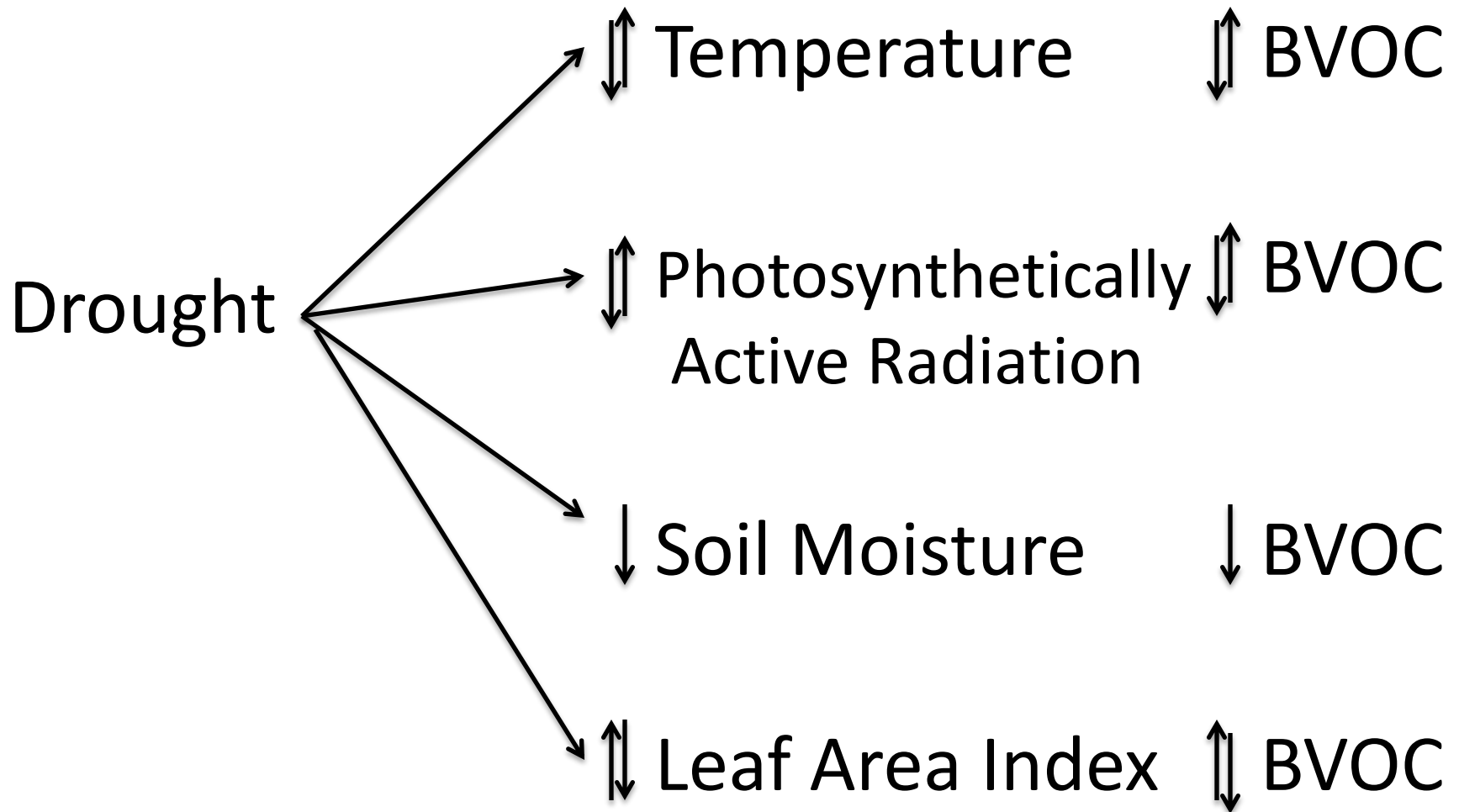
Erin Chavez-Figueroa

Daniel Cohan

Motivation

- Drought in US expected to increase
- BVOC emissions often dictate NO_x:VOC
- BVOC still uncertain
- Direct and indirect impact from drought

Drought Impacts on BVOC Emissions

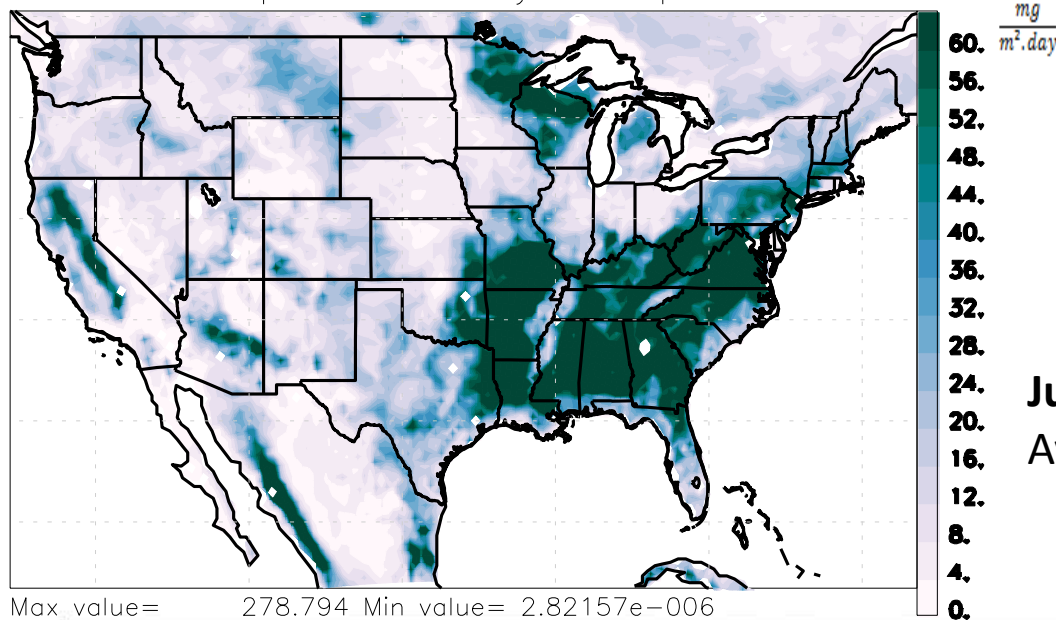


Study Design

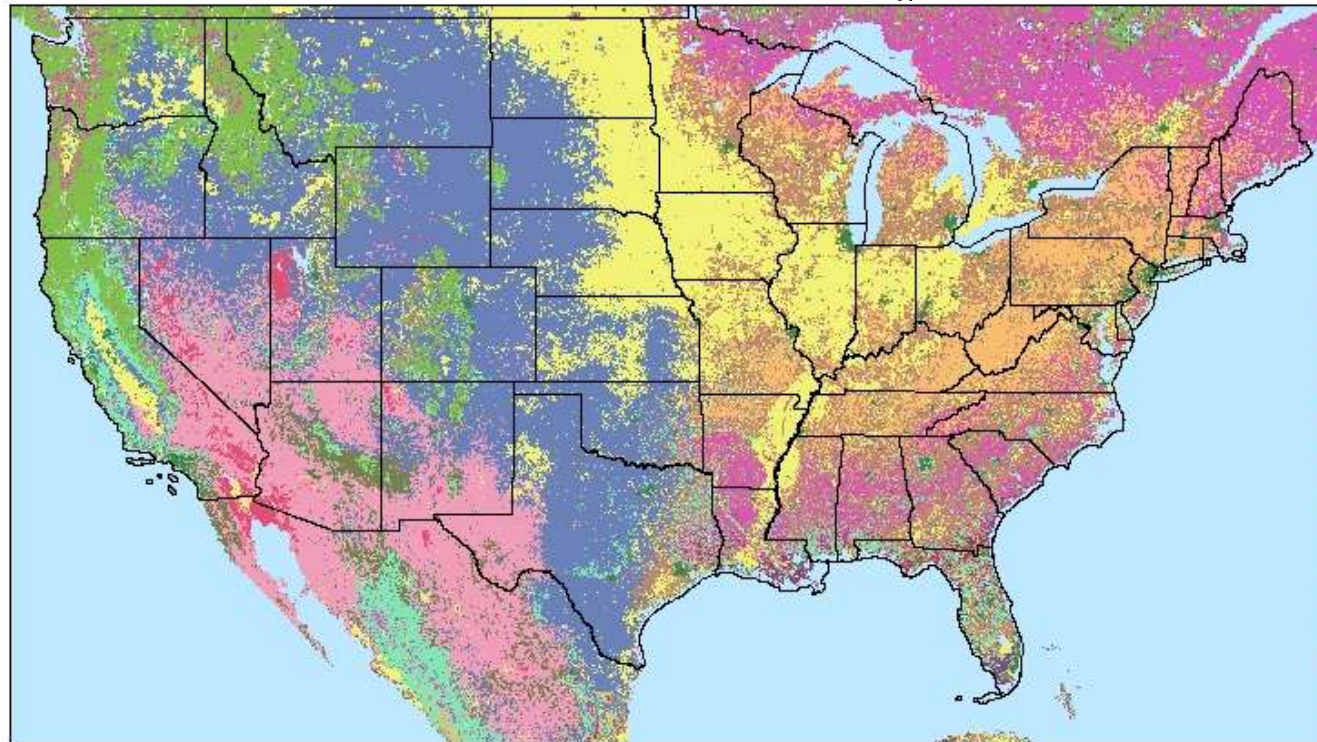
- Ensemble of MEGAN Runs
 - Summers 2005 and 2007
 - Meteorology from WRF
 - Pleim-Xiu Surface Physics
 - NCEP Observational Nudging
 - PAR from WRF or Satellite (UMD)
 - LAI for each year or 2001 -2010 average
 - MODIS monthly average LAI at 0.25° (BU)
 - Modeled daily values at 1.0° (Stockli)

Isoprene Emissions

July 2007 Isoprene Emissions
Average Daily Total



Max value= 278.794 Min value= 2.82157e-006



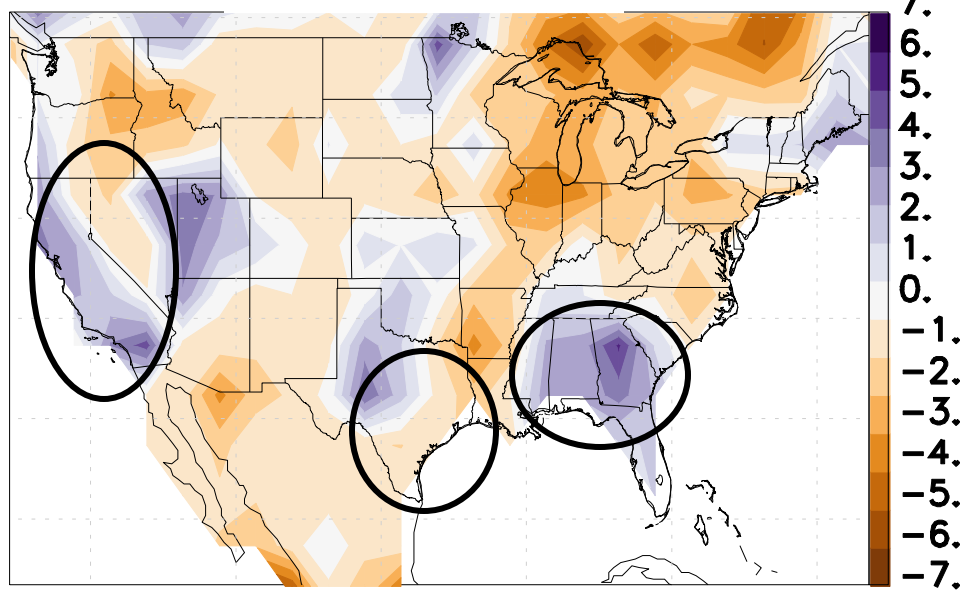
Legend

- Water
- Evergreen Needleleaf Forest
- Evergreen Broadleaf Forest
- Deciduous Needleleaf Forest
- Deciduous Broadleaf Forest
- Mixed Forest
- Closed Shrublands
- Open Shrublands
- Woody Savannas
- Savannas
- Grasslands
- Permanent Wetlands
- Croplands
- Urban and Built-Up
- Cropland/Natural Vegetation Mosaic
- Snow and Ice
- Barren or Sparsely Vegetated

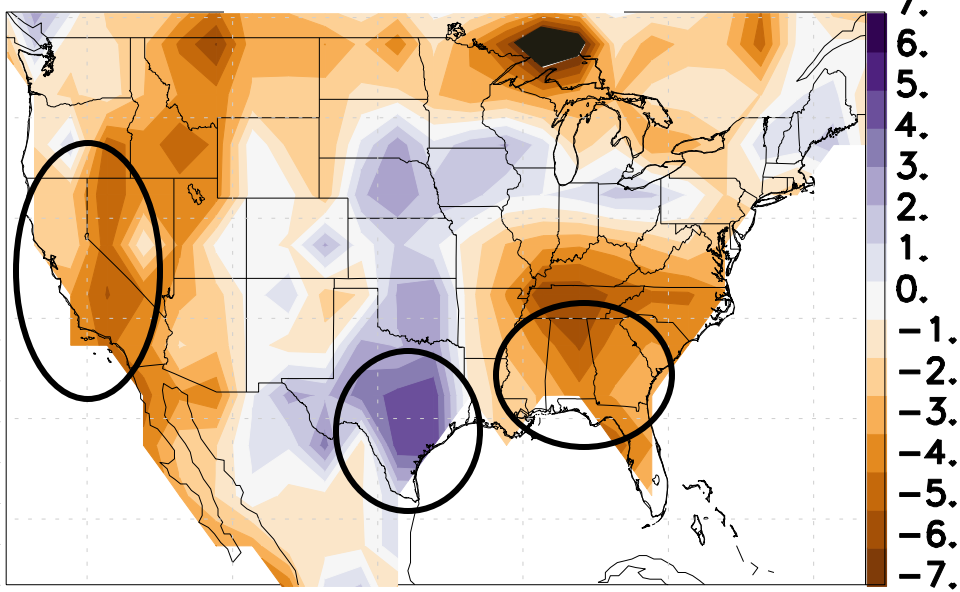
MODIS Landcover Categories

PDSI and T Influence on BVOC

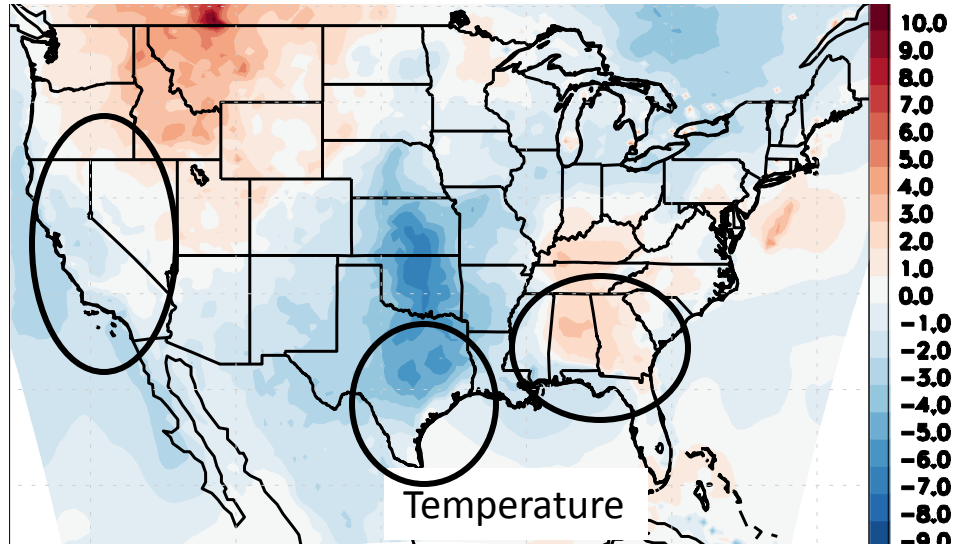
July 2005 PDSI



July 2007 PDSI



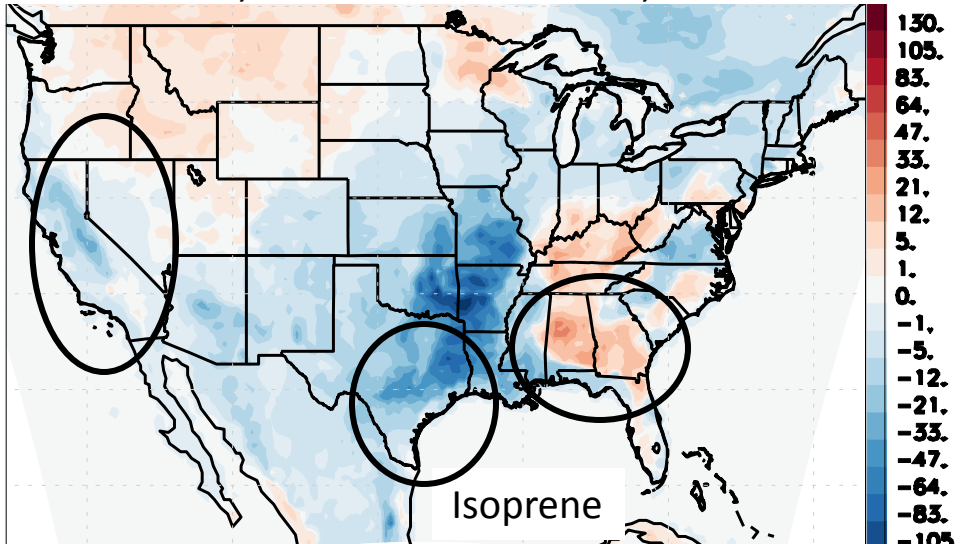
WRF2007 – WRF2005



Temperature

Max value= 10.5034 Min value= -10.2917

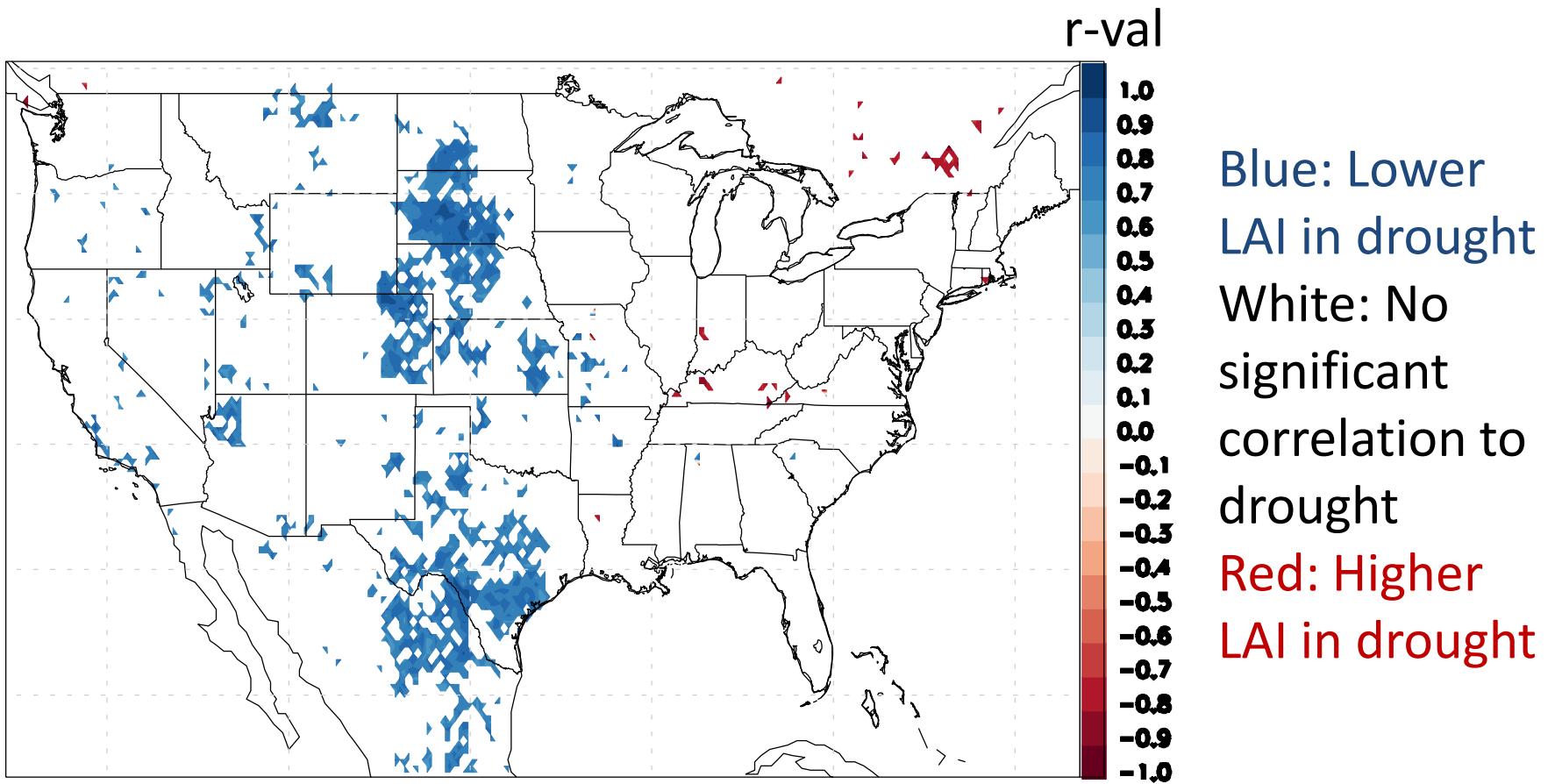
WRF2007, LAI2007 – WRF2005, LAI2005



Isoprene

Max value= 45.3432 Min value= -130.529

LAI Sensitivity to Drought

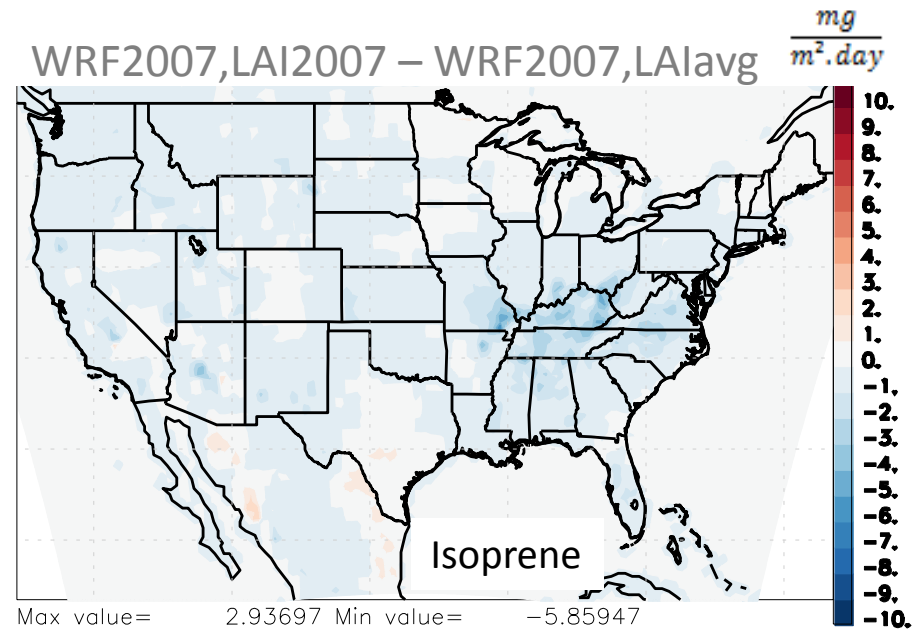
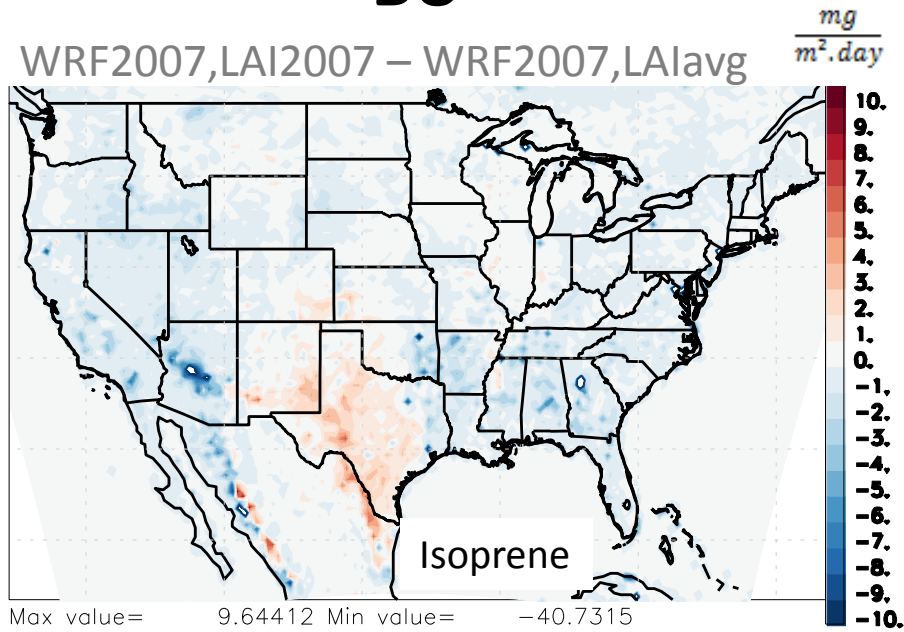


Leaf Area Index anomalies correlated to PDSI

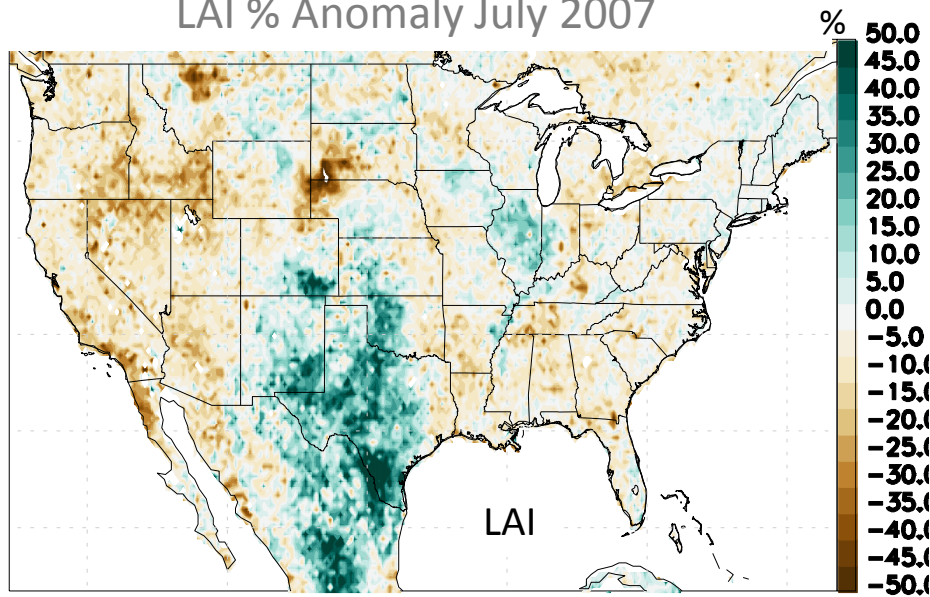
LAI Influence

BU

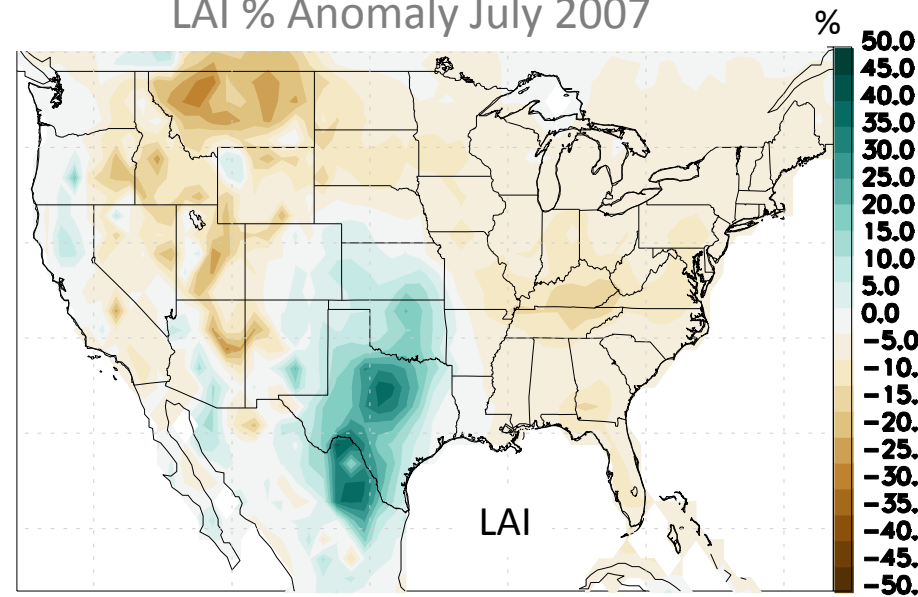
Stockli



LAI % Anomaly July 2007

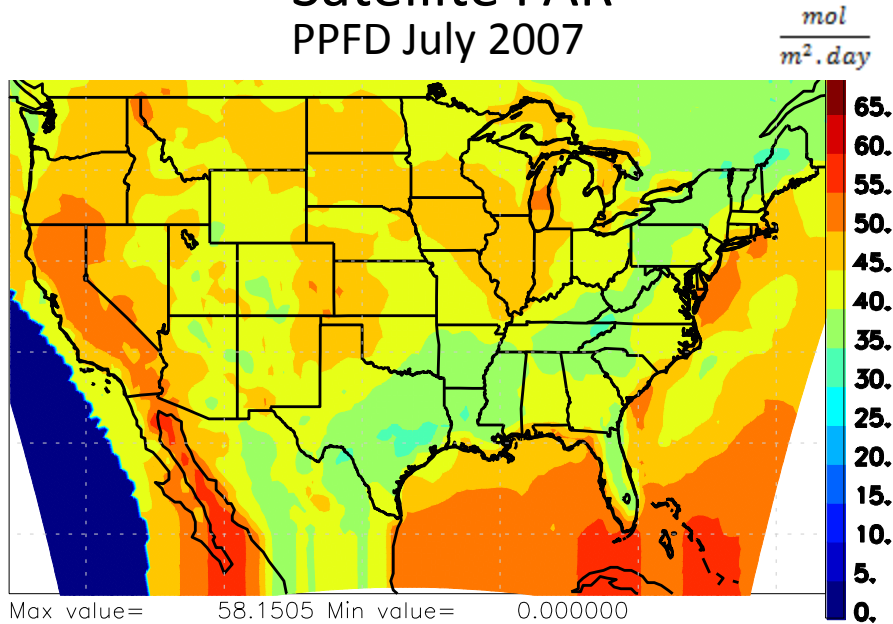


LAI % Anomaly July 2007

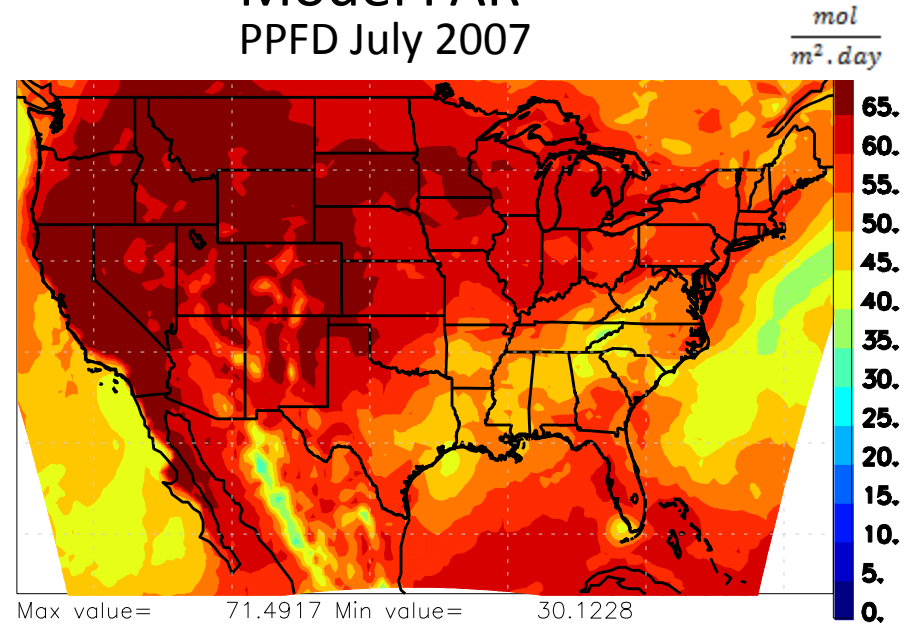


PAR: Satellite v WRF

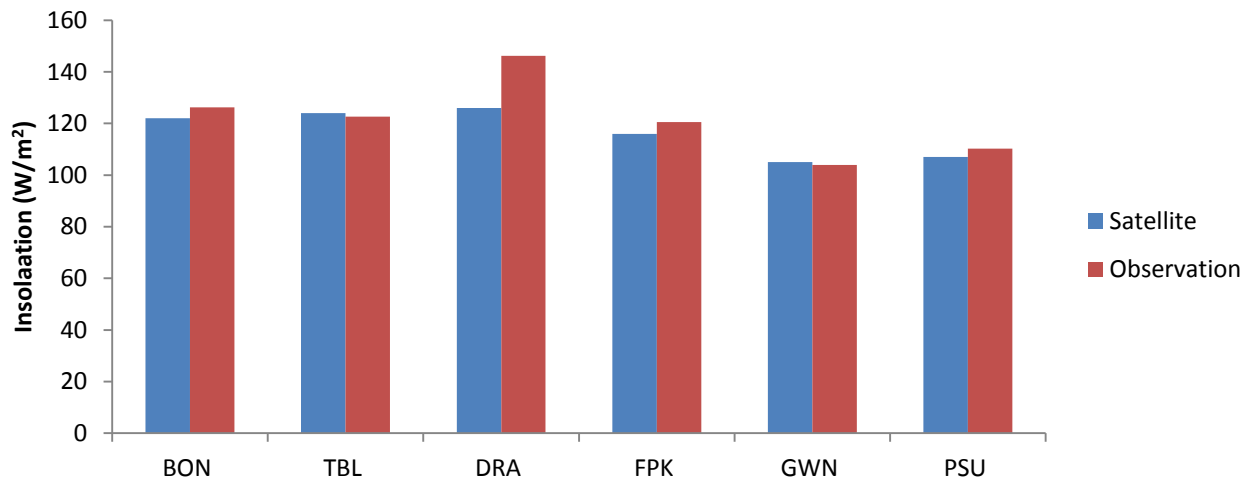
Satellite PAR
PPFD July 2007



Model PAR
PPFD July 2007



Satellite and Ground Observations of Insolation



Ground observations from
SURFRAD 6

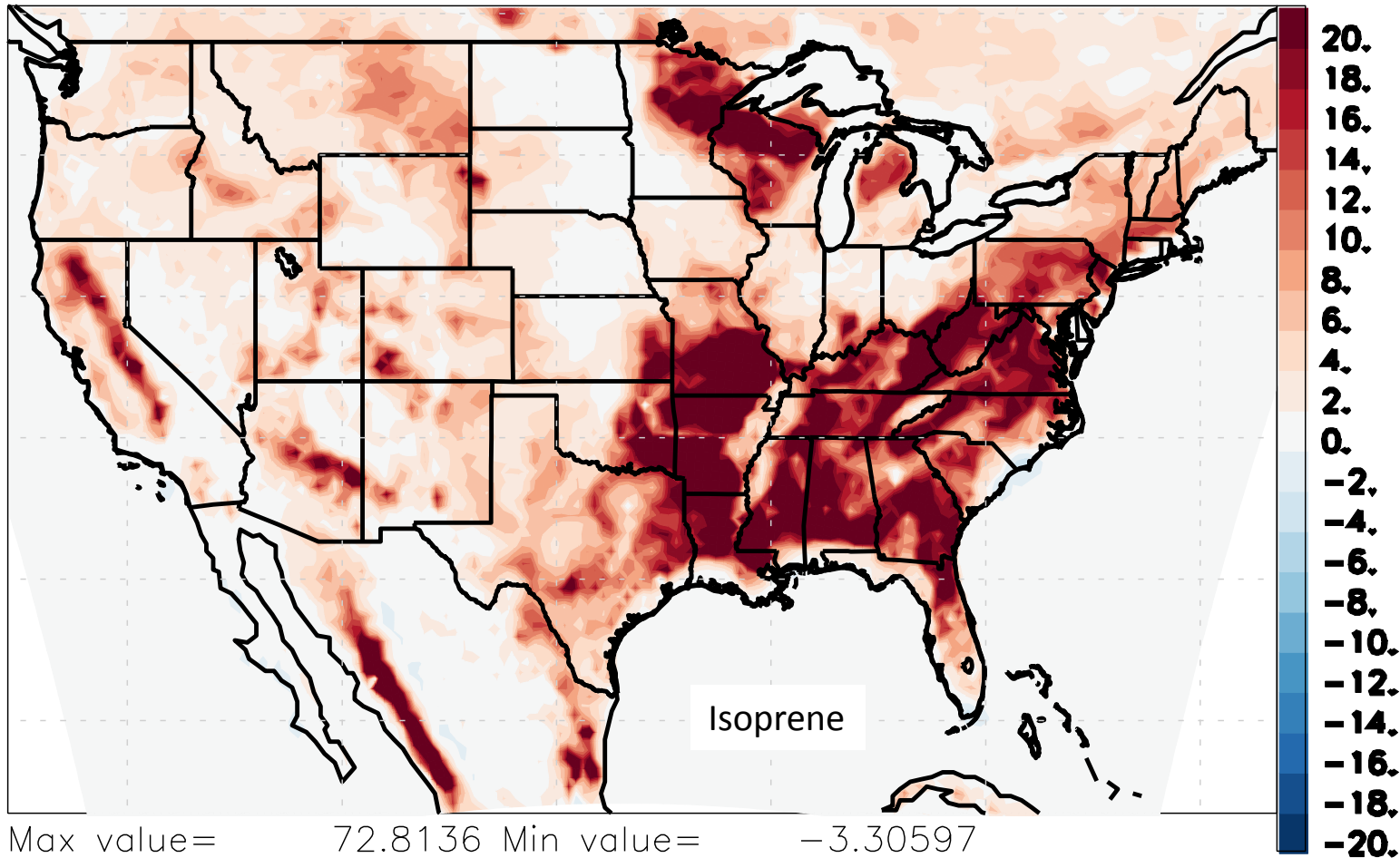
Satellite from **UMD satellite**
PAR dataset

Model PAR from **WRF run**

PAR Influence

WRF2007,LAI2007 – SAT2007,LAI2007

$\frac{mg}{m^2 \cdot day}$



Conclusions

BVOC estimates are most influenced by:

- Temperature
- Choice of LAI dataset
- Source of PAR data

Acknowledgements

- Data Provided By
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- Alex Guenther and Xiaoyan Jiang
- Dan Cohan
- NASA ACAST



NASA Air Quality Applied Sciences Team

Earth Science Serving Air Quality Management Needs

