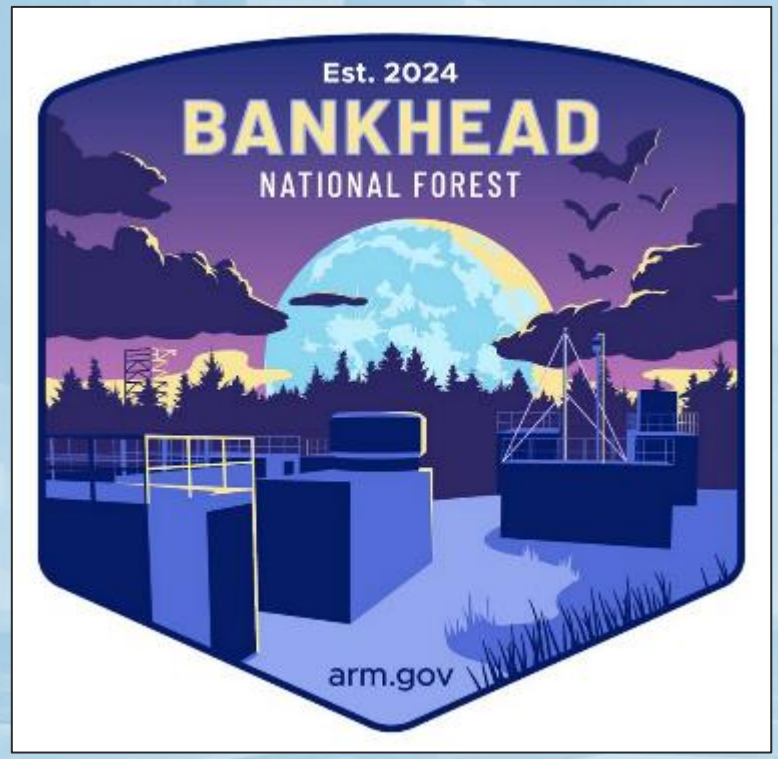


LASSO-BNF: Future Scenario Considerations

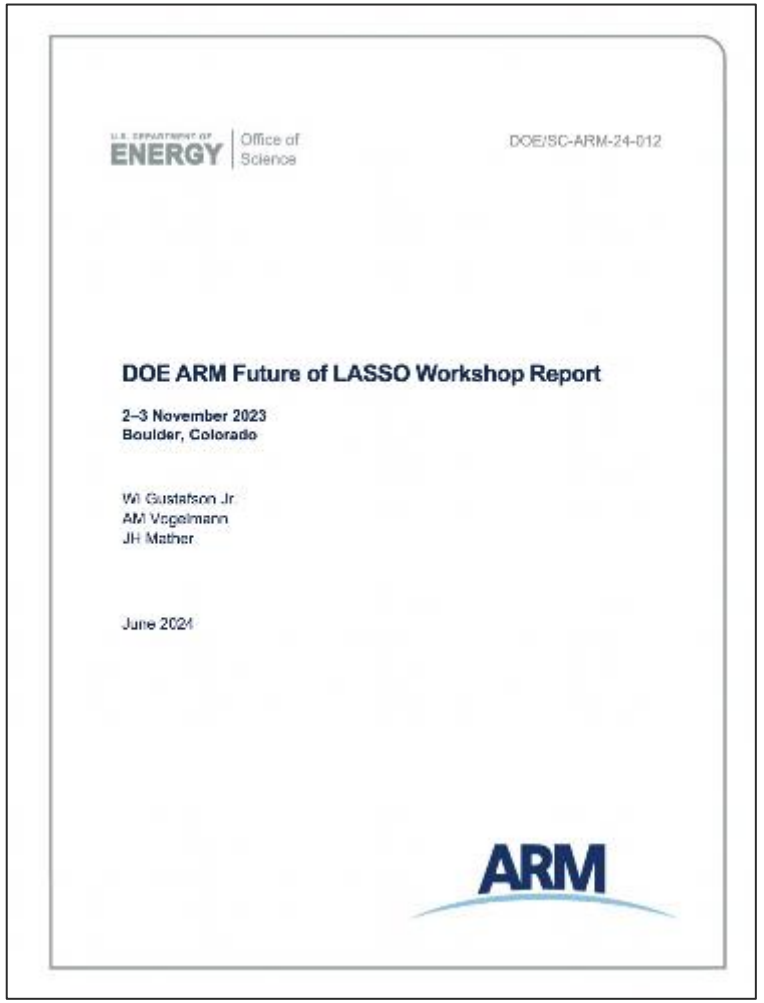
Breakout Session Hour 2, Talks & Discussion

Scott E. Giangrande[2], William I. Gustafson Jr.[1] ,
& the LASSO Team

[1] Pacific Northwest National Laboratory; [2] Brookhaven National Laboratory

What is Next for LASSO?

- LASSO held a “Future of LASSO Workshop” to discuss its history and future direction (Winter 2023).
- Workshop solicited the community to submit ideas to discuss future scenarios, as well as improvements to the LASSO approach.
- Recent ARM campaigns received the most feedback (BNF & EPCAPE).
- ***One Takeaway: Several opportunities at BNF.*** BNF represents a long-term investment for ARM, and LASSO will expedite research that capitalizes on BNF’s unique multi-disciplinary instrumentation.



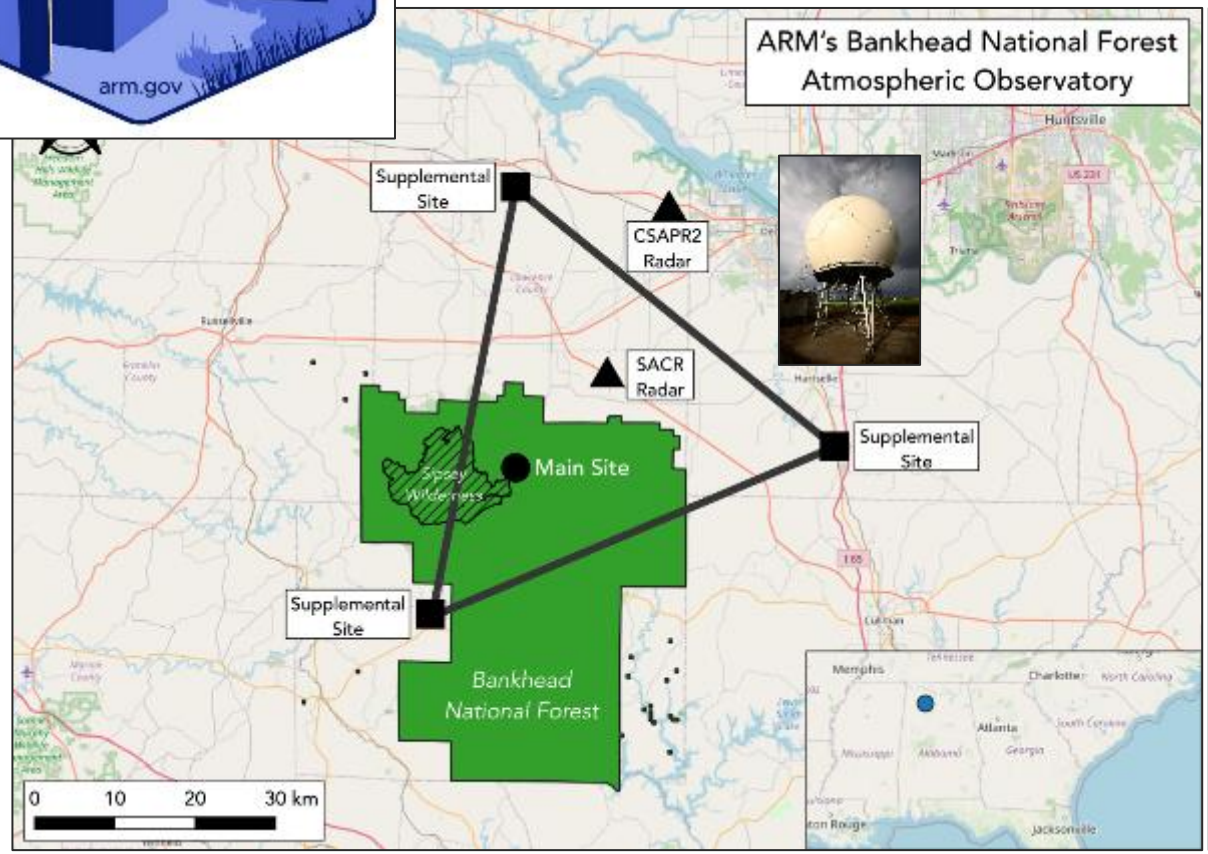
How Will LASSO Prioritize Designing LASSO-BNF?

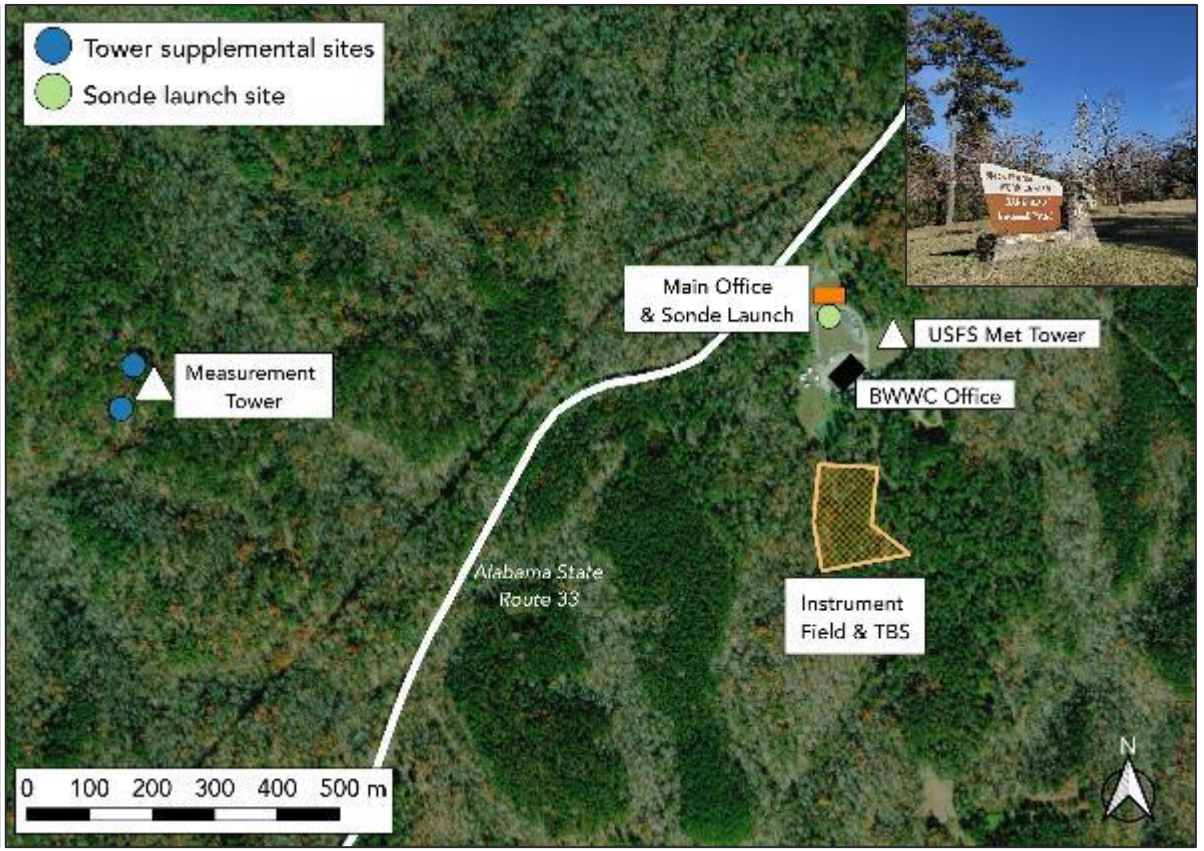
Factors LASSO must consider in future scenario & community discussions:

- ***Scientific Relevance and/or Connectivity?***
  - Is the scenario highly aligned with key DOE program foci? Potential for multi-agency partnerships?
- ***Observations Readiness?***
  - Does LASSO have the ***requisite observational library*** and/or will LASSO ***increase visibility*** of ARM datasets?
- ***Community Interest / Anticipated User Base?***
  - Will the scenario integrate with anticipated DOE and other projects?
- ***Computational / Labor Resources?***
  - Is there sufficient computing/storage, complexity consistent with anticipated scenario demands/use?

The Bankhead National Forest (BNF)

Breakout Session 6: Thursday, 6 March, 10:45 AM [Eisenhower]



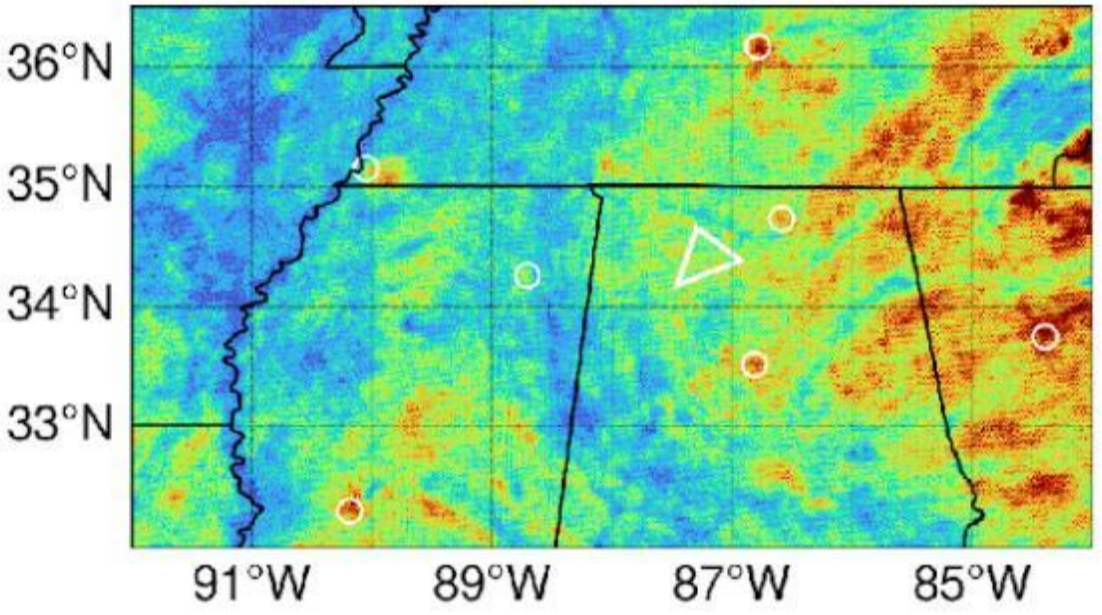


Science Drivers: Abundant shallow to deep convection, local coupling of the land surface with atmospheric processes.

Complex Cloud Controls at Regional S.E. US Scales
Frequent Cumulus within the BNF Domain

Quiescent Conditions

Summer Cumulus Occurrence

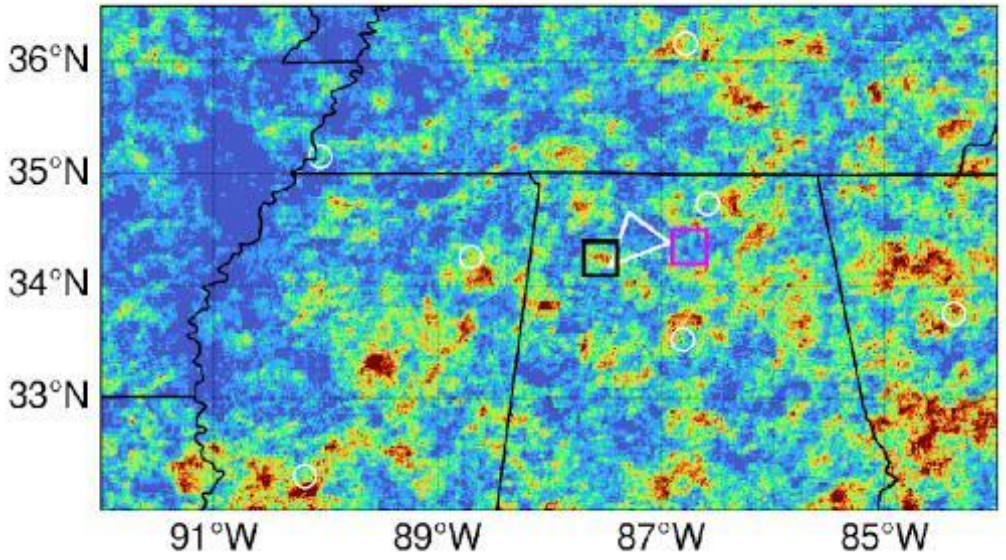


May – August, 2012-2016 (5 Summers)

Following, Gambill and Mecikalski (2011)
Plots courtesy of Nick Leitmann-Niimi, Greg Elsaesser

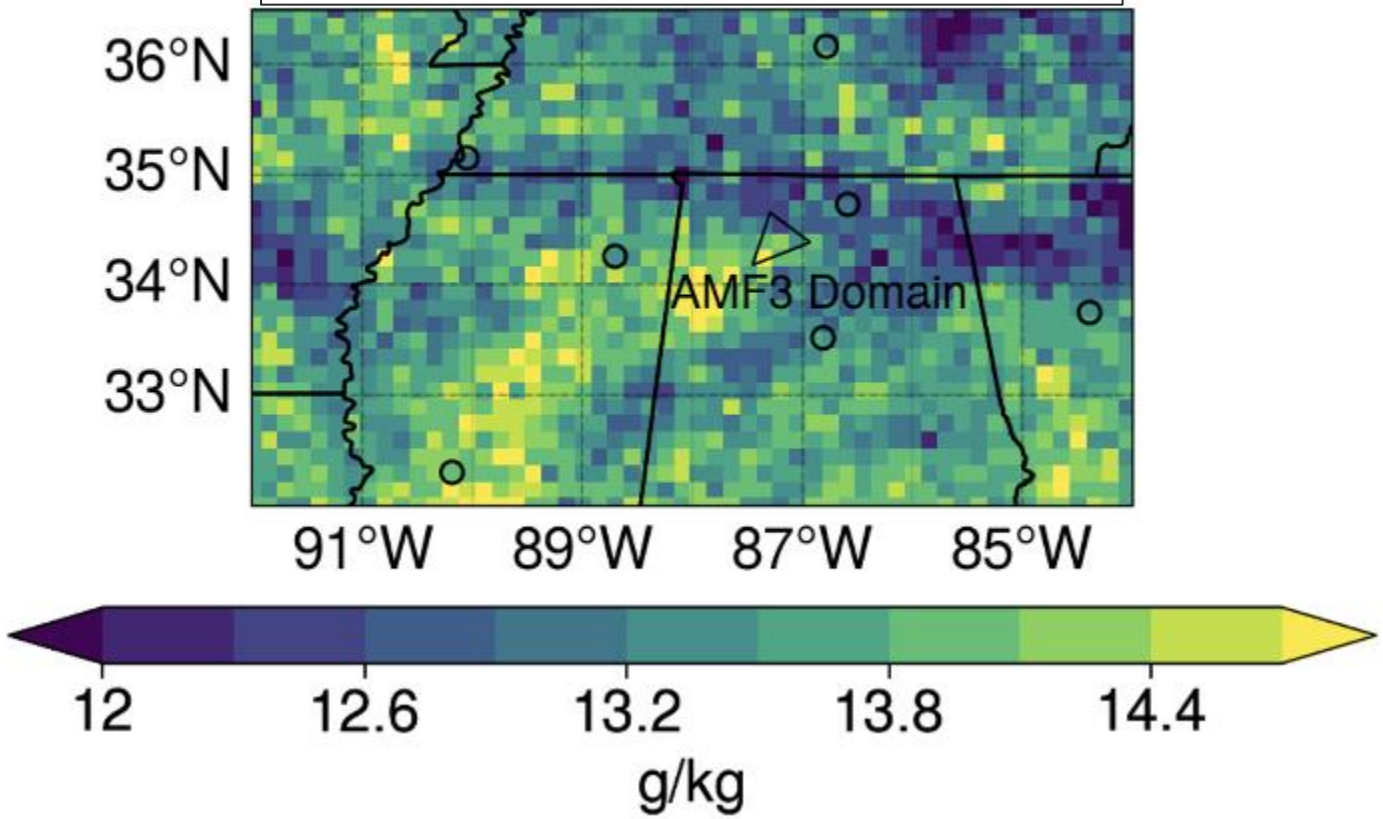
GOES Indicates "Hot Spots" for Deeper Convection
Can This be Attributed to Land Surface Coupling?

Deep Convective Counts



- Approx. 3x higher DCC frequency in the black box.
- Soil moisture vs. slowly changing features important in preconditioning moisture?

Quiescent Conditions
Suomi SNPP Qv 925 hPa



Usefulness for (IOP) observations of fine-scale resolution within the BNF domain to identify controls.

SNPP QV : SiFSAP – Wu et al. 2023 AMT
Plots courtesy of Nick Leitmann-Niimi, Greg Elsaesser

Building on Past Scenarios to Inform LASSO's Next BNF Scenario?

SGP Shallow Convection → BNF Shallow Convection

- **BNF Science Drivers:** Processes controlling cloud onset, shallow to deep transitions. Role of the surface, prior convection on subsequent clouds.
- ***Talk in this Session:*** "BNF Shallow Convection Modeling" (Girish Raghunathan).

CACTI Deep Convection → BNF Deep Convection

- **BNF Science Drivers:** Convective initiation, severe weather, environmental characteristics that control deep convective updrafts and mass flux.
- ***Talk in this Session:*** "INCUS Synergy with LASSO" (Steve Saleeby).

Discussion that follows these talks is not limited to these options (or a single BNF scenario). Any LASSO scenario requires effort spanning multiple years.

A Discussion on a LASSO-BNF Scenario and its Needs

- What science questions would you use to build this LASSO-BNF scenario?
- Would a different LASSO approach improve your ability engage with ARM data (e.g., “routine” LES, “MIP-inspiring” or “MIP-responsive”)?
- Critical model resolutions, domains, complexity for BNF scenarios?
  - Ways to efficiently use CONUS capabilities (i.e., HRRR)?
- “Extended library, less complex” vs. “Fewer cases, more complete”?
  - Most publications that use LASSO re-run the model.