LASSO* Data bundles & CMDV-CM4 related data developments

Andrew Vogelmann¹, William Gustafson², Bhargavi, Krishna³, Tami Toto¹, Zhijin Li⁴,⁵, Xiaoping Cheng⁵, Satoshi Endo¹, Jinwon Kim⁴, & Heng Xiao²

¹BNL, ²PNNL, ³ORNL, ⁴UCLA, ⁵JPL, ⁵Nanjing U.

LASSO Webpage: https://www.arm.gov/capabilities/modeling
LASSO e-mail list sign up: http://eepurl.com/bCS8s5

*LES ARM Symbiotic Simulation and Observation
LASSO Breakout Session (Potomac), Today 4-6 p.m.

Posters presentations Tuesday A1 (3:30-5:00 p.m.)

- #168, Oue et al. ARSCL simulator
- #171, Li et al., Multiscale Data Assimilation Forcing for LASSO
- #172, Krishna et al.: LASSO Bundle Browser Using NoSQL Technologies
- #173, Gustafson et al., LASSO Overview
- #174, Vogelmann et al., LASSO Data Bundles
Goal is to use routine LES – constrained and evaluated by ARM observations – to help bridge the model-observation gap

- Intended to build a library of simulations w/ observations for research

It is a 2-year pilot project due to transition to operations this year

- Focused initially on shallow convection at the SGP
- To be applied to other phenomena and ARM sites

A “data bundle” is a package of observations and simulations (aka, a “data structure”) aimed at providing the best description of the atmosphere
What’s in a data bundle?

- Case descriptors
  - Cloud type, weather state, inversion strength, etc.

- Model evaluation metrics
  - Model-observation diagnostics
  - Model skill scores

- Model input and output fields
  - 3-D model fields, profile statistics, and model-based budget terms
  - Forcings and initial conditions
The LASSO Bundle Browser

Enables interactive queries to find the cases of interest

http://www.archive.arm.gov/lassobrowser
What observations are used?

- LASSO’s focus is on developing the workflow so must focus on robust, shovel-ready (or nearly so) data products
  - Alpha 1: Focused on central facility cloud and environmental observations
  - Alpha 2: Extends focus to surrounding facilities to capture regional variability

- Climate Model Development and Validation (CMDV) Project:
  Coupling Mechanistically the Convective Motions and Cloud Macrophysics in a Climate Model (CM4) [CMDV-CM4: PI David Romps]
  - Goal: Dramatically improve the representation of shallow clouds in the DOE’s ACME model by taking advantage of the newest ARM observations, the latest developments in cloud modeling, theory and parameterization, and state-of-the-art techniques for diagnosis and validation.
  - Appropriate research-level products developed will be adopted into the LASSO workflow