Overview of the LASSO 2017 Large-Eddy Simulations of Continental Shallow Convection at the Southern Great Plains

William I. Gustafson Jr.1, A. M. Vogelmann2, Z. Li1,3, X. Cheng5, S. Endo2, B. Krishna4, T. Toto2, H. Xiao1
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What is LASSO?
The Large-Eddy Simulation (LES) ARM Symbiotic Simulation and Observation (LASSO) workflow generates routine LES simulations of shallow convection over the Southern Great Plains (SGP) region in Oklahoma to augment routine observations. The simulations are coupled with ARM observations, diagnostics, and skill scores to form a library of data bundles, which is linked to a web interface for ease of access and to quicken scientific discovery.

Getting LASSO Data Bundles
LASSO data bundles are freely available from the US DOE Atmospheric Radiation Measurement (ARM) data archive. The Bundle Browser is a specially designed web interface for querying the LASSO library and downloading bundles of interest. Results can be intercompared between simulations, simulation-specific plots and diagnostics can be viewed, and bundles queued for downloading.

Data Bundle Contents
LASSO data bundles are designed for use by a wide range of researchers who are either new to modeling or highly familiar with models.

Information Category Included Data
LES model inputs Large-scale forcings and surface fluxes for reproducing the simulation
LES model output Domain snapshots and traditional LES statistics, such as fluxes, every 10 min.
Observations E.g., cloud fraction, LWP, cloud-base height, LCL, temperature, and water vapor
Evaluation Plots, diagnostics, and skill scores for evaluating the LES

LES Ensembles
All cases include multiple simulations as an ensemble of plausible conditions leading to shallow convection for that date.

Available Cases
The LASSO pilot phase ended last summer, generating sets of simulations for two shallow convective seasons at SGP. LASSO is transitioning into routine operations and data bundles for a third shallow convection season will be released this summer.

Periods
Shallow convection typically occurs in spring and summer. LASSO has generated simulations for these periods:
- 5 days from May–July 2015
- 12 days from May–August 2016
- 31 days from April–September 2017 (available soon)

LASSO's Future
The LASSO team is in the process of exploring the next weather regime to pursue with LASSO in addition to shallow convection at SGP. The primary decision factors include 1) science drivers, 2) how the LES would add value to ARM’s observations, and 3) feasibility.

Example scenarios under consideration include:
- Mixed-phase clouds in the Arctic
- Maritime clouds at the Azores
- Deep convection or clear-air turbulence at SGP

Which would you choose and why? Send your feedback to William Gustafson and Andrew Vogelmann at lasso@arm.gov.

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