LES ARM Symbiotic Simulation and Observation (LASSO) Workflow Pilot Project

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ARM CLIMATE RESEARCH FACILITY

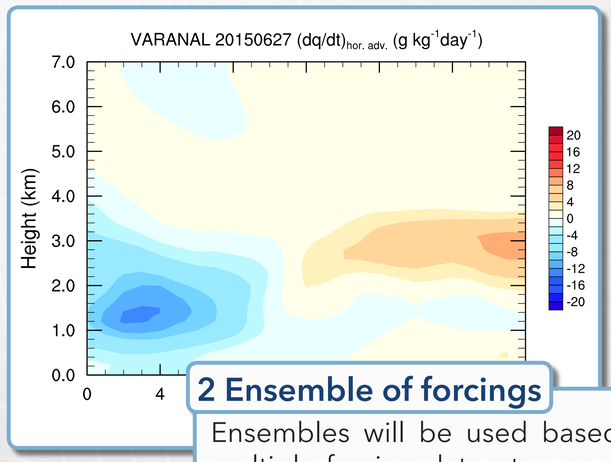
The LASSO Workflow Pilot Project is developing the capability to generate routine LES simulations of shallow convection over the SGP region. The ongoing, routine simulations will form a library of LES simulations to supplement the extensive observations at the ARM megasite.

The LES library will be useful for parameterization development, observation remote retrieval development, testing theories over a statistically robust sample set, and for evaluating forcing behaviors for modelers.

a) LASSO Workflow Features

1 Enhanced observations

ARM is enhancing 4 boundary facilities to provide remotely sensed profiles of boundary layer temperature and humidity to better constrain the large-scale forcing. Other inputs include surface fluxes, radiosondes, radar-based winds, satellite radiances, and routine surface observations.

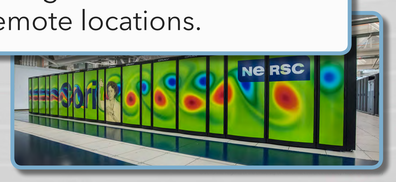


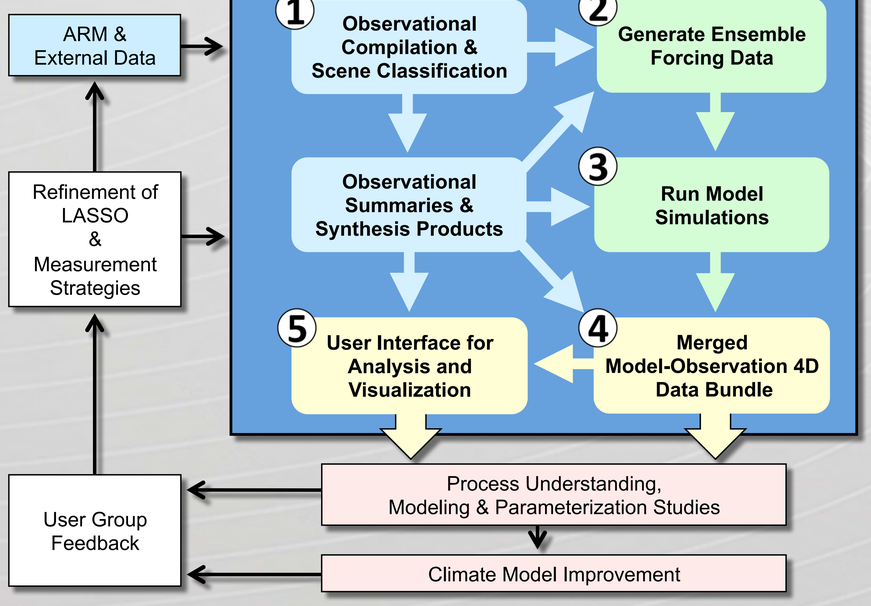
2 Ensemble of forcings

Ensembles will be used based on multiple forcing datasets, as uncertainty in the forcing will be the biggest driver of model spread. Testing during the pilot phase will examine using ARM's constrained variational analysis, multi-scale data assimilation, and ECMWF-forecast-based forcings.

5 Analysis tools

Tools will be developed to simplify analysis and visualization. The goal is to have quick-looks and efficient filtering methods via a web interface plus a scripted interface for efficiently interacting with the data from remote locations.





3 Ensemble of LES simulations

Each simulated day will consist of an ensemble of LES simulations using 2-moment bulk microphysics plus one deterministic simulation using spectral bin microphysics.

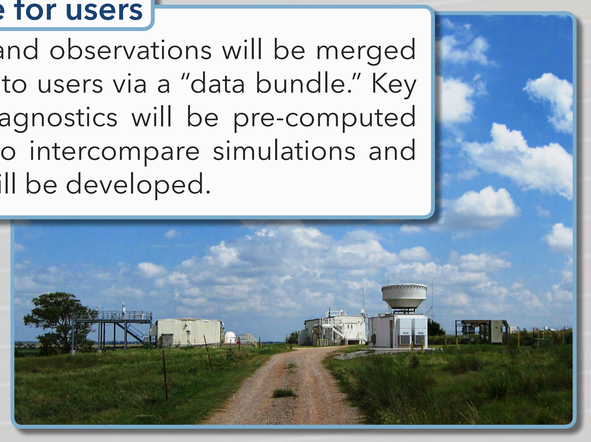
Testing during the pilot period will examine the SAM and WRF models.

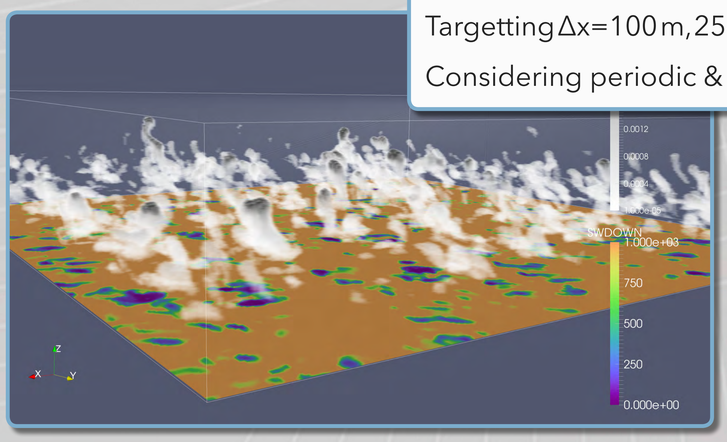
Targetting $\Delta x = 100$ m, 25-km domain.

Considering periodic & nested LES.

4 Data bundle for users

Model output and observations will be merged and presented to users via a "data bundle." Key metrics and diagnostics will be pre-computed and methods to intercompare simulations and observations will be developed.





b) LASSO Data Bundles

Data bundles are the primary interface for users to interact with LASSO data.

- User selectable contents packaged on demand
- Combine observations, model output, post-processed fields, and evaluation metrics & diagnostics
- Enables searchability for case selection

c) LASSO Timeline

May 2015	Pilot project began
June 2016	Initial ShCu simulations from spring-summer 2015 made available • Ensemble of forcings • LES from SAM and WRF • Obs. in comparable format • Metrics & diagnostics
January 2017	ShCu simulations for spring-summer 2016 • Includes impact of boundary facility profiles • Both bulk & bin microphysics
April 2017	Additional test cases for year-round shallow cloud conditions Beta software suite Recommended configurations for ongoing simulations
May 2017	Pilot project over; transition to routine simulation mode

To be included in LASSO project e-mail updates, sign up for the LASSO Information e-mail list at http://eepurl.com/bCS8s5

The LASSO website: http://www.arm.gov/science/themes/lasso
For more information contact William.Gustafson@pnnl.gov;
http://www.pnnl.gov/atmospheric/staff/staff_info.asp?staff_num=5716; http://www.researcherid.com/rid/A-7732-2008

Funding provided by the DOE Office of Science Biological and Environmental Research Program through its Atmospheric Radiation Measurement Facility.

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