

## Abstract

These data represent model output from simulations using the Regional Atmospheric Modeling System (RAMS). These data accompany the manuscript:

Grant, L. D., & van den Heever, S. C. (2018): Cold pool – land surface interactions in a dry continental environment. *Journal of Advances in Modeling Earth Systems*, submitted.

The accompanying abstract from this manuscript is as follows:

“Cold pools influence convective initiation and organization, dust lofting, and boundary layer properties, but little is known about their interactions with the land surface, particularly in dry continental environments. In this study, cold pool – land surface interactions are investigated using high-resolution idealized simulations of an isolated, transient cold pool evolving in a dry convective boundary layer. Results using a fully interactive land surface demonstrate that sensible heat fluxes are suppressed at the center of the cold pool but enhanced at the edge due to the spatial patterns of land surface cooling and the temperature and wind speed perturbations. This leads to cold pool dissipation from the edge inwards. By comparing the interactive land surface simulation to a simulation with imposed surface fluxes, the land surface feedbacks are shown to reduce the cold pool lifetime, extent, and intensity by up to 50%, which has significant implications for cold pool-induced convective initiation.”

## Description:

The RAMS output data is contained in three separate folders representing different simulations or simulation time periods as described in the accompanying manuscript. Each folder contains:

- HDF5 files (\*.h5) and corresponding header files (\*head.txt). Both analysis files and lite files are provided. HDF5 analysis files are named a-A-YYYY-MM-DD-hhmmss-g1.h5 and contain every variable that is output by the model. Restart simulations can be performed from analysis files. HDF5 lite files are named a-L-YYYY-MM-DD-hhmmss-g1.h5. Lite files only contain a small subset of variables and cannot be used for restart simulations.
- Four surface files needed for restart simulations:
  - ndh-N-YYYY-MM-DD-hhmmss-g1.h5 containing NDVI information
  - sfch-S-g1.h5 containing land surface information for the LEAF land surface model

- ssth-W-YYYY-MM-DD-hhmmss-g1.h5 containing sea surface temperature information
  - toph-S-g1.h5 containing topography information
- A RAMSIN file, the namelist text file used to define all settings to run the simulation.

The sub-folders are the following:

- PreColdPool\_12-14LT/: This folder contains the RAMS analysis and lite file output for the first two hours of the simulation in which the convective boundary layer is allowed to develop but no cold pool is introduced. The time period is from 12:00 to 14:00 local time, analysis files are every 30 min, and lite files are every 5 min.
- FB\_14-16LT/: This folder contains the RAMS analysis and lite file output for the FB (surface FeedBacks included) simulation described in the manuscript. In brief, a cold pool is introduced and it evolves over an interactive land surface. The time period is from 14:00 to 16:00 local time, analysis files are every 15 min, and lite files are every 1 min.
- NOFB\_14-16LT/: This folder contains the RAMS analysis and lite files for the NOFB (NO surface FeedBacks) simulation described in the manuscript. In brief, horizontally homogeneous but temporally variable surface sensible and latent heat fluxes are prescribed; these prescribed fluxes are determined from the average environmental fluxes in the FB simulation, as described in the manuscript. The time period and output frequency is the same as for the FB simulation.

The RAMS model source code, related documentation, and detailed information on output variables available in the HDF5 files are all available on the RAMS website: <https://vandenheever.atmos.colostate.edu/vdhpage/rams.php>