



E3SM Single Column Model

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Brief Overview of E3SM SCM

- Energy Exascale Earth System Model (E3SM) SCM (Bogenschutz et al. 2020; submitted to GMD).
 - Github wiki: <https://github.com/E3SM-Project/scmlib/wiki/E3SM-Single-Column-Model-Home>
- User base is the E3SM community, spread over several DOE labs (e.g. LLNL, LBNL, PNNL, ANL, ONL, BNL, etc.)
- E3SM SCM primarily used to:
 - Study cloud processes and evaluation of parameterizations
 - Support parameterization implementation/development efforts
 - Perform perturbed parameter sensitivity studies
 - Efficiently debug the model

Brief Overview of E3SM SCM

- E3SM was originally inherited from CAM
 - SCM uses netcdf file format; driven by a single forcing file per case.
- E3SM SCM library contains 27 scientifically validated cases.
 - All SCM cases are configured to match any “idealizations” for apples to apples comparison with LES (where available)
 - A unique script is provided for each case
- Ability to seamlessly “replay” a column from a GCM run.
- E3SM SCM diagnostics package available on Github wiki
 - Currently only supports model vs. model run
 - Ability to add LES/CRM and observations can be extended

E3SM Case Library

E3SM Single Column Model Case Library

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Verified Cases:

- [AEROSOLINDIRECT - Study of Aerosol Indirect Effects in China](#)
- [ARM95 - Deep Cumulus Convection](#)
- [ARM97 - Deep Cumulus Convection](#)
- [ARM GCSS Shallow Convection - Diurnal Cycle of Continental Shallow Convection](#)
- [ARM - SGP Continuous Forcing \(2004 - 2015\)](#)
- [BOMEX - Trade Wind Cumulus](#)
- [DYCOMS RF01 - Nonprecipitating Marine Stratocumulus](#)
- [DYCOMS RF02 - Drizzling Subtropical Stratocumulus](#)
- [DYNAMO AMIE - Dynamics of the Madden Julian Oscillation](#)

DYNAMO Revelle - Dynamics of the Madden Julian Oscillation

Overview This is a 90 day case from the [Dynamics of the Madden Julian Oscillation](#) (DYNAMO) field campaign which was an IOP over the Indian Ocean to collect data to study the onset of the MJO. This particular case includes forcing data collected aboard the R/V Roger Revelle operated by the Scripps Institution of Oceanography.

[DYNAMO Revelle Run Script](#)

GATE - Tropical Atlantic Deep Convection

Overview: This case is based on the Global Atmospheric Research Program's Atlantic Tropical Experiment (GATE, [Houze and Betts 1981](#)), who's goal was to improve basic understanding of topical convection and its role in the global atmospheric circulation. This is a 20 day case that begins on 30 August 1974.

Verification Notes: This case is simulated with the expected behavior.

[GATE Run Script](#)

GOAMAZON - Green Ocean Amazon

Overview This is a 23 month case from the Observations and Modeling of the [Green Ocean Amazon](#) (GOAMAZON) field campaign ([Martin et al. 2017](#)). Observations and forcing are derived from the ARM Mobile Facility, which was located downwind of the city of Manaus, Brazil near

E3SM SCM webpage on Github (publicly viewable)

Currently we provide support for 27 cases that will run out of the box with E3SMv1 and master

Each case has short description and supported run script

All needed input is preinstalled on widely used E3SM machines

<https://github.com/E3SM-Project/scmlib/wiki/E3SM-Single-Column-Model-Home>