

LES and SCMs at CliMA



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SCM: Turbulence and convection parameterizations

- EDMF scheme with multiple unsteady plumes (Tan et al., *JAMES* 2018).
- Around 10 cases, based on published LES studies. Forcing: hardcoded (for now), Output: NetCDF4. ullet



GABLS

Shading: LES range from original case study.

DYCOMS-II RF01

(Lopez-Gomez et al., *JAMES*, under review)



GCM-forced LES

Enable:

- Study of cloud response to global warming (Schneider et al., Nat. Geosci., 2019).
- Creation of extensive LES data set (1000 cases) for model calibration. (Shen et al., JAMES, 2020).

CliMA-LES can run on CPUs and GPUs, allowing fast data generation through distributed computing.

Forcing: NetCDF4, Output: NetCDF4.



Adapted from Schneider et al., Nat. Clim. Change, 2017

GCM-forced LES + SCM for model calibration

- Calibration and uncertainty quantification with MCMC requires $N > 10^5$ SCM evaluations.
- Calibrate-emulate-sample approach provides an efficient alternative by sampling a cheaper emulator.



LES, SCM and CES code available at: https://github.com/CliMA

(Cleary et al., J. Comp. Phys., under review).