Update on Fast-Physics Testbed and Some CAM SCM Results

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Outline

• Update on Fast-Physics Testbed
• SCM Simulations with continuous forcing
• Effect of interactive land surface
SCAM3 ready
GFDL almost ready
GISS in process

SCAM3
All SCM IOP cases (SGP, TWP, NSA)
Continuous forcing 1999-2001
Full period (monthly) or any subperiod

Surface and upper air (< 100 hPa): monthly climatology
Single column model CAM3.1 is being executed:

**Your SCM experiment has been completed! Start post processing, please wait ...**

Select a model

- CAM3.1
- CAM3
- CAM2
- CCM3.6
- GFDL
- GISS
- CAM Dev

Select physics schemes

More model options

Select forcing data

Forcing options

Simulation options

Summary of SCM experiment settings

Start SCM Experiment
Single column model CAM3.1 is being executed:

Your SCM experiment has been completed! Start post processing, please wait ...
View/download the results. Quicklook plots.

Select a model

CAM3.1 CAM3 CAM2 CCM3.6 GFDL GISS CAM Dev

- Select physics schemes
- More model options
- Select forcing data
- Forcing options
- Simulation options
- Summary of SCM experiment settings

Start SCM Experiment
Total (convective and large-scale) precipitation rate

- scam3: 11.06 mm/day
- Obs_SGP_0003: 12.95 mm/day
Diurnal phase (cldtot)

- obs: summer & winter similar
- cam: opposite during daytime

Diurnal amplitude (cldtot)

- obs: winter much smaller
- cam: comparable

Cloud vs. precip

- jja: precip peaks earlier, more so in obs (less tightly coupled)
- djf: obs precip still peaks earlier, but cam diff. phase diff small compared to jja.
CAM: more regular diurnal phase
higher overlapping ratio
(less tilting of vertical structure)
Obs: larger variability, horiz, vert, temporal
(individual or case to case)
(more cases meaningful)
Surface normalized SW CRF vs Cloud Albedo

\[ F_{cld} = F_{all}^{dn} - F_{clr}^{dn} \]

\[ \alpha_{cld}^{SRF} = -\frac{F_{cld}^{dn}}{F_{clr}^{dn}} = 1 - \frac{F_{all}^{dn}}{F_{clr}^{dn}} \approx \alpha_r f \]

(approximation assuming equal contribution by each cloud type)

Alternative: direct calculation of cloud albedo based on cloud optical thickness
Cloud albedo dominates SW CRF variation

Model and obs albedo similar variation daytime

DJF model albedo variation in phase with cloud, obs not. (in phase with precip instead)

Cloud water and cloud amount more tightly coupled in models despite using RH-cloud fraction scheme
Seasonal scale

CRF seasonal significant
albedo and cloud amount both contribute

Seasonal total precip less effective measure of performance with prescribed forcing
Interactive land vs prescribed surface properties

- LH Flux
- SH Flux
- Precip (mm/day)

Local time (hours)
Summary

• Update on Testbed
  SCAM ready for all available cases
  Online evaluation ready

• 3-Year SCM simulations identify some systematic biases in model

• Cloud albedo derived from surface SW forcing reasonable to large extent

• Current model not particularly sensitive to interactive land surface