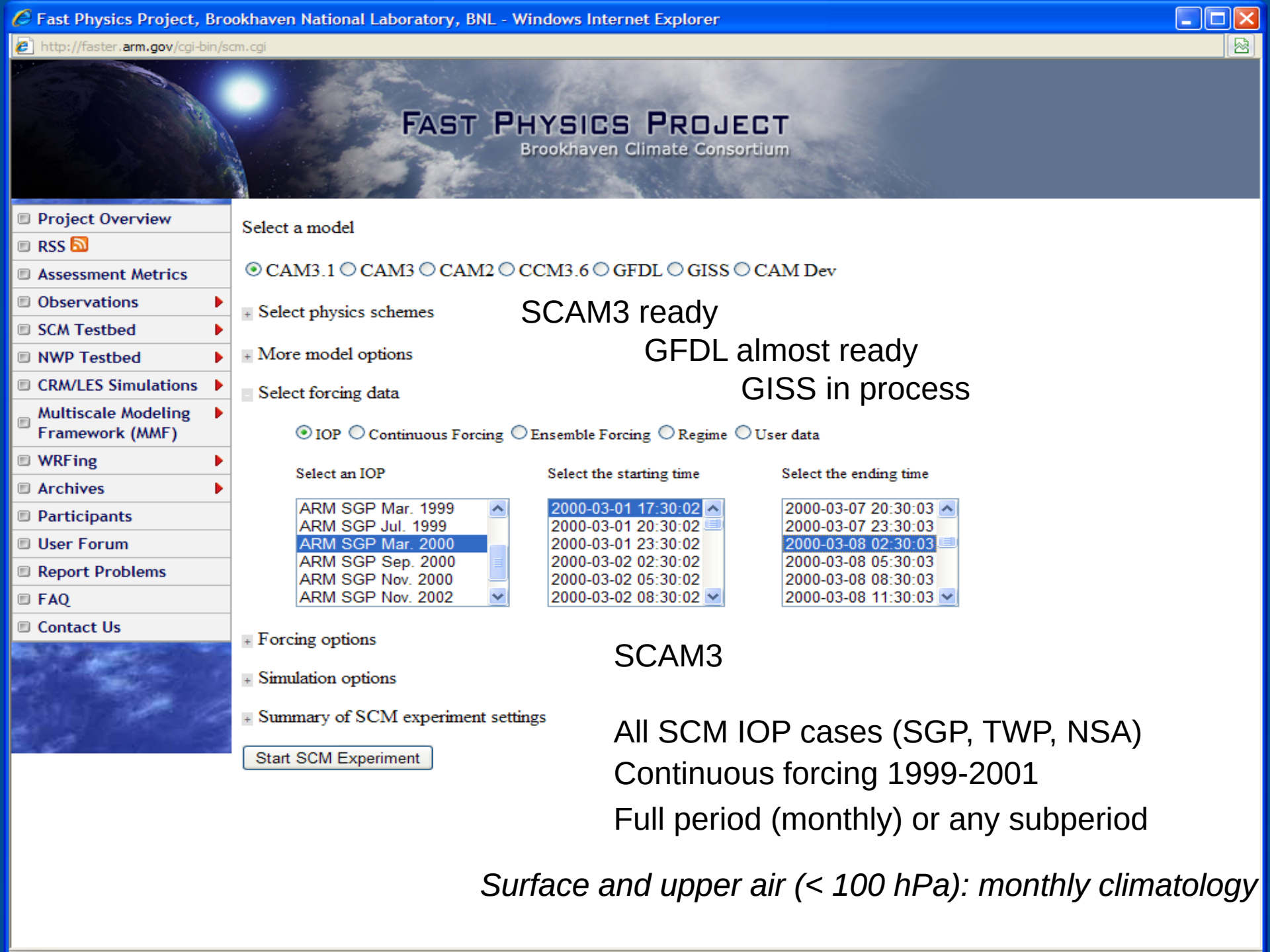
Update on Fast-Physics Testbed and Some CAM SCM Results

Wuyin Lin and Yangang Liu, BNL

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


Fast Physics Project, Brookhaven National Laboratory, BNL - Windows Internet Explorer
http://faster.arm.gov/cgi-bin/scm.cgi
FAST PHYSICS PROJECT
Brookhaven Climate Consortium
Project Overview
RSS
Assessment Metrics
Observations
SCM Testbed
NWP Testbed
CRM/LES Simulations
Multiscale Modeling Framework (MMF)
WRFing
Archives
Participants
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Report Problems
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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

FAST PHYSICS PROJECT

Brookhaven Climate Consortium

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

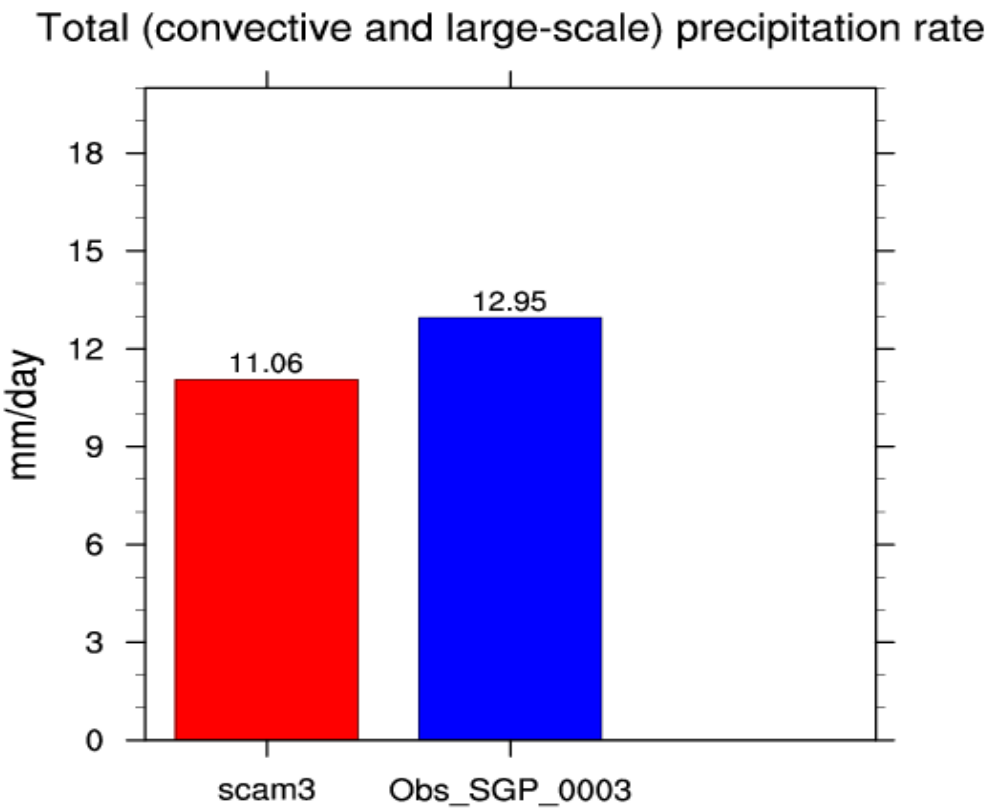
+ Simulation options

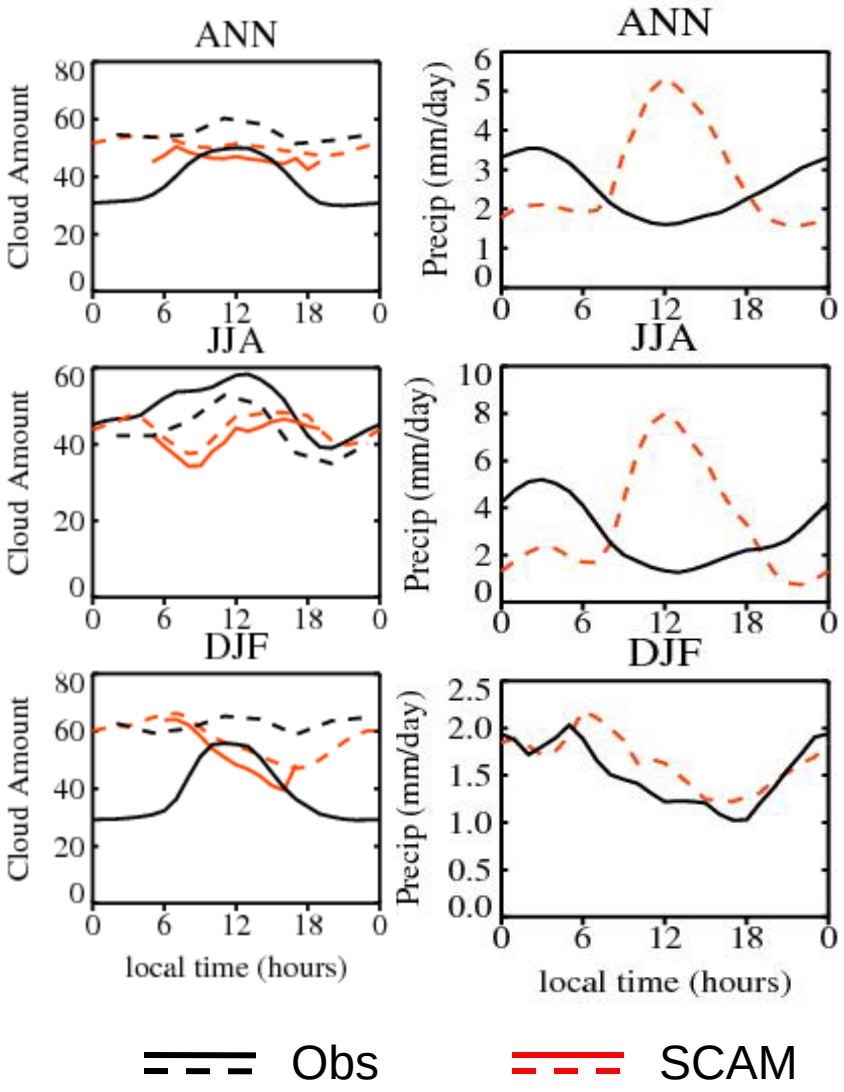
+ Summary of SCM experiment settings

Start SCM Experiment

Display Single Level Fields ISCCP Timeseries, Average, Diurnal Display Multi-Level Fields

< PRECT FSDS FLNT FSNT TREFHT PBLH CLDTOT CLDLOW >





Diurnal phase (cldtot)

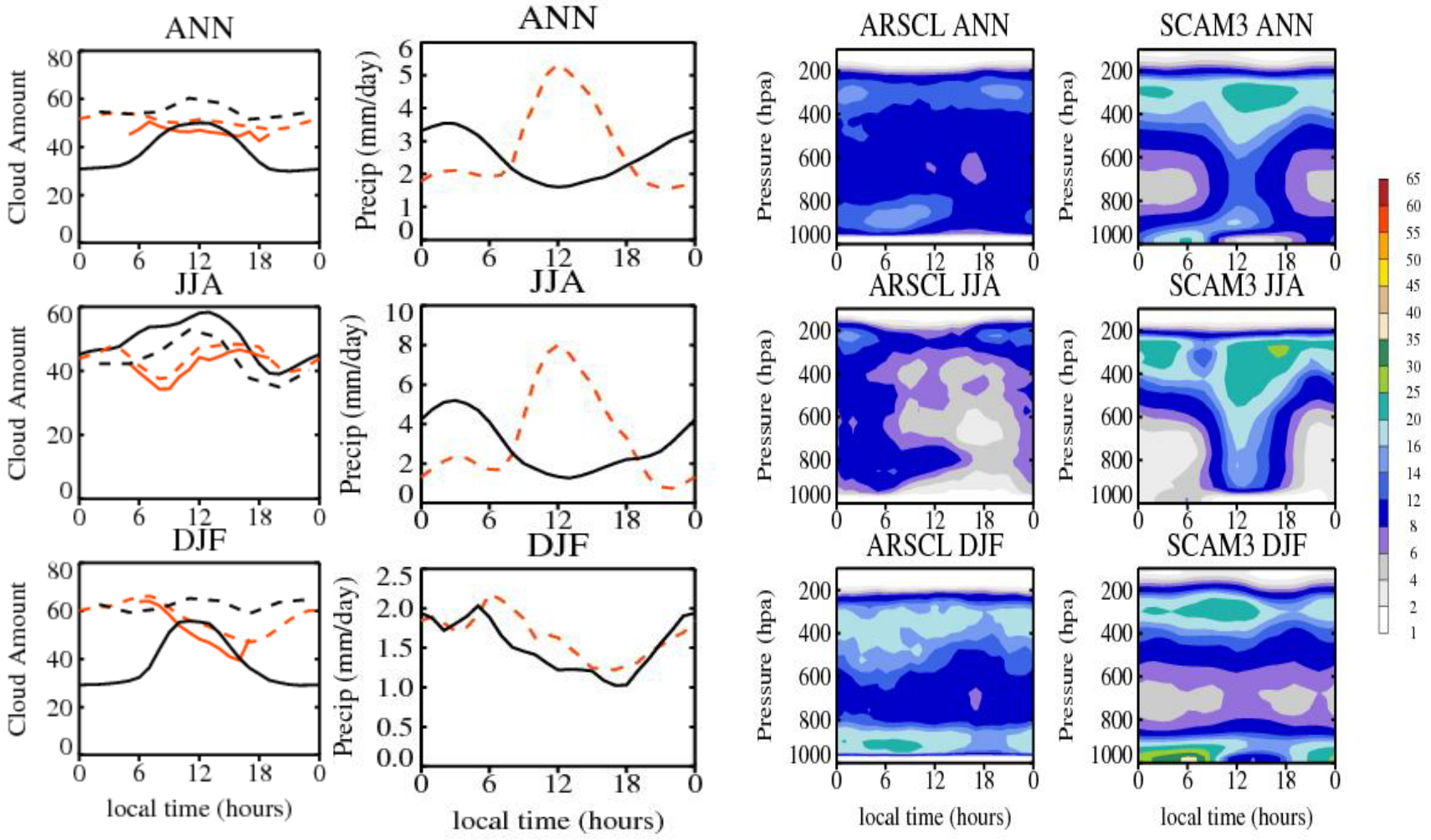
obs: summer & winter similar
cam: opposite during daytime

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.



Obs SCAM

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)

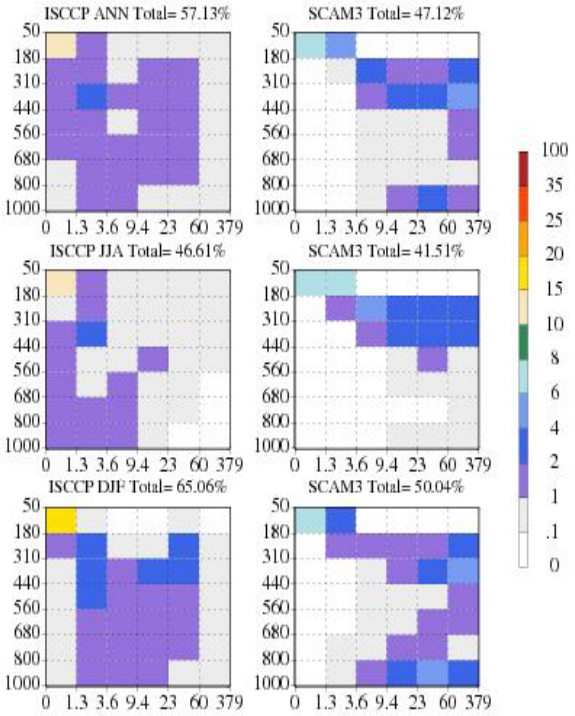
Surface normalized SW CRF vs Cloud Albedo

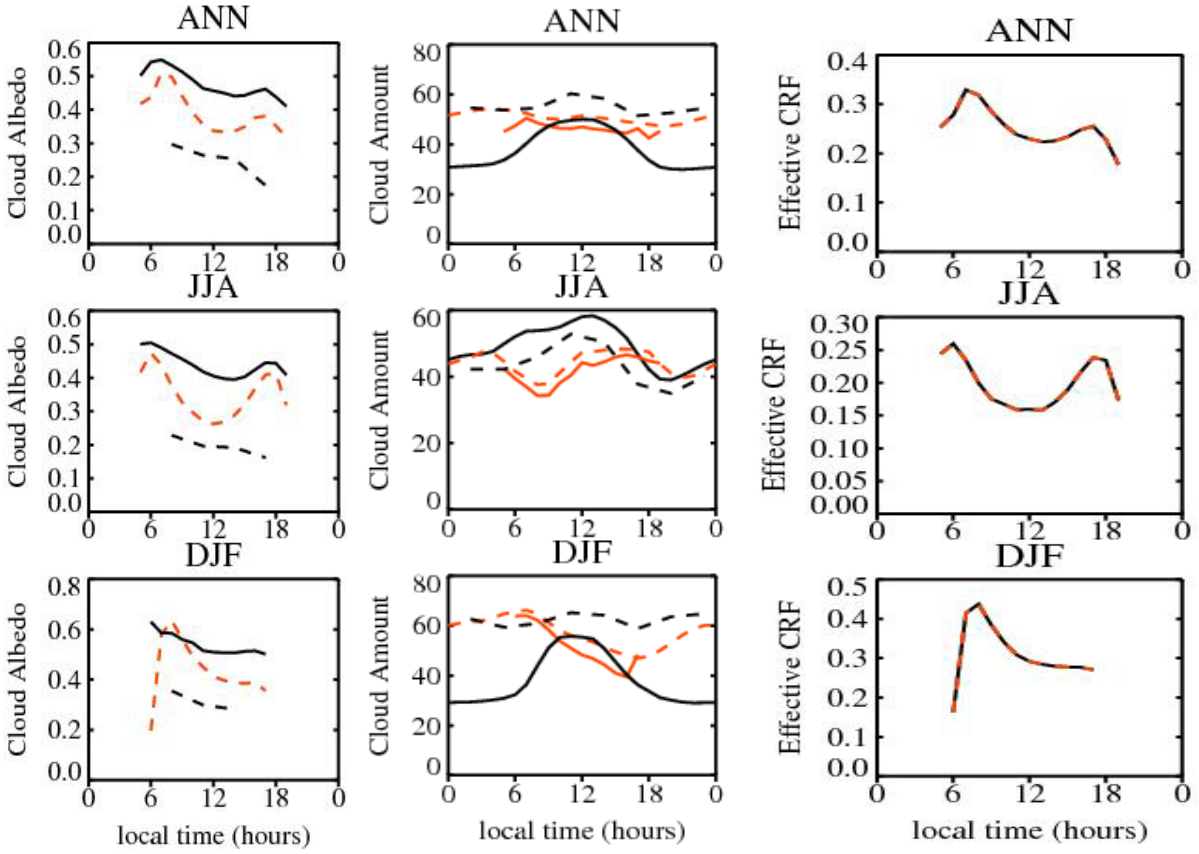
$$F_{cld} = F_{all}^{dn} - F_{clr}^{dn}$$

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

(approximation assuming equal contribution by each cloud type)

Alternative: direct calculation of cloud albedo based on cloud optical thickness



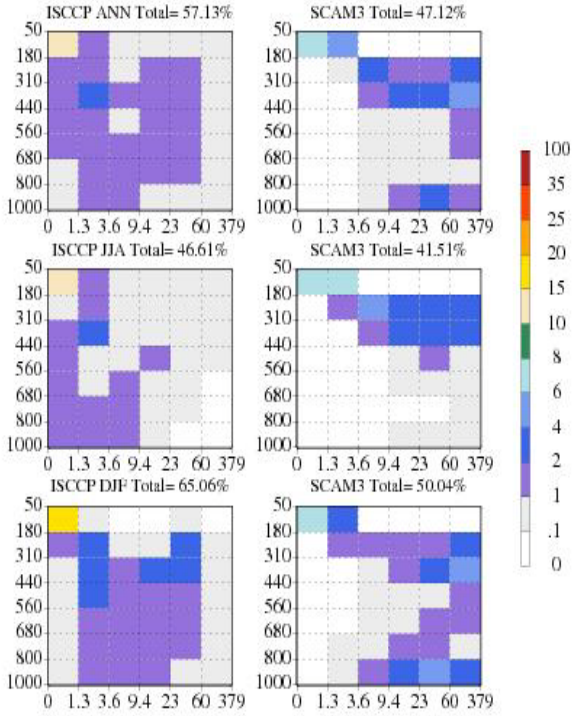


Cloud albedo dominates SW CRF variation

Model and obs albedo similar variation daytime

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

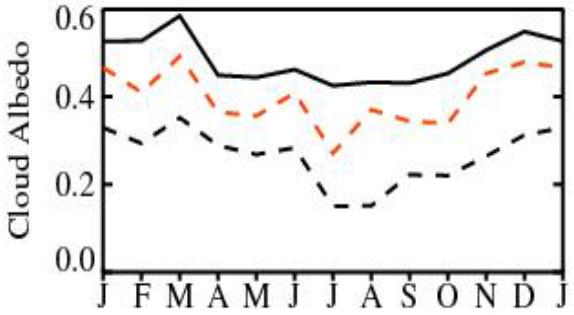
Cloud water and cloud amount more tightly coupled in models despite using RH-cloud fraction scheme

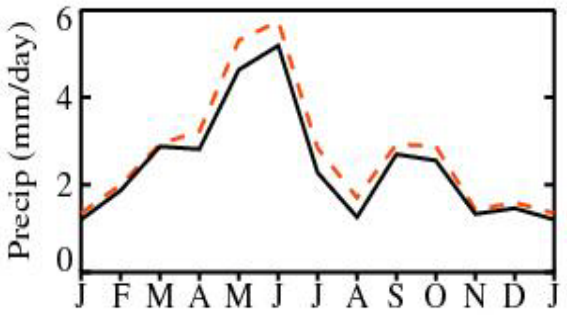


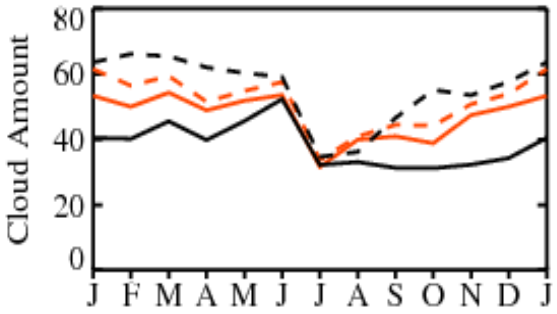
Seasonal scale

CRF seasonal significant

albedo and cloud amount both contribute

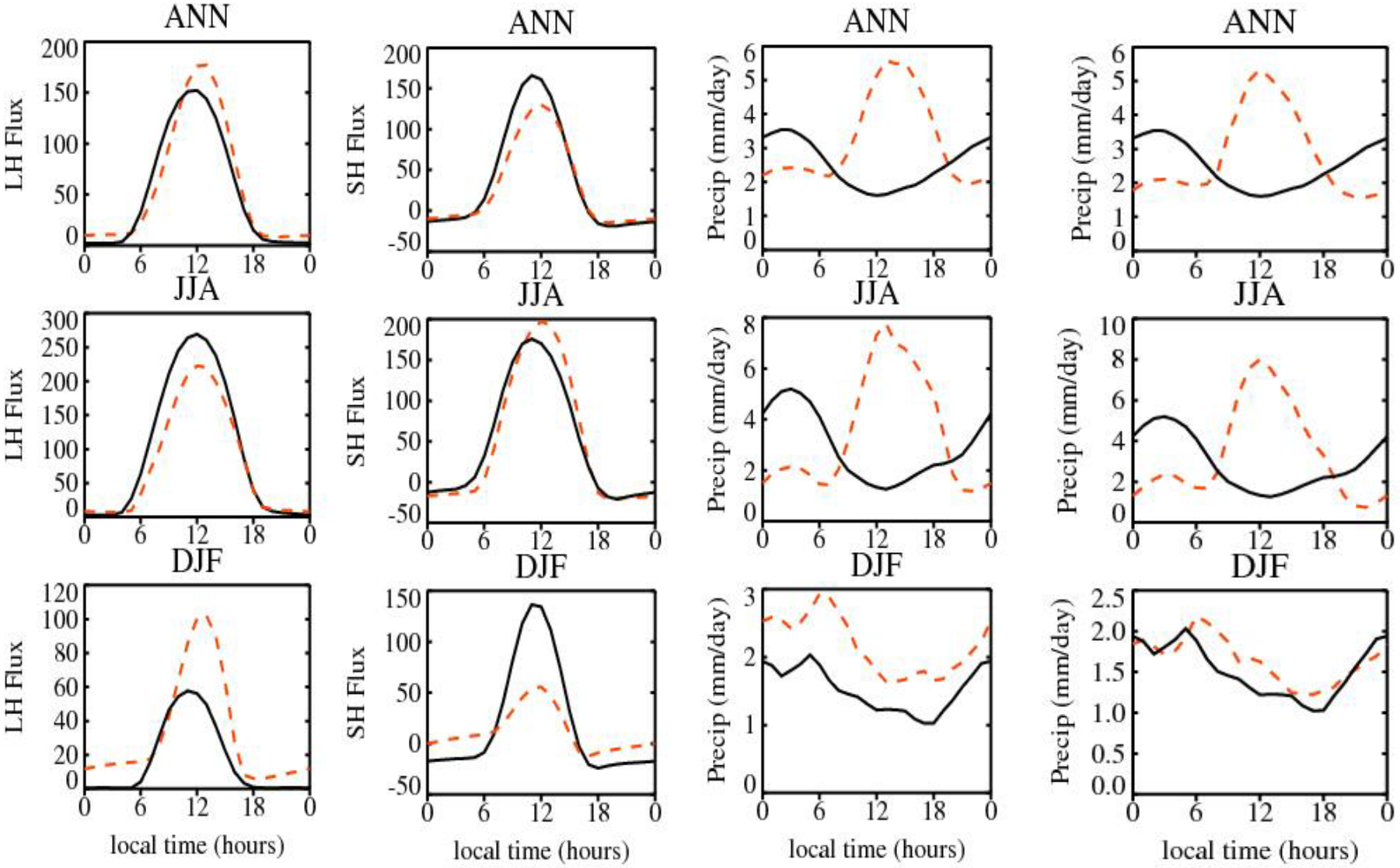


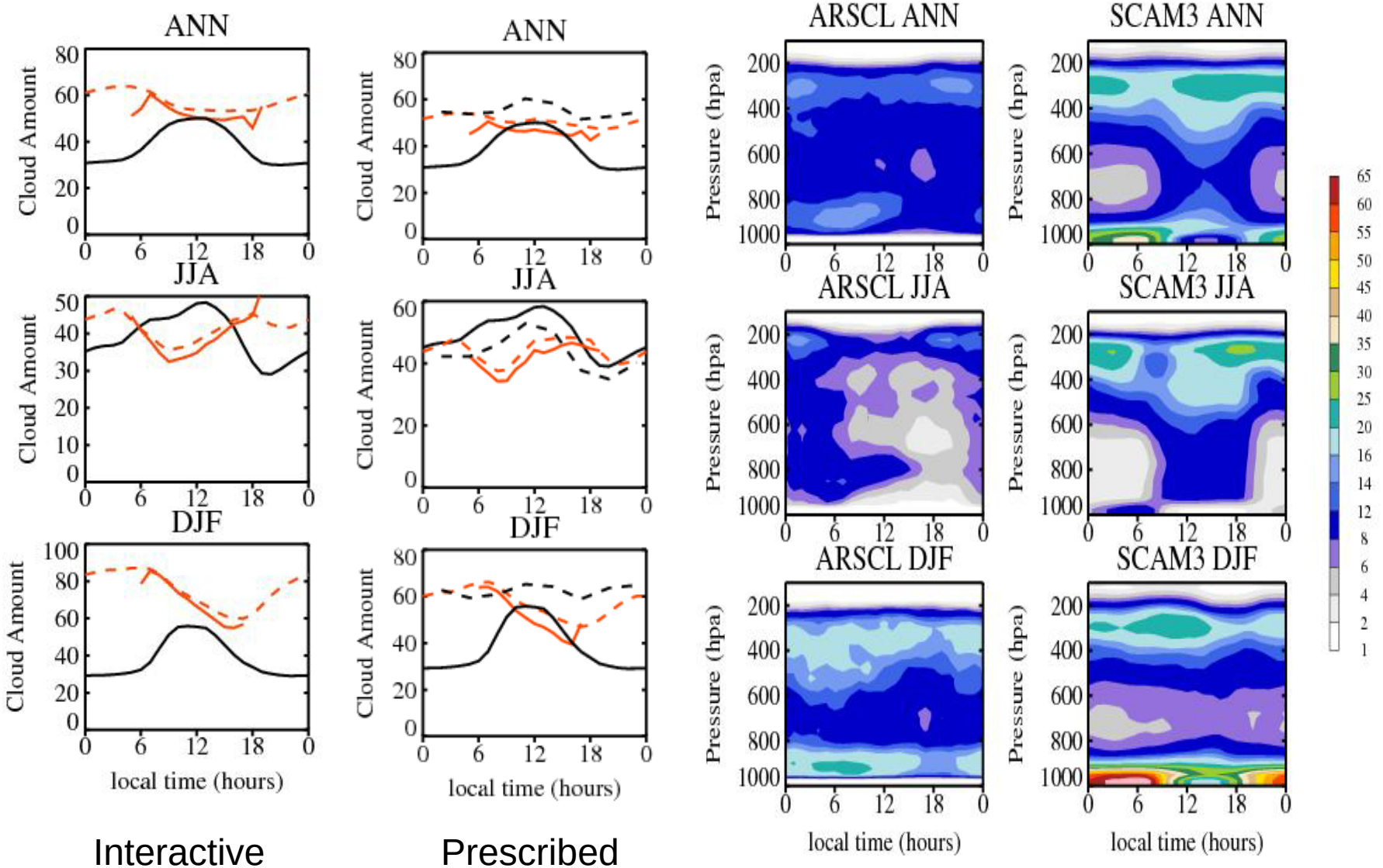


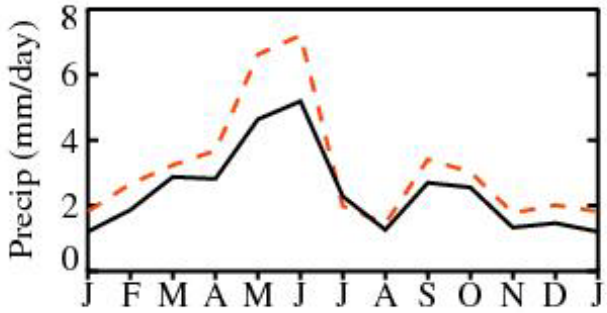


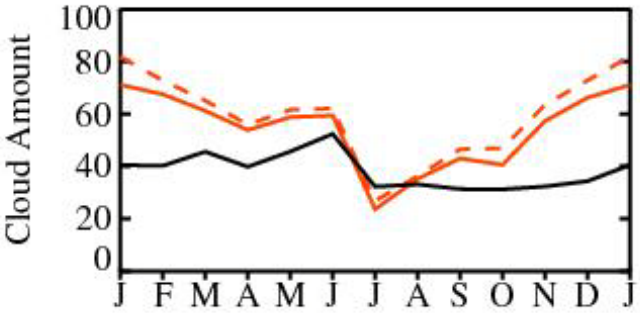
Seasonal total precip less effective measure of performance with prescribed forcing

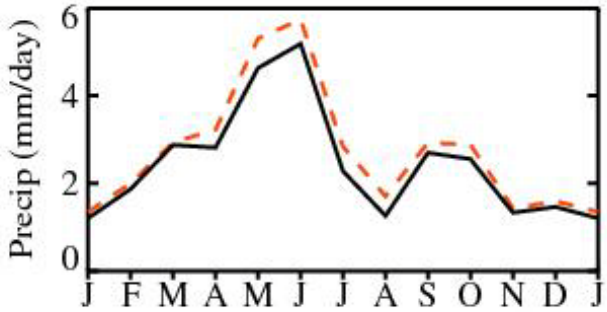
Interactive land vs prescribed surface properties

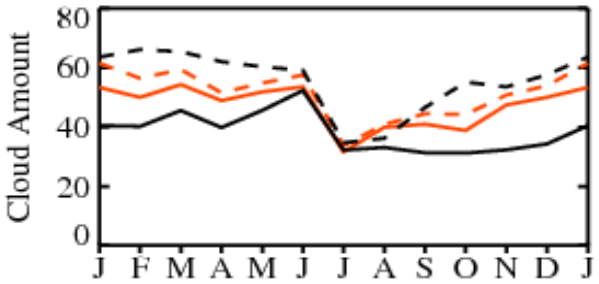


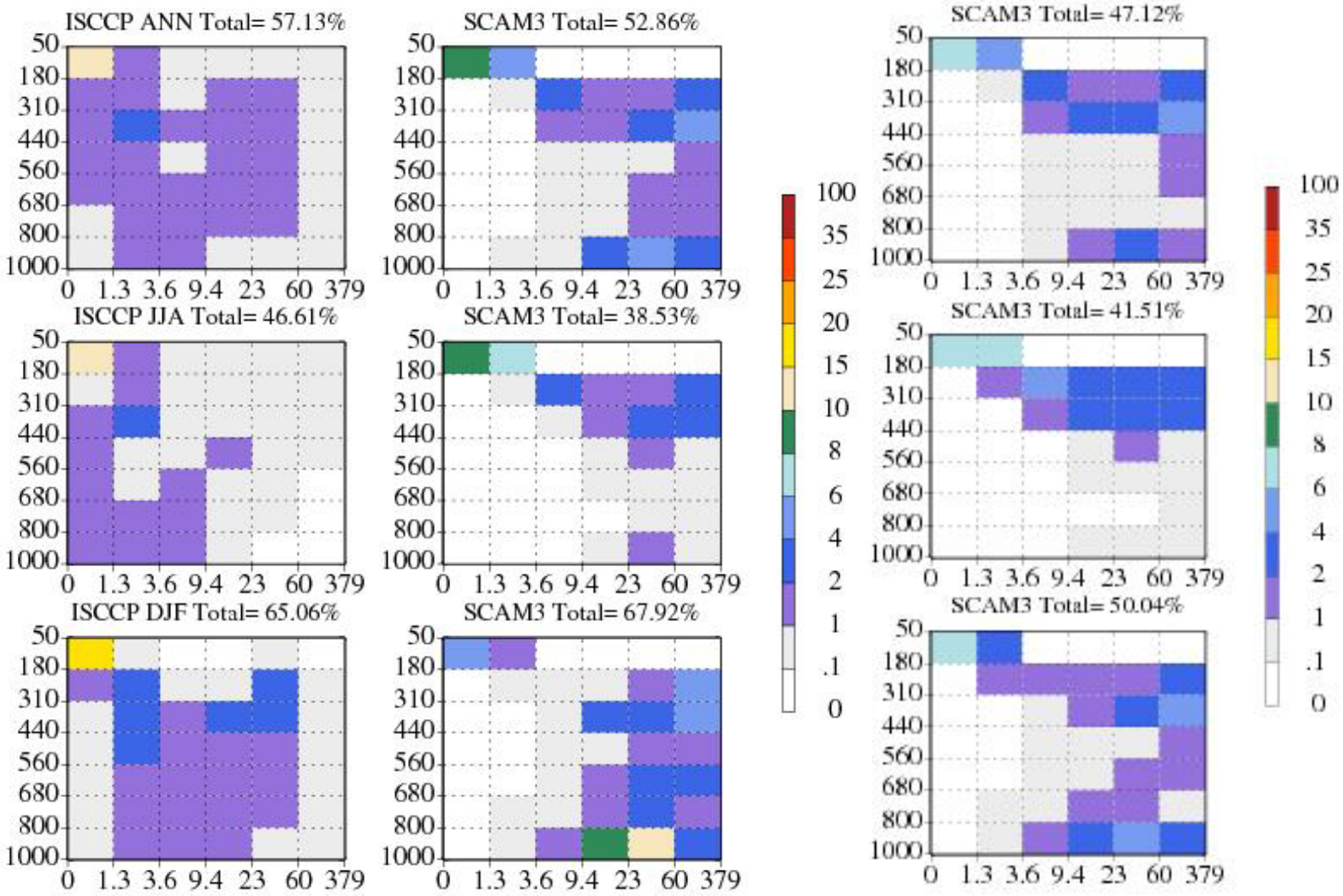

ANN
JJA
DJF
Cloud Amount
local time (hours)
ARSCL ANN
SCAM3 ANN
ARSCL JJA
SCAM3 JJA
ARSCL DJF
SCAM3 DJF
Pressure (hpa)
Interactive
Prescribed


Precip (mm/day)
8
6
4
2
0
J F M A M J J A S O N D J


Cloud Amount
100
80
60
40
20
0
J F M A M J J A S O N D J


Precip (mm/day)
6
4
2
0
J F M A M J J A S O N D J


Cloud Amount
80
60
40
20
0
J F M A M J J A S O N D J


ISCCP ANN Total= 57.13%
SCAM3 Total= 52.86%
SCAM3 Total= 47.12%
ISCCP JJA Total= 46.61%
SCAM3 Total= 38.53%
SCAM3 Total= 41.51%
ISCCP DJF Total= 65.06%
SCAM3 Total= 67.92%
SCAM3 Total= 50.04%
50
180
310
440
560
680
800
1000
0 1.3 3.6 9.4 23 60 379
100
35
25
20
15
10
8
6
4
2
1
.1
0

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