The ARMIP

Comparing Clouds And Their Seasonal Variations in 10 AGCMs With Satellite Measurements

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FIGURE 1: Overall View of the SGP CART Site (Approximate Scale: 50 km/in.)
ARMIP Motivation:

- Identify systematic cloud biases in GCMs to relate ARM SCM, CRM and process studies to global models

- Document current status of clouds in GCMs to measure future progress
The ISCCP Simulator Is Used In All Models
(Steve Klein and Mark Webb)
Observations:
ISCCP
CERES/MODIS

Models:
CAM2
CAM2c
CAM2x
GFDL
GISS
GMAO
HadAM3
HadAM4
LMD
ECHAM5
Check for

\[ C_m > \max(C_{ISCCP}, C_{CERES}) + \delta_{\text{max}} \]

\[ C_m < \min(C_{ISCCP}, C_{CERES}) - \delta_{\text{min}} \]
Figure 1

(a) ISCCP, CERES, CAM2

(b) High

(c) Middle

(d) Low

Latitude (Degrees North)
Figure 3

(a) High

(b) Middle

(c) Low

Latitude (Degrees North)
Figure 5: Comparison of cloud cover with different models:

(a) Thick layer
(b) Intermediate layer
(c) Thin layer

Cloud cover is shown as a percentage of latitude (Degrees North).
(Potter and Cess, 2004)

(Zhang et al., 2004)
1. Does This Matter?

2. How Reliable Are the Data?

3. What Are the Physical Causes?
JJA Minus DJF

(a) $C_s$

(b) $D_c$

(c) $C_s$

(d) $D_c$

$R_m = 0.80$

$S_d = 0.09$

$R_m = 0.64$

$S_d = 0.23$
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1. Does This Matter?

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1. Does This Matter?

2. How Reliable Are the Data?

3. What Are the Physical Causes?
SUMMARY:

- Model Cloud Biases In Altitudes
- Model Cloud Biases In Optical Thickness
- CRF
- Amplitude of Seasonal Variation
- Zhang et al. (2004) ARM CPM Special Issue of JGR
Zhang et al. (2004, ARM CPM Special Issue of JGR)