

Let's talk about ...
**Cloud Feedbacks Model Inter-
comparison Project (CFMIP) and
CFMIP Observational Simulator Package
(COSP)**

12:30 pm TODAY

Chapman Room

AGENDA:

- 1) Update/Discussion on COSP and CFMIP diagnostics (Jen Kay, AMP)
- 2) Update/Discussion of plans and priorities for completing CFMIP runs (Ben Sanderson, CCR)
- 3) Discussion of research plans for COSP and CFMIP runs (all)

Analysis of CAM4 and CAM5 Clouds using COSP

**NCAR's CFMIP Contact and the one about to remind/convince you that CFMIP
and COSP are very important to the AMWG:**

Jen Kay

Cloud Colleagues:

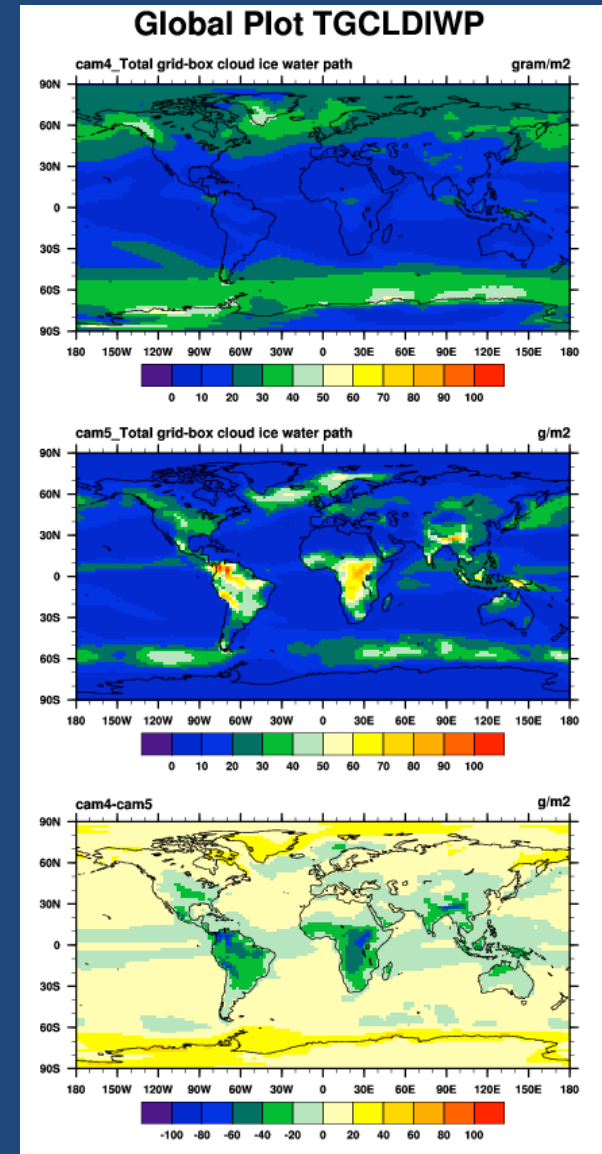
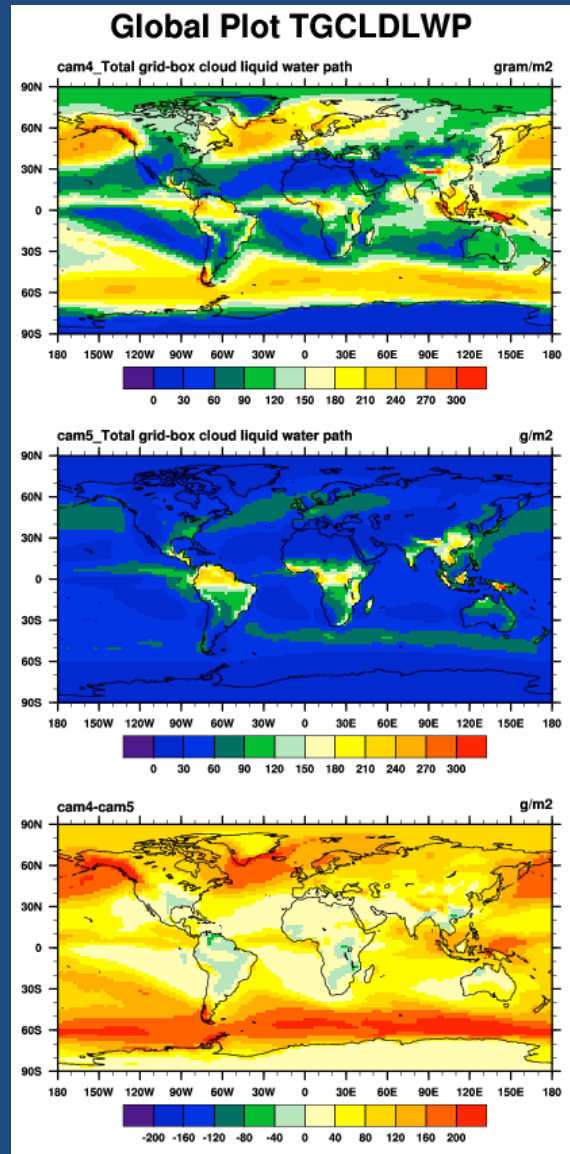
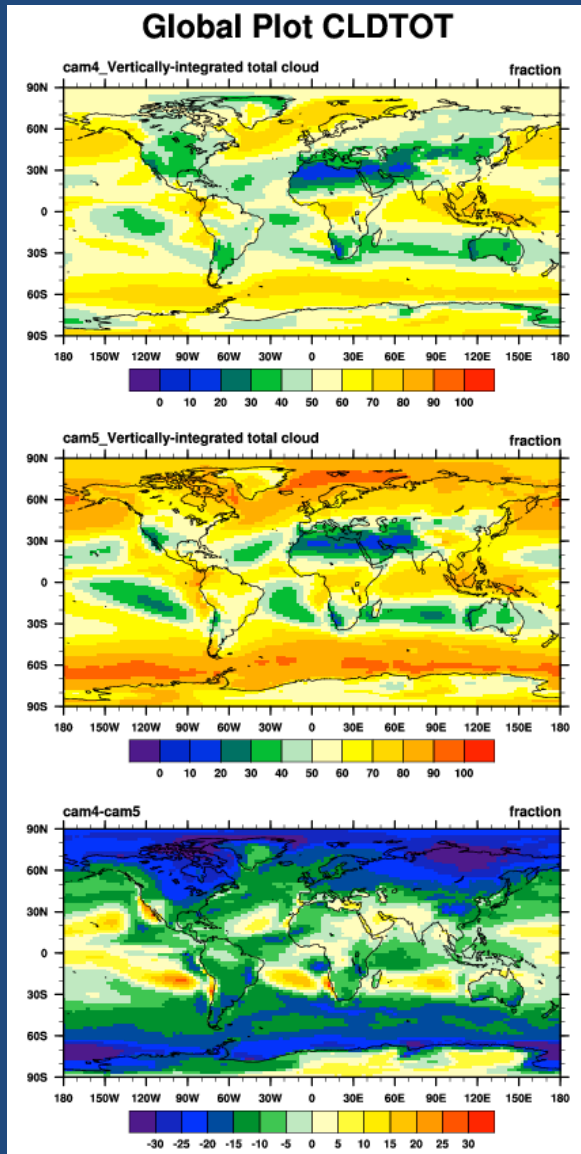
Yuying Zhang, Steve Klein, Jim Boyle,
Brian Eaton, Mat Rothstein, Andrew Gettelman, and CAM developers

Let me begin with a humbling thought...



If we can't use observations to evaluate which models have the best clouds, why do we bother making observations?

CAM4 and CAM5 clouds are shockingly different!



Total Cloud Fraction

Liquid Water Path

Ice Water Path

Cloud feedbacks explain the spread in projected warming in IPCC-class models.

BUT... How do we know if we have the clouds “right”? How can I answer Marcus on the NCAR shuttle – does CAM4 or CAM5 have “better clouds”?



A cartoon illustration of an elephant in a living room. The elephant is grey and has its trunk on the floor. It is standing in a room with pink walls, a framed picture on the wall, and two red armchairs. The text is overlaid on the elephant's body.

COSP removes a common
concern from model vs.
observation cloud
comparisons ...

the (often) unaddressed
question:
What is a cloud?

The new code on the block...

COSP in CAM

```
../models/atm/cam/src/physics/cosp  
../models/atm/cam/src/physics/cam/cospsimulator_intr.F90  
+ mods for CFMIP diagnostics, to get input for COSP from CAM4/CAM5 physics
```

Process began in Summer 2009. COSP v1.3 now works with CAM4/CAM5. Code on CAM trunk. CAM4 CFMIP version final this week. CAM5 has snow issues.

Today, results from 2deg 10-year AMIP runs

- CAM TAG: cam5_0_34. (CAM4, CAM5 released code)
- November 1998 – October 2009
- Run on bluefire: CAM4 (2:36/yr, 234 GAU/yr), CAM5 (6:36/yr, 584 GAU/yr) (no MODIS simulator)



But... I don't know anything about how clouds are defined... or COSP... and why should I bother with such details?

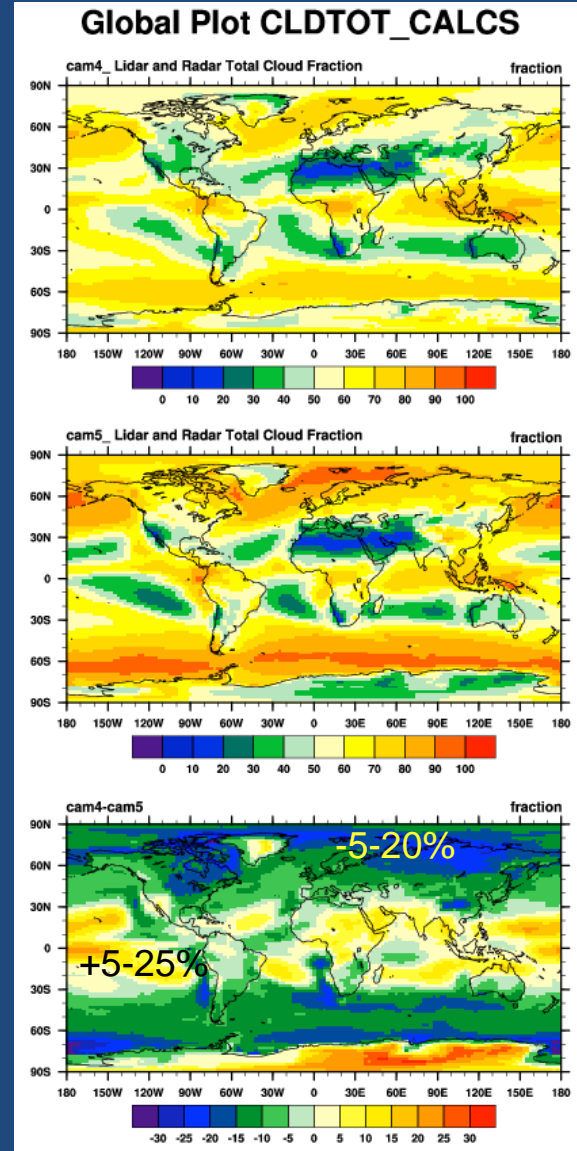
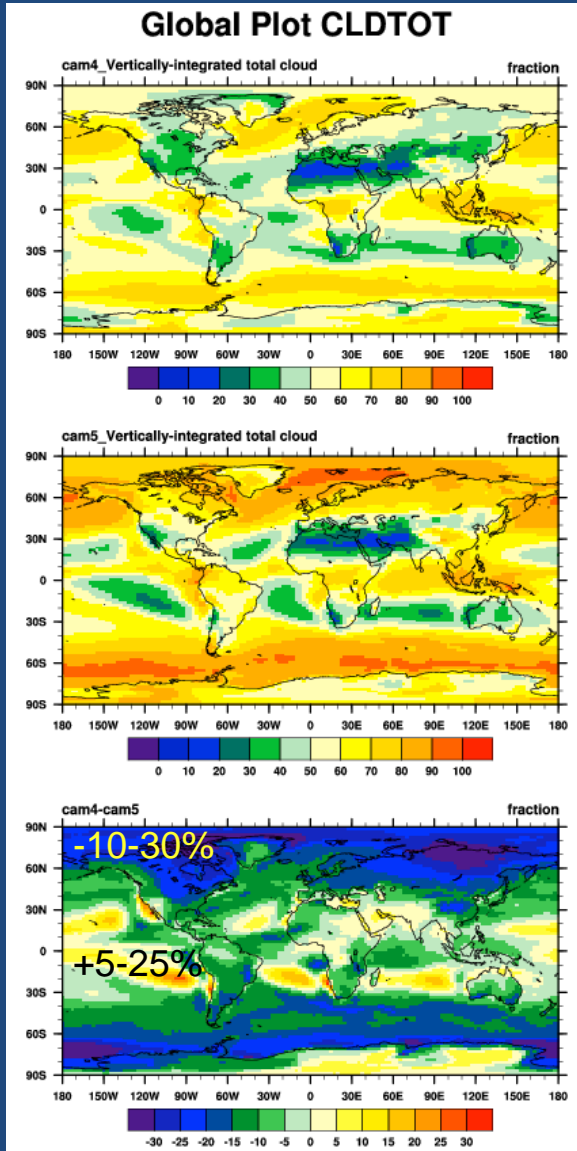


Because it will give you the truth you seek, and using COSP outputs does not have to be scary with help from cloud friends, so I'm learning...

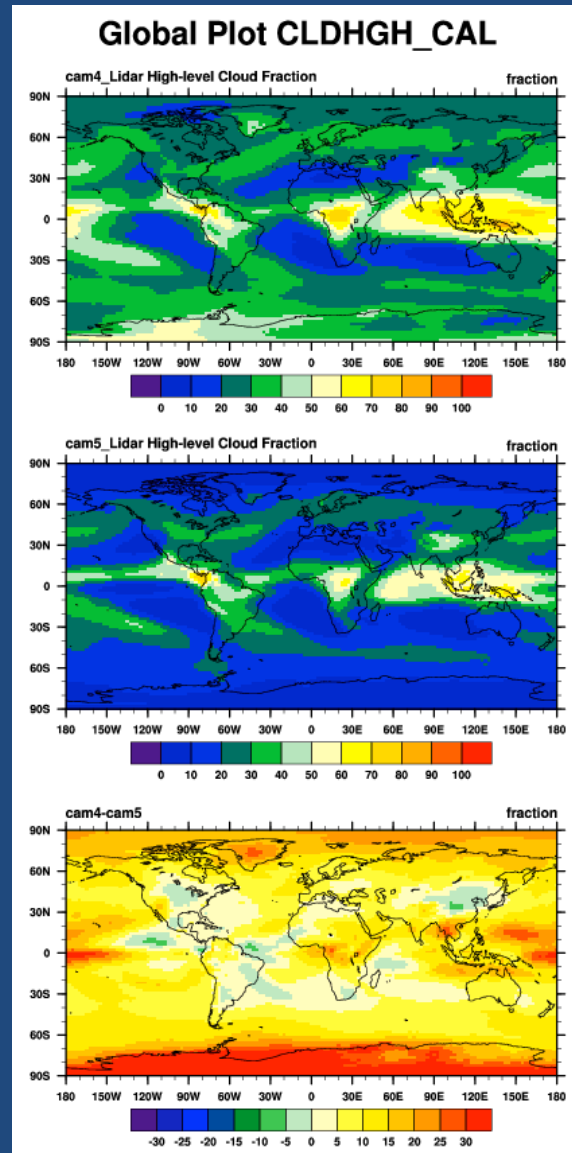
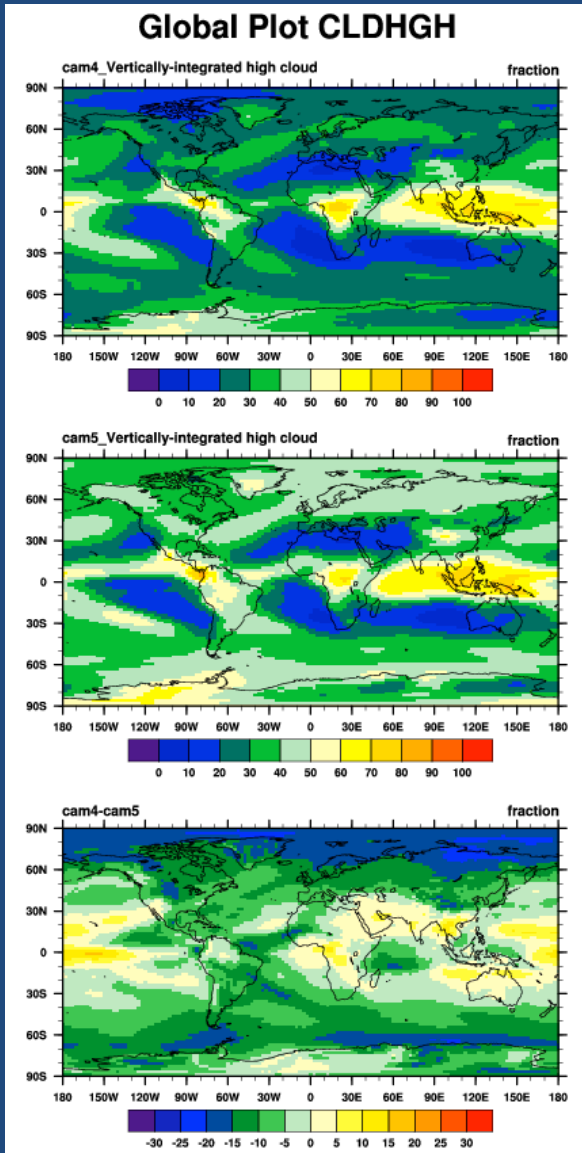
For example, let's start by looking at total cloud fraction.

CLDTOT (our old familiar friend)

CLDTOT_CALC (COSP diagnostic)



CLDHGH and CLDHGH_CAL (COSP diagnostic)



For CAM4,
CLDHGH and
CLDHGH_CAL look
very similar.

For CAM5,
CLDHGH >>
CLDHGH_CAL,
especially in extra-
tropics. Snow
contributions to
cloud fraction
missing in
CLDHGH_CAL.

Summary:

1) COSP and CFMIP-requested diagnostics are working in-line within CAM4 and CAM5.

2) Analysis in progress (more welcome!) but the answers and tools are well worth the wait.

COSP/CFMIP address a key climate question for AMWG and the larger climate community:

How do we know if we have the clouds “right”?

