



# **DOE/UCAR Cooperative Agreement**

## **Regional and Global Climate Modeling Program**



# **HIGH RESOLUTION CAM5 – CAPT HINDCASTS**

**David L. Williamson**

**National Center for Atmospheric Research**  
**Boulder, Colorado, USA**

# CAM5.1 Precipitation Errors in Eastern Tropical Pacific

## Standard CAM 5.1

- 0.25 degree Finite Volume Dynamical Core

- 1 degree physics tuning parameters

- 15 minute physics time step

5-day forecasts initialized from

- ECMWF YOTC analyses

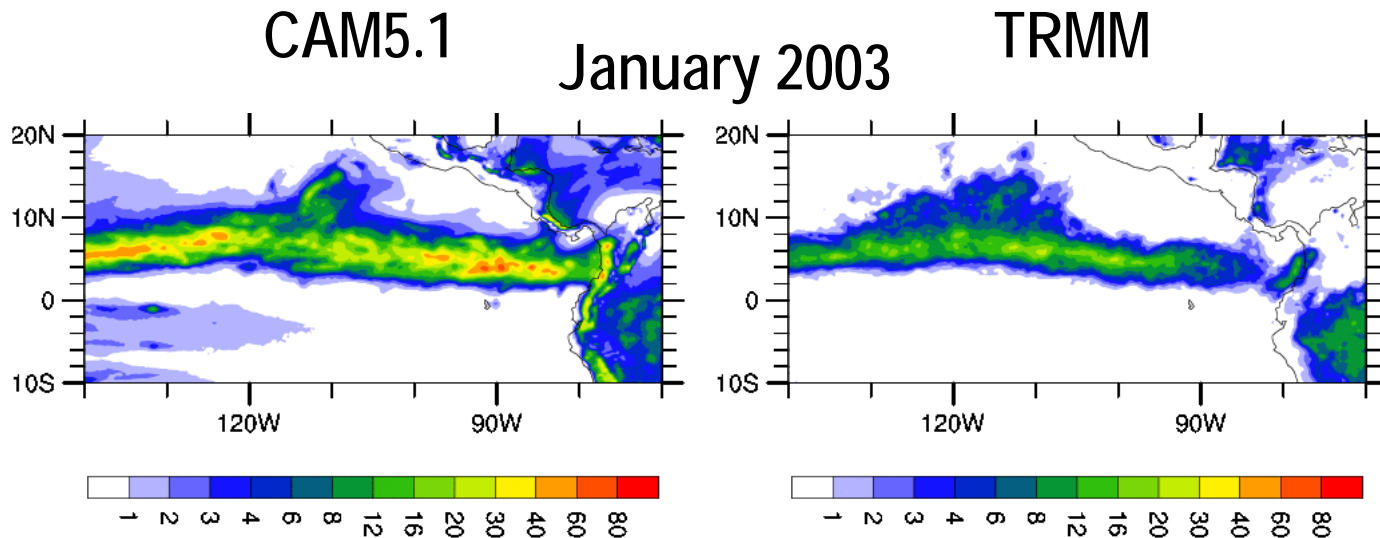
- 00Z 3 to 24 January 2009

Compare to

- Precipitation from 3-hourly 0.25 degree TRMM (3B42)

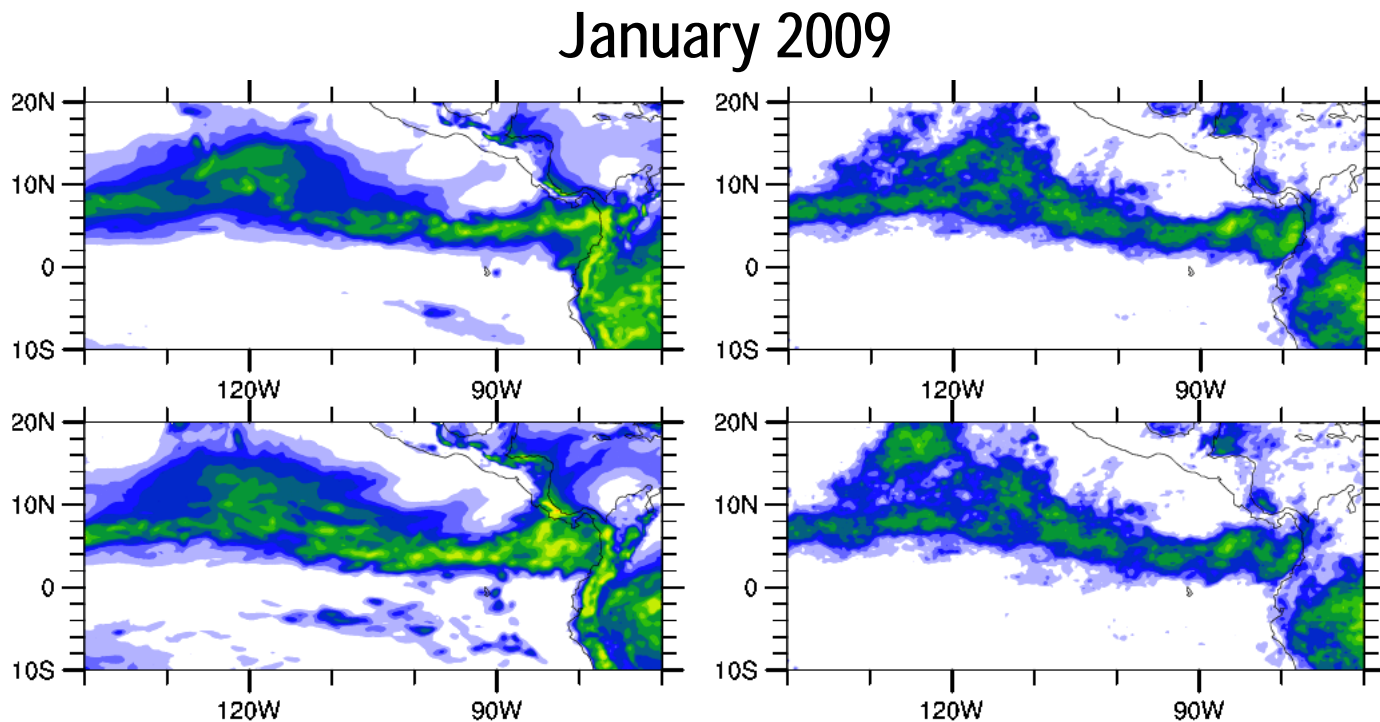
24-HR PRECIPITATION (mm/day)

CLIMATOLOGY



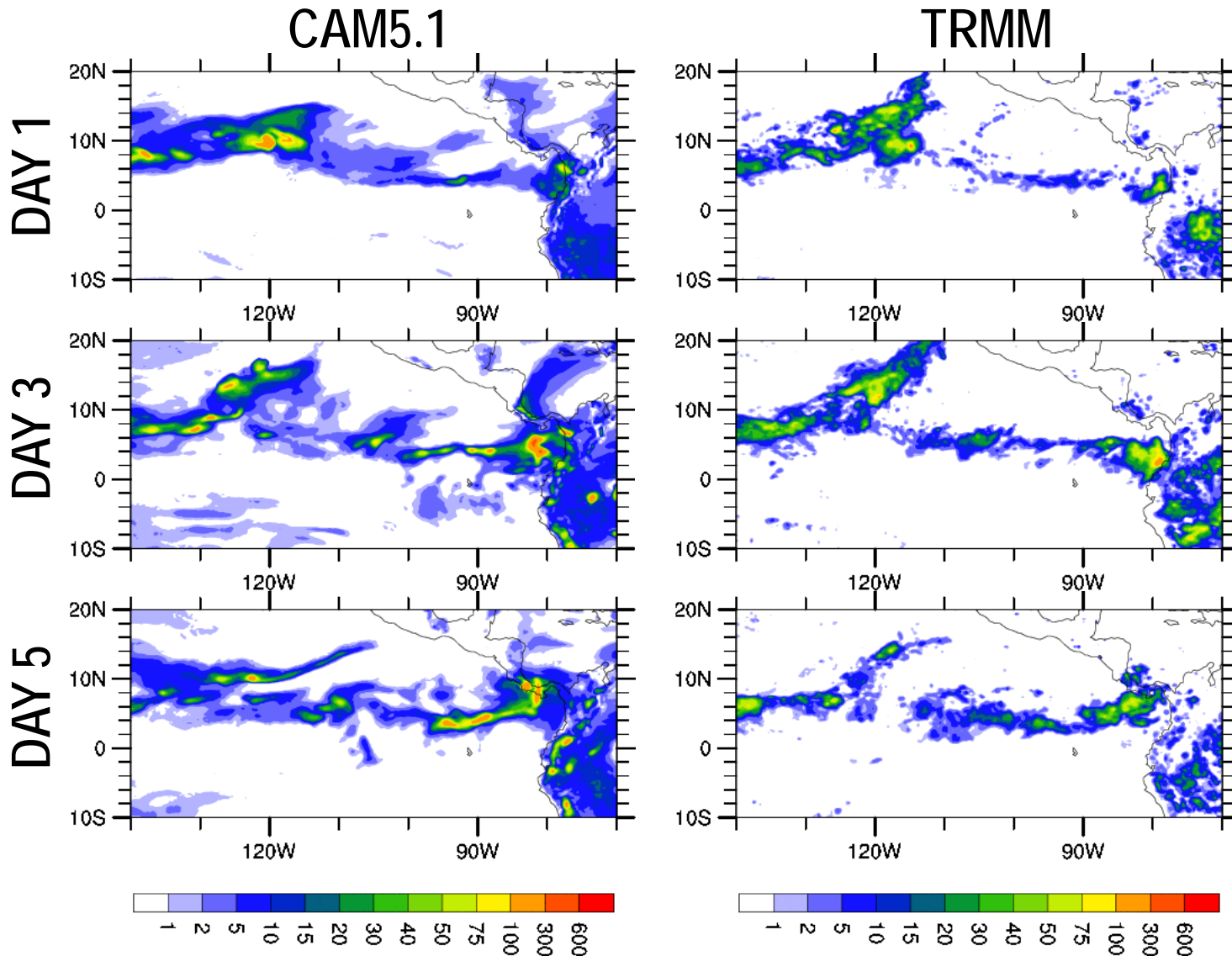
FORECAST ENSEMBLE

DAY 1  
DAY 5

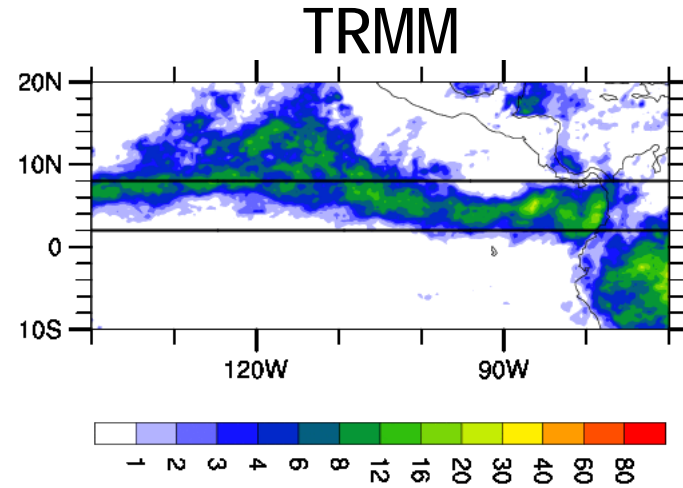
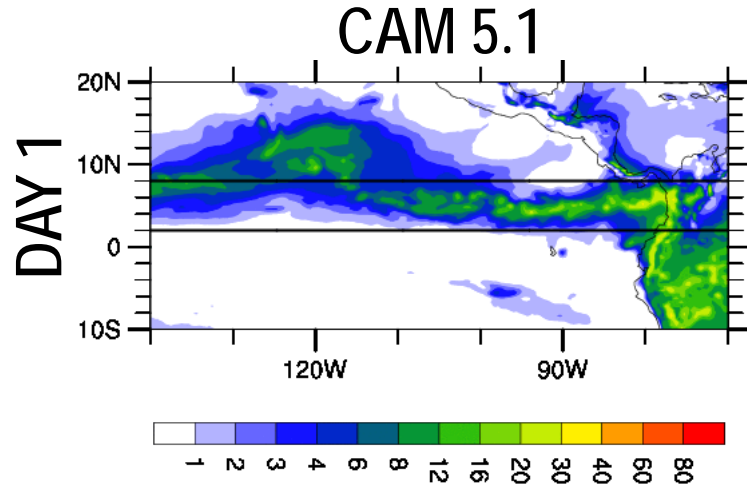


CAM5.1 climate courtesy of Mike Wehner

# 24-HR PRECIPITATION (mm/day), IC = 03 January 2009



# FORECAST ENSEMBLE 24-HR PRECIPITATION



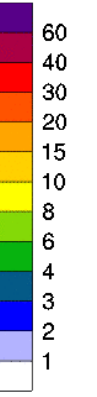
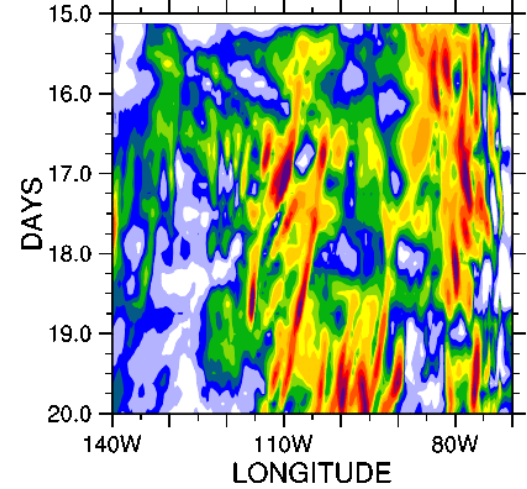
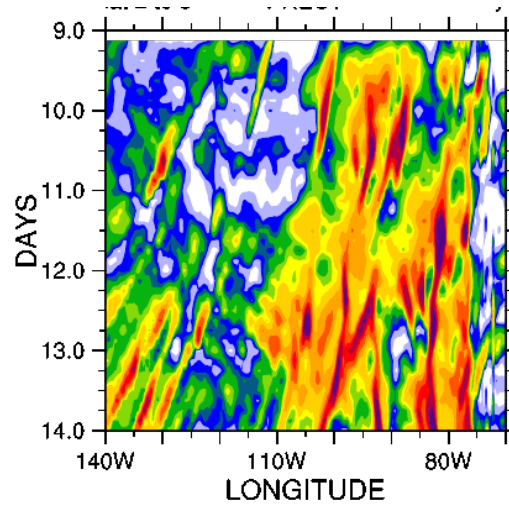
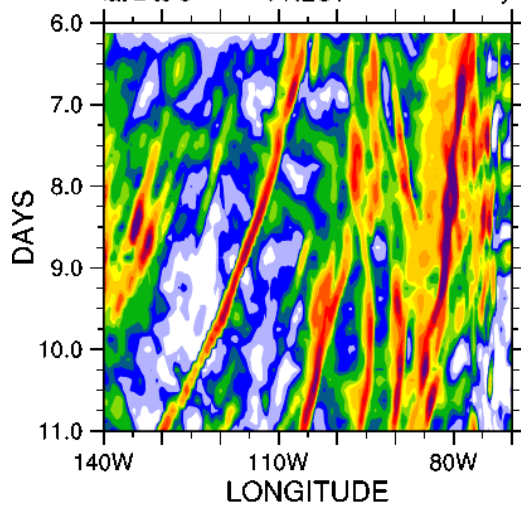
# INDIVIDUAL FORECASTS 3-HR PRECIPITATION 3 HOUR AVERAGES 2 to 8 DEGREES

IC = 6 JAN

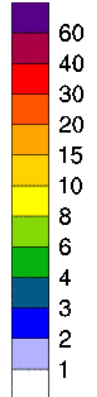
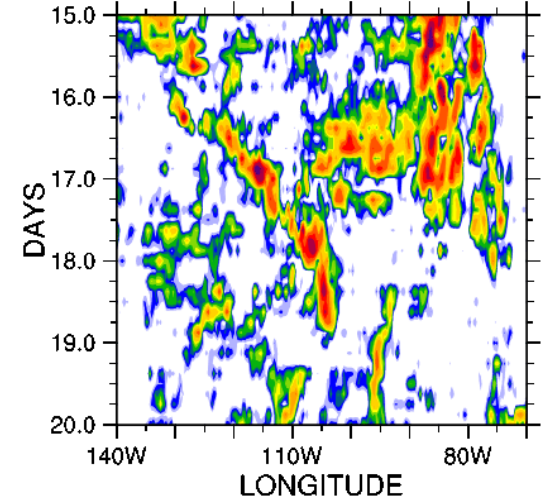
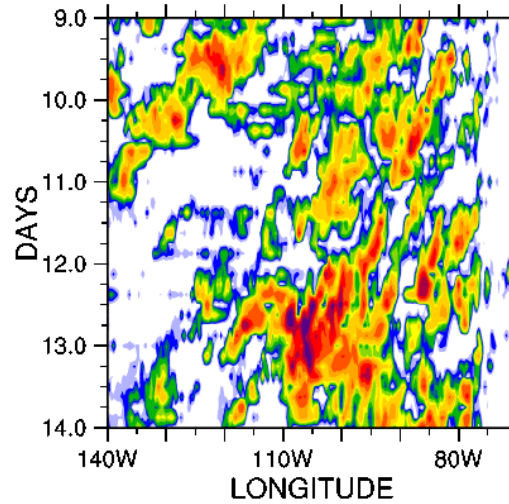
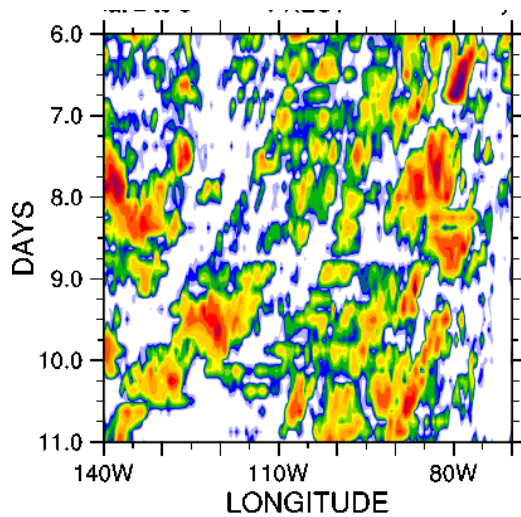
IC = 9 JAN

IC = 15 JAN

CAM5.1



TRMM





# INDIVIDUAL FORECASTS

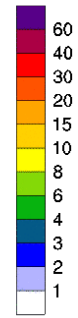
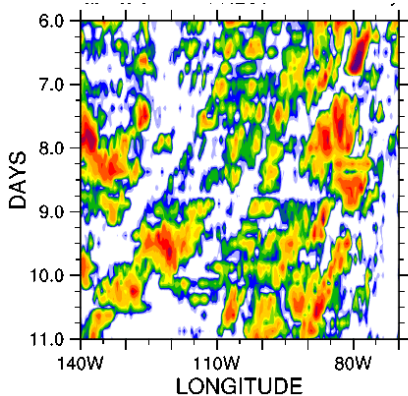
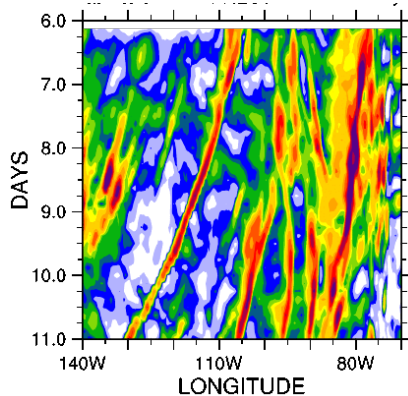
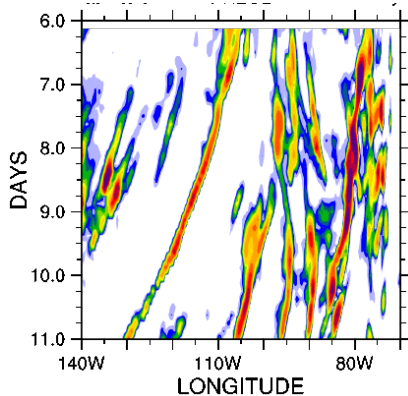
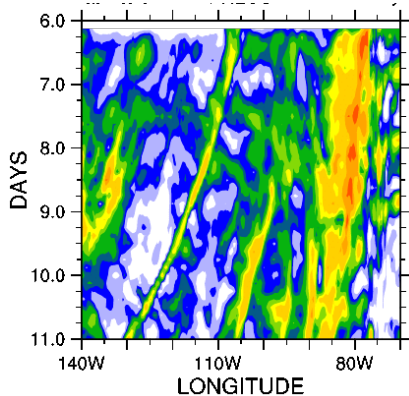
## CAM5.1 CONVECT

## CAM5.1 GRID

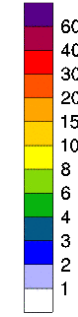
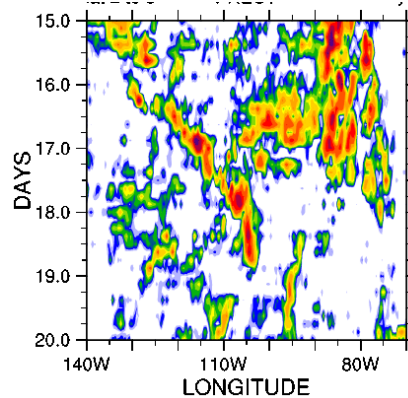
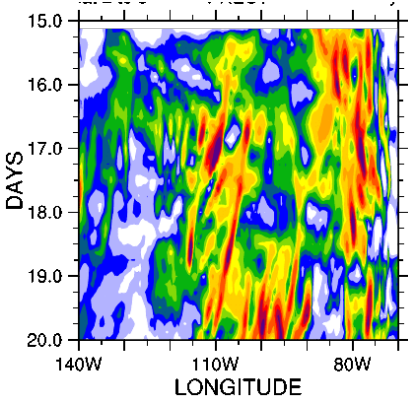
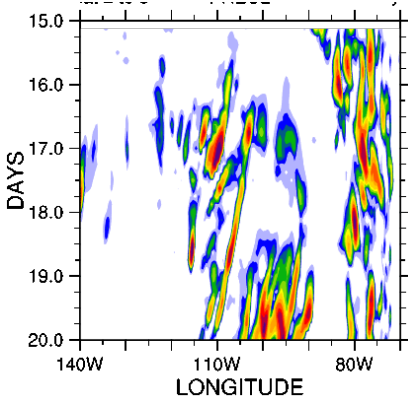
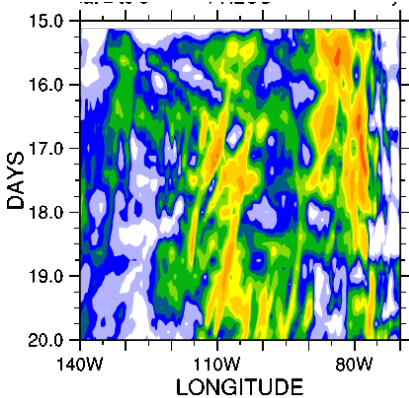
## CAM5.1 TOTAL

## TRMM

IC = 6 JAN



IC = 15 JAN



# INDIVIDUAL FORECAST IC = 6 JAN

## CONVECT

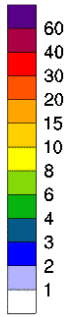
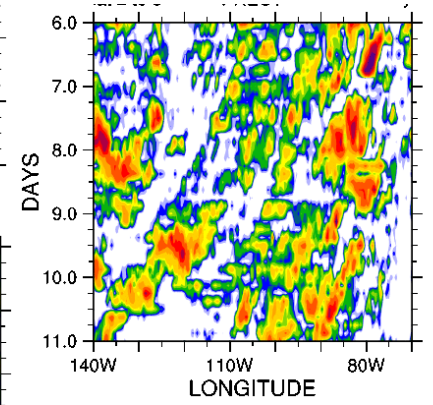
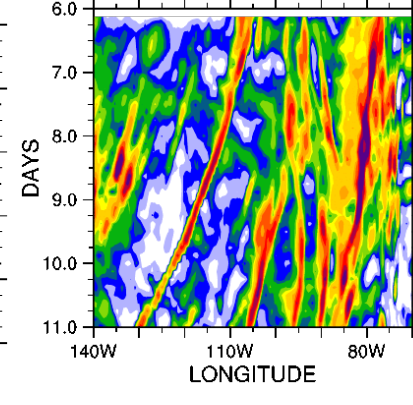
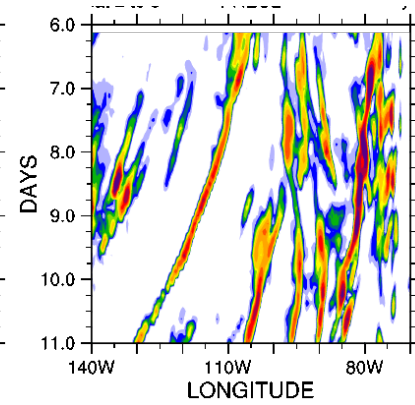
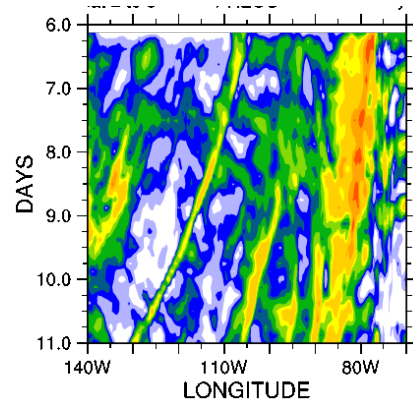
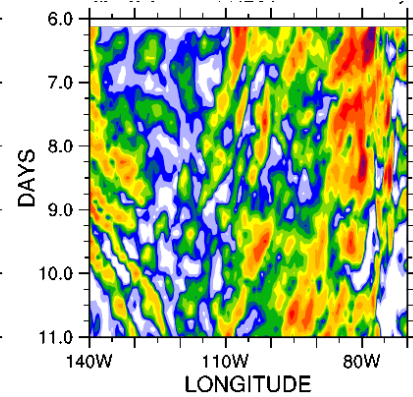
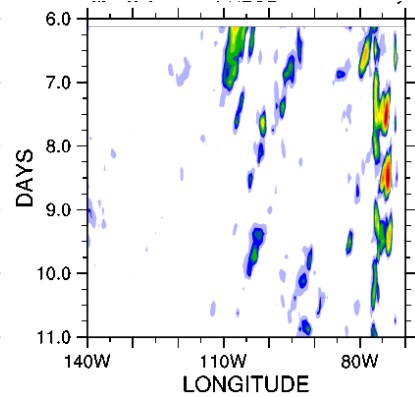
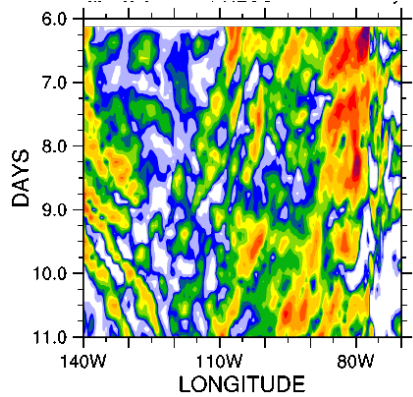
## GRID

## TOTAL

## TRMM

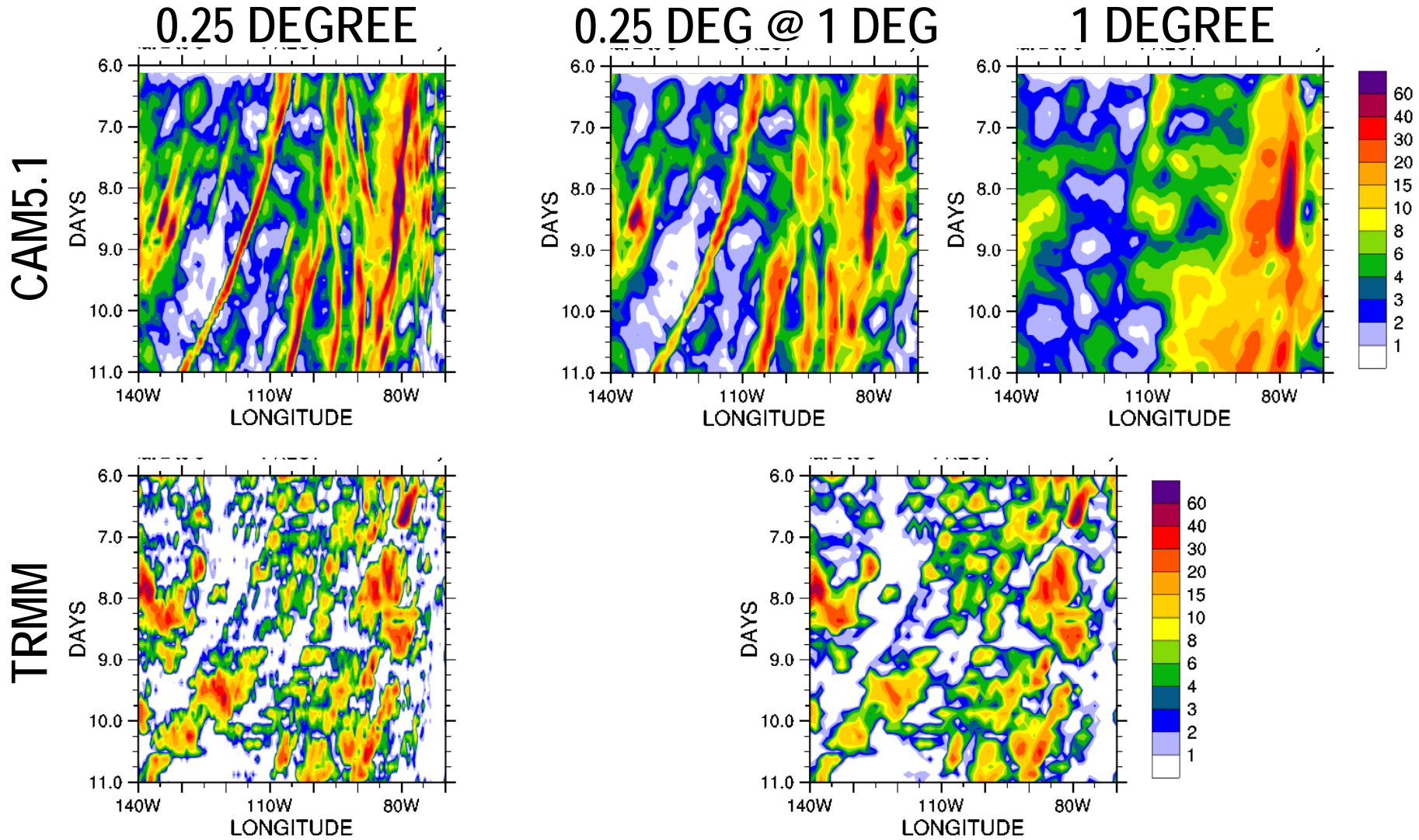
5 MIN T-SCALE

CAM 5.1





# INDIVIDUAL FORECAST IC = 6 JAN



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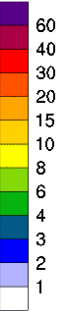
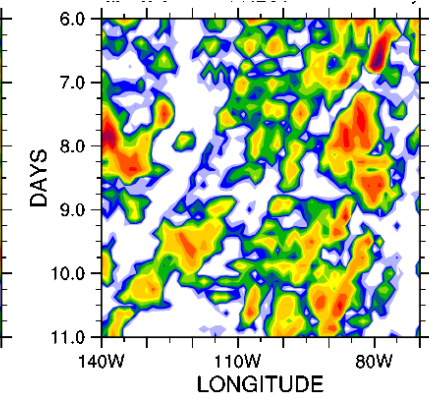
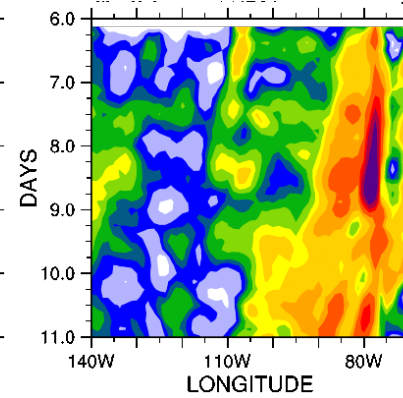
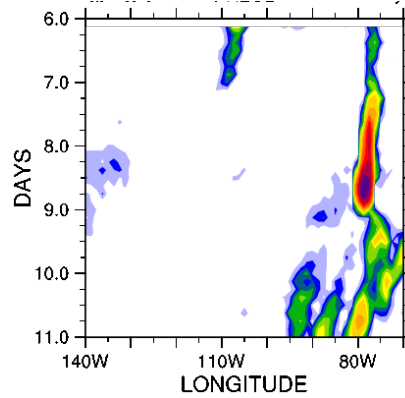
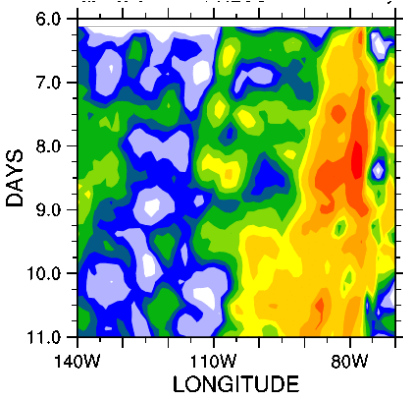
## CONVECT

## GRID

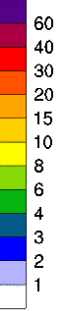
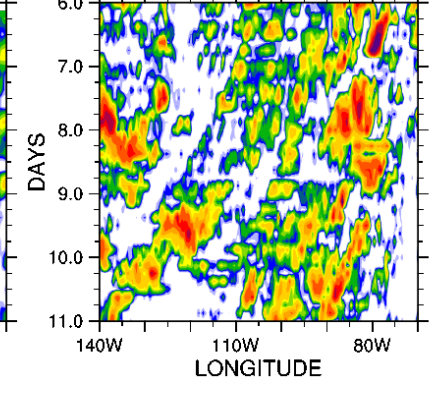
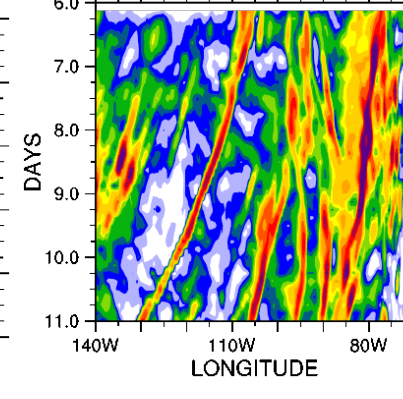
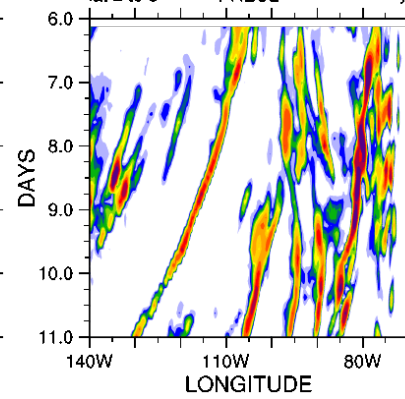
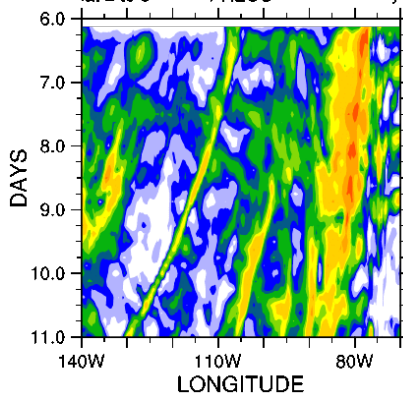
## TOTAL

## TRMM

### 1 DEGREE



### 0.25 DEGREE



## 0.25 degree CAM 5.1 precipitation compared to TRMM

Small amounts over too large an area  
not enough diurnal variability

Cells are

- too strong

- too long lived

- too coherent in time

Too weak eastward propagation

Cellular precipitation structure occurs in high resolution CAM  
because convection is not active enough

Convection is constrained by assumed time-scale,  
large scale condensation takes over

Condensational heating – dynamical convergence at small scales

Inclusion of precipitation pressure loading (Julio Bacmeister)  
reduce the dynamics – condensation feedback

Partition between processes has serious ramifications for  
vertical distribution of heating  
vertical transport of constituents  
resolved  
parameterized

