# Seasonal Variation of Low Clouds in Track 1 and Track 5 CAM

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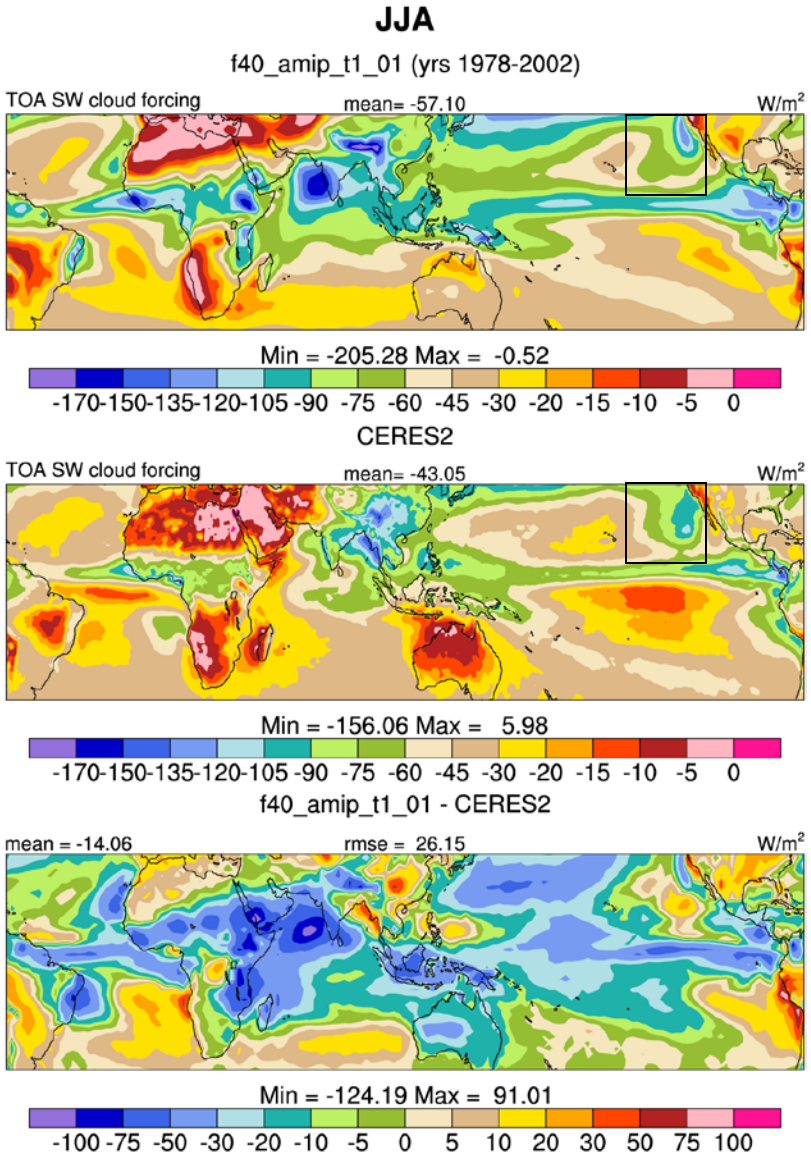
Cecile Hannay (NCAR) and the CAM Development Team

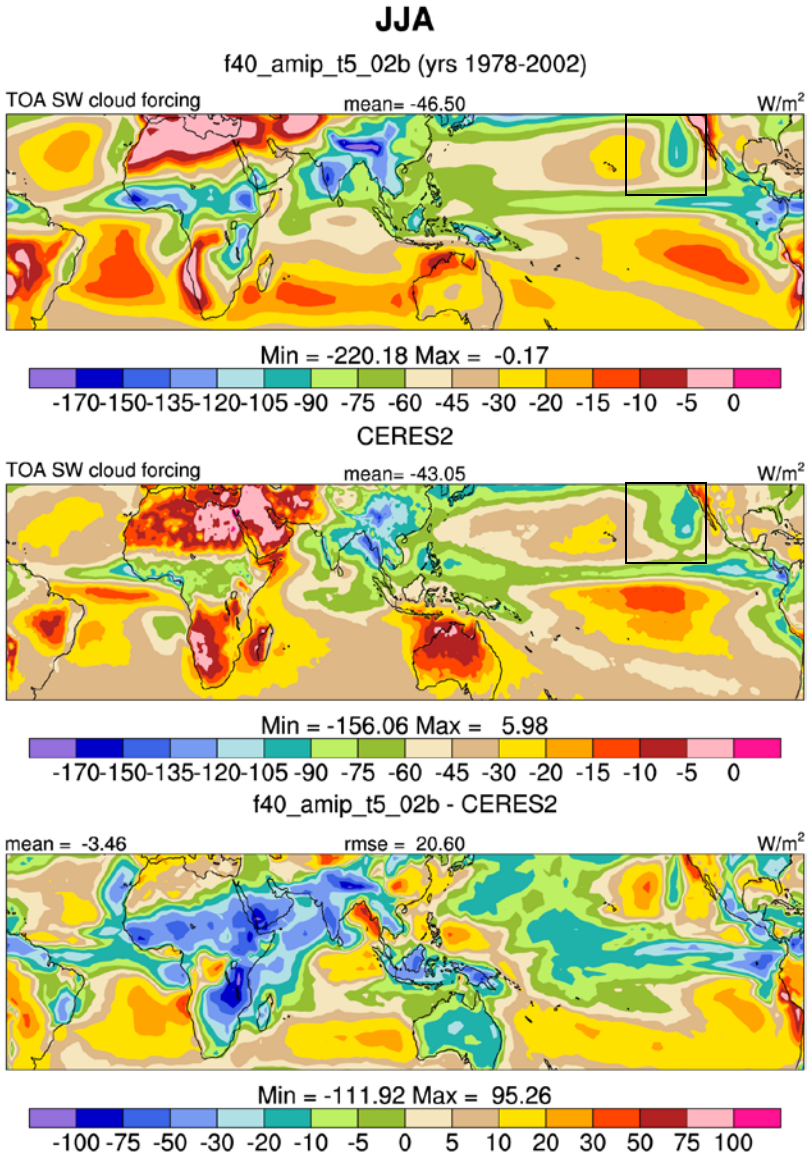
Wuyin Lin (Brookhaven National Laboratory)

# SW CRF

## Track 1



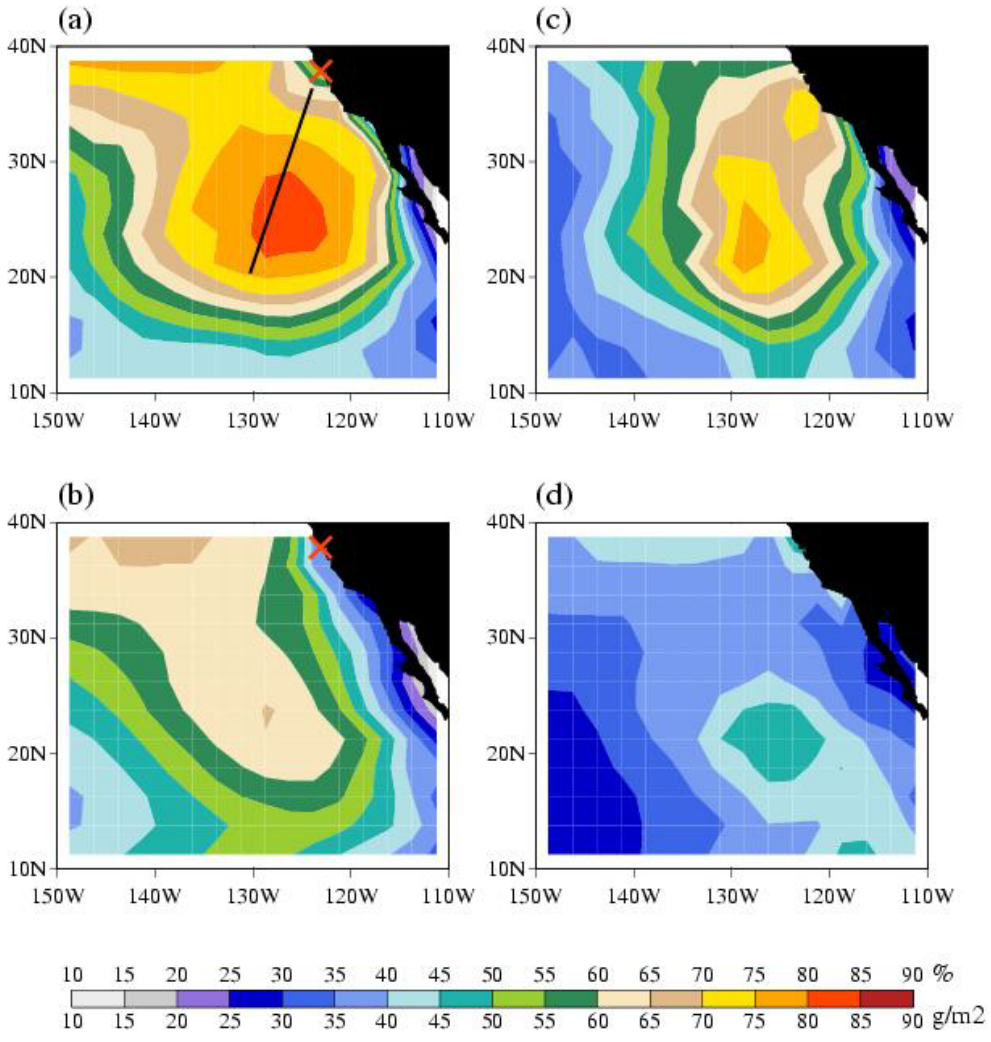

## Track 5



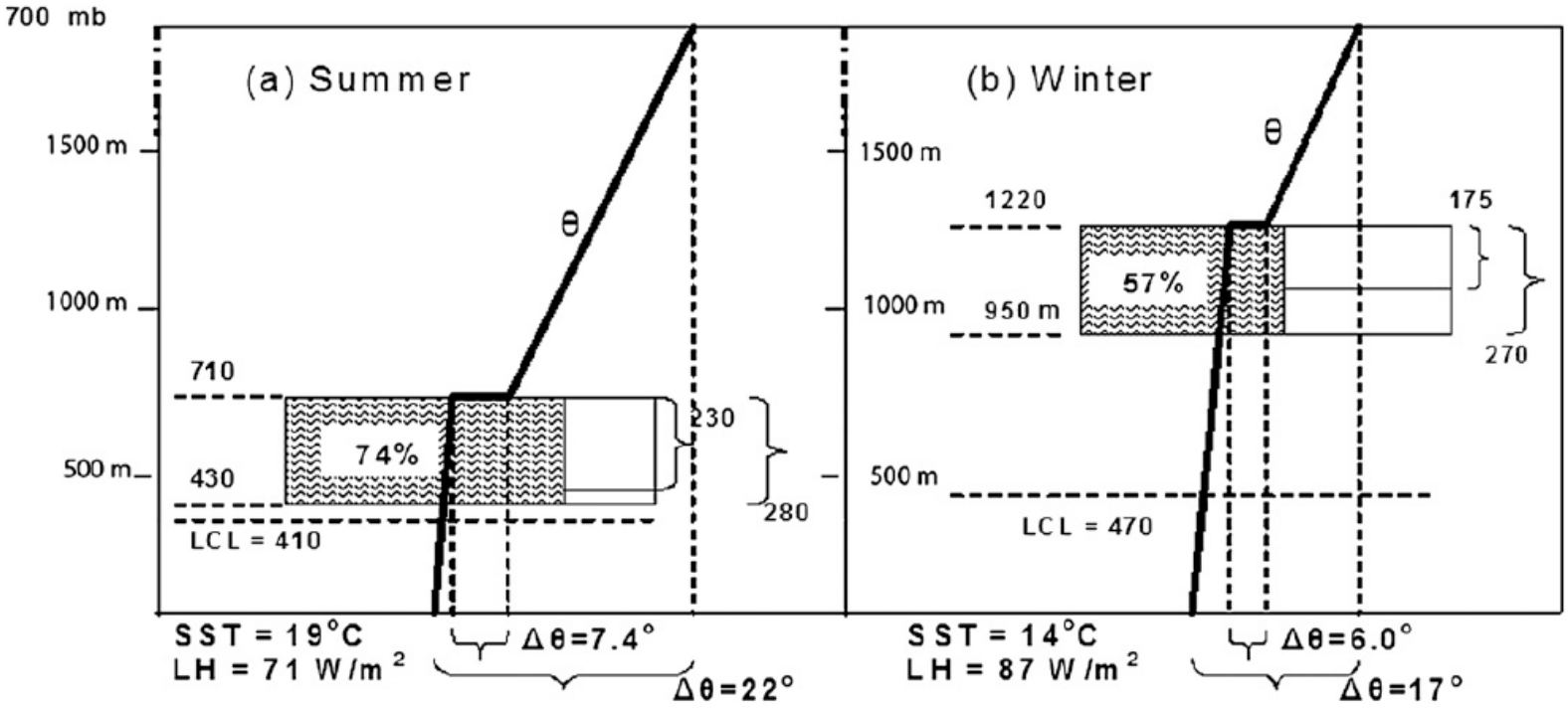
Cloud Amount  In-cloud liquid path

JJA

DJF



JJA DJF

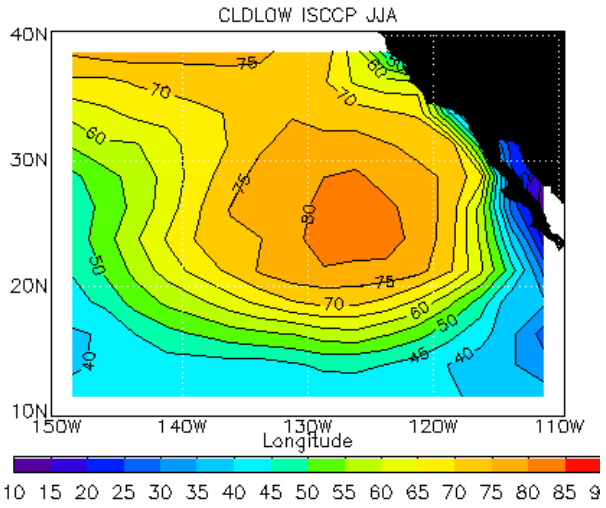


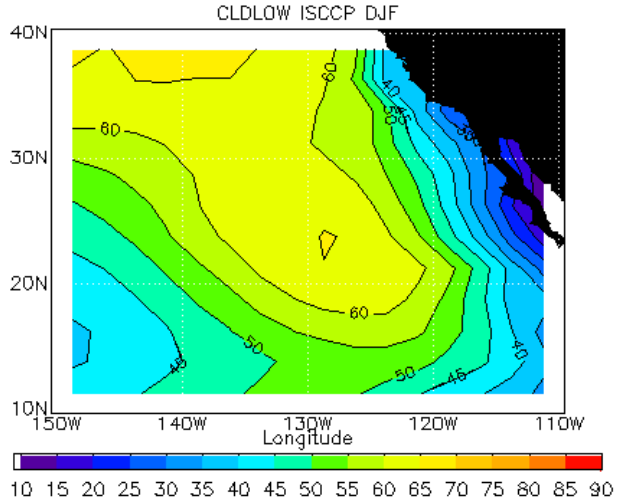

Lin, Zhang, Loeb (2009,JCL)

# Cloud Amount and Liquid Water Path

# CLDLOW

## OBS

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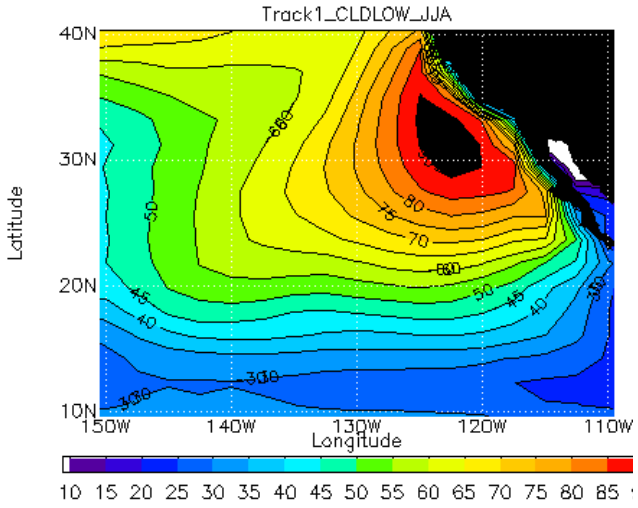


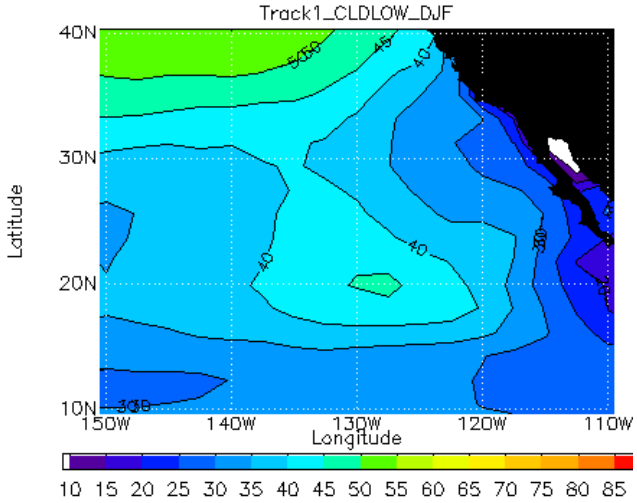


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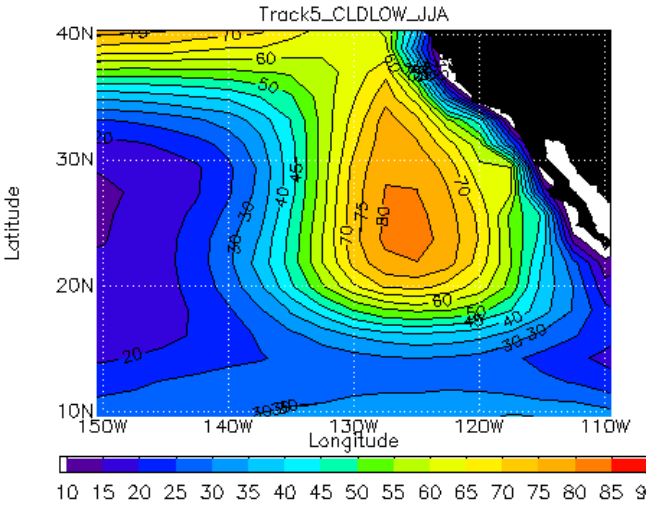


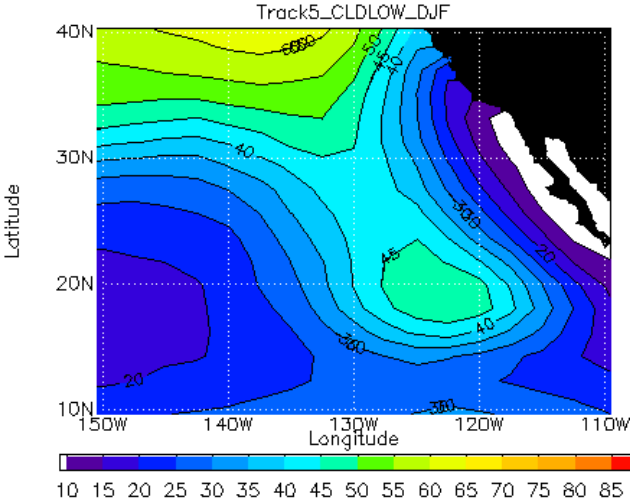

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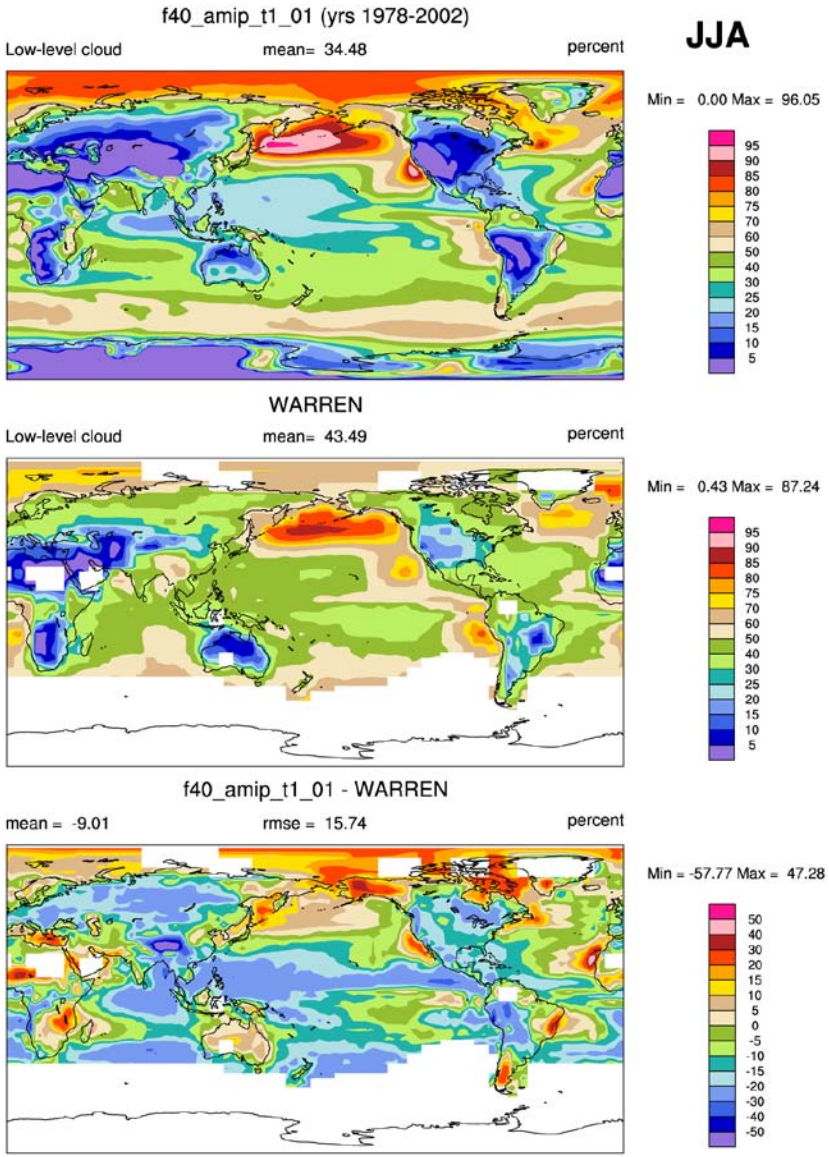


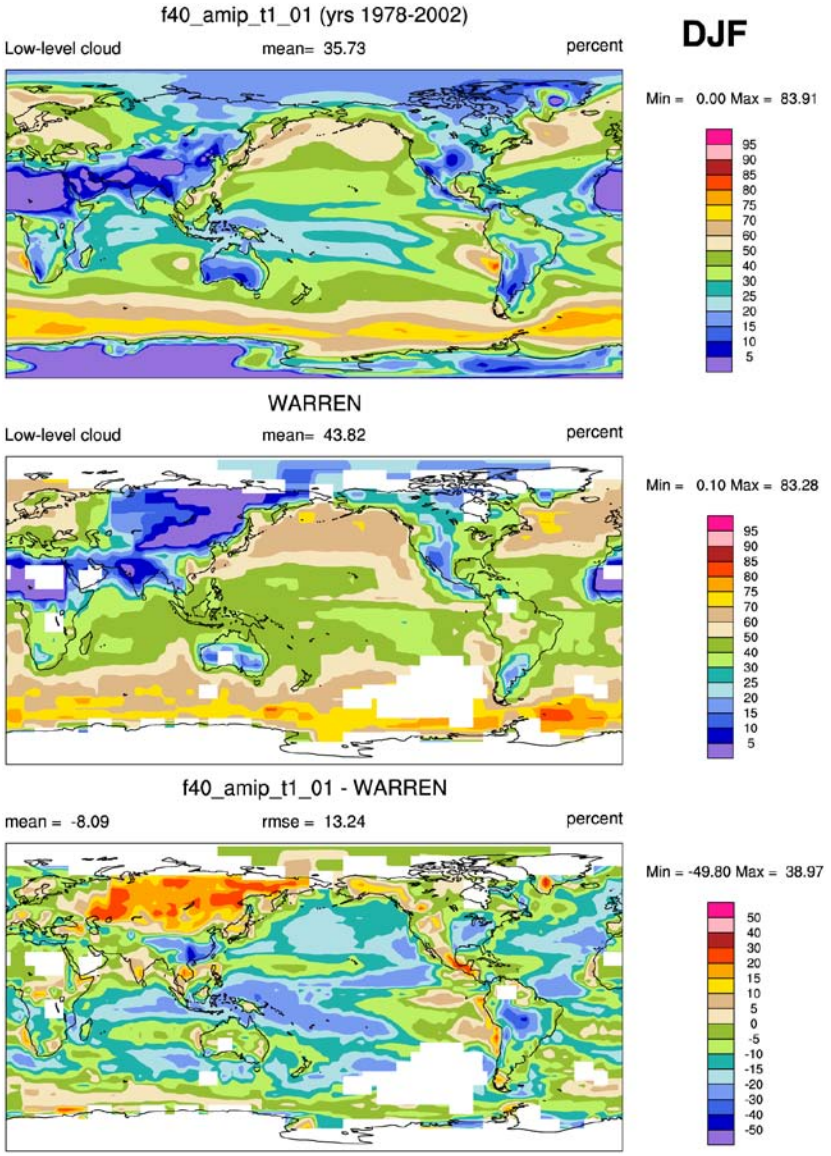

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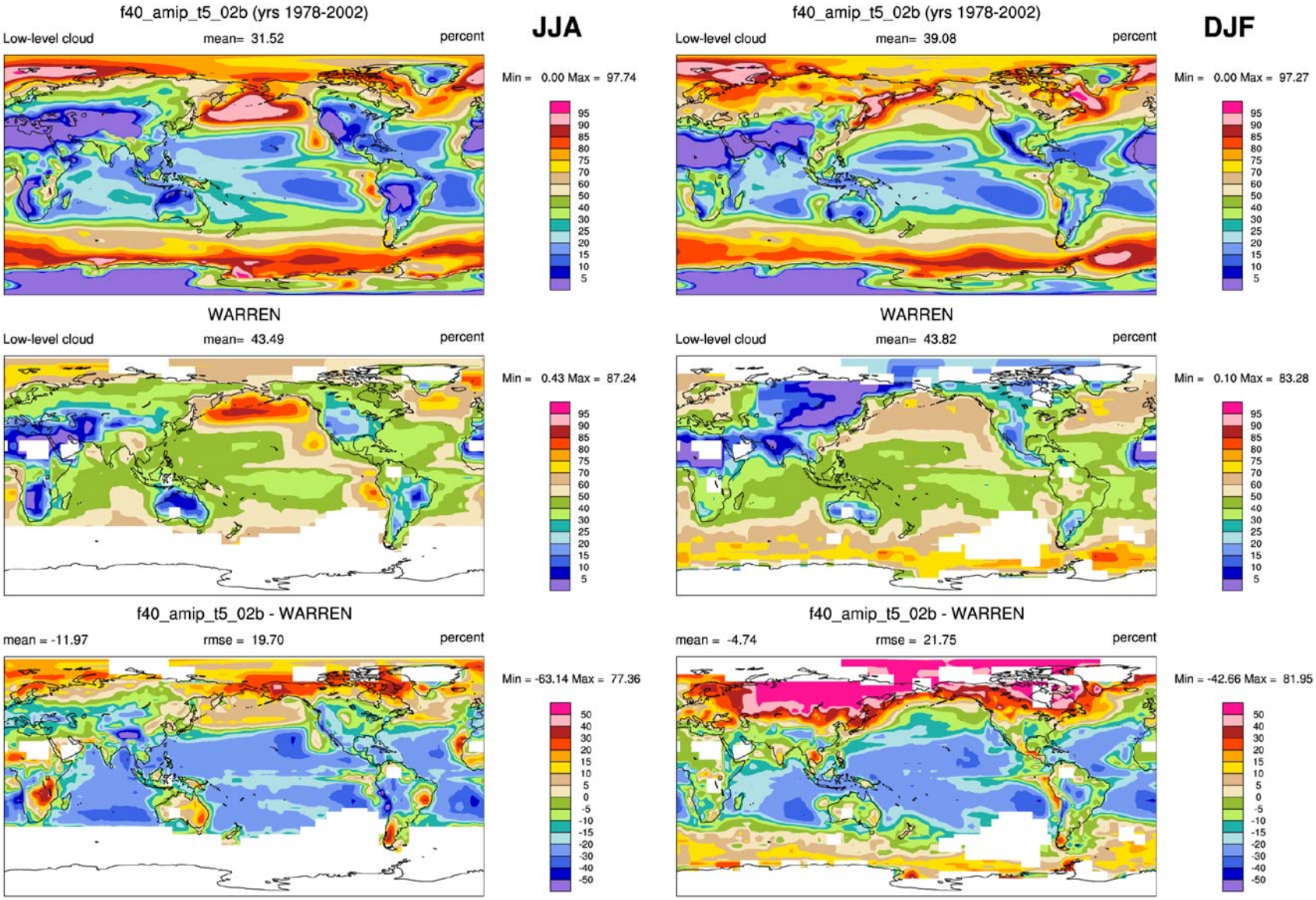
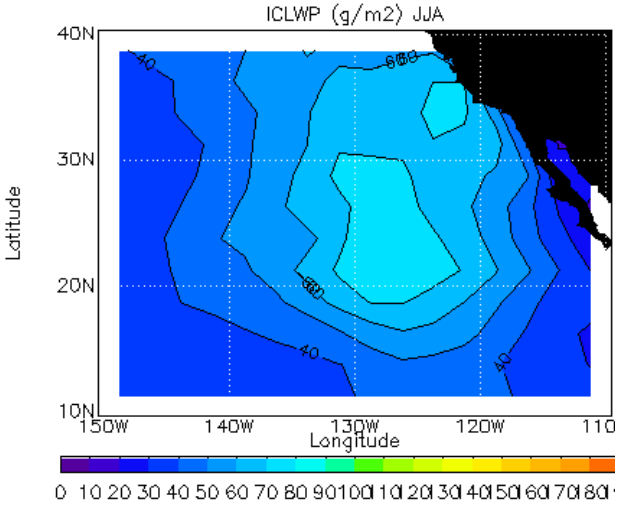
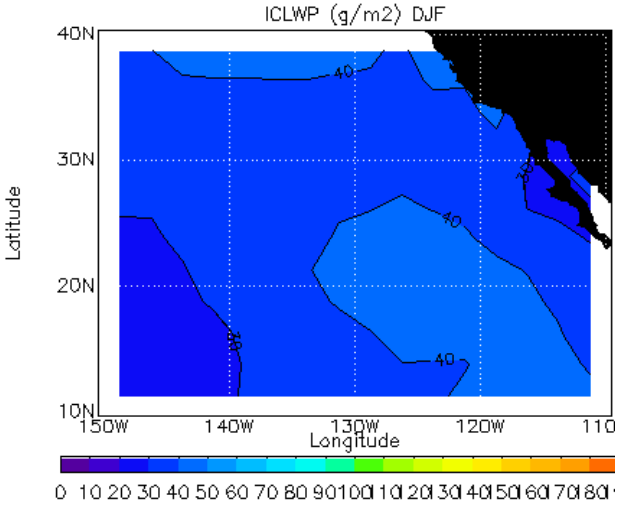


# In-Cloud Liquid Path

## OBS

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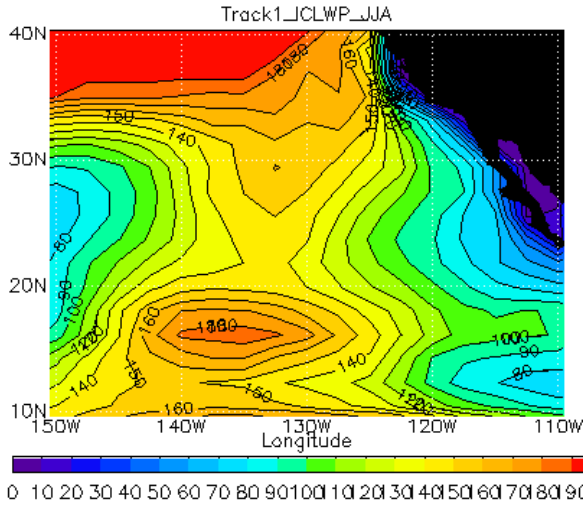


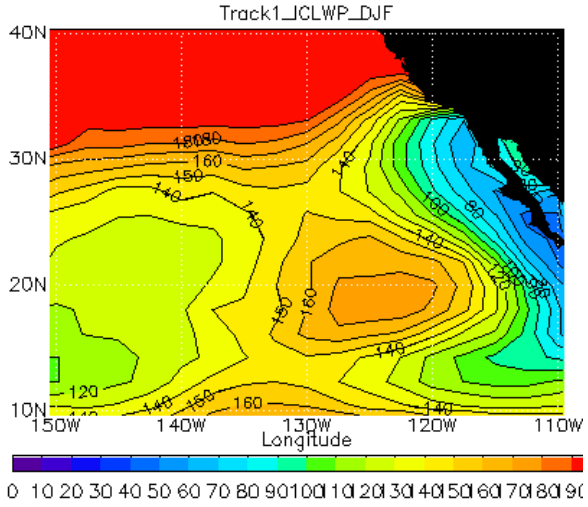


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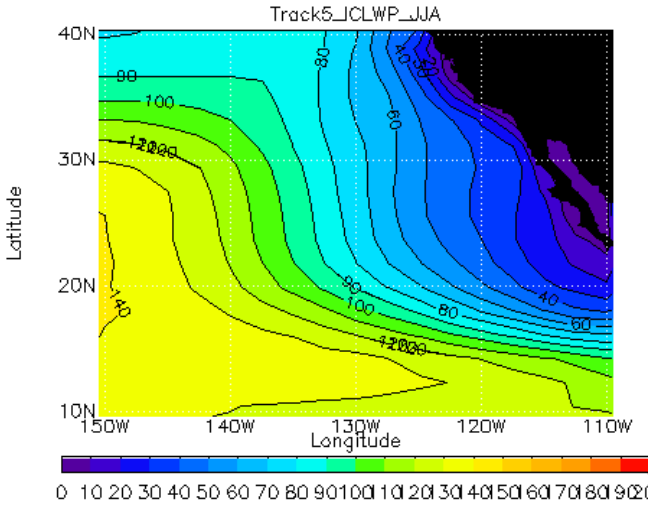
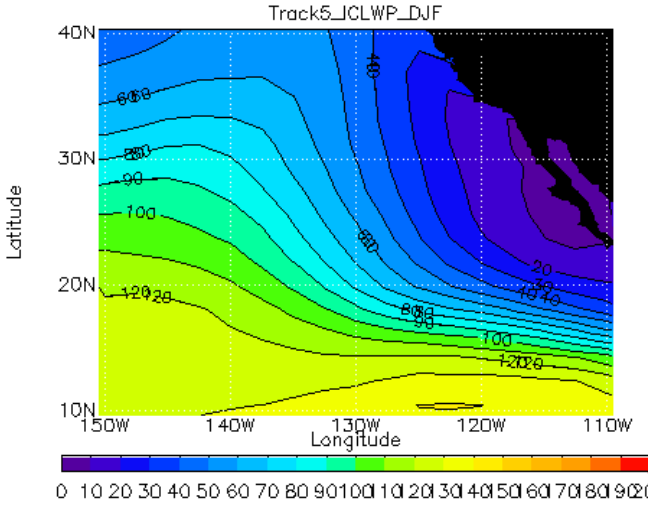
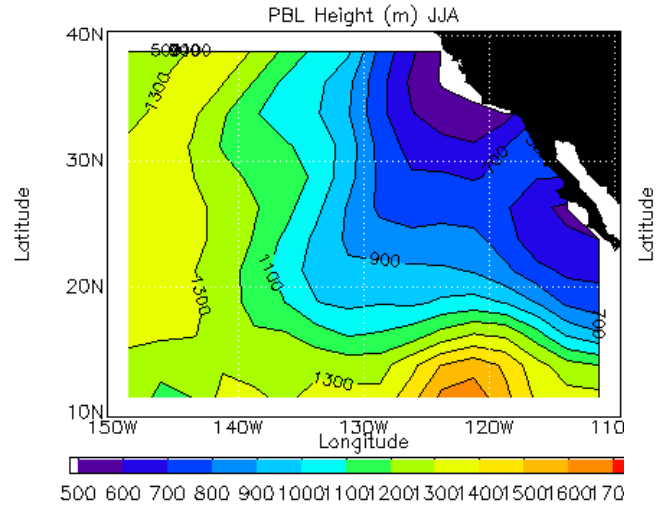


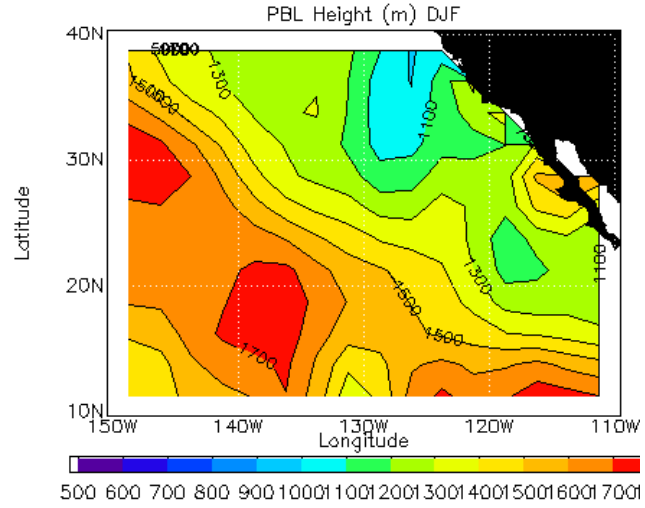



## Other features

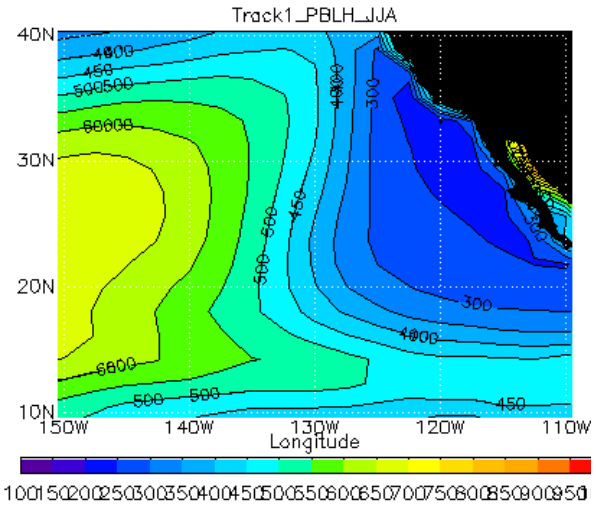
# PBL Height

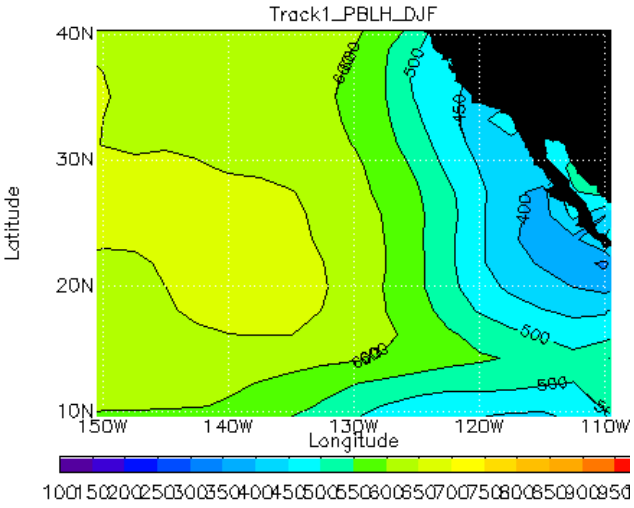
## OBS




## Track 1

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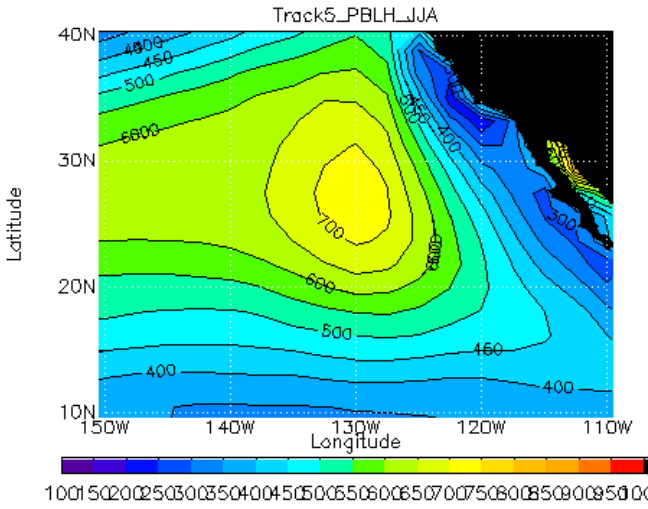
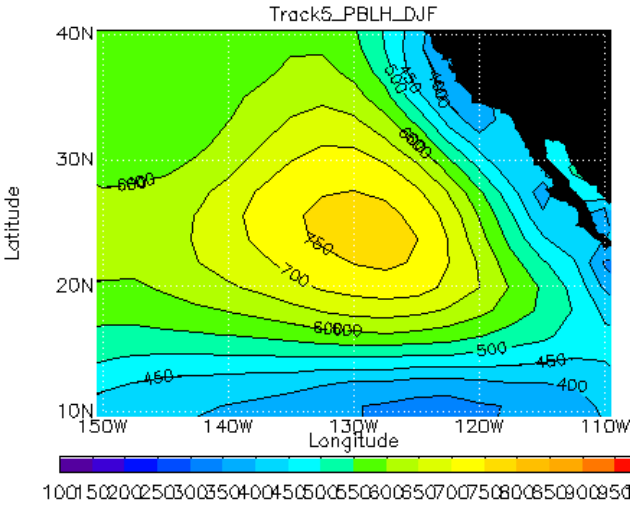
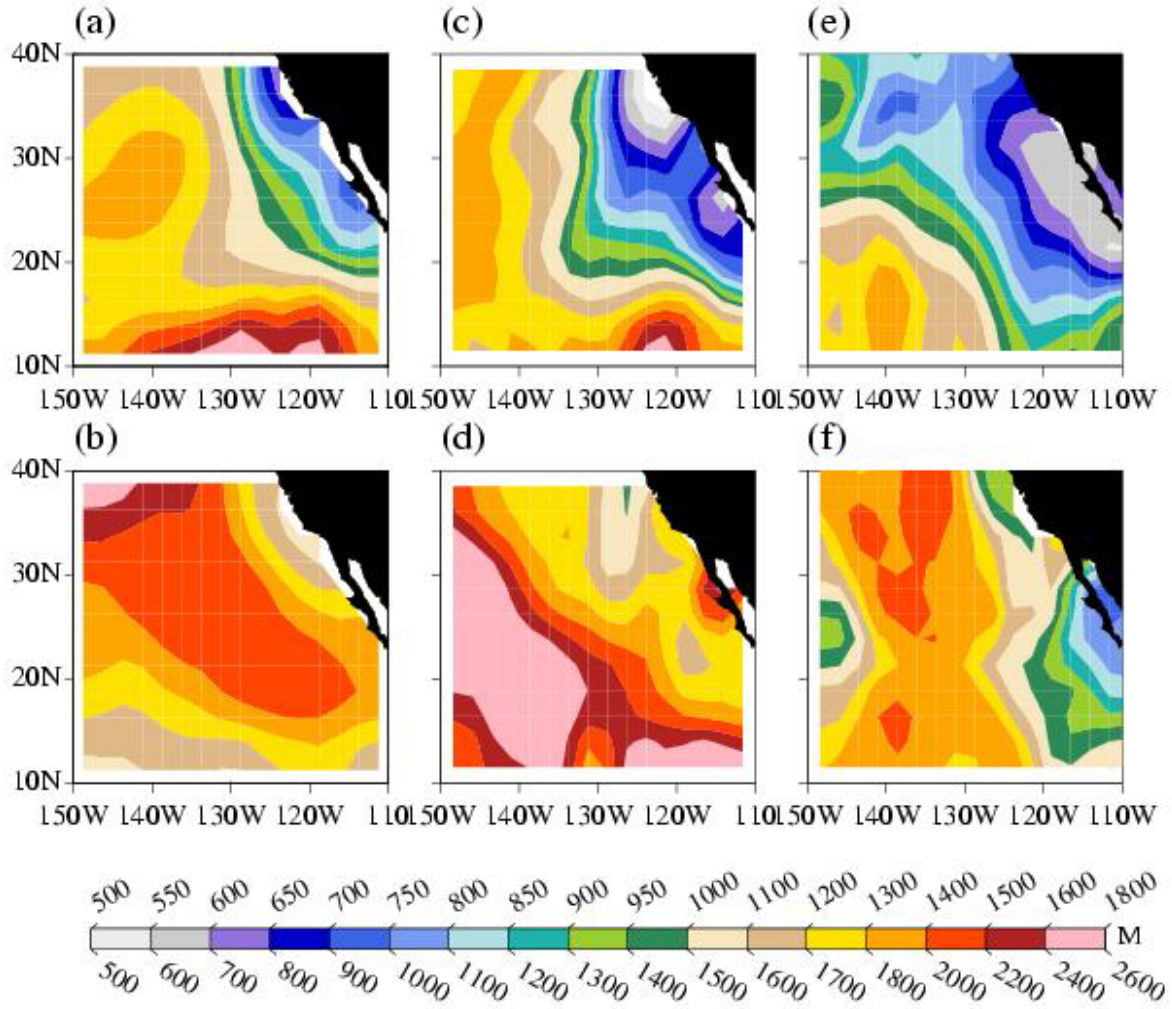


CERES CALIPSO GLAS

JJA

DJF



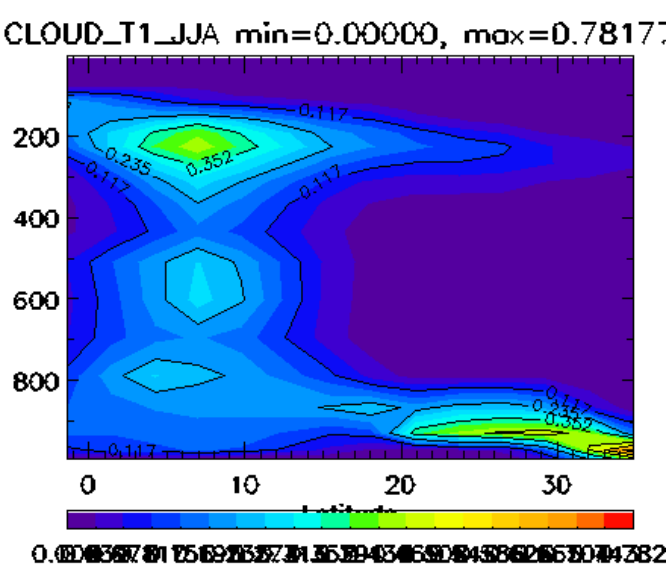

Cloud Top Height
(Inversion Height)

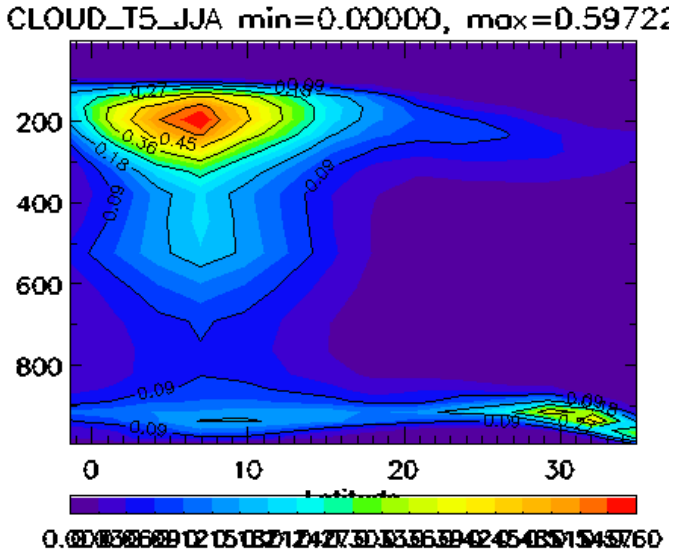
# Cloud Amount

## Track 1

## Track 5

JJA

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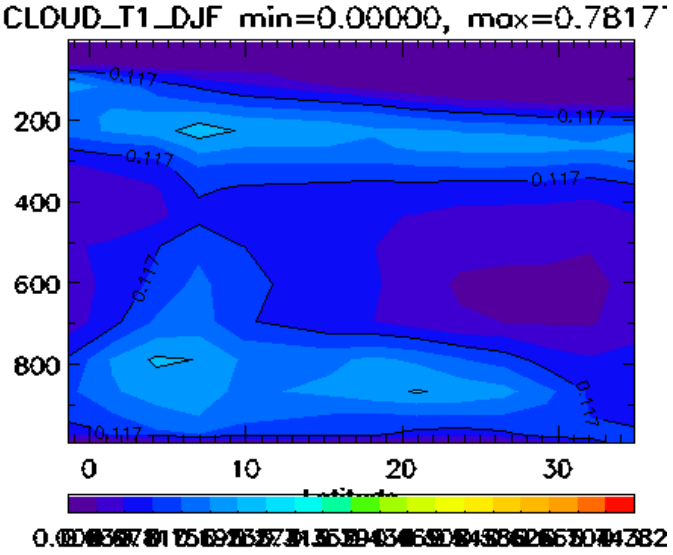
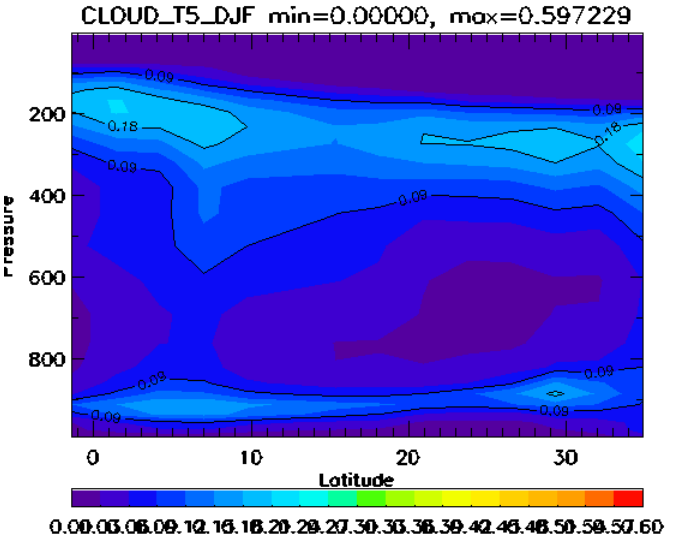
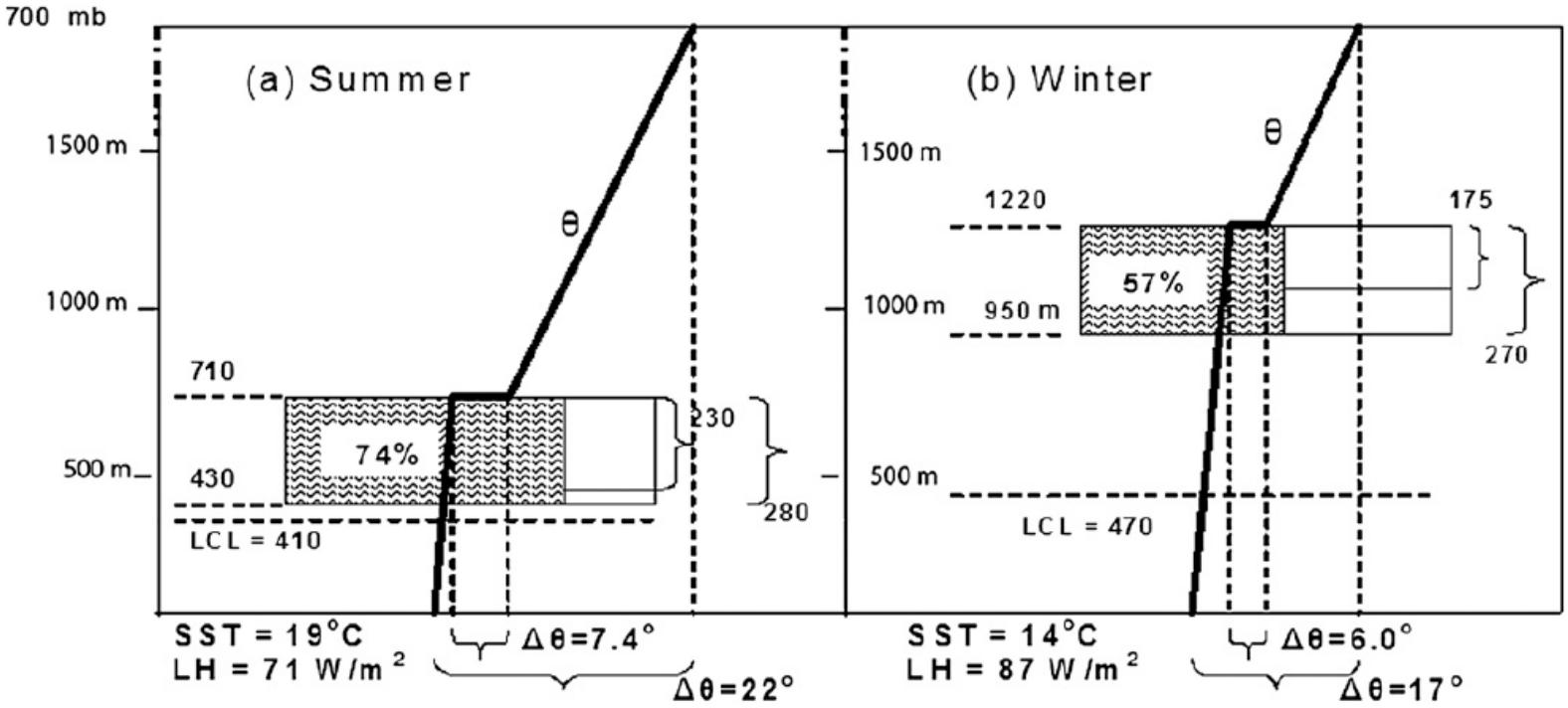


JJA DJF

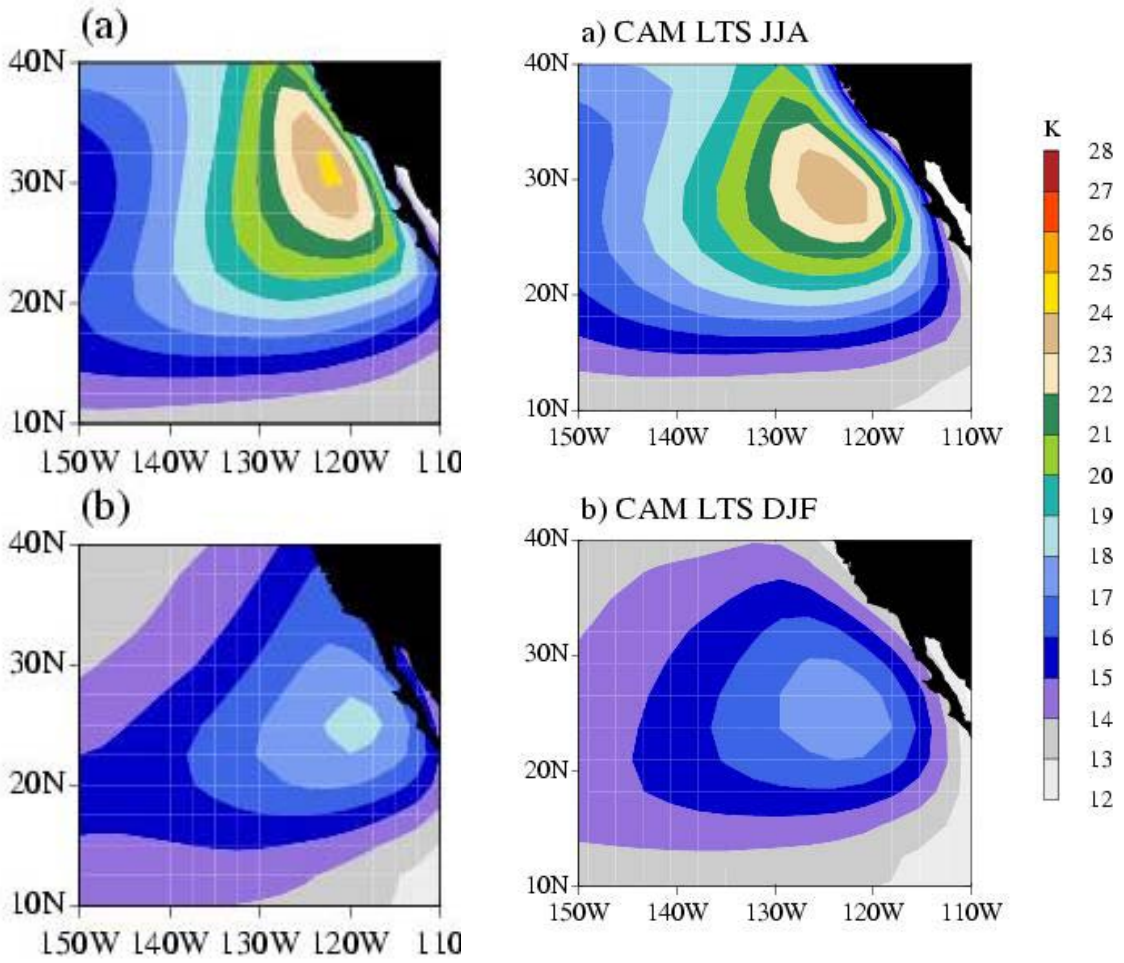



(Lin, Zhang, Loeb 2010,JCL)

# Low Tropospheric Stability

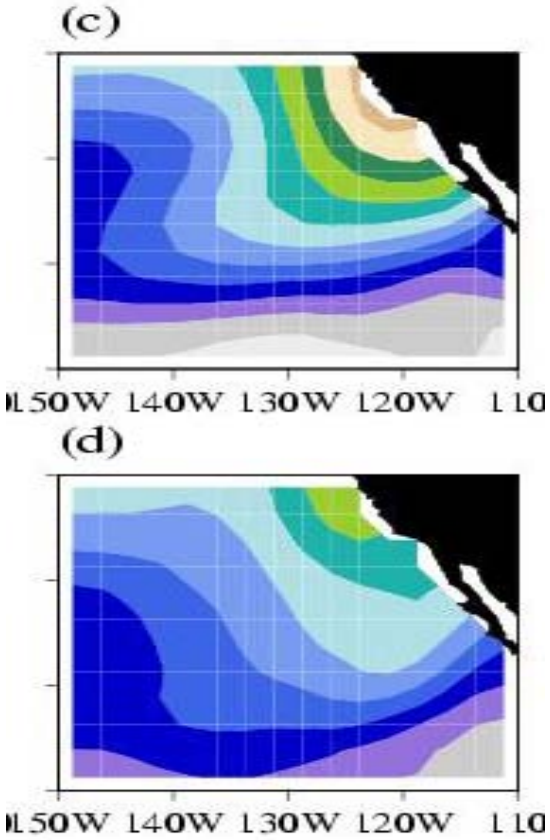
OBS

CAM3.35 (Track1)

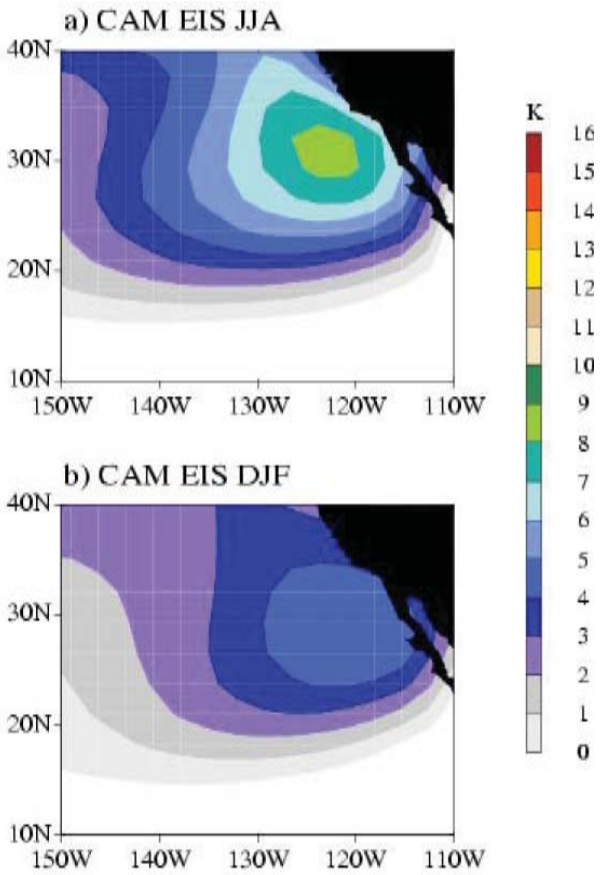


# Inversion Strength

OBS

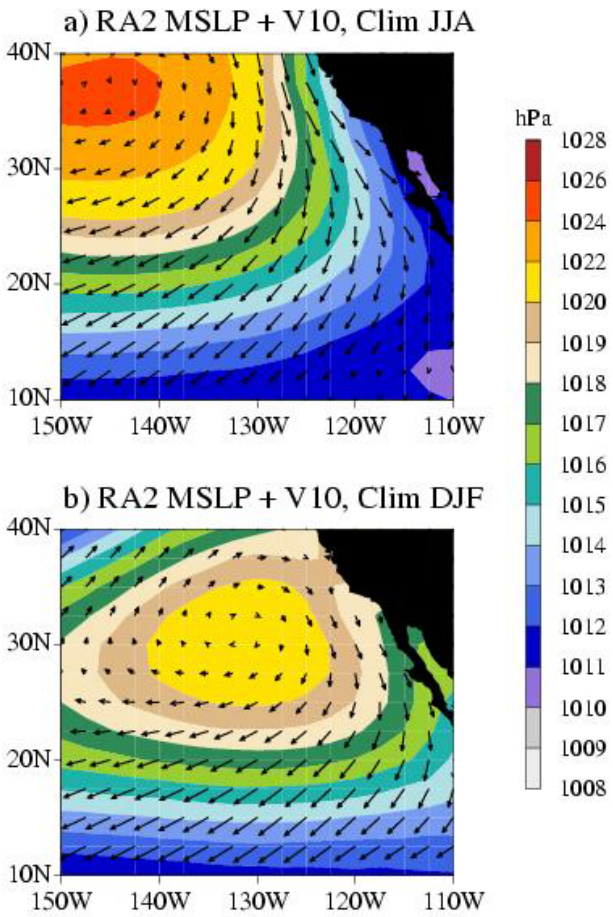



CAM3.35 (Track1)

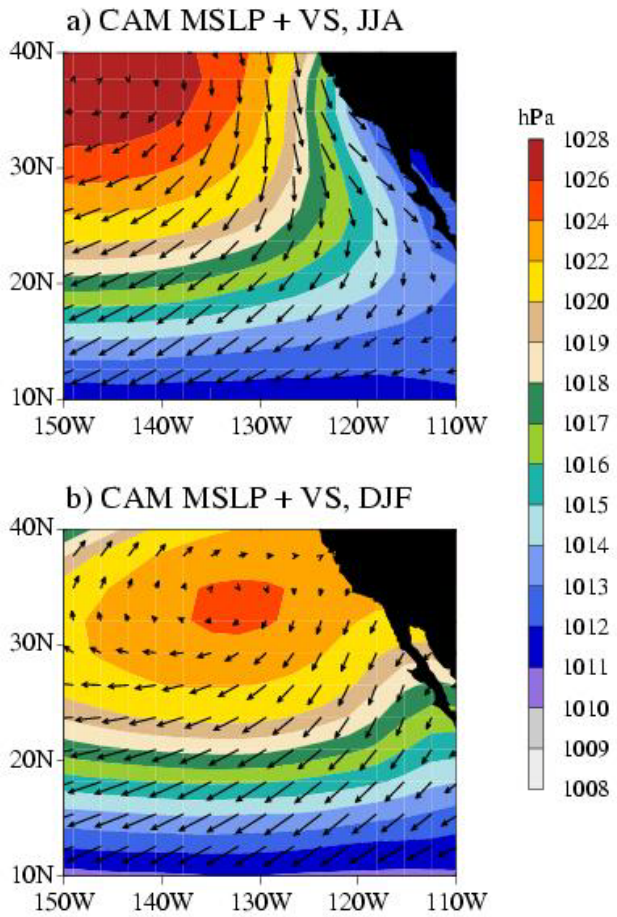


# CAM PSL and Lowest Model Level Winds

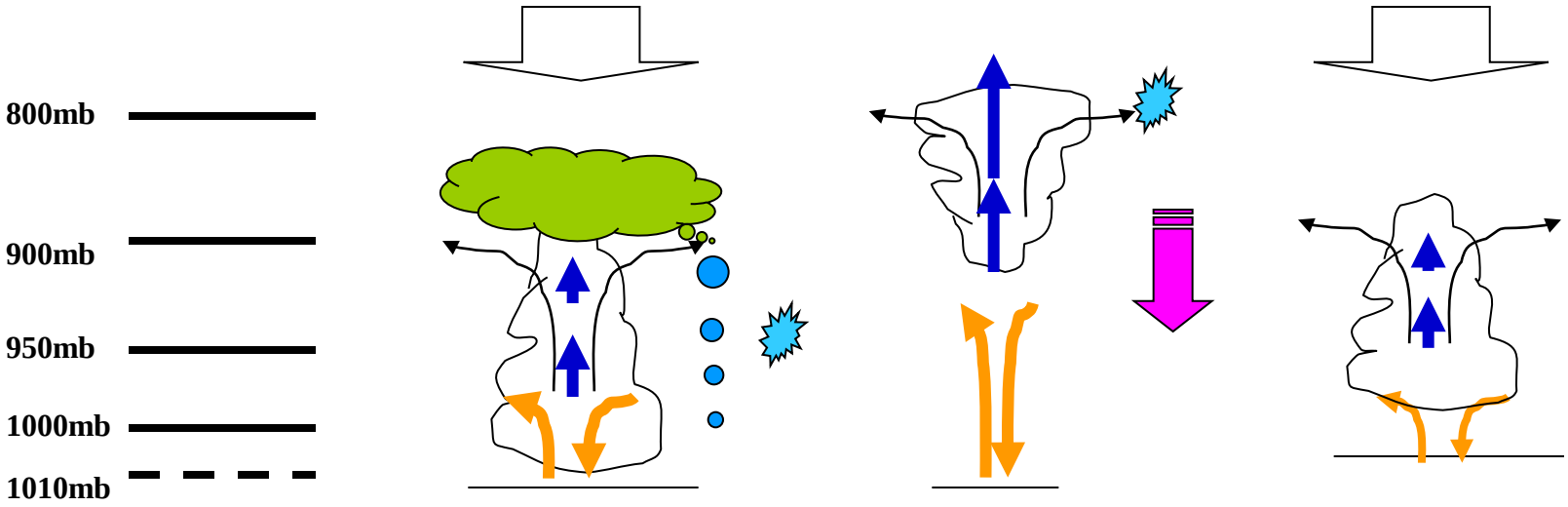
## OBS




## CAM3.35 (Track1)



# CAM3.1

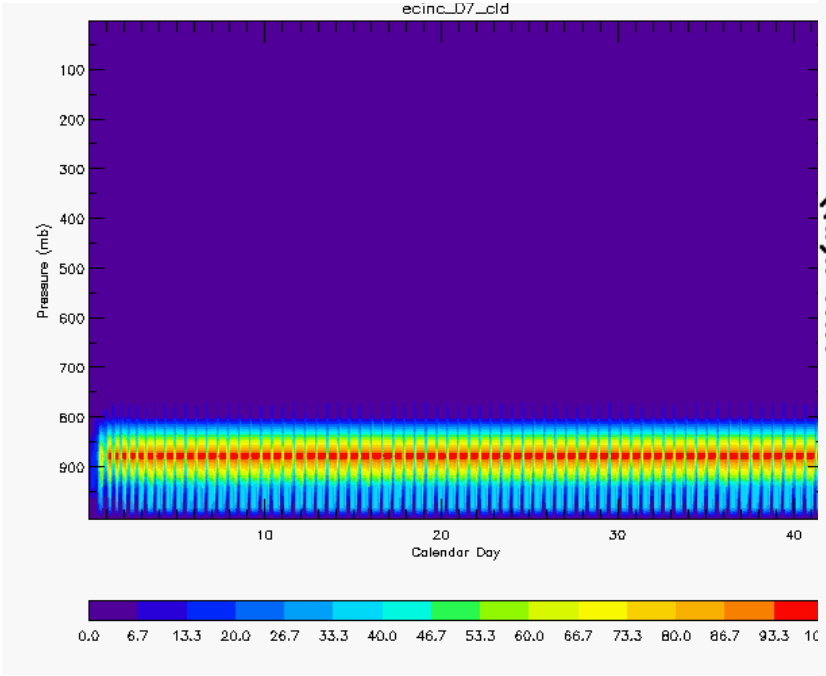


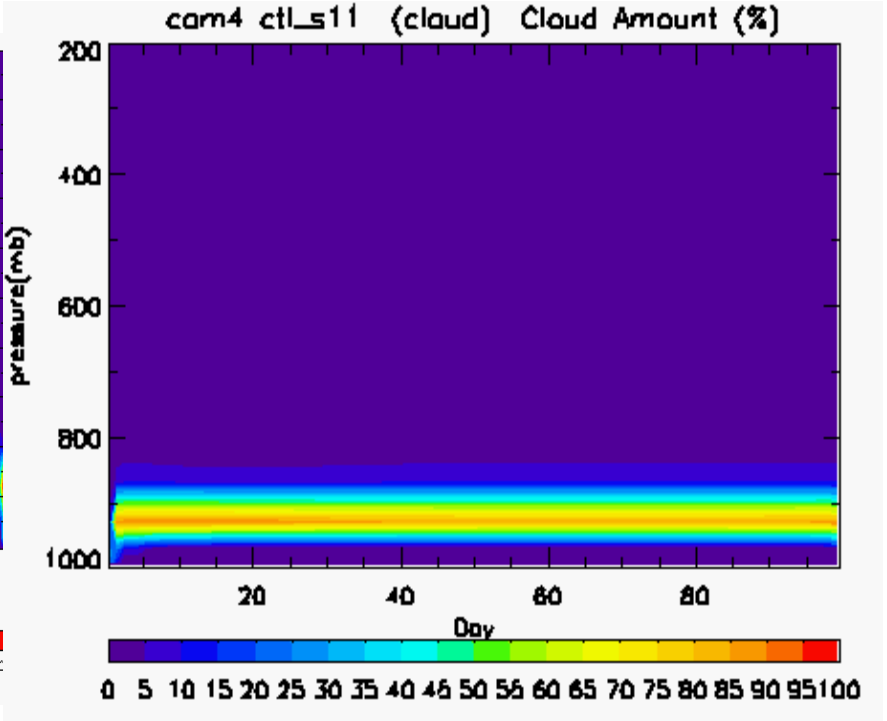

Zhang and Bretherton (2008, JCL)

# Low Clouds Simulated in SCM Using Idealized Forcing

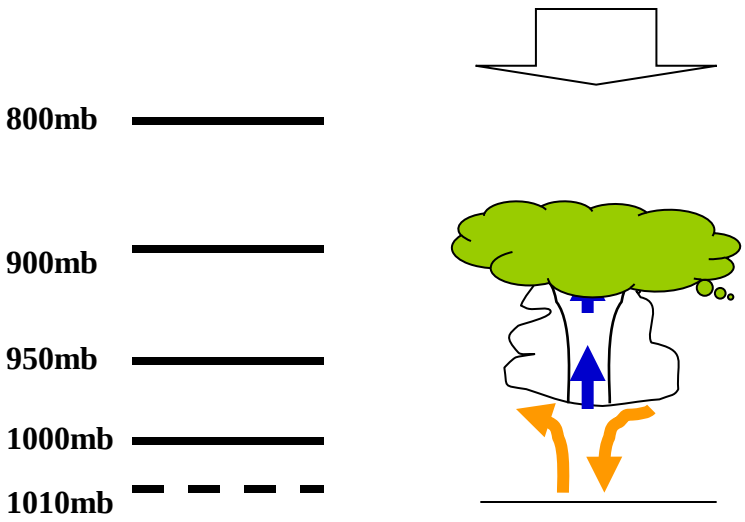
CAM3.1

Track 1 (CAM3.5.35)



Track 1



# CFMIP-GCSS Intercomparison of LES and SCMs

**CGILS Meeting**

**March 1-2, 2010**

**Stony Brook, New York**

**http://somas.stonybrook.edu/cgils**

# Summary

1. The models simulated the sign of seasonal variation of MBL cloud amount. The amount in winter is too lower; the in-cloud liquid in is too high. These errors compensate to produce a good SW cloud forcing.
2. Track 5 is an improvement to Track 1.
3. The seasonal cycle of the large-scale conditions is well simulated, but the inversion strength is not. This is likely related to the boundary layer height to be too lower.
4. We need to understand the interaction of the parameterization components to better understand the model