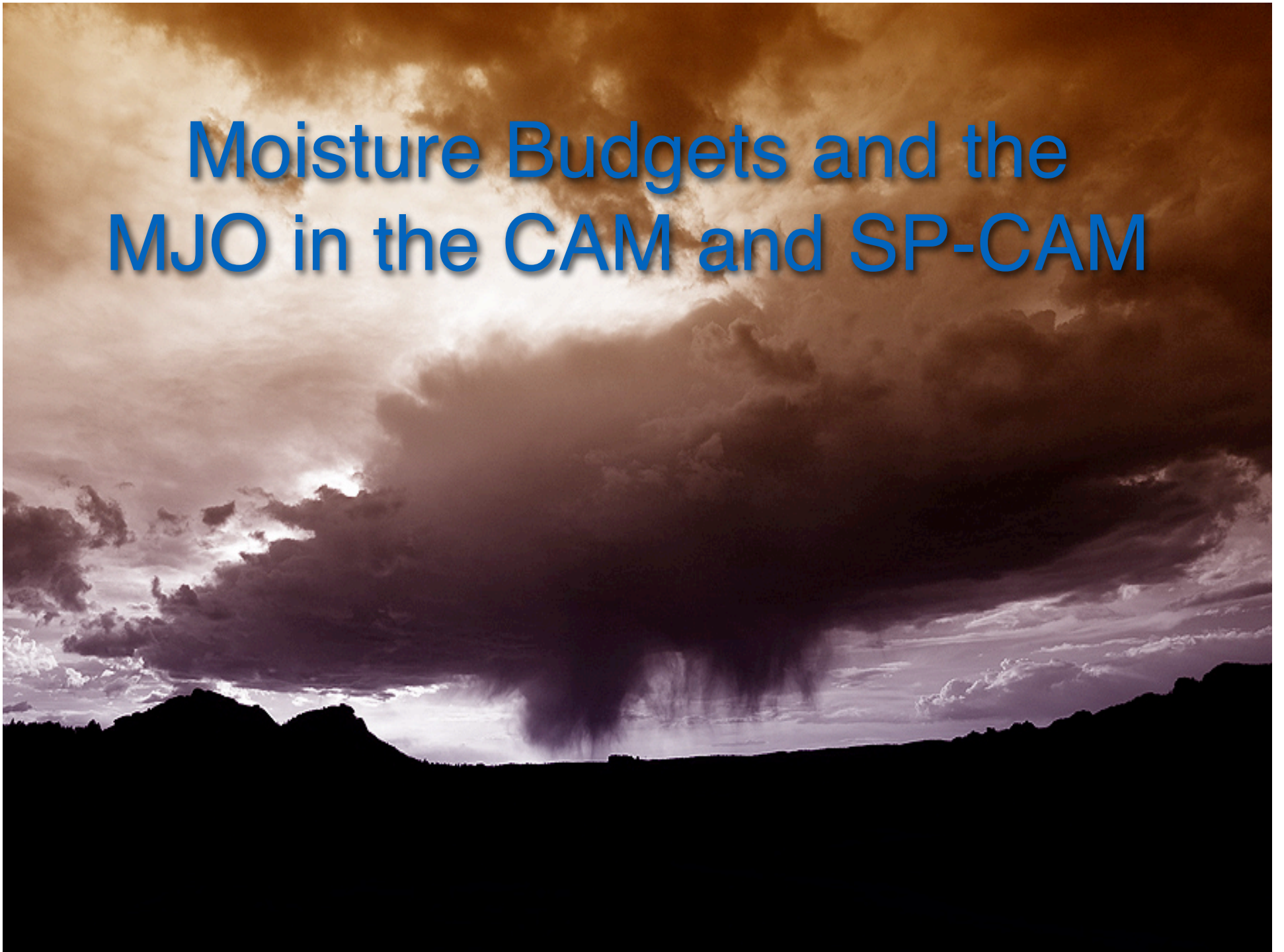
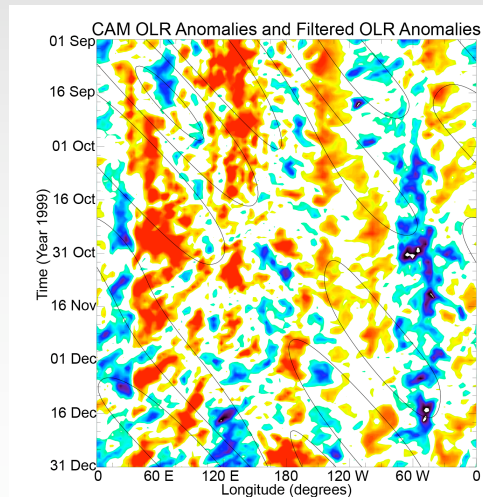
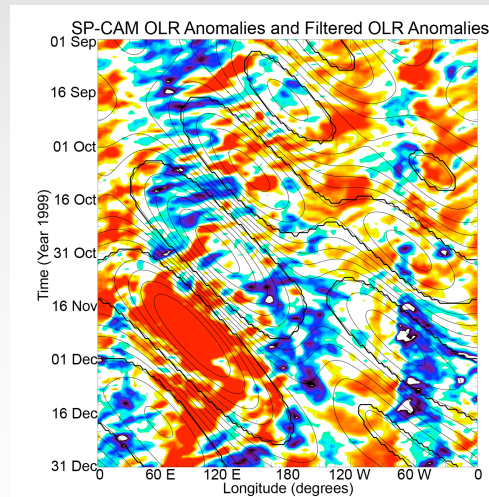
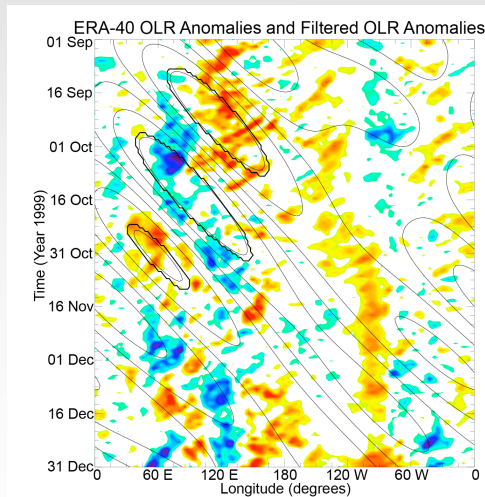


# Moisture Budgets and the MJO in the CAM and SP-CAM

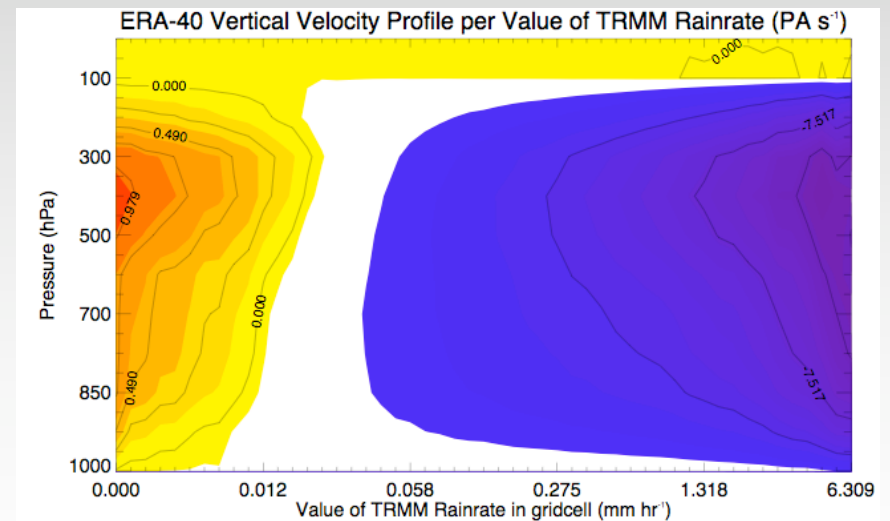
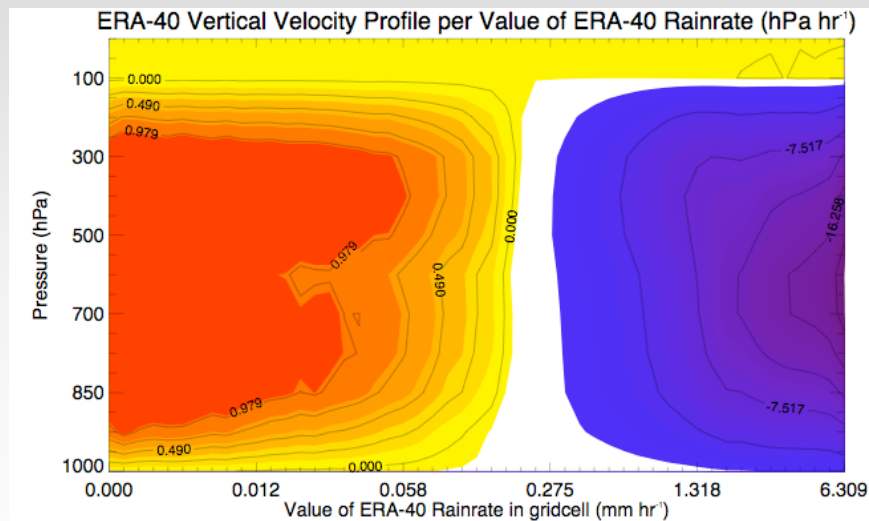
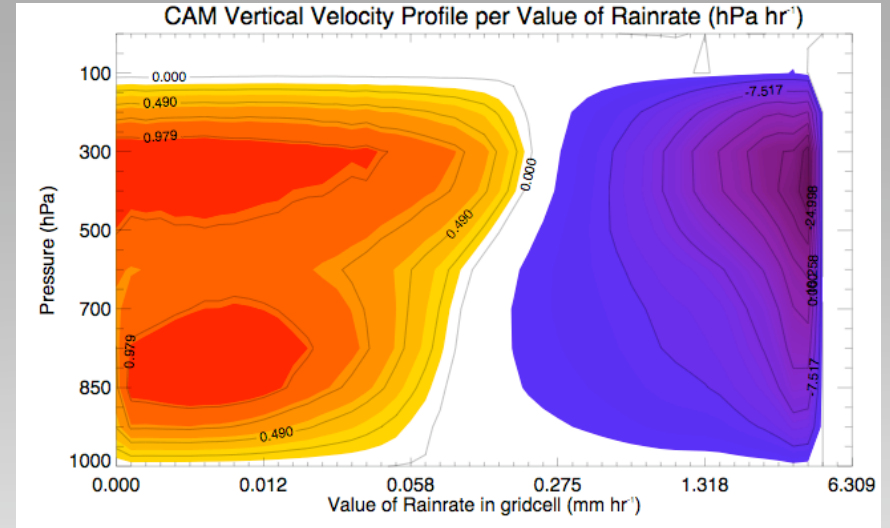
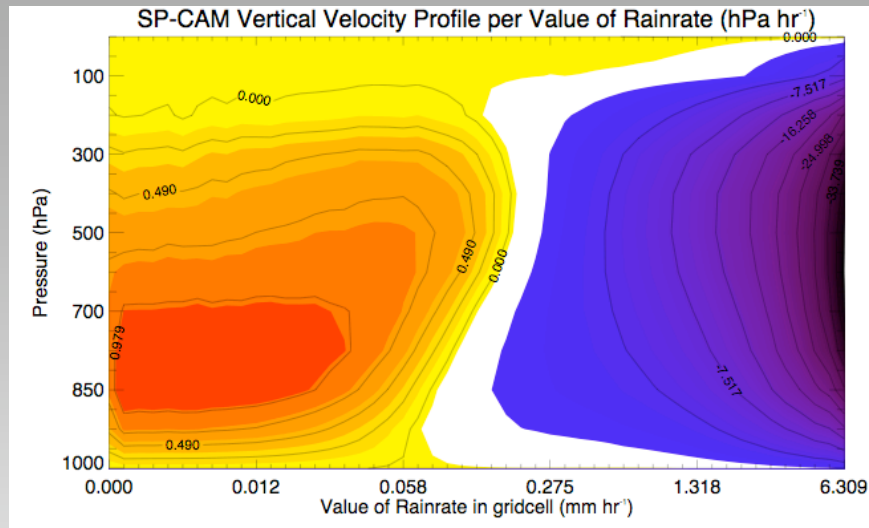


# About the Models

- Both run at PNNL about 2 years ago
- 4 yrs of each at  $2.5^{\circ} \times 2.0^{\circ}$  CAM grid and Finite Volume Dy-Core
- SP at 4km spacing aligned East-West

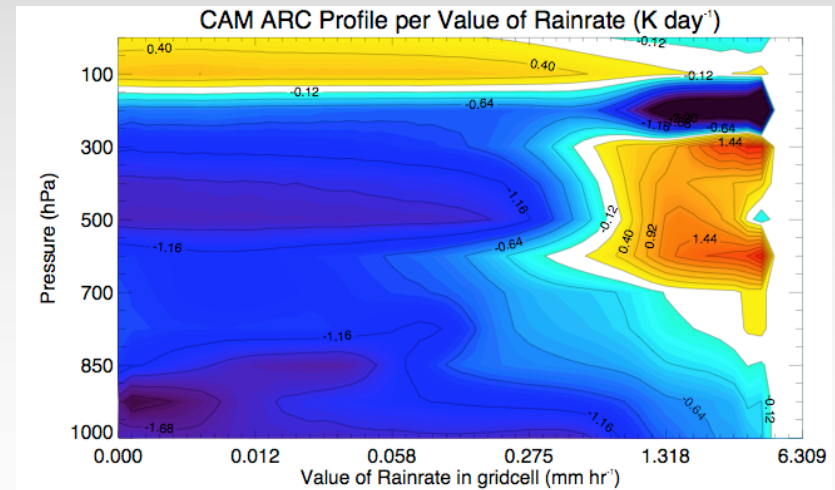
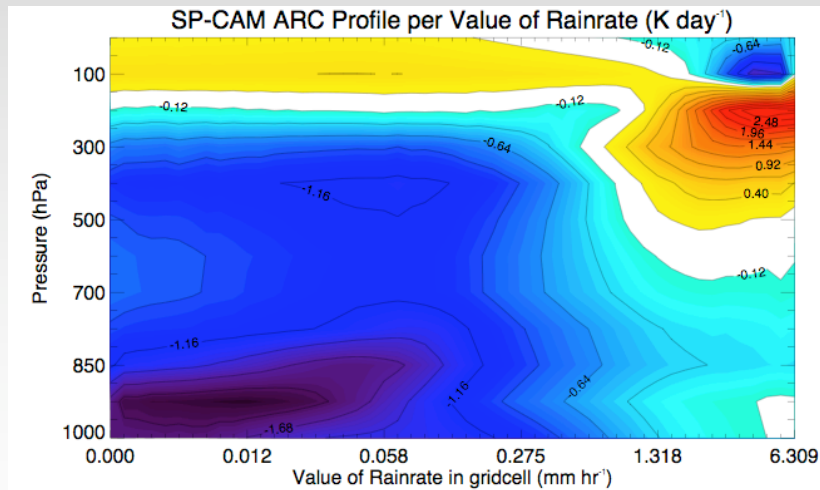
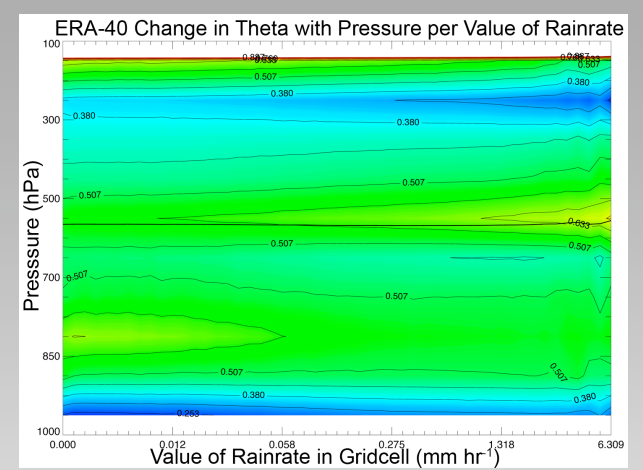
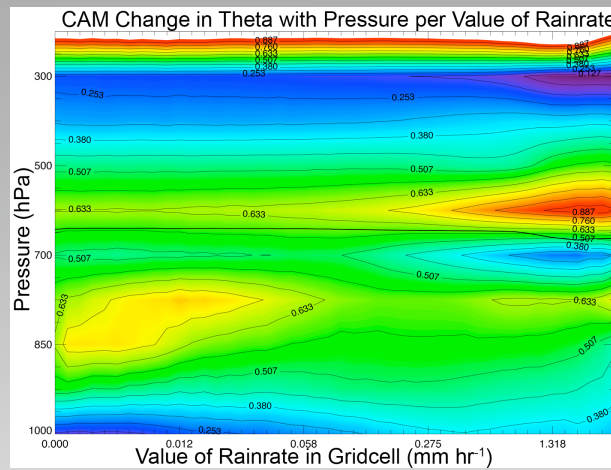
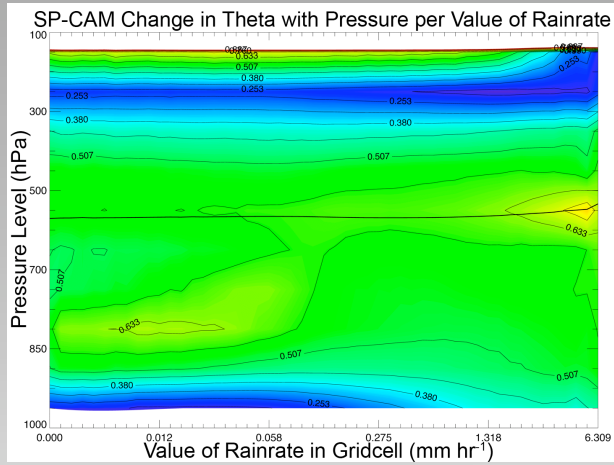


# Vertical Velocity vs Rainrate



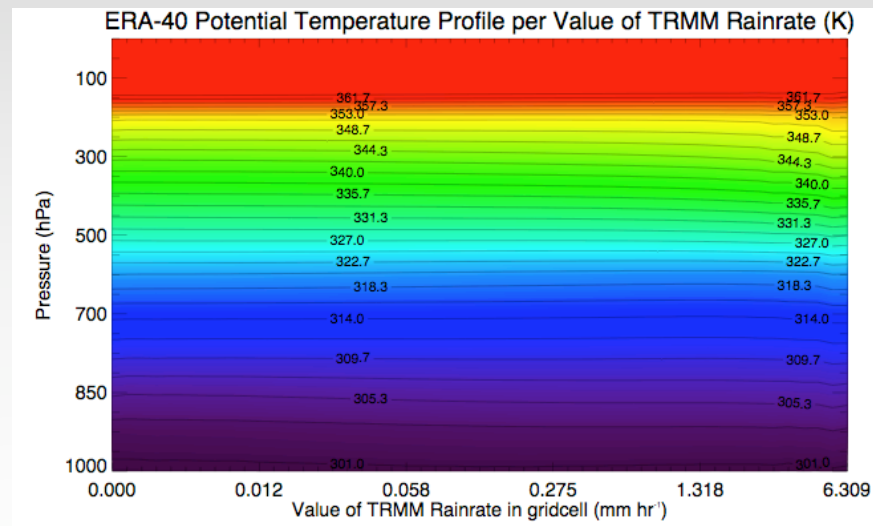
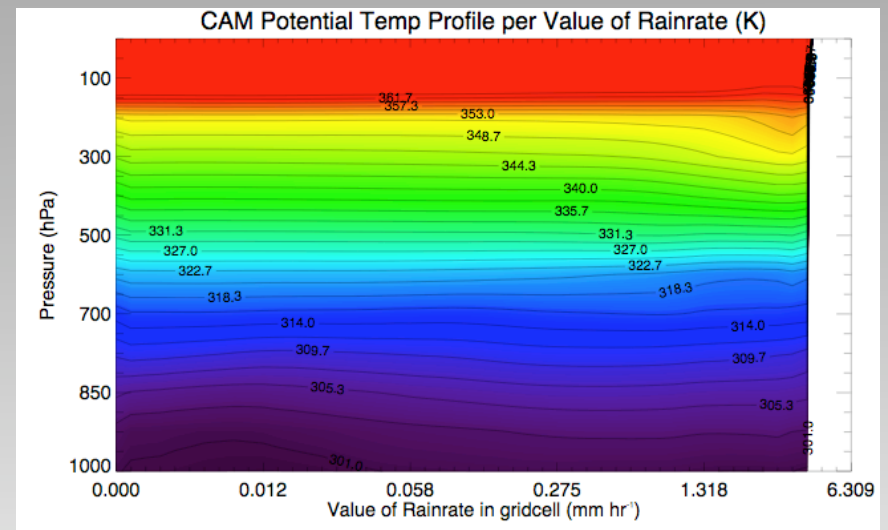
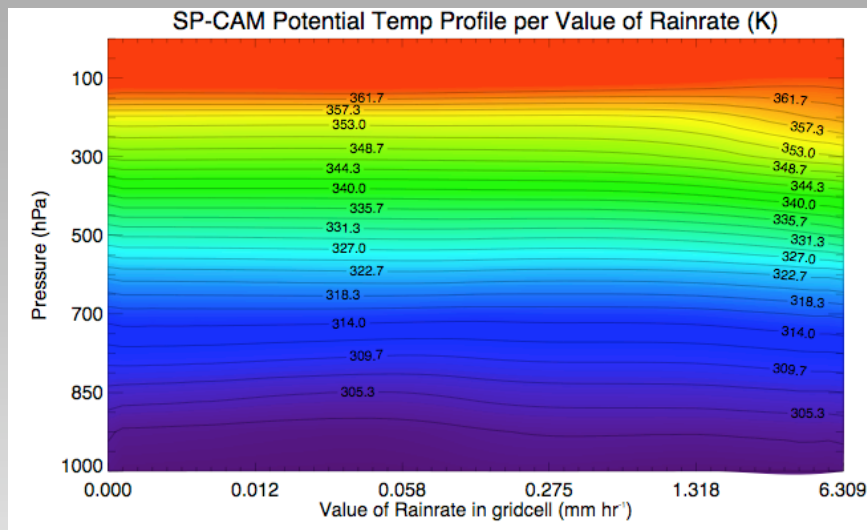


# Static Stability and ARC Profiles

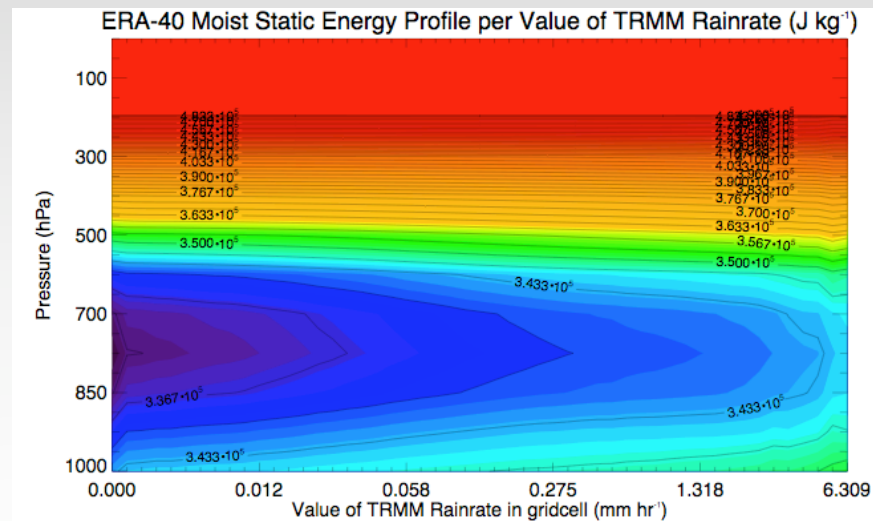
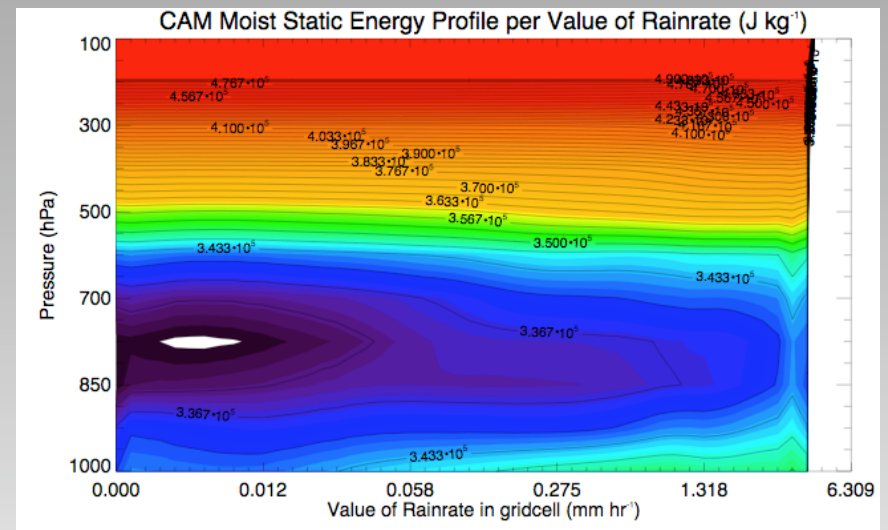
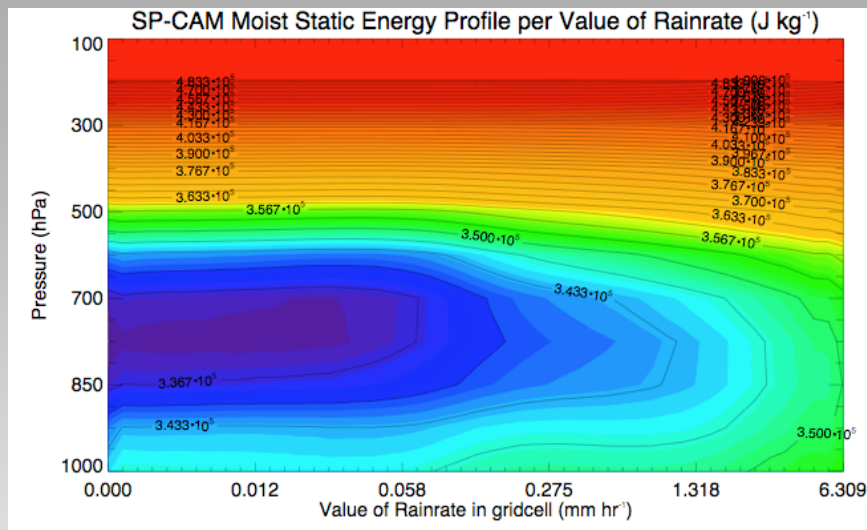




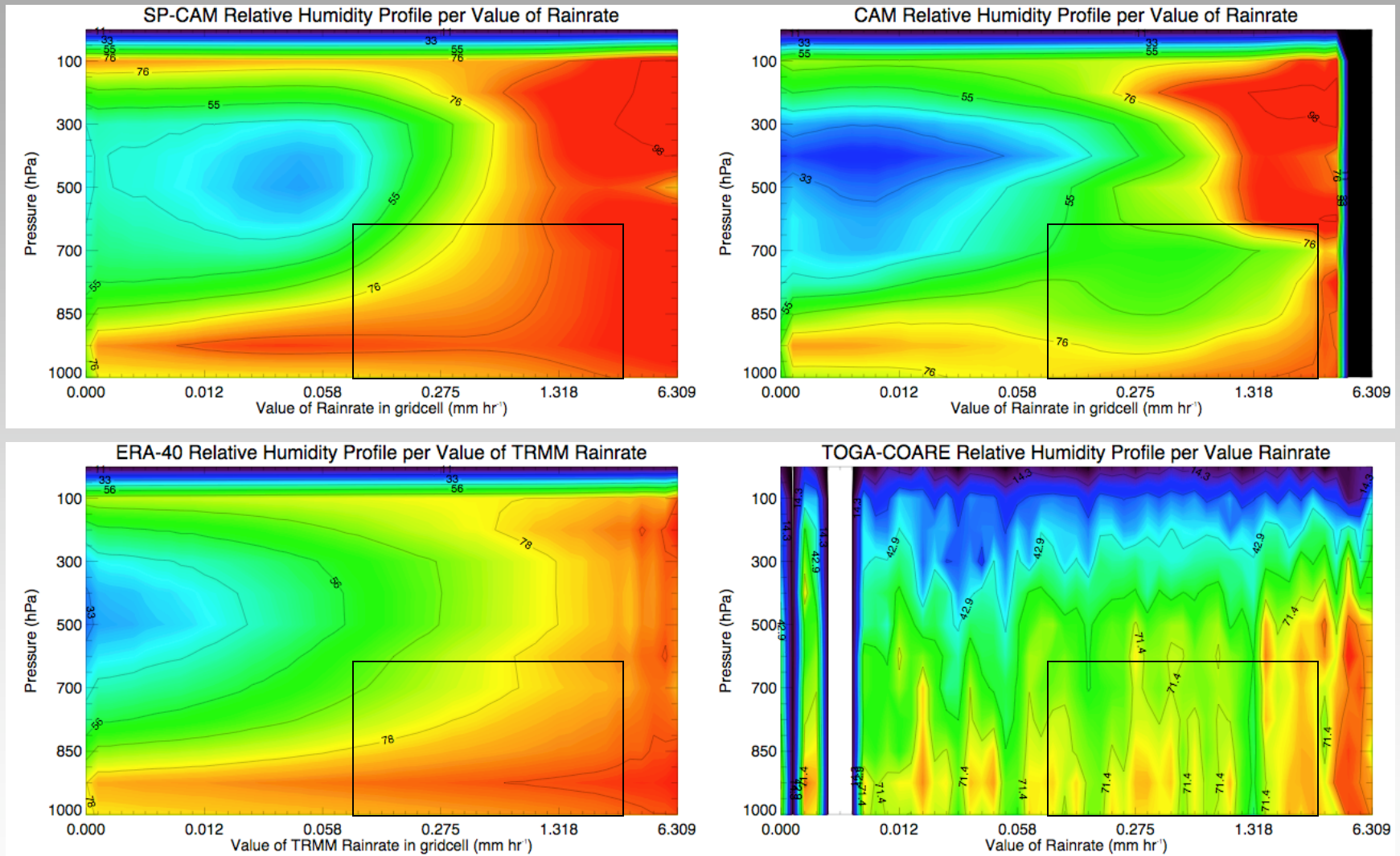
# Potential Temperature Profiles



# Moist Static Energy Profiles



# Relative Humidity Profiles

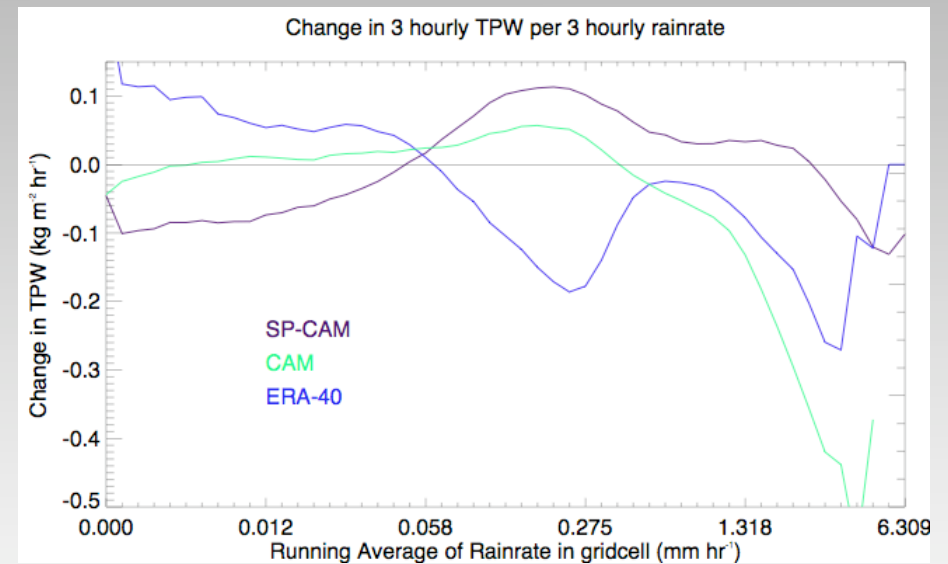
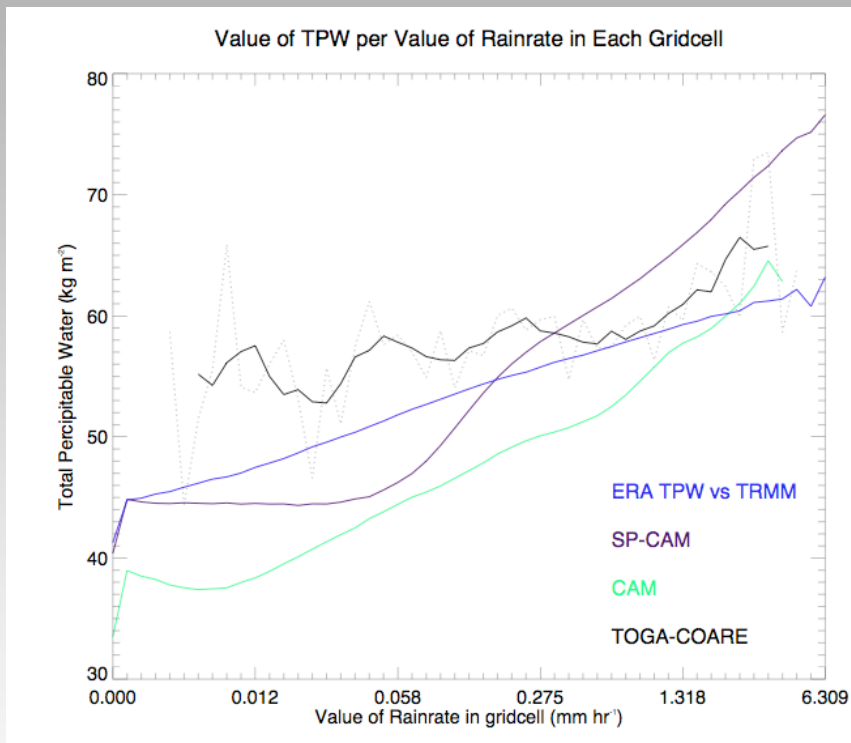




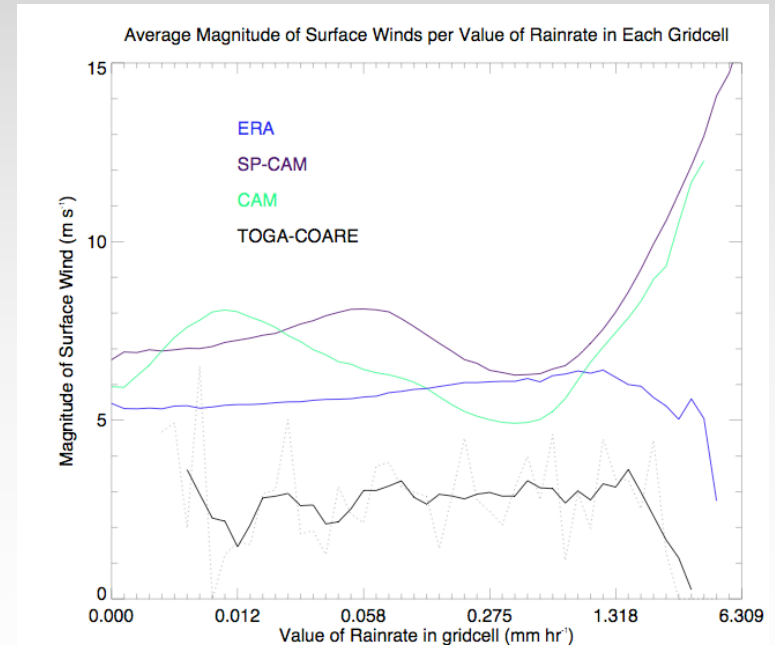
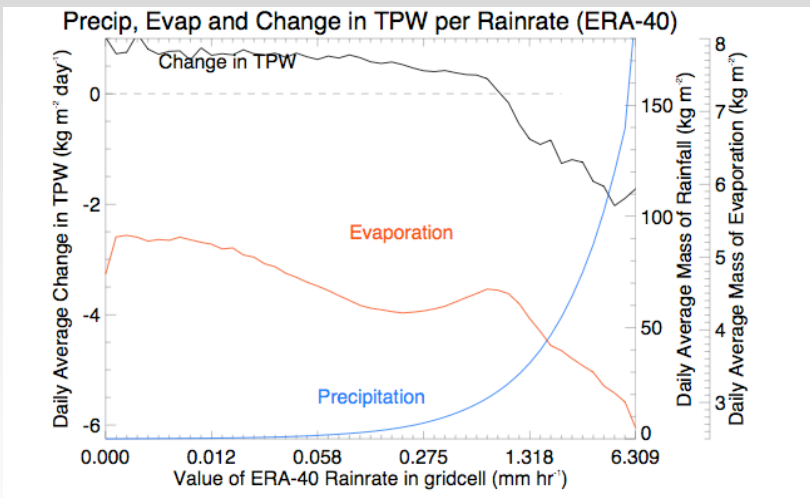
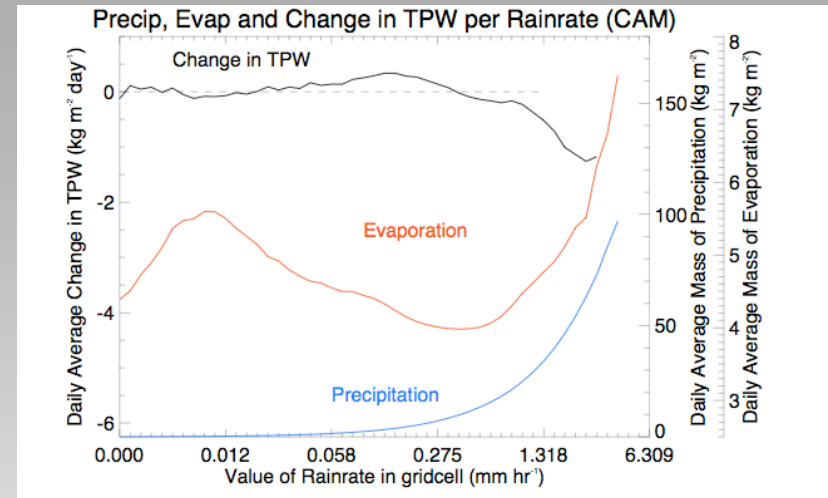
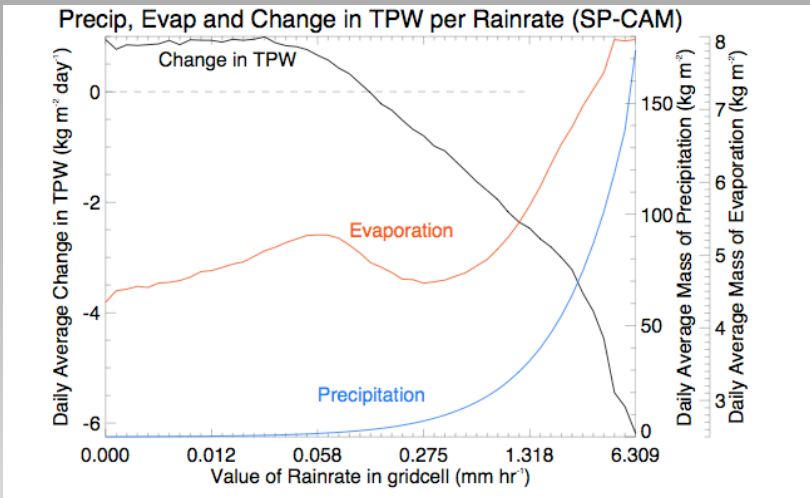
# So Far

- Dry regions in the CAM cause increased stability
  - Above low rainrates -> prevents penetrating convection
  - Above high rainrates -> produces cold spot and artificial pinching of those profiles
- Overly moist regions in the SP-CAM don't look realistic
  - Increased mixing reduces low level instability

# TPW and Rainrates



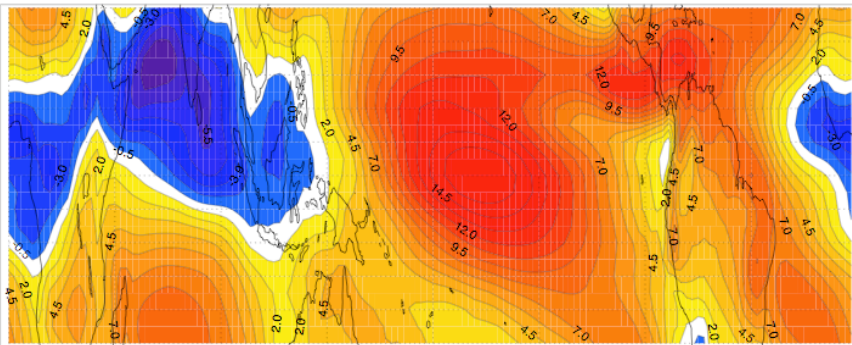
# Moisture Budgets



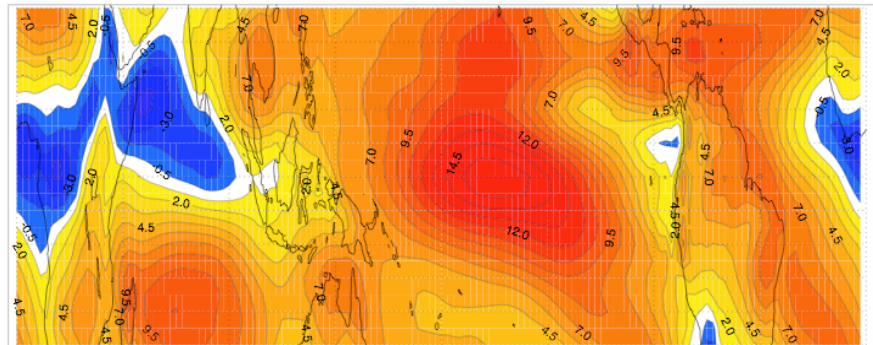


# Mean Zonal 850 hPa Winds

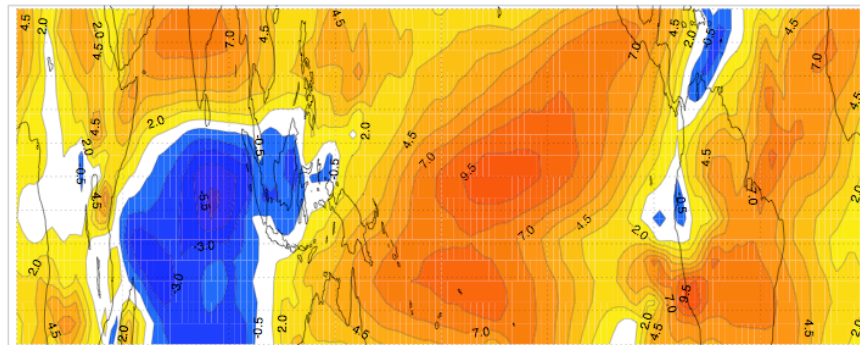
Mean Tropical Zonal Winds in the SP-CAM 06/98 - 06/02 ( $\text{m s}^{-1}$ )



Mean Tropical Zonal Winds in the CAM 06/98 - 06/02 ( $\text{m s}^{-1}$ )

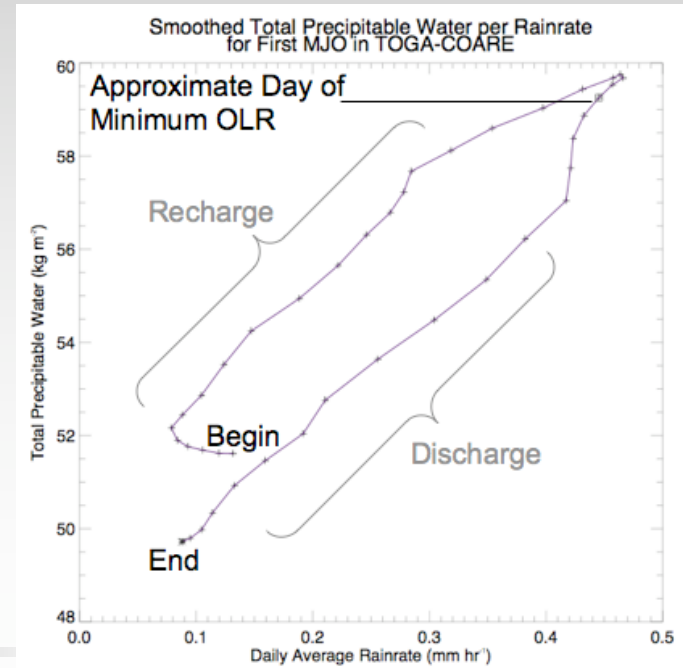
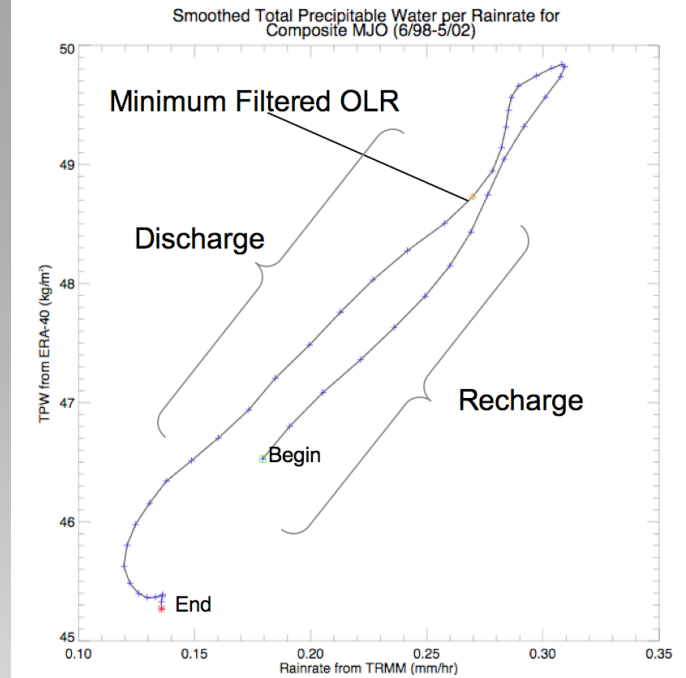
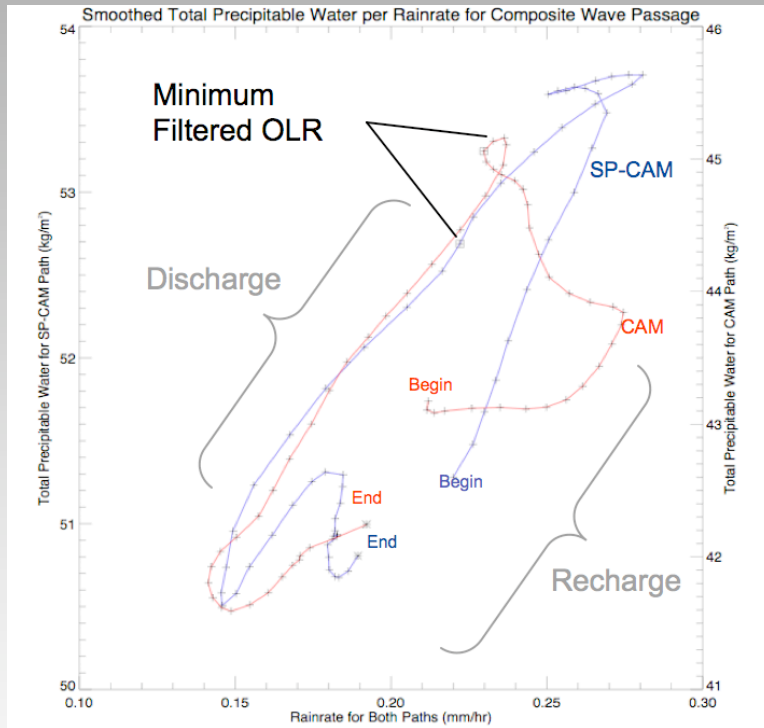


Mean Tropical Zonal Winds in ERA-40 06/98 - 06/02 ( $\text{m s}^{-1}$ )



- Much like Inness et al (2003)

# Discharge - Recharge



# Summary

- Wind-Evaporation feedback does seem to have an impact on this version of the SP-CAM (Luo and Stephens, 2006)
  - Low winds with low rain -> too dry for low rainrates
  - High winds with high rain -> too moist for high rainrates
- Over-drying in the parameterizations of the CAM counter-acts the increased wind-evaporation feedbacks
  - Results in lower convection-related variability all around



# Impact on the MJO

- Discharge-Recharge Mechanism seems to be important for developing an MJO in the models
  - The CAM has trouble both recharging and discharging because of the disconnections between rain and moistening
  - The SP-CAM has overly recharged and serious discharge likely due residuals from the CAM surface parameterizations