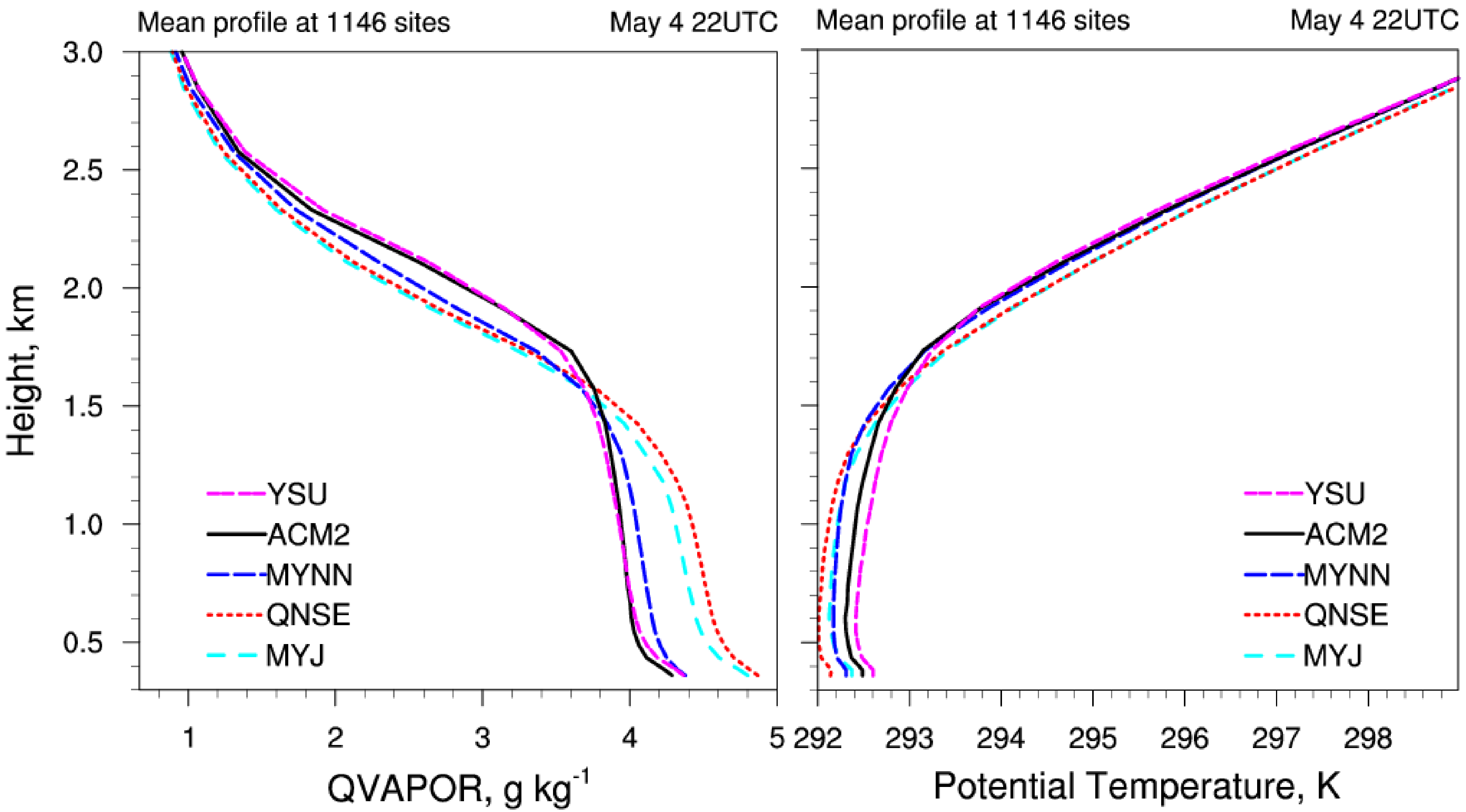
Sensitivity of simulated precipitation to different mixing schemes

CAPS, OU

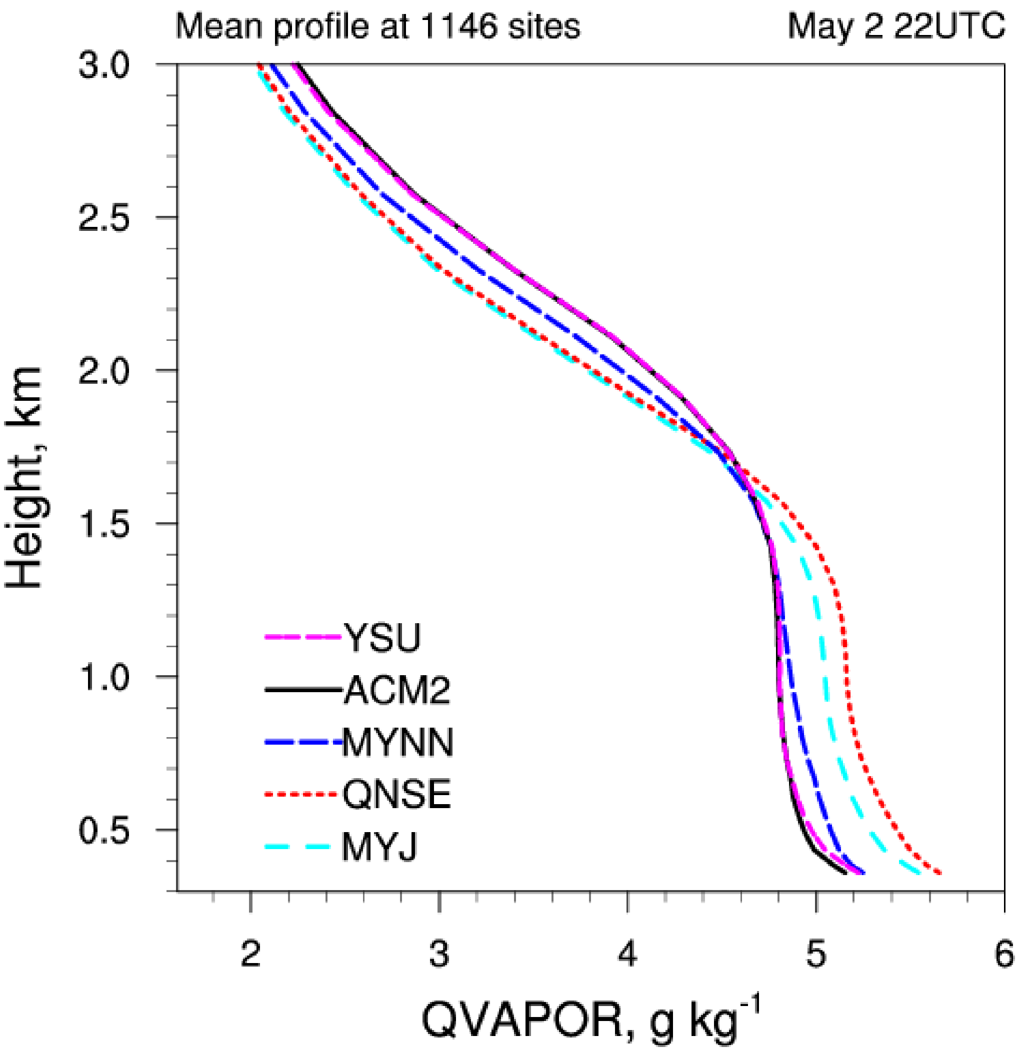
Nov. 30, 2011

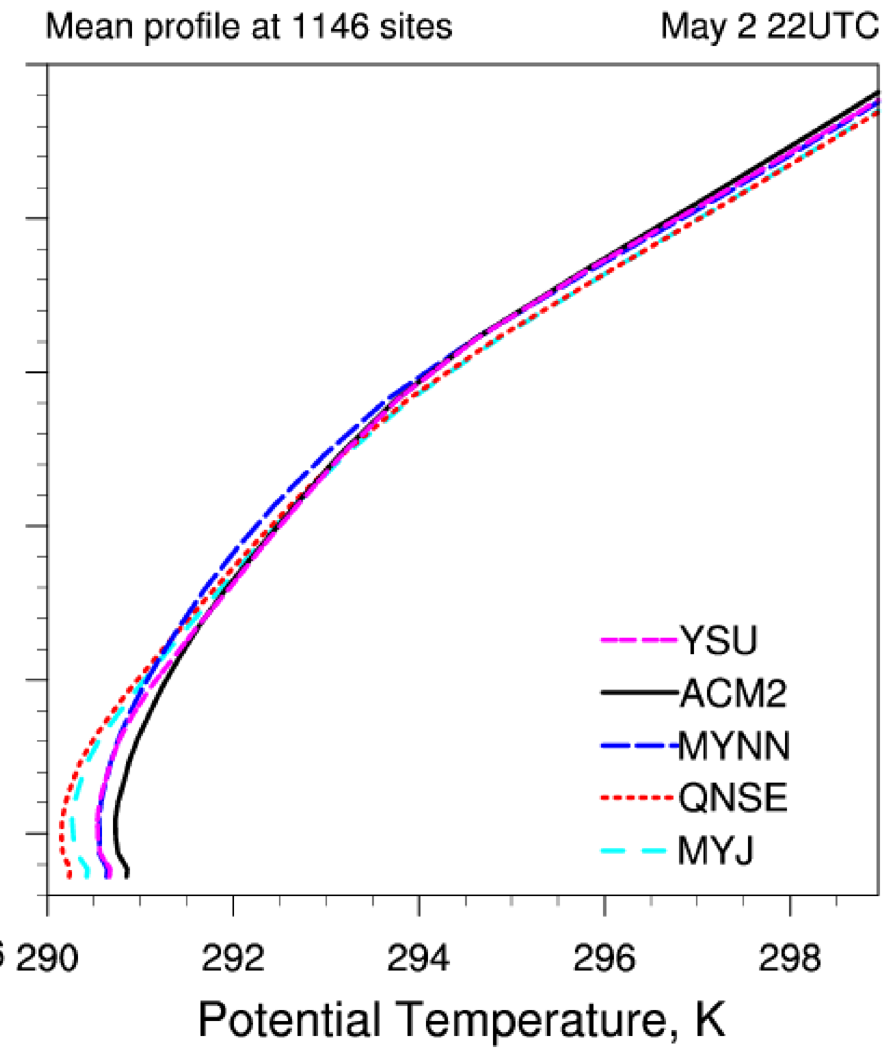
Profiles of QVAPOR and Temperature



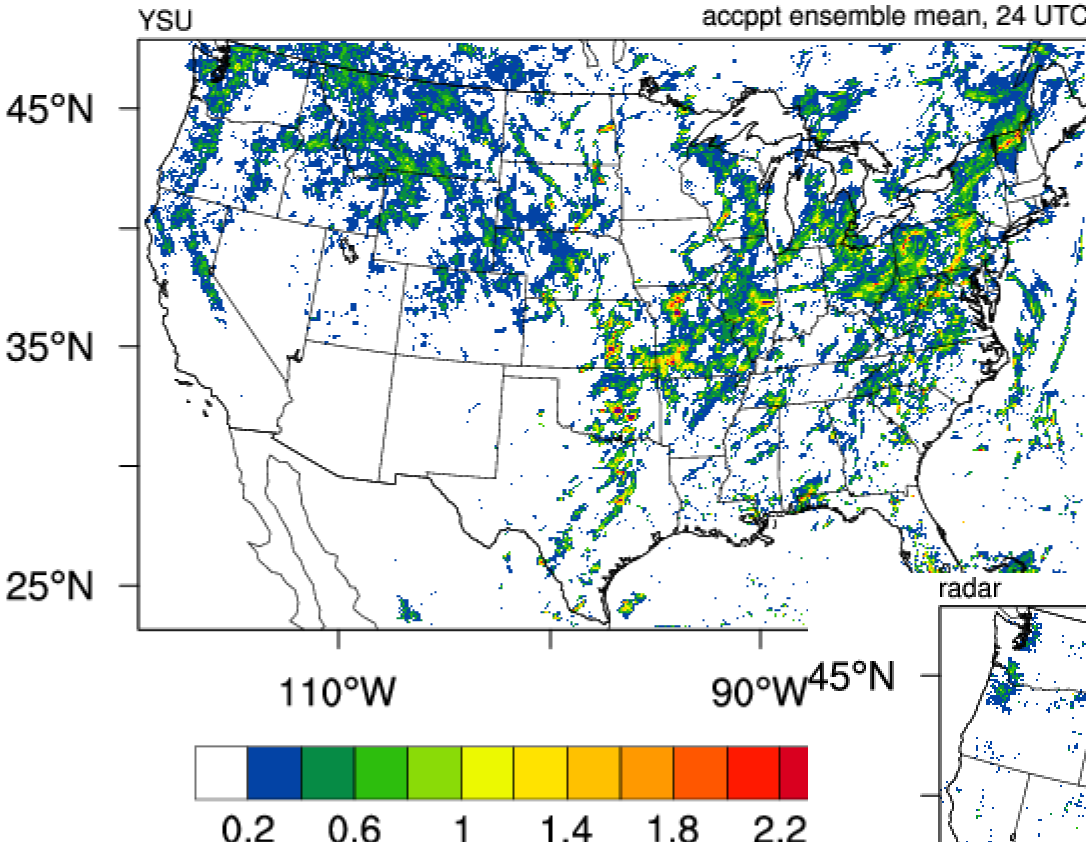
The relative mixing strength of the PBL schemes is consistent with Hu et al. (2011)

Profiles on May 2, 2011

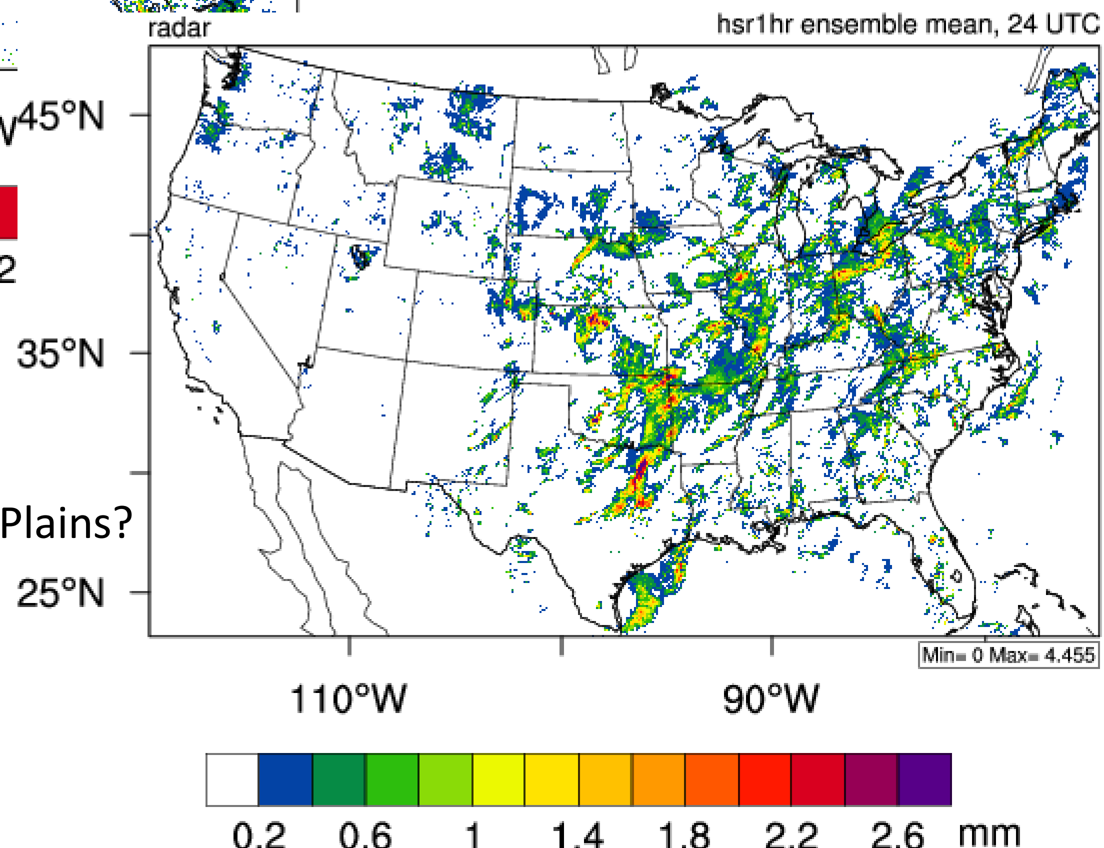


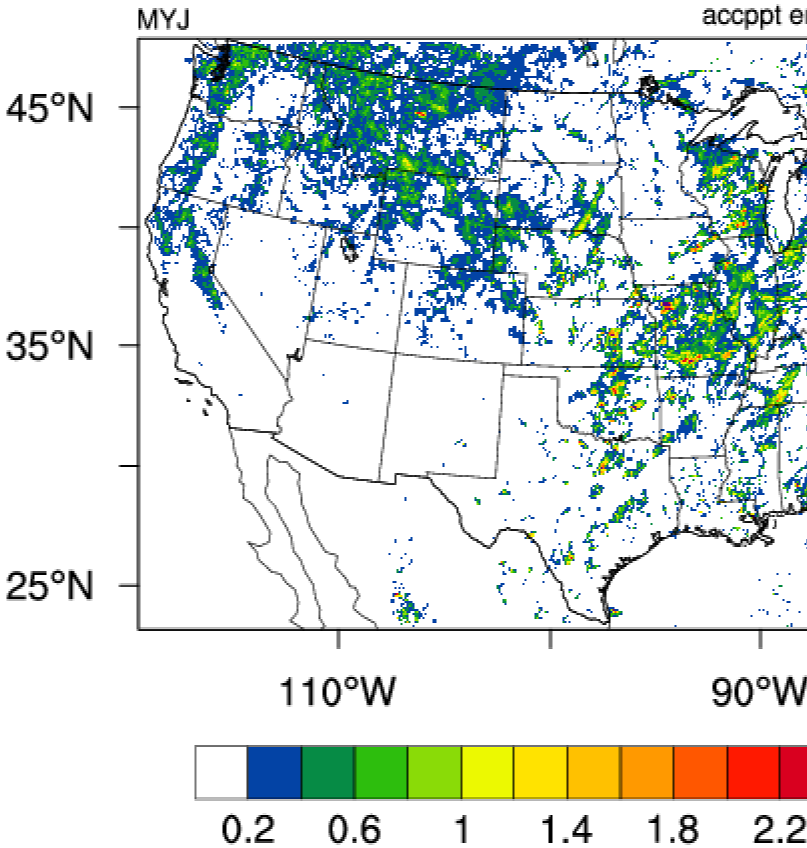


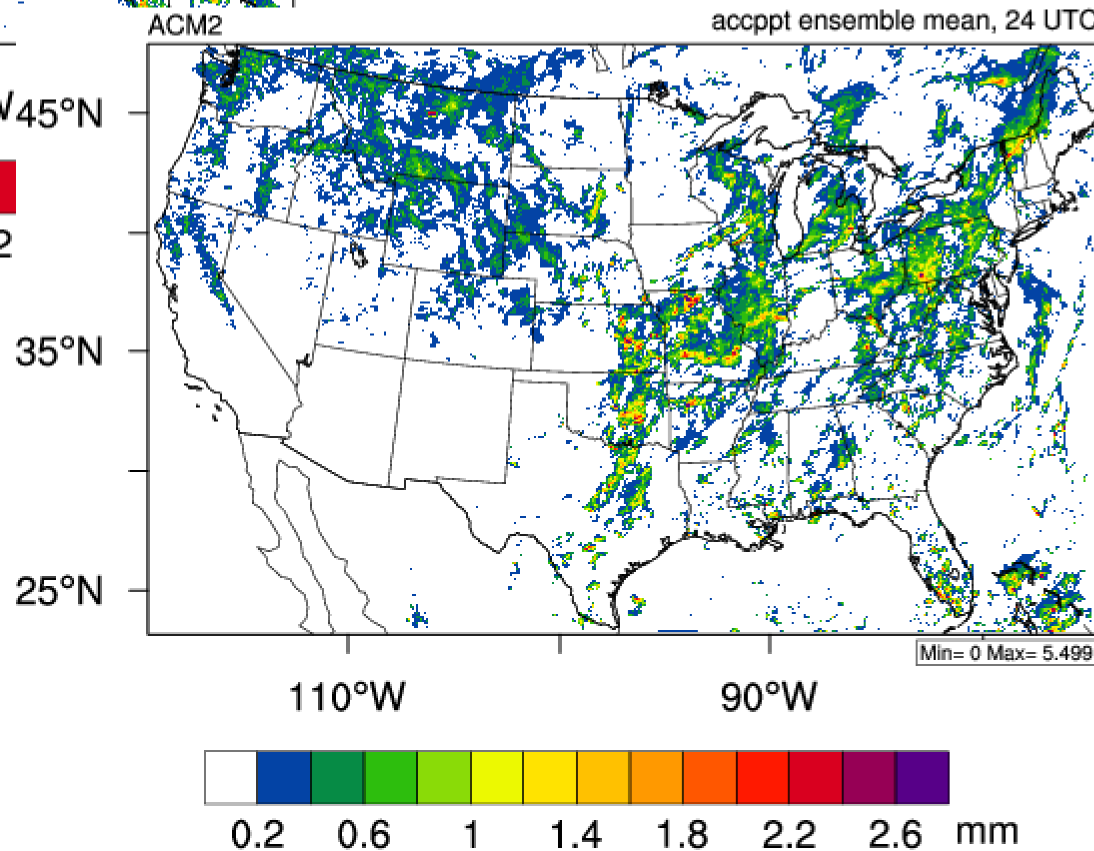
Zhang and Klein (2010) found that with more 2-4km water vapor, rain starts earlier and lasts longer. Does this mean YSU will lead to earlier and longer precipitation?



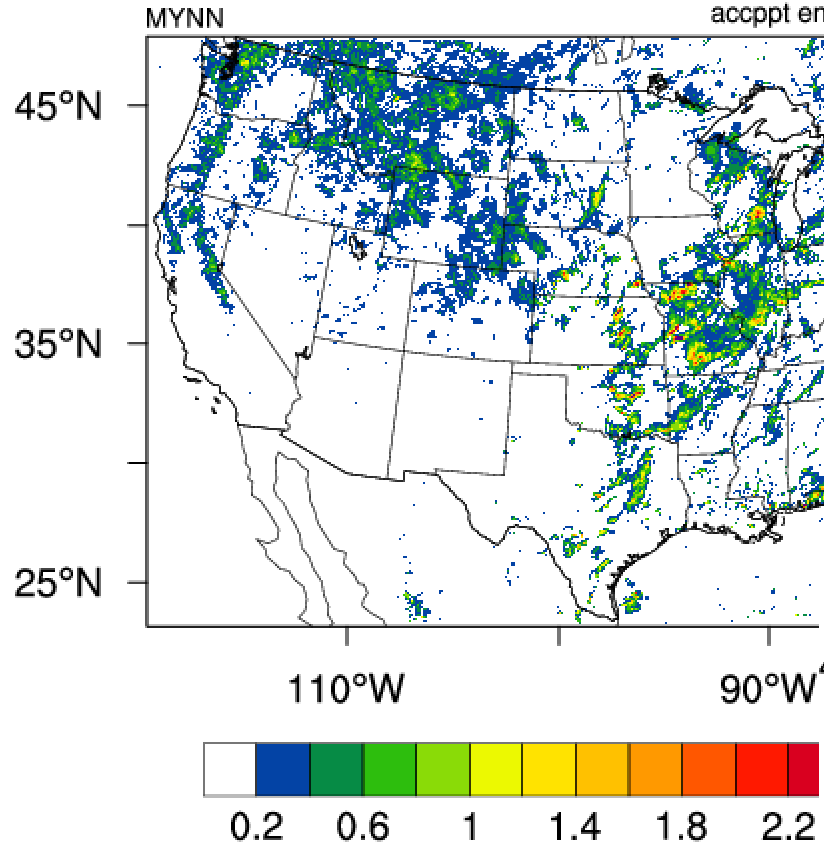
Underestimate precipitation over Great Plains?

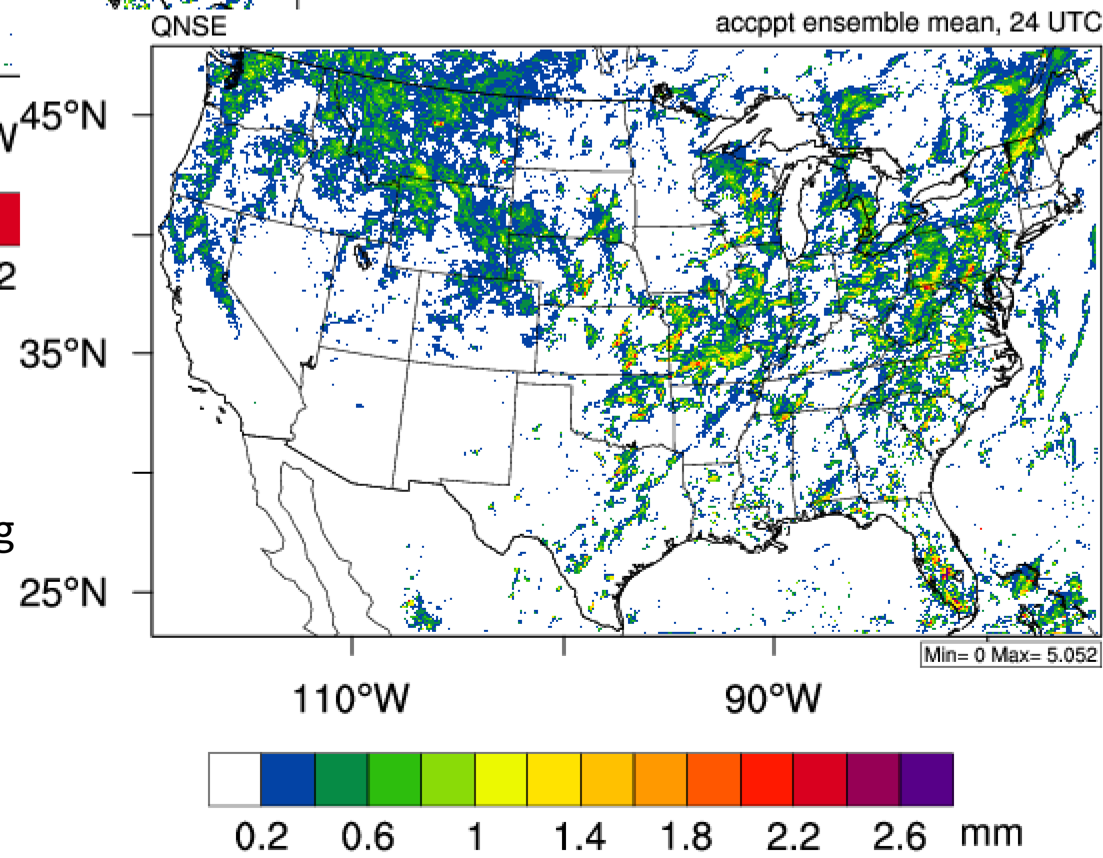






ACM2 performs better?





The schemes with weaker vertical mixing perform worse over the Great Plains? Contradicting with the results from Jankov et al. (2005, 2007)?

Questions

- How relevant are these precipitation types: MCS, deep convections, rotating storms, etc? How could the results from Jankov (2005, 2007), Zhang and Klein (2010), Clark (2011) be applied to our analysis?
- Stronger mixing mean weaker wind shear? Thus can not predict strongly rotating storms? Seems not, see Clark et al. (2011).

References

- Hu, X.-M., J. W. Nielsen-Gammon, and F. Zhang (2010), Evaluation of Three Planetary Boundary Layer Schemes in the WRF Model, *J. Appl. Meteor. Climatol.*,**49**, 1831–1844.
- Zhang, Yunyan, Stephen A. Klein, 2010: Mechanisms Affecting the Transition from Shallow to Deep Convection over Land: Inferences from Observations of the Diurnal Cycle Collected at the ARM Southern Great Plains Site. *J. Atmos. Sci.*, **67**, 2943–2959.
- Jankov, Isidora, William A. Gallus, Moti Segal, Brent Shaw, Steven E. Koch, 2005: The Impact of Different WRF Model Physical Parameterizations and Their Interactions on Warm Season MCS Rainfall. *Wea. Forecasting*, **20**, 1048–1060.
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