How does convection moisten the upper troposphere?

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Weinstock et al.
Baumgardner et al.
“We expect that most of the analyses presented will be at an intermediate stage.”

- The Crystal Brain Trust
Sherwood, 1996; Salatthe and Hartmann, 1997, 2000; Pierrehumbert and Roca, 1998; Dessler and Sherwood, 2000; Gettelman et al., 2000; Folkins et al., 2002
Folkins et al., 2002
Folkins et al., 2002
\[ \rho = 0.93 \left( 0.05 + 0.95 e^{-r/90} \right) \]
Particle radius (microns)

Cumulative mass

Particle radius (microns)
Preliminary conclusions

• Measurements show significant amounts of water in the UT in the form of ice
  – Most of the mass will either fall or evaporate within a few hours
  – Simple model indicates that this ice might significantly moisten UT
  – Not clear how to resolve this with other analyses
Next steps …

• Use unified size distributions, IWC
• Isotope data
• Trajectory simulations using MM5 winds, humidity
• Incorporate non-spherical particle physics

• We acknowledge support from the CRYSTAL-FACE program
UARS MLS UTH, v4.90, Aug. 1992, 215 hPa
[Dessler and Sherwood, JGR, 2000]
100 micron particle
20 micron particle
500 micron particle