

## ***Interactive comment on “The roles of convection, extratropical mixing, and in-situ freeze-drying in the tropical tropopause layer” by W. G. Read et al.***

**Anonymous Referee #1**

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This paper presents an updated version of a 2D TTL transport model, which includes parameterizations for transport, mixing, convection and chemistry. The paper is generally well written and is suitable for publication in ACP with some minor changes.

The results are well presented and well commented.

The conclusions regarding the evolution of the TTL humidity with increases and then decreases in water vapor are interesting.

Minor points:

p3963, L5: Gettelman et al 2002 should be cited here. This was the first trajectory based model.

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p3964, L 10: Gettelman et al 2004 -> Gettelman and Webster 2005.

p3965, L18: Gettelman et al 2002 show dehydration with increased temperature variance.

p3967, L1: what is 'd'? It is not used in eq 1 or after?

p3968, L15: This sedimentation was used by Gettelman et al 2002.

p3977, L13: Can the vertical an horizontal averaging kernel of ACE-FTS really see strong variability in HDO which might be due to convection? Or by necessity is it going to average out profiles which in-situ instruments do not?

p3978, L1: Awkward (and misspelled). How about: "...convection does not sediment all its ice, but some evaporates, consistent with the Keith (2000)..."

p3981, L24-27: This sentence is unclear and confusing. Please reword.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 3961, 2008.

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