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Interactive comment on "A redistribution of water due to pileus cloud formation near the tropopause" *by* T. J. Garrett et al.

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We thank the reviewer for the comments, as they have enabled us to better clarify our intended argument.

General comments

1. The goals of this paper are not to quantify any dehydration or radiative interactions by pileus. This is beyond the scope of this study. Rather we deliberately limit ourselves to showing merely that an irreversible repartion between phases can occur when pileus cloud forms. We see where this confusion can arise, and have attempted to reword the introduction to make the paper's goals more clear.

2. The description of the simulations is now moved to an appendix, in order to improve readability

3. Potter and Holton's study was solely numerical, and focused on gravity wave propagation into the stratosphere. We are looking at laminar cloud formation that starts close to the forcing mechanisms where direct thermodynamic interactions occur.

Specific comments

1. Section 3: We like the photographs too, and feel it conveys information unavailable from current numerical modeling or in situ measurements.

2. Section 4: This is a valid argument, and we now limit our description associated with discussion of isotopes to a discussion of mixing processes.

3. We now move most of the discussion of how the simulations were calculated to appendices. Again, these are valid points, and we now include and address these in the text. The reason Figure 4 suggests that simple mixing did not occur is that the particle sizes were unusually small. If cold deep convective air simply mixed into supersaturated ambient air, ice crystals would be, if anything, larger than in the convection. We now describe this in detail in the text.

4. Section 5. We now include description of how the isentropic lifting curves were calculated. It is only relatively straightforward thermodynamics that is involved. The main argument, which we now try to make clearer, is that mixing between pileus and convection can be expected in some circumstances. When this happens, it means that the TTL air that created the original pileus cloud does not evaporate in the lower phase of the wave, but rather survives as an irreversible phase change. We hope that this is clearer now in the new version of the text.

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 8209, 2005.