

***Interactive comment on* “Commentary on  
“Measurements of ice supersaturations exceeding  
100% at the cold tropical tropopause” by E.  
Jensen et al.” by D. M. Murphy**

**D. M. Murphy**

Received and published: 16 June 2005

Anonymous referee #1:

Please note my comment “Correction to Figure 2” that the black curve on Figure 2 of the original submission overestimated the supersaturations at positive roll angles.

Detailed responses to the referee:

1. Figure 2 shows enhanced ice saturations for positive roll angles compared to negative ones. I agree with referee #2 that it is important to know if there is a systematic calibration bias for the roll angle which could affect the conclusion for the ice saturation

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bias.

Reply: There are no independent calibrations for the roll angle. However, the roll angle on all flights except January 29 and February 2 are strongly peaked at zero, as expected. As far as we know, no maintenance was done on this system by the aircraft mechanics during this period. The roll angle on the intervening flight (January 30) was normal. There is no apparent reason not to believe the recorded data.

2. Can the author give at least an estimate for the temperature bias due to aircraft maneuvers e.g from testing the sensor response on that during other missions?

Reply: This is difficult because the positions of the pressure sensors were changed between missions. No maneuvers were done for the pre-AVE mission. There was also no separate set of wind measurements with which to judge the aircraft navigation system.

3. The correlation between roll angle and ice saturation ratio is also not too convincing to me from Figure 1. Is there an explanation why the distinct role angle peak at the lower edge of the period in turn does not seem to affect the saturation profile?

Reply: I agree that there is no obvious correlation on Figure 1. During the period of Figure 1, the aircraft was descending through some very sharp vertical gradients in temperature, so it may not be the best place to look for a correlation.

4. In line 11 ff. the author mentions the possibility of the aircraft rolling in response to the wind shear. If this was the case and if the aircraft was passing the regions of ice supersaturation shown in Figures 1 and 2 always in the same direction relative to the wind direction, the correlation between the role angle and the ice saturation may simply reflect a correlation between ice saturation and high wind shear. Can this possibly be excluded from the flight pattern or for other reasons?

Reply: I agree that it is very difficult to separate cause and effect without calibrations from deliberate aircraft maneuvers.

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