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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mesoscale temperature fluctuations in the stratosphere" *by* B. L. Gary

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General Comments

This is excellent and unique work, showing how to express the temperature and pressure fluctuations observed in the atmosphere in a compact and useful way. The statistical characterization of isentropic surfaces affects many aspects of atmospheric variability, likely to become increasingly important as global numerical models push their spatial and temporal resolution to smaller and smaller scales.

Specific Comments

I think that the paper, particularly the methodology in section 7 and the discussion in section 8 could be improved incorporating some recognition of the results in the following references: [1] Lovejoy, Schertzer and Tuck (2004), Physical Review E, 70, Art. No. 036306. That paper deals with the effect of the turbulent structure of the atmosphere during AASE upon the motion of the ER-2 aircraft itself. It is relevant because all the

flights analyzed were across the polar night jet stream and may therefore cast light on the limitation mentioned by the author concerning jet streams. [2] Tuck, Hovde and Bui (2004), Q. J. R. Meteorol. Soc., 130, 2423-2444. That paper specifically considers ER-2 flights along and across jet streams, and shows the emergence of a correlation between measures of jet stream strength and the power law scaling exponent H describing the MMS wind speed and temperature measurements. [3] B. B. Mandelbrot (1998), 'Fractals and 1/f Noise', Springer, Berlin, pp. 396. This book deals with the statistics of how to treat the non-Gaussian probability distributions observed in references [1] and [2]. [4] Murphy (2003), Geophys. Res. Lett., 30, Art. No. 2230, doi: 10.1029/2003GL018566. This paper shows the effects of including realistic temperature fluctuations, represented by the scaling parameter H, in calculations of ice crystal formation at low temperatures characteristic of the lower stratospheric winter polar vortex and at the tropical tropopause.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 7369, 2006.