

Interactive comment on “The latitude dependence and probability distribution of polar mesospheric turbulence” by M. Rapp et al.

Anonymous Referee #1

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Comments on “The latitude dependence and probability distribution” by M. Rapp et al.

Recommendation: reject in present form.

My main concern is that the authors simply do not have enough data (just 3 rocket flights in a 5-day period at one of the two sites and only about a dozen flights spread over 12 years at the other) to draw any definitive conclusions regarding the spatial variability of mesospheric eddy dissipation rates. This is especially true with respect to the claim, made in the title, that the authors are somehow able to derive the “latitudinal dependence” and even “probability distribution” from just a few profiles obtained at the two locations. Is there a really global latitudinal effect, or is it simply caused by other

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factors such as proximity to land and so additional sources of gravity waves at one of the sites, for example?

To “improve” their statistics, the authors lump together measurements made in the whole altitude range 72-95 km. But it is clear from their own results (e.g., solid curve in Fig. 1) that in this height range the dissipation rates change on average by about 3 orders of magnitude. How can these very different values be put together into a single bin? What would this bin physically represent?

A substantial number of observations (roughly 30%) are classified as non-turbulent and essentially assigned zero dissipation rates. This does not necessarily mean that there was no turbulence and no dissipation observed in all those cases, just that the respective spectra did not fit the assumed $-5/3$ shape. Could this result in underestimation of the heating rates? Does turbulence always have to have the $-5/3$ spectrum?

Comparisons with numerical simulations do not appear very convincing either because the two models seem to support two different explanations neither of which may be actually true in view of a very simplified representation of gravity-wave sources. It is also clear from Figs. 3 and 4 that the models produce dissipation rates that are very different in magnitude and vertical shape between them and also very different from the observations.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 12199, 2006.

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