**Review of amt_2017_463, Dorrestijn et al.**

GENERAL

The entire abstract will need to be rewritten in view of the results contained in the DOIs listed at the end of this review. It reflects omissions and mistaken assumptions listed in the detailed commentary that follows. The 'scaling of variance' has to recognise that the variance of atmospheric variables obtained by observations acquired by adequate measurement techniques does not converge. That is one of several relevant results obtained by the finding that atmospheric variables have non-Gaussian probability distributions, with fat-tailed power laws best represented by Lévy statistics. The zoo of scaling behaviours displayed in this manuscript arises from this basic fact and its consequences. These facts have to be at least recognised as being in existence rather than simply ignored as in the present manuscript.

DETAILED COMMENTARY

Page 1, Lines 16-18: Energy is deposited in the atmosphere by the absorption of photons by molecules, that is to say it has no alternative but to propagate upscale. This is argued at length in some of the references supplied as DOIs.

Lines 18 et seq: See the last, 8th, DOI for a refutation of these arguments. They are profoundly mistaken.

Page 2, Lines 3-14: Inspection of the DOIs supplied will show a view differing substantially from that in these references. The Lindborg papers especially rest on bad assumptions. The Lovejoy & Schertzer book also has a lot on scaling in models, an advance on lines 15-28.

Section 3: KT09 in my opinion deploys flawed analytical methods. If the authors insist on using it, it must be justified in the light of the conclusions reached in the DOIs below. That includes the results on how easy it is to find false scale breaks, especially if less than three decades of good quality observations are present. They cannot be simply ignored.

Sections 4 and 5: At the very least these will have to be rewritten to accommodate the existence of alternative views and results conatined in the DOIs and books listed below. For example, models contain assumptions about variances and covariances being random that are at odds with observed reality; that is one of many problems.

REFERENCES

- https://doi.org/10.1080/01431161.2011.602652
- **DOI:** 10.1029/2012GL051689
- **DOI:** 10.1029/2009JD013353
- **DOI:** 10.1002/qj.644
- **DOI:** 10.1029/2008JD010651

Finally, two books:

S Lovejoy & D Schertzer, 2013, THE WEATHER AND CLIMATE: Emergent Laws and Multifractal Cascades, CUP, ISBN 9781107018983

A F Tuck, 2008, ATMOSPHERIC TURBULENCE: A Molecular Dynamics Perspective, OUP, ISBN 9780199236534