

Review of *npg-2018-48* “Estimating vertically averaged energy dissipation rates”, Sugiura et al.

It is a commonplace that the global ocean is much less well observed than the atmosphere, a matter of central importance given the role of the oceans in the crucial topic of global heating. It is perhaps for this reason that scaling approaches to the oceans have lagged behind those in use for the atmosphere. Nevertheless, the current work is to be welcomed as being an important new step.

In the atmosphere, things have advanced substantially since Kolmogorov dissipation accompanied by Gaussian and log-normal distributions. In the spirit of trying to encourage the authors to extend and expand their analysis, I suggest a few references herewith:

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

*A F Tuck, 2010, *Quart. J. R. Meteorol. Soc.*, **136**, 1125-1144. From molecules to meteorology via turbulent scale invariance. Doi: 10.1002/qj.644

* SJ Hovde, AF Tuck, S Lovejoy, D Schertzer - *International Journal of Remote Sensing*, **32**, 5891-5918, 2011. [Vertical scaling of temperature, wind and humidity fluctuations: dropsondes from 13 km to the surface of the Pacific Ocean.](#)

It may be that the oceanic dissipation can be calculated simply from the kinetic energy components, but as a non-oceanographer I am bound to ask whether the effects of salinity, acidity and the entropy of mixing have been properly accounted. The atmospheric experience suggests that dissipation must be treated explicitly, even though it is still not an automatic procedure.

Figures 4 and 6 give me pause before recommending this paper for publication. The Gaussian fit in Figure 4 is telling in my opinion: to the left of the maximum, the fit near maximum slope is poor, and the poor fit continues, with the opposite sense, into the tail, which is clearly longer and fatter than its counterpart on the right hand side. Figure 6, in both halves, shows curves that are not sufficiently linear to sustain claims of scaling.

My recommendation is that the authors should be encouraged, with the proviso that they need to meet the criticisms offered above.