

Interactive comment on “Mesoscale cascades and the “conundrum” of energy transfer from large to dissipation scales in an adiabatic ocean” by Mikhail S. Dubovikov

Anonymous Referee #1

Received and published: 19 July 2017

I must disclose that I have not properly read the entire manuscript, which is very hard to follow. However, it appears that it is clear even just from the introduction that the entire argument builds on assumptions that are very much at odds with the general understanding of mesoscale ocean turbulence.

The introduction lists 7 “inputs” which are used to construct the argument. Multiple of these “input” assumptions appear to be strongly at odds with what I thought to be widely recognized.

For example, I would strongly disagree with assumption (3), that “intense release $EPE \rightarrow EKE$ begins at scales where the spectral Rossby number $Ro(k)$ which at large scale is

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small, increases to unity.” While the author argues that this is “commonly recognized”, I believe that it is instead widely recognized that strong conversion from $EPE \rightarrow EKE$ occurs at the radius of deformation, which is generally much larger. (see e.g. the textbook by Geoff Vallis).

Maybe even more importantly, it is widely recognised (again see e.g. the textbook by Geoff Vallis) that total eddy energy is transferred to larger scales (both horizontally and vertically) in geostrophic turbulence (and mesoscale ocean turbulence is to a good approximation geostrophic). This appears a priori undermine the entire argument that is attempted here.

Maybe I’m missing something important, but at the very least the author would have to clarify where his assumptions come from, why they appear to be glaringly at odds with well accepted theories, and why the reader should not be worried about this.

Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2017-23>, 2017.

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