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Ocean Science Discussions

Interactive comment on "Scale-dependent analysis of in situ observations in the mesoscale to submesoscale range around New Caledonia" *by* Guillaume Sérazin et al.

Anonymous Referee #1

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The authors conduct a fairly extensive analysis of a complex region near New Caledonia in regards to scale-dependent characterization of turbulence characteristics while also considering seasonal and depth dependence. The most impressive part of the study is that it is done using a mixture of observational data (ship-based ADCPs, ship-based temperature and salinity), as opposed to modeling. The analysis is conducted by considering possible approaches to extract the most from upcoming SWATH missions. Clearly the authors spend significant effort on this. The paper is very well written and makes good use of past literature. I am aware of two papers in which similar structure function approaches have been used, with some success in extracting the direction of energy cascade from drifter data:

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Discussion paper

Poje, A.C., et al., 2017: Evidence of a forward energy cascade and Kolmogoroff self-similariy in submesoscale ocean surface drifter observations. Physics of Fluids, 29, 020701.

Mensa, J.A., et al., 2018: Surface drifter observations from the Arctic Ocean's Beaufort Sea: evidence of submesoscale dynamics. JGR-Oceans, 123/4, 2635-2645.

which are not cited here. I encourage the authors to take a look.

The resulting picture painted by the analysis is complex, as expected in a region consisting by mesoscale motions, deep waves and wakes behind islands. In many ways, this is the real strength of the paper.

I just have one major question: in some of observational (not modeling) studies in which submesoscales have been truly detected, for instance (which are not cited by the way):

D'Asaro et al., 2018: Ocean convergence and dispersion of flotsam. PNAS, https://doi.org/10.1073/pnas.1718453115.

Poje, A.C., et al 2014: Submesoscale dispersion in the vicinity of the Deepwater Horizon spill. Proc. Nat. Acad. Sci. 111, 12693-12698.

submesoscale flows exist because they are not overrun by mesoscale flows, which are far stronger. So, how come the authors emphasize weak submesoscale motions in a region presumably dominated by mesoscale and other very strong flows (IGWs and wakes)? Or submesoscale band is simply a generic name for many other phenomena that map into that range somehow?

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