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Interactive comment on “Validation of the Thorpe scale-derived vertical diffusivities against microstructure measurements in the Kerguelen region” by Y.-H. Park et al.

Anonymous Referee #1

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The paper presents a detailed discussion of the authors' methods of processing CTD data from the Kerguelen region of the Southern Ocean and validating the Thorpe scale overturns in the processed density profiles. The diffusivity estimates computed from the Thorpe scales are calibrated against microstructure measurements. The authors compare two parameterizations for diapycnal diffusivity, one from Osborn (1980) and one from Shih et al. (2005), as well as two different values of the overturn ratio R_0 (Gargett and Garner, 2008). They conclude that the Shih parameterization combined with the $R_0=0.25$ criterion produce better agreement between Thorpe scale and microstructure diffusivities than the Osborn parameterization and the $R_0=0.2$ criterion.

The discussion in the paper is clear and well-organized, and the results should be of

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good practical use to other researchers using CTD data to estimate mixing. However, given the emphasis on validating the Thorpe scale, it seems a bit narrow in scope to limit the discussion only to one method. It would be useful to know how the Gargett and Garner validation method performs compared to the van Haren and Gostiaux (2014) criterion of the z/d ratio. Also, since temperature CTD data tend to be considerably less noisy than density, if good results could be achieved by identifying overturns in the temperature profiles rather than the density profiles, or if salinity compensation made such an approach impractical.

Some minor technical edits:

Pg. 12143, Line 15: need the "The" in front of Gargett and Garner or the "s" after, but not both.

Pg. 12144, Lines 20-25: I found the wording here confusing. The text speaks of suspect overturns "passing" the $R_0=0.2$ and/or 0.25 criteria, which sounds as if the overturns were validated, when they were actually flagged as false. I'd say an overturn with $R_0 < \text{threshold value}$ fails the validation, not passes it.

Pg. 12146, Line 14: no need for "the" in front of "unity". Line 17: should be "prevents detection of". Line 26: should be "much more reasonable agreement". Line 27: again, no "the" in front of "unity".

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