Nonlinear Processes in Geophysics Discussions

Nonlin. Processes Geophys. Discuss., referee comment RC1
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Comment on npg-2021-21

Anonymous Referee #1

Referee comment on "Enhanced diapycnal mixing with polarity-reversing internal solitary waves revealed by seismic reflection data" by Yi Gong et al., Nonlin. Processes Geophys. Discuss., https://doi.org/10.5194/npg-2021-21-RC1, 2021

Three survey lines of seismic data were used to reveal internal solitary waves and mixing properties. The specific polarity-reversing processes of internal waves were found to induce energetic mixing. The mixing distribution and driving factors are discussed. This paper is very interesting, with some innovative properties on internal wave mixing revealed. So I think this paper quite deserves publication before some comments and concerns being addressed and responded. 1. Title, suggest includes the seismic method as used, since this is a very valuable and attractive method used for internal wave research. 2. Method, The N from the reanalysis data was used to estimate the diffusivity. That means N and other variables in the equations 2-1, 2-2 are at the different time, so as for the mixing scheme evaluation. Should clarify the reasonability of time differences. 3. One of the main finding is that, mixing intensifies during the polarity reversal process. If this is a general conclusion, I believe some other studies based on numerical simulations and other field data will also support this point. If not, some explanations on the detailed physical process and mechanisms should be added. The general knowledge is that, polarity reverse does not directly correspond to breaking and mixing. 4. In Figure 5, as said by the author, occurrence of internal wave breaking, cannot be discerned by the readers. May give an enlarged regional image around 5 Km from Figure 5c. 5. For the discussions of convective and shear instability, as in Figure 9, the authors should provide clear and direct evidences. In Figure 9, nothing about the instability can be clearly seen. Also, why provide the regional section from Figure 5b, but not from Figure 5c with much more instability and mixing as mentioned. 6. Lines 37-38, only one reference is not enough to indicate the commonality of internal tides and internal waves on the global continental shelves and slopes. 7. Lines 58-59, Internal solitary waves in the northeastern South China Sea, can be generated from the Luzon Strait as the authors told. But most internal solitary waves are generated from the nonlinear steepening of internal tides remotely from the Luzon Strait or locally generated from the continental slope (Min et al., 2019, GAFD; Xu et al., 2016 JGR). 8. Lines 73-75, some references on the Kuroshio and its connection to internal waves should be added. Like Jan et al., 2011 JGR, Xu et al., 2021 JGR. 9. Lines 44-45, please confirm that 73% of internal wave energy can be attributed to internal solitary waves. 10. Line 47, researches-> research.