

## ***Interactive comment on “High-resolution diapycnal mixing map of the Alboran Sea thermocline from seismic reflection images” by Jhon F. Mojica et al.***

### **Anonymous Referee #1**

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#### General Comments:

The paper presents some nice data acoustic data from the Alboran Sea, for which turbulent mixing estimates within the thermocline have been estimated at high spatial resolutions. mixing estimates show an interesting 'patchyness'. Some oceanographic data has also been used to compare mixing rate estimates. Overall the paper is well put together and the data well presented. However, I feel that the paper requires some further work on three counts: 1 - Clarification should be provided regards the physical mechanisms behind the mixing distribution observed. Messages regards the influence of internal waves seem confused 2 - The analysis of mixing-rates from oceanographic

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data, using fine-structure estimates (and assumptions therein) needs to be improved - see comments below 3 - I would like to see a comparison of mixing estimates from the internal wave and Batchelor regimes of the MCS spectra

Specific comments: Lines 35-37: Please clarify here - I think that both your references refer to internal-wave phenomena

Lines 50-53: I am not sure what you are saying here.

Lines 65: I think that lowered microstructure profiles are generally the most robust source of turbulent measurements.

Line 150: Do you have evidence for this? Could you compare acoustic reflection horizons to density horizons in the oceanographic data?

Line 165: If possible you should use integrated shear and or strain spectra to get estimates from CTD/ADCP data - perhaps you are limited by depth ranges? You are also missing some terms in for shear-to-strain ratio and inertial frequency e.g. see Waterman, S., K. L. Polzin, and A. C. Naveira-Garabato (2012), Internal waves and turbulence in the Antarctic Circumpolar Current, *J. Phys. Oceanogr.*, 43, 259–282. You should at least quantify the omission of these terms and also explain how you decide on what you mean by 'uncertainty bounds' in several places in the text. You should also mention the errors associated with fine-structure estimates - particularly in regions away from the open ocean.

Lines 195-200: This should be in methods

Line 203: Spatial resolution - be careful what you mean by this as really each data point is an average over 1200m by 15 m box

Lines 215: What scale are you computing shear over i.e.  $dZ$ ? Also how to you quantify buoyancy frequencies,  $N$ ?

Lines 319: Shear to strain ratios tell you about the frequency content of the internal

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wave field. You might well expect higher inertial content (i.e high shear to strain ratios) near the surface due to wind generation.

Lines 325: How do dissipation estimates compare for GM and Batchelor parts of the MCS spectra? This may tell you something about the role of IW in generating the turbulence/GM assumptions

Line 334 and 351: Confusing regards what you are trying to report regards role of internal waves here - please clarify.

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