

## RESPONSES TO REVIEWERS AND EDITOR

Manuscript Number: egusphere-2024-2749

**Dissipation ratio and eddy diffusivity of turbulent and salt finger mixing derived from microstructure measurements**

Note: The reviewer/editor's original comments are indicated in black, and our responses are indicated in blue. Our changes in the marked-up version of the revised manuscript are given in green.

### Responses to Reviewer #2

There is some unusual use of English but I think the intended meaning is clear enough to be left to copy-editing.

**Response:** We thank the reviewer for pointing out this. To ensure accuracy and clarity, we carefully reviewed and refined the entire manuscript again, with additional polishing by native English speakers. We hope the reviewer find the revision much improved. (All revisions are highlighted in the marked-up version of the revised manuscript.)

Line 122. Please check the formulae in  $(Tu = \tan^{-1}(\alpha\theta_z - \beta S_z, -\alpha\theta_z + \beta S_z))$  for the Turner angle. The second is exactly the negative of the first which would imply  $45^\circ$  or  $-45^\circ$  only.

**Response:** The reviewer is right, and we are sorry for this mistake. The formulae used to calculate the Turner angle is  $Tu = \tan^{-1}(-\alpha\theta_z - \beta S_z, -\alpha\theta_z + \beta S_z)$ . It has been corrected in the revised manuscript. (Line 122 in the marked-up version of the revised manuscript.)

Section 2.3. I think this is now logical but not easily followed by myself as a reader less familiar with the quantities involved. The steps in (2) need reference either to the papers cited or to the authors' response to the first round of reviews. Lines 178-180 "introduce"  $r^F$  which does not then appear in (6). [Was the superscript omitted to avoid "clutter"? Is a separate symbol  $r^F$  necessary? I see that  $r^F$  is used in section 4.2]

**Response:** We thank the reviewer for this helpful suggestion. St. Laurent and Schmitt (1999) provided the detailed derivation of the Eq. (2),  $\Gamma = \frac{\chi_T N^2}{2\varepsilon \theta_z^2} = \left(\frac{R_f}{1-R_f}\right) \frac{K_\theta}{K_\rho} = \left(\frac{R_f}{1-R_f}\right) \left(\frac{R_\rho-1}{R_\rho}\right) \left(\frac{r}{r-1}\right)$ , and we added it as the reference of the steps in Eq. (2). We introduce  $r^F$  because only density flux ratio of salt finger can be derived using  $r^F = R_\rho \Gamma^F / (R_\rho \Gamma^F + R_\rho - 1)$ , and  $r$  in the Eq. (6),  $K_\theta^F = \left(\frac{R_\rho-1}{R_\rho}\right) \left(\frac{r}{1-r}\right) \frac{\varepsilon}{N^2} = \Gamma_\theta^F \frac{\varepsilon}{N^2}$ ,  $K_S^F = \frac{R_\rho-1}{1-r} \frac{\varepsilon}{N^2} = \Gamma_S^F \frac{\varepsilon}{N^2}$ , should be  $r^F$ . We corrected this mistake in the revised manuscript. (Lines 153, 154, 161, 164 and 166 in the marked-up version of the revised manuscript.)

Figure 16. The horizontal axes are labelled as (salinity diffusivity) / (temperature diffusivity), consistent with text lines 507-517, but the caption (lines 519, 520) refers to the inverse ratio.

**Responses:** We thank the reviewer for pointing out this mistake. It has been corrected. (Lines 496, 497 in the marked-up version of the revised manuscript.)

## **Responses to the handling editor**

Line 107 Change 'ect' to " and other information".

**Response:** We thank the handling editor for this suggestion. It has been revised in the revision.  
(Line 107 in the marked-up version of the revised manuscript.)