1 General comments

The paper studied turbulent mixing in the northern and southern Patagonian regions using measurements of improved spatial and temporal coverage. The methods used for calculating relevant variables are stated, but assumptions are often neglected. Most of the results and conclusions are supported by the data. However, I think the presentation of the manuscript can be improved by using a better structure.

Ans:

Thanks for your comments, the new version of the manuscript was re-readed and checked now same sections of the Discussions were re-written and changed of section, and Results now incorporates values to be more quantified of the mixing within these systems, thus we avoid references like " we observed high values of …" therefore now we think the manuscript acquire a shape less qualitative than the previous version.

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2 Specific comments

1. Equation (1)

$$\varepsilon = 7.5\nu \left(\frac{\partial u}{\partial z}\right)^2$$

is under isotropic turbulence assumption, but this assumption is not stated. Since the paper studies turbulence in stratified environment, isotropic turbulence assumption introduced error in strongly stratified regions.

Ans:

We agree with the reviewer comments. As Figure 4 shows, the stratification regions covered only the first 10 meters of the water column in fjords that received the major freshwater discharge. Below this layer, the assumption of isotropic turbulence holds, as does the observation of fully mixed conditions in the water column, e.g., at the Desertores pass (Fig. 4). Additionally, Lueck et al. (2013) proposed that in steady, non-stratified flow, the rate of turbulent kinetic energy dissipation is equal to the rate of production. In contrast, under stratified conditions, approximately 20% of the energy produced is expended in increasing the fluid's potential energy, while the remaining 80% is dissipated as turbulence.

Lueck, R. (2013). Calculating the rate of dissipation of turbulent kinetic energy (Rockland Scientific Technical Note 028) Rockland Scientific, Inc., Victoria, BC, Canada. https://rocklandscientific.com/support/technical-notes.

2. Section 4.1 and 4.2 mainly discuss previous studies and explain the motivation and relevancy of this study, so I suggest summarizing section 4.1 and 4.2, and moving the summarization to Introduction.

   Ans:

   Thanks for the comment, now we edited the old sections 4.1 and 4.2 and moved to the introduction.

3. There are overlaps between Results and Discussion. Section 3 Results mainly discuss results without connecting the dots. Section 4 Discussion show consistent and similar results as in Section 3, and is strongly connected to Results section. For example, when discussing tidal mixing and wind speed in section 3.3, the reason putting the results on tidal mixing and wind speed together is not explained but rather stated in Discussion section. I think the flow of the presentation will be more natural if Section 3 Results and Section 4 Discussion are merged.

   Ans:

   Thanks, in part when we move the older 4.1 and 4.2 sections from Discussion, we made a re-structuration of the Discussion including new paragraphs that compares tidal, winds and stratification in order to evaluate their relative contribution for mixing in both regions northern and southern Patagonia.

4. The Section 3.3 showed averaged wind patterns in northern and southern Patagonian and section 4.4.2 tries to establish a link between wind energy and energy dissipation rate. However, because of the lack of quantitative results, it is unclear that to what degree wind contributes to the energy budget of the region and how much it accounts for observed dissipation rate.

   Ans:

   In the Discussion section, now the focus into compares drivers we included a section of estimations of the power of stratification and winds and compares the order of magnitude. In a companion paper (Castillo et al., 2025) the authors make this comparison between winds and stratification in the Almirantazgo fjord, here we extended that calculations to northern Patagonia and compared the order of magnitude obtained with tides and stratification.

   Castillo, M. I., Zuñiga, C., Barrios-Guzmán, C., Cisternas, N., Garces-Vargas, J., Landaeta, M. F., Piñones, A., Rojas-Celis, M., Guerrero, A. I., and Sepúlveda, M.: The answer is blowing in the wind: seasonal

hydrography and mixing of the inner sea of Tierra del Fuego, Southern Patagonia, EGUsphere [preprint], https://doi.org/10.5194/egusphere-2025-5692, 2025 .

5. Figure 9 is confusing. Is it plotting the tidal mixing parameter or total tidal energy dissipation?

   A comparison of spatial pattern of ε and tidal energy dissipation rate $C_d U^3/h$ will illustrate the relationship between energy released due to bottom friction and local dissipation rate ε. Given that velocity profiles are only available in a few places, I think having a line plot of both ε and $C_d u^3/h$ will provide valuable information.

   Ans:

   We decide to focusing in tidal dissipation only on this figure in order to make comparisons between the drivers. We include a new Appendix 3 to describe t ε *and* K_{shear} distributions in the regions. Also, the new included estimations of the power of tidal, winds and stratification and the comparison of the orders of magnitude involve could be better explanations to quantify the main drivers of the mixing in these regions. Now, we have a better description of the drivers and we conclude that wind and tides play an important role for mixing in both regions.

3 Technical corrections

1. In the abstract line 26, should the unit of dissipation rate be Wkg^{-1}?

   Ans:

   We edited the unit by W kg^{-1}.

2. Equation (5) has a typo.

   Ans:

   We edited equation 5.

3. In equation (6) and (7), should h be same as H?

   Ans:

   Thanks, it was a mistake, we changed in the new eq 6 and 7.

4. In figure 3 and figure 4, the caption mislabeled the years of the data. It should be ’2023/2024’ rather than ’2024/2025’. Also, it will be easier to compare if sub-

figures of the same season are aligned horizontally.

Ans:

We edited the labels of figures 3 and 4.

5. The figure supporting lines 232-236 seems to be figure A3, but it's not mentioned in the paper. I think it is helpful to move Figure A3 to the main text.

   Ans:

   We moved Fig. A3 to the next page and renamed it as a new Fig. 6.

   The second sentence of the caption of figure A3 should be 'The along-fjord distance is referenced to Parry Fjord'.

   Ans:

   We edited the label of Figure A3.

6. The second paragraph of section 4.5 refers figure A1 and A2, but does not point out that. I think it's good to state that explicitly in the paragraph.

   Ans:

   We edited the text.

7. Line 261, 262, and 263 mention location Desertores Passage and Queullin Passage, but they are not labeled in the figure 7. It will be easier for readers to understand those lines if the locations are labeled in the figure7. Similarly, Seno Almirantazgo is not labeled in figure 8.

   Ans:

   We edited Fig. 7 in accordance with the comments.

8. Figure A1 and A2 uses the notation log10(K_z) but the text uses the no- tation log10(K_{shear}). Also, what is changed from panel a) to panel g) in Figure A2?

   Ans:

   Thank you for pointing this out. To ensure consistency throughout the manuscript, we have standardized the notation and now use $\log_{10}$(Kshear) in both the text and the figures. We also revised Figure A2 and its caption to clarify the panel organization. The figure now presents the relative frequency

distributions of ε and Kshear for the different basin groups: PN1 (Reloncaví–Desertores, including Comau Fjord), PN2 (Desertores–Moraleda, including Puyuhuapi Fjord), PN3 (Moraleda–Laguna San Rafael, including Quitralco Fjord), and PS (Atlantic entrance of the Strait of Magellan, including Parry Fjord). Each curve represents a different seasonal oceanographic campaign conducted between 2023 and 2024. The caption has been updated to clearly describe the basin grouping and the variables displayed in each panel.