Answer to Qian Li,
Southern Ocean deep mixing band emerges from a competition between winter buoyancy loss and upper stratification strength

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Dear Qian Li,
Thank you for your careful second consideration of our manuscript. We improved the points you mentioned. Please find our answers to the reviews in this document. We used `this monospace font` to cite the original comments, and we provided point-by-point responses.
Best regards,
Romain Caneill and co-authors

Minor comments

- `Lines 178 -- 179: ‘‘We expect` B^{θ}_{250} `to be positive north of the PF (stabilising effect of temperature) and negative south of it (destabilising effect), while` B^{S}_{250} `should be negative north of the SAF and positive south of it.’’ I think ‘‘positive’’ and ‘‘negative’’ should be swapped here.`

  Thanks for catching up this typo. As you mentioned, as temperature is increasing stratification north of the PF, this means that B^{θ}_{250} is negative (similar reasoning applies for salinity). We corrected it in the manuscript.

- `Figure 7 and line 5: What time period is defined for ‘‘late summer’’? In Fig. 7, why not compute the terms of` B_{250} `and` $\mathcal{B}^{CS}$ `during the same time period, such as the cooling season? Otherwise, it needs to justify the meaning/fairness to compute the difference between them` $(B_{250} - \mathcal{B}^{CS})$.

  Here, late summer is defined as the time before which the ocean starts loosing buoyancy, which is in April on average. We do not compute the average B_{250} during the cooling season, as we use the columnar buoyancy as the starting point, from which buoyancy is removed during the cooling season. Thus, taking $(B_{250} - \mathcal{B}^{CS})$ provides the state of the columnar buoyancy at the end of winter, neglecting other processes than surface buoyancy fluxes, and Ekman driven buoyancy advection.

  The explanation given line 168 (section 2.2) was clarifying this idea: “Thus the comparison of B_{250} with the buoyancy loss directly informs if the buoyancy fluxes can produce a mixed layer of 250 m.”

  We added a comment to better clarify: “We compute B_{250} in April, just before the cooling season, so $(B_{250} - \mathcal{B}^{CS})$ estimates the columnar buoyancy at the end of winter. Thus, the comparison of B_{250} with the buoyancy loss directly informs if the buoyancy fluxes can produce a mixed layer of 250 m.”