We thank all three Referee for their insightful reviews that have helped us improve the manuscript.

Short summary:

The article "Deep through-flow in the Bight Fracture Zone and its imprint in the Irminger Sea" presents the properties of the throughflow through the Bight Fracture Zone (BFZ) from ship based and Arvor float observations and focusses mainly on the property transformation of ISOW passing it. The transports and hydrographic properties of the through-flow are presented and reveal a very variable throughflow of the BFZ. Due to a small recirculation in the middle of the BFZ vertical mixing is discussed. By using two Arvor floats the influence of the through-flow on the ISOW in the Irminger Sea is attempted. The paper concludes a significant influence of the throughflow through the BFZ on the ISOW properties in the Irminger Sea.

General remarks:

I think the paper need some minor revisions as marked in the pdf and attached to this text. the experimental setup was thoroughly though through an only leaves one open question for me. The reasoning about the keyrole of the BFZ for counteracting freshening in the Irminger Sea is not supported enough by the two floats available - I think this paret should be written a little more vague or other observational data should be included in the discussion (remarks in the text). For this reason I would propose to change the name of the work to something less proposing a study of the absolute influence of the BFZ on the salinification of the ISOW signal in the Irminger Sea since from the data base presented here this is not adequately possible.

The two floats show that the salinity maximum associated with the throughflow of ISOW at BFZ is distinct from that of the CGFZ throughflow, and that the BFZ throughflow has a specific signature in the hydrography north of BFZ. Nevertheless, we agree that we cannot show from these two floats that the "*imprint*" of the BFZ through-flow can be traced over the entire Irminger Sea. So following your suggestion, we changed the title into "*Deep through-flow in the Bight Fracture Zone*".

Also, we agree that we cannot quantify to how much the salty contribution from the BFZ compensates for fresh water sources in the Irminger Sea. As such we modified the last sentence of the abstract as: "*Hence, our analysis reveals the key role of the BFZ through-flow in the salinification of the NADW in the Irminger Current*". We also modified the sentence in the result "*Hence, the northward erosion of the ISOW core reveals a compensation between cold and fresh inflow from the Irminger Sea and the saltier and warmer BFZ through-flow, which maintains a maximum in salinity for the ISOW layer at these latitudes*" into "*Hence, the limited northward erosion of the ISOW core reveals the key role of the BFZ through-flow in maintaining a maximum in salinity for the ISOW layer at these latitudes*".

Another point which is more a general point of discussion is the name of the water mass discussed - ISOW or NEADW (see remark in the text).

Formed downstream of the Iceland-Scotland-Faroe Ridge (Van Aken & De Boer, 1995; Dickson et al., 2002), the name ISOW is commonly used to define the water mass with a density higher than 27.8 kg m^{-3} and a salinity higher than 34.94 over the Iceland Basin and across the Reykjanes Ridge (Saunders, 1994; Xu et al., 2010; Zou et al., 2017; Bower and Furey, 2017).

However, we agree with Reviewer 1 and Reviewer 2 that the overflow water circulating in the Irminger Sea is a modified version of ISOW. Following Fried & DeJong (2022), we now use the name North-Atlantic Deep Water (NADW) to call the deep water circulating in the Irminger Sea.

Notes with the pdf:

page 1, L10: This is maybe a general point of discussion - whether to call the water mass ISOW or NEADW. In my understanding ISOW is really the overflow water at the ISR and FBC since it is modified almost directly when entering he Iceland basin - as you describe also in this article - hence, I always call it NEADW. The same would hold for DSOW -> but here we only know one name …
See answer on the general comment #2.

page 1, L13: allow
Done.

page 1, L18: homogenized
Done.

page 1, L19: Should be rather ISOW circulating in the Irminger Sea - or are you sure the ISOW is formed in the Irminger Sea?
The sentence was misleading. It has been modified and now reads: "*There, ISOW is mixed isopycnally with comparatively fresher NADW circulating in the Irminger Sea.*"

page 1, L20: This
The sentence has been removed for clarity.

page 1, L20: results
The sentence has been removed for clarity.

page 2, L35: reach
Done.

page 2, L36: crosses
Done.

page 2, L49: from investigating
Done.

page 2, L51: by
Done.

page 2,L 56: 2 Data and Methods -> general remark : I think it would be nice for completeness to give one sentence on the used toolboxes like TEOS-10 etc for the calculations
Additionally you state you use the methods from Petit et al. 2018 it would be nice to have one or two sentences summarizing the interpolation and treatment shortly.

We clarified the processing of the measurements, which now reads: "*The calibrations and processing of these measurements were identical for all four cruises. As described by Petit et al. (2018), the OS150 datasets were used to correct the calibration of the second S-ADCP, and the velocity profiles were averaged over 2-km segments along the sections.*"

And: "*The geostrophic velocities were estimated from the CTDO$_2$ measurements using the seawater toolbox, and were referenced by velocity measurements from the OS38 and OS75 (Petit et al., 2018).*"

page 3, L 67: Regarding the km scale here I would not call them basins - rather - channels ?
Done.

page 3, L69: 200-m isobaths spacing from white at the surface to dark blue at greater depths; * erase, page 3: The deepest bathymetries are represented with darkest blue
Done.

page 3, L80 : at,
Done.

page 4, L82 : basins -> deep channels
Done.

page 4, L102 : 0.002 psu ? Or g/kg salinity units
As we use the Practical Salinity for a better comparison with previous OVIDE papers, there is no unit (as indicated in TEOS10). We clarified the sentence, which reads: "*The accuracies of the temperature, practical salinity, pressure and dissolved oxygen concentration are better than 0.002°C, 0.002, 1 dbar and 1.5 µmol kg^{-1} for the four cruises, except for the dissolved oxygen concentration for which the accuracy was estimated at 2 µmol kg^{-1} for OVIDE18.*"

page 6, L135 : 0.004 psu ?
See answer above, the sentence now reads: "*Temperature, practical salinity and pressure were measured using a Seabird SBE41CP CTD sensor with a target accuracy of 0.002 °C, 0.004 and 7 dbar, respectively.*"

page 6, L139 : salinity
Done.

page 6, L148 : areas
Done.

page 6, L148 : East Reykjanes Ridge section
We clarified the text by indicating: "*along the OVIDE section*".

page 7, L152 : eastern entrance
Done.

page 7, L156 : East section (upper panels)
Done.

page 7, L156: Middle section (lower panels)
Done.

page 8, L164 : the
Done.

page 8, L165 : the
Done.

page 8, L166-168: Did you check the SPG index -> maybe it also related to different states of the SPG

This is an interesting idea, but with the limited temporal resolution of our data set any correlation with an SPG index would be speculation. We prefer to comment the close ratio of barotropic/ISOW transports for these two years, as suggested by Reviewer 2: "*The similar ratio of ISOW/top-to-bottom transports between 2015 and 2017 suggests that the BFZ through-flow is influenced by local barotropic circulation, as observed at the CGFZ (Bower & Furey, 2017; Bower & von Appen, 2008; Racapé et al., 2019).*"

page 9, L189 : 0.005 psu

As now indicated in section 2.2 and 2.3, the salinity has no unit because we are using Practical Salinity.

page 9, L190: shows

Done.

page 9, L196: which

Done.

page 11, L 222 : channels

Done.

page 11, L 230 : channels

Done.

page 11, L 232 : channels

Done.

page 11, L 234 : from the Irminger Sea.

I am not sure about the exact origin - It might be the ISOW that passes CGFZ, mixes etc and is then transported along the western flank of RR ? ISOW from the Irminger Sea sounds like it is formed here.

As previously, the sentence was misleading and has been modified into: "*This suggests that ISOW exiting the BFZ along the northern walls of the channels is isopycnally mixed with colder and fresher NADW circulating in the Irminger Sea.*"

page 11, L236-237: must originate from the Irminger Sea -> see comment above

The sentence now reads: "*The lower part of the layer (σ_0 > 27.855 kg m^{-3}) is fresher along the northern walls than in the upper part. This lower part of the layer cannot be renewed by BFZ through-flow, whose density is lower than 27.855 kg m^{-3}, and must be mainly fed by denser NADW.*"

page 12, L238 : channels

The sentence has been changed, see answer below.

page 12, L239: See comment above

The sentence now reads: "*The ISOW layer at the exit of the BFZ is thus a superposition of dense waters of different origins: the upper part results from the mixing of BFZ through-flow with fresher and colder NADW, while the lower part is mainly composed of dense NADW flowing in the Irminger Sea.*"

page 12, L243: at a few week interval -> in an interval of several weeks

Done.

page 12, L250: channels
Done.

page 12, 256: from the Irminger Sea
The sentence has changed and now reads: "*Hence, the limited northward erosion of the ISOW core reveals the key role of the BFZ through-flow in maintaining a maximum in salinity for the ISOW layer at these latitudes*."

page 12, L263: channels
Done.

page 13, L273: additional deep inflows -> could diapycnal mixing play a role here? Since you have a steep flanks in the middle part and a recirculation cell diapycnal mixing could be an additional possible source. - how about the import of LSW and SPMW into the section - does it change between im- and export in the BFZ?
Inflows of ISOW through deep valleys localized immediately north of the entrance sill (<0.5 Sv) show similar properties to those of ISOW at the eastern and middle sections. Due to the small evolution of the ISOW properties in the rift valley, mixing does not play a significant role there (Figure 4b).

page 13, L 278: isopycnal mixing -> diapycnl mixing? See my comment above
See answer above.

page 14, L 279: left hand side - > southern side?
Sorry for the confusion. We moved "(*i.e. southern wall*)" immediately after "*left hand side*".

* Highlight, page 14: basins
Done.

* Highlight, page 14: isopycnal mixing
See answer above.

* Highlight, page 14: isopycnal mixing
See answer above.

page 14, L301-302: See Holliday 2018 -> 1 Sv of the flow exiting the IC in the lNADW class is added to the uNADW class at OSNAP -> is 1 Sv really playing a key role when thinking about a through flow of unsteady ~1 Sv through the BFZ? Id rather say that the BFZ is supplying salt to the Irminger Sea but if this really plays a significant role compared to the saline inflow of water in the upper AMOC component in the Irminger current and the slight freshening of ISOW in the Irminger Sea through mixing with LSW is an open question to me. As the salinification of ISOW happens just south of the ISR (Devana 2021) and the ISOW has this very saline signature at the EGC at OSNAP EAST and at OSNAP WEST. I am wondering about the relative importance here.

We agree that ISOW has a very saline signatures at OSNAP East and OSNAP West, both sites being downstream of the BFZ. Here, we simply argue that the BFZ contributes to this very saline signature as evidence by the analysis of the float measurements. This role is further confirmed by the amplitude of ~1 Sv of the ISOW transport through the BFZ. It is of similar magnitude as the exchanges of deep water reported in other main fracture zones of the North and Equatorial Atlantic, including the Romanche Fracture Zone (Mercier et al., 1994), Vema Fracture Zone (Mercier & Morin, 1997) or the Charlie-Gibbs Fracture Zone with 1.1 Sv of ISOW (Petit et al., 2018), with significant impact of the deep water mass properties in the downstream basin. This is now clarified in the discussion:

"*The inflow of NADW from the interior of the Irminger Sea has been estimated to 1.4 Sv by Petit et al. (2019). It is of similar magnitude as the BFZ through-flow estimated in this study (~1 Sv). Hence, our analysis highlights the key role of the BFZ through-flow in the salinification of the NADW as it flows northward along the Reykjanes Ridge and provide benchmarks for the validation of ocean models at high resolution.*"

page 14 L303-307: I would include the OSNAP observations here - the southward current band is not stable and possibly part of a recirculation cell within the Irminger Sea. Additionally concluding from one float I rather arbitrary.
We simplified the discussion of the float trajectories as we agree that we cannot conclude on pathways shown by 2 floats. The first sentence of the paragraph now reads:

"*Although more Deep-Arvor floats would be required to analyze the imprint of the BFZ through-flow on the evolution of NADW properties over the entire Irminger Sea, the pathways of the 2 Deep-Arvor floats can provide insights about the deep circulation in the Irminger Sea.*"

page 14, L306: a local
The sentence has been simplified:

"*The southward propagation of a Deep-Arvor float along the western flank of the Reykjanes Ridge is consistent with the southward currents observed west of the Irminger Current at OVIDE latitudes (de Jong et al., 2020; Lherminier et al., 2007; Sarafanov et al., 2012; Våge et al., 2011) and at 56.4°N along the Reykjanes Ridge (Petit et al., 2019).*"

page 14, L310 : get
Changed into "*got*"

page 15,L 314 : floats
Done.

page 15, L 315-317: I would include the mean circulation argument from eg. Fischer et al 2018 here - the central Irminger Sea is occupied by 2 large recirculation cells rather close to the Greenland shelf break.
The reference has been added.

page 15, L321 – 324 : Maybe add Fox et al 2022
The reference has been added.

References

Dickson, B., Yashayaev, I., Meincke, J., Turrell, B., Dye, S., & Holfort, J. (2002). Rapid fresheninig of the deep North Atrlantic Ocean over the ast four decades. *Nature*, *416*, 832–837. http://dx.doi.org/10.1038/416832a

Fried, N., & Femke de Jong, M. (2022). The role of the Irminger Current in the Irminger Sea northward transport variability. *Journal of Geophysical Research: Oceans*, *1990*, 1–16. https://doi.org/10.1029/2021jc018188

Van Aken, H., & De Boer, C. J. (1995). On the synoptic hydrography of intermediate and deep water masses in the Iceland Basin. *Deep-Sea Research Part I*, *42*(2), 165–189. https://doi.org/10.1016/0967-0637(94)00042-Q

Review on "Deep through-flow in the Bight Fracture Zone and its imprint in the Irminger Sea" by Petit et al.

Summary

Using deep Argo-float and hydrographic data, Petit et al. have investigated the transport and property evolution of the Iceland-Scotland Overflow Water (ISOW) when it flows through the Bight Fracture Zone (BFZ). Possible attributions of the evolution, including isopycnal and vertical mixing in the fracture zone, as well as the property imprint in the Irminger Sea were discussed. Overall, I found the paper well-written and the focus on ISOW branch through the BFZ, which was less studied before, is of interest to the oceanographic community. Observation- based descriptions on transport and property structures were quite thorough. However, their temporal and spatial variabilities observed by the data need better explanations.

Major comments

[1]. It is still unclear of what determines the transport/property difference between years at the BFZ. In 2015, the ISOW at east section is saltier, denser and the transport core is located at the center of the section. In 2017, on the other hand, the ISOW at east section is fresher, lighter and the maximum transport is attached to the northern bathymetry. Is this temporal difference attributable to a different source in the East Reykjanes Ridge Current (e.g. either from west of 30W or between 29-30W)? Or is the interannual variability of the ERRC itself responsible for this downstream difference?

Our dataset is not adequate to investigate the interannual variability of the ISOW transport through the BFZ. The East section was carried out a few kilometres upstream in the entrance channel in 2015 as compared to 2017. Thus the difference in velocity structure could also be due to the difference in the location of the sections. In addition, the East section was carried out in 2015 and 2017, while the Middle Section was carried out in 2015 and 2018.

We only describe the interannual variability of the ISOW salinity at the entrance of the BFZ between the 4 years of observations at the end of the manuscript without going deeper in the investigation because this would be speculation.

We clarified this point in Section 3.1 as follow:

"*Our dataset does not allow us to determine whether these differences are due to temporal variability of the inflow from the Iceland Basin, or to differences in the local bathymetric constrains within the narrow channel of the BFZ entrance, as the East section in 2015 is localized slightly upstream in the channel as compared to the East section in 2017 (Figure 1b).*"

[2]. A related question is whether the difference of cyclonic pathway at the middle section is related to the different transport structure at the east section between 2015 and 2018.

See answer above.

Minor comments

[1]. Line 19 & 234: I think "ISOW" may not be the appropriate name for the deep water in the Irminger Sea because mixing has eroded much of the ISOW characteristics (e.g. high salinity). I would suggest calling it Northeast Atlantic Deep Water.

We agree with Reviewer 1 and Reviewer 2 that the overflow water circulating in the Irminger Sea is a modified version of ISOW with a large range of density that includes LSW and DSOW. Following Fried & DeJong (2022), we now use the name North-Atlantic Deep Water (NADW) to call the deep water circulating in the Irminger Sea.

[2]. Figure 1: The blue dots are indistinguishable from the background color.

We changed the colour of the dots to make them more distinguishable form the background colour.

[3]. Table 3: The ratio of ISOW transport to top-to-bottom transport seems to be quite steady over years. This implies a barotropic transport variability through the BFZ. What might be responsible for this barotropic variability? This is related to my major comment.

See answer above. Nevertheless, we agree that the similar ratio of ISOW/top-to-bottom transports between these two years suggests an impact of the top-to-bottom circulation on the ISOW transport. This is now indicated in the text: "*The similar ratio of ISOW/top-to-bottom transports between 2015 and 2017 suggests that the BFZ through-flow is influenced by local barotropic circulation, as observed at the CGFZ (Bower & Furey, 2017; Bower & von Appen, 2008; Racapé et al., 2019).*"

[4]. Line 182: I think you are referring to Figure 1d (instead of Figure 1c). Also, the trajectories in Figure 1d, especially the blue ones, are not easy to track. Please enlarge the trajectories for better illustration.

Thank you for indicating the mismatch, we changed into "*Figure 1d*" in the text. As for your comment #2, we changed the colour and enlarged the floats trajectory.

[5]. Lines 200-205: It is interesting to see a homogenization of the ISOW in terms of temperature within the BFZ. By looking at Figure 4a, there is an increase of bottom depth from east section (station 99) to the middle section (station 104). Could this topographic change result in vertical mixing observed here?

We agree that this topographic change can induce vertical mixing. We now discuss this hypothesis in section 4: "*The cyclonic circulation of ISOW in the rift valley is associated with a strong homogenization of the ISOW layer, which highlights a vertical mixing within the layer. This vertical mixing is possibly due to a downslope acceleration of the bottom flow, downstream of the eastern sill, which induces instabilities and mixing.*"

[6]. Lines 239-241: Where are you referring to as "Eastern and Western sills"?

These two sills are indicated in Figure 1c and described in section 2.1. For clarity, we changed the text into the "*upstream sills*" and, when possible, we refer to the name of the sections throughout the text.

[7]. Line 260: This sentence may need to be re-written. Previous studies have shown a discontinuity of the boundary current from the CGFZ northward based on hydrographic sections (Stramma, 2004) and floats (Zou et al., 2020).

We agree that these papers show a discontinuity of the boundary current at the exit of the CGFZ. We clarified the sentence, which now reads: "*A combination of new and insightful data sets allows us to investigate the role of the BFZ as a new source of ISOW for the NADW spreading in the Irminger Sea*."

References

Stramma, L. et al. Deep water changes at the western boundary of the subpolar North Atlantic during 1996 to 2001. Deep Sea Res. Part I: Oceanographic Res. Pap. 51, 1033–1056 (2004).
Zou, S., Bower, A., Furey, H., Susan Lozier, M. and Xu, X., 2020. Redrawing the Iceland– Scotland Overflow Water pathways in the North Atlantic. Nature communications, 11(1), pp.1-8.

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egusphere-2022-248

Deep through-flow in the Bight Fracture Zone and its imprint in the Irminger Sea

by Tillys Petit, Virginie Thierry, and Herlé Mercier

In this manuscript the flow of dense Iceland-Scotland Overflow Water from the Iceland Basin to the Irminger Sea through Bight Fracture Zone is investigated. The authors quantify the transport, mixing within the fracture zone, and impact on the Irminger Current.

I think this is an interesting paper that contributes to the understanding of the deep circulation in the North Atlantic and the importance of Bight Fracture Zone relative to Charlie-Gibbs Fracture Zone farther south. I only have a few minor comments that I hope the authors will consider before the paper is published.

Specific comments:

Line 89 and elsewhere:
Consider replacing "hydrology" by "hydrography", which may be more appropriate for the properties of sea water.

Done.

Line 106:
How deep do the shipboard ADCP measurements extend?

The maximum depths reached by the pulses was 1300 – 1400 m for the OS38, 700 – 800 m for the OS75 and 200 – 250 m for the OS150. This is now indicated in the text.

Line 110:
Do you mean absolutely-referenced geostrophic velocities, i.e., that the geostrophic calculation was referenced using velocity measurements rather than a level of no motion? Please clarify.

Yes we mean absolutely-referenced geostrophic velocities as the geostrophic calculation was referenced using the velocity measurements from the S-ADCPs. The sentence has been clarified and now reads:

"These measurements were used to estimate absolutely-referenced geostrophic velocities perpendicular to the sections and the associated gridded transports (Figure 2 and Table 3). The geostrophic velocities were estimated from the $CTDO_2$ measurements using the seawater toolbox, and were referenced by velocity measurements from the OS38 and OS75 (Petit et al., 2018). The geostrophic velocities were then evaluated by comparison to the L-ADCP velocities at the East and Middle sections (Figures A3 and A4)."

Line 113:
Another important distinction is that the lowered-ADCP measurements contain the total velocity field, not just the geostrophic velocities. Within a narrow fracture zone and near rough topography ageostrophic motions may be particularly prominent. As such, perfect agreement should clearly not be expected.

We agree that ageostrophic motions are considered in L-ADCP measurements. The sentence has been clarified and now reads:

"Note that L-ADCP measurements provide local measurements of the total velocity field at each hydrographic station while geostrophic velocities are averaged velocities between two successive stations (Lherminier et al., 2007), so we cannot expect a perfect agreement between the two data sets."

Line 130:
Drifting *into* the Irminger Sea may be more appropriate.

Done.

Line 139:
How was the salinity bias of 0.002 determined?

The bias in salinity of 0.002 in the Deep-Argo floats #6902881 was determined by comparison with a ship-based calibrated cast acquired at float deployment. The correction was validated by comparison with float #6902882 for which no correction was applied. Information are available through the following webpage https://www.umr-lops.fr/SNO-Argo/Activities/DMQC

The following sentence has been added: *"This bias was determined by comparison with a ship-based calibrated cast acquired at float deployment."*

Line 146:
Figure 3 is mentioned in the text before Figure 2. Perhaps the order of these two figures should be changed.

Figure 2 is mentioned on line 110, thus before Figure 3.

Line 148:
Areas should be plural.

Done.

Line 148:
ISOW properties and ages in the interior of the Iceland Basin are likely very different than those near the core of the boundary current along the Reykjanes Ridge. Also, depth ranges are probably more

meaningful than longitude bands, in particular in relation to the depths of the BFZ sills. I think the discussion in this paragraph could be more dynamically oriented by considering physical rather than geographical quantities that are more central for the dynamics governing the flow of ISOW.

We agree that our geographical areas can be related to the veins of ISOW repeatedly observed along the OVIDE section and defined by depth ranges. We find that the 2100-m isobath is associated with the limit at 30W along OVIDE, which is now outlined in Figure 3. We further discuss this point in the paragraph:

"*The comparison in the density range 27.8–27.87 kg m^{-3} reveals three geographical areas along the OVIDE section that are related to the three ISOW branches permanently observed at 30°W, 29°W and 27°W along the eastern flank of the Reykjanes Ridge (Daniault et al., 2016 ; Xu et al., 2010 ; Petit et al., 2019)*."

Line 161:
Perhaps you could clarify how the sampling was inappropriate for calculating ISOW transports from this velocity section.

We clarified the sentence, which now reads:

"*The geostrophic velocity section acquired in 2016 is not discussed here because the sampling of the stations, limited to the two flanks of the channel, was not appropriate to capture the ISOW transport at depths higher than ~1500 m within the sill.*"

Line 169:
There's a mismatch between significant figures in the transport estimates and the percentage of transport represented, from one significant figure in the transport estimate (the error) to three significant figures in the percentages.

The mismatch has been corrected.

Line 173 and elsewhere:
You describe the flow of ISOW within the rift valley of the Reykjanes Ridge, to the northeast along the eastern side of the valley and to the southwest along the western side of the valley, as a cyclonic pathway. I would have envisioned something slightly different from the term "cyclonic", perhaps a better description could be found.

The circulation follows the flanks of the rift valley along a cyclonic loop between the two sills at the entrance and exit of the BFZ. We thus refer to cyclonic circulation in the text. Nevertheless, we now clarify this point, and the sentence now reads:

"*This circulation at the Middle section, following the flanks of the section, suggests that ISOW flows along a cyclonic loop in the rift valley of the Reykjanes Ridge, possibly driven by the bathymetry.*"

Line 194:
It is unclear whether the sill at 2150 m depth is the Eastern Sill or another sill located between the two sections.

The eastern sill is localized at the entrance of the BFZ and between the two sections. We clarified the sentence, which now reads:

“*This can possibly be ascribed to the bathymetry of the sill at the eastern entrance of the BFZ, in case the densest water cannot overflow this topographic obstacle at 2150-m depth (black star in Figure 4b)*.”

Line 222:
Each of the western *basins* should be plural.

Done.

Line 249:
The unit of density should remain intact rather than be split across two lines.

Done.

Line 278:
It may be surprising that diapycnal mixing is more prevalent than isopycnal mixing. I think expanding this discussion by a couple of sentences explaining why this is the case would be enlightening.

This was indeed misleading because isopycnal mixing cannot be evidenced from properties showing no isopycnal gradients. We deleted this part of the sentence. Thank you.

Line 298:
It should be the *so-called* OVIDE section.

Done.

Line 309 and elsewhere:
The text changes abruptly from past to present tense without apparent reason. I suggest consistently using the past tense to describe past events and observations.

Done.

Line 314:
Floats should be plural.

Done.

Figure 1:
The white stars marking the eastern and western sills are difficult to discern, please make the symbols more visible. I think it would also be good to indicate the location of the sea mount mentioned in the text (line 67) on this map.

The white stars are now larger in Figure 1c, but we choose to not use another symbol to localize the seamount as lots of information are already indicated in the Figure.

Figure 4:
I think it would be good to include a legend to panels a) and b).

The colour code of Figure 1b can be found in Figure 1a such that a legend would not provide any additional information.