We thank Referee RC3 for his/her insightful reviews that have helped us improve the manuscript.

egusphere-2022-248

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

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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.