EGUsphere, referee comment RC1
https://doi.org/10.5194/egusphere-2022-248-RC1, 2022

Comment on egusphere-2022-248

Anonymous Referee #1

Referee comment on "Deep through-flow in the Bight Fracture Zone" by Tillys Petit et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-248-RC1, 2022

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 recirculöation 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.
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).

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 …

page 1, L13
allow

page 1, L18
homogenized

page 1, L19
Should be rather ISOW circulating in the Irminger Sea - or are you sure the ISOW is formed in the Irminger Sea?

page 1, L20
This

page 1, L20
results

page 2, L35
reach

page 2, L36
crosses

page 2, L49
from investigating

page 2, L51
by

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.

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

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

page 3, L80
at,

page 4, L82
basins -> deep channels

page 4, L102
0.002 psu ? Or g/kg salinity units

page 6, L135
0.004 psu ?

page 6, L139
salinity

page 6, L148
areas

page 6, L148

East Reykjanes Ridge section

page 7, L152
eastern entrance

page 7, L56
East section (upper panels)

page 7, L156
Middle section (lower panels)

page 8, L164
the

page 8, L165
a

page 8, L
the

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

page 9, L189
0.005 psu

page 9, L190
shows

page 9, L196
which

page 11, L 222
channels

page 11, L 230
channels

page 11, L 232
channels

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.

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

page 12, L238
channels

page 12, L239
See comment above

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

page 12, L250
channels

page 12, 256
from the Irminger Sea

page 12, L263
channels

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?

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

page 14, L 279
left hand side - > southern side?

* Highlight, page 14
basins

* Highlight, page 14
isopycnal mixing

* Highlight, page 14
isopycnal mixing

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.

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.

page 14, L306
a local

page 14, L310
get

page 15,L 314
floats

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.

page 15, L321 - 324
Maybe add Fox et al 2022

Please also note the supplement to this comment:
https://egusphere.copernicus.org/preprints/2022/egusphere-2022-248/egusphere-2022-248-RC1-supplement.pdf