

## ***Interactive comment on “Overflow of cold water across the Iceland-Faroe Ridge through the Western Valley” by Bogi Hansen et al.***

### **Anonymous Referee #3**

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Review: Overflow of cold water across the Iceland-Faroe Ridge through the Western Valley, Hansen et al., Ocean Science Discussions

### Summary:

Hansen et al. present current meter records from the Western Valley of the Iceland-Faroe Ridge which is the deepest channel in the north-western part of the ridge. However, this paper shows a much smaller flux than expected (max 0.1 Sv). Using the relationship between the instruments and SSH, the authors reconstruct the transport through the WV since 1993, showing that the flux during the field campaign was particularly low. However, even using the long-term mean transport, overflow through the WV is insufficient to explain the previously reported transport downstream of the ridge.

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The paper is interesting and scientifically robust. The authors have been very thorough and I have very few comments as I found the authors have already answered them all in the manuscript. The findings add to the knowledge of overflow over the Iceland-Faroes Ridge and I think this study will spawn further research. Additionally, the paper is well written and the figures are of a high quality. As such I recommend acceptance after very minor revisions.

Comments:

Lines 14-19, p.6: I think that the different distributions at A and C suggest the two sites possibly have different mechanisms going on. A seems to be almost normally distributed around about 3°C – sometimes it has colder water, sometimes warmer. I wondered if it was as a result of a change in the lateral or vertical position of the overflow interface depending on the volume of overflow (or other effects). In contrast C has a bi-modal structure – it is either overflow water, or water centred upon 4°C. I wondered whether this site is mostly within the overflow, but that it is sometimes replaced by (northward flowing?) Atlantic water?

Lines 5-6 p.7: suggest addition that U(T) and T(A) are positively correlated, whilst U(T) and T(B) are negatively correlated.

Lines 1-8, p.7: think you need to add a sentence to remind the readers the velocity measurements are at B only. The velocity could change quite a lot laterally? I think I find it most surprising that U(D) and T(B) are not significantly correlated!

Lines 12-13 p.11: could you add an additional sentence or two explaining how you calculated the uncertainties associated with the regression coefficients?

Lines 18-23, p.12: your figure 1b also suggests there may be other places along the IFR where overflow is stronger than through the WV.

I found some of the figure captions difficult to follow. For some figures (e.g. 6) you had: (a) description, (b) description; whilst for others (e.g. 7) you have: description (a),

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description (b). I think sticking to one format would help the reader.

Figure 4: could you define BTL in figure caption (for those of us who look at the figures before reading the article)

Figure 4: suggest addition of where the CTD stations were (e.g. by crosses on upper x-axis)

Figure 5: either plot all on same y-axis, or put note to reader in caption that different y-axis are used.

Figure 6: swap round so (a) is top panel, and (b) bottom panel

Figure 9: could you add the locations of A and C onto the plots too? I think this would be interesting to see

Table 1: were all the instruments 17 m off bottom? (as mentioned in the text)

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Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2018-40>, 2018.

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