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# *Interactive comment on* "Norwegian Atlantic Slope Current along the Lofoten Escarpment" *by* Ilker Fer et al.

## Anonymous Referee #1

Received and published: 25 March 2020

Review of the manuscript: "Norwegian Atlantic Slope Current along the Lofoten Escarpment" by Ilker Fer et al. (os-2020-15).

This work is based on a comprehensive data set, addresses important questions, and is generally well written and illustrated. Thus, I am confident that it deserves publication in something close to its present form, but it does contain some confusing aspects and details that need to be clarified before final acceptance, as elaborated below.

Main comments

1) Velocity components: Figure 1b shows an (x,y) coordinate system and you expect velocity components to follow the standard notation (u,v). This is confirmed on lines 97-98: "Current components are along-slope, u, and across-slope, v", but then this

statement is followed by: "(In the figures, we explicitly use the notation ua and ux, respectively.)" without explaining, which is which (and ux is not along the x-axis). Most of the manuscript seems to keep the (ua, ux) notation, but Sect. 7 with Eqs. (2) and (3) partly returns to the (u,v) notation. This is unnecessarily confusing. Stick to one notation. I would suggest (u,v).

2) Projected distance: On lines 181-182, you write: "The moorings are separated by approximately 6 km (horizontal distance between the locations), and when projected onto the cross-slope section to their respective isobaths, the distance is about 8 km". How can a projected distance become larger than the distance ? Using the positions in Table 1, I get a distance of 5.3 km, which projected onto the cross-slope direction ought to be around 4 km. This projected distance is used extensively in the manuscript. I am not sure that any main results are substantially affected by this, but again it is unnecessarily confusing and has to be corrected.

3) The width of the current for transport calculation: As I read your description (lines 182-187), your transport calculation is equivalent to multiplying the average transport density from the two moorings by 28 km (which according to the previous comment ought to be 24 km), but you do not mention what you do with the shallowing bottom in the 10 km inside of MN (to 250 m according to line 184). The statement on lines 184-185: "hence assign a 14 km effective width of water column to each mooring" does not indicate that this was taken into account. This should either be briefly clarified or the transport corrected if it has not been taken into account. As for many similar studies, the width of the current is probably the most uncertain aspect of the transport calculations, so is this uncertainty included in the uncertainties cited in Table 2 or are they just statistical (standard error ?). This should be clarified in the table heading and perhaps also in the text.

4) Transport of the top 50 m layer: The average volume transport cited in the abstract (2.8 Sv) seems not to include the top 50 m (line 213). I assume the reason to be that this layer is less saline than 35.17 on average (Figure 2) due to some admixture of

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water from the Norwegian Coastal Current, but isn't the fraction of Atlantic water in this layer still » 50% ? Using S=35.17 as a lower boundary for Atlantic water does not necessarily imply that you should use the same criterion for an upper boundary. If you want to retain this, it should in any case be better justified in the text.

Details

5) line 7: "volume transport" -> "volume transport of Atlantic water"

6) line 19: "Iceland-Faroe ... channels" is not standard. You could use "gaps" instead of "channels"

7) line 110: "Norwegian Sea Deep Water" -> "deeper water". The NSDW is usually reserved for the deepest component, which is separated from AW by intermediate water masses.

8) Figure 2, third line of caption: "typical value" -> "typical lower limit".

9) lines 118-119 : The last sentence seems to contradict the previous sentence.

) line 168: "the two moorings" -> "MS and MN".

10) lines 175 onwards : In line 175, the letter "Q" (with or without subscripts) is defined as "transport density (m**2/s). After that, the same letter is used for "transport" (m**3/s). This should be corrected.

11) Figure 8: Consistent with my main comment 1) above, I suggest that you use (Wx,Wy) instead of (Wa,Wx). Having Wx perpendicular to the x-axis is confusing. In the caption to this figure, it might also be emphasized that the velocities in Figure 8b (presumably) are low-passed (not band-passed, as might be assumed from line 220).

12) line 324: Isn't there a rho-0 too much in the last equation ?

13) line 330: Isn't a parenthesis missing in the middle equation ?

14) Figure A1b: In my printed version of the manuscript, I could not identify any "ma-

genta line". On the screen, there is something that could be magenta, but it does not resemble a line.

15) Appendix A: The contents of the appendix seem rather crucial to some of the results and the last parts of the abstract. You might consider pulling it into the main manuscript as a separate section just before the conclusion.

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