

Response to Reviewer #1

We appreciate the helpful comments from Reviewer 1 on our submitted manuscript "Import of Atlantic Water and sea ice control the ocean environment in the northern Barents Sea". We believe that the constructive feedback has contributed to substantial improvements to the manuscript.

Below are our detailed responses to the review comments. Line numbers refer to the track-change manuscript.

As we understand the comments, the reviewer finds that the descriptive parts of the paper appear somewhat monotonous, and that interesting features of the data that are left without explanation. We understand the reviewer's concern; but we believe our approach is defensible. Given the nature of the dataset and the study, we have chosen to adhere relatively strictly to the IMRAD structure with an – admittedly – fairly dry description of the data in the Results section and the interpretation in the Discussion focused on a few specific topics. We believe that it is important to present the observational time series in their entirety as they provide important environmental context for other research. However, it is not our goal to explain all the features in the dataset; nor do we believe that we are necessarily able to do so. We have chosen instead to focus the discussion on a few key questions where we believe this study makes meaningful contributions to the state of knowledge. Based on the reviewer's comment, we have explained our approach more clearly at the beginning of the paper in order to better introduce the reader to the structure of the study (L109-110, L119-121).

The stronger freshening at M1 than at M2 is discussed in L619-625.

Both reviewers found major shortcomings in the section about atmosphere-ocean dynamical links. We acknowledge that this section had its weaknesses, and have tried to remedy them in the revised manuscript with good help from the suggestions from both reviewers. We have taken into account the suggestion from Referee #1 and performed correlation analyses between CARRA 10-m wind components the currents at both M1 and M2 (Fig. 10). We have made major changes to the text in section 3.4, and to some degree section 2.4 and 3.1, so as to better justify and motivate the use of the pressure difference between weather stations as an index of "atmospheric forcing". We believe that in the revised version, the pressure difference is better justified as a meaningful quantity (see in particular the paragraph at L540-554). We hope that the inclusion of a correlation analysis with CARRA winds, as well as the above modifications to the text, have addressed the reviewer's concern.

The reviewer makes a fair point about the estimate of freshwater content based on a very few points in the vertical: Lacking information about the vertical structure between the sensors, the linear assumption is perhaps too rough to be meaningful. In the reviewed manuscript, we have removed FWC altogether, and instead discuss our findings instead of salinity/temperature alone.

The reviewer requested an explanation of why we use Conservative Temperature (CT) in some cases and in-situ temperature (T) in others. This was done because we do not have CT available from all instruments; the RBR Solo instruments only measure T, not S, and we cannot therefore calculate CT. We acknowledge that this should have been made clearer to the reader, and have added an explanatory sentence in paragraph 1 of Section 3.2.1 (L328).

The reviewer reacted to the use of correlations between currents at different depths to support the idea that the observed currents were "vertically uniform". We acknowledge that the original phrasing of the sentence in question was misleading, and have reworded it in the revised version (L331-332). We have not removed the correlations from the text as we believe it provides useful information in combination with the figures.