

Interactive comment on “Assessment of variability of the thermohaline structure and transport of Atlantic water in the Arctic Ocean based on NABOS CTD data” by N. Zhurbas and N. Kuzmina

Anonymous Referee #1

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Review of the manuscript “Assessment of variability of the thermohaline structure and transport of Atlantic water in the Arctic Ocean based on NABOS CTD data” by N. Zhurbas and N. Kuzmina (OS-2019-54)

The manuscript present an interesting analysis of CTD data collected by NABOS and Polarstern expeditions in the Nansen, Amundsen, and Makarov basins. Data are underutilized and a new analysis of them should be welcomed. Careful analysis is done for evaluation the patterns and variability of temperature and salinity along these cross-sections. The authors used standard dynamic method to evaluate geostrophic water transports using cross-slope sections at several locations of the Arctic Ocean. Sev-

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eral interesting conclusions were made. Specifically, a maximum of geostrophic water transport was found in 2006-2008, which corresponds well to temperature and salinity variability in the eastern Arctic Ocean. However, I have several major comments and quite a few minor comments to the text. This may require substantial work, thus, I recommend major revision before the manuscript is published.

Major comments:

1. All findings of the paper should be placed in the context of the existing literature. I provided some references in Minor comments.
2. Care should be taken to separate spatial and temporal variability. See my minor comments for specifics.

Minor comments:

1. Abstract, lines 11-12. Sentences like “Estimates...” in the current form do not carry any useful information and should be modified or skipped completely.
2. Line 15: Instead of “on” one can use “along”
3. Abstract, lines 24-26: Same as in comment 1.
4. Line 34: 2000s, not 2000-ies.
5. Lines 35-38: Same as comment 1.
6. Intro: More recent papers related to analysis of NABOS data can be useful for the analysis and should be mentioned in the Intro: Pnyushkov, AV, et al. Heat, salt, and volume transports in the eastern Eurasian Basin of the Arctic Ocean from 2 years of mooring observations, *Ocean Science*, 2018 Dmitrenko, IA, et al. Atlantic water flow into the Arctic Ocean through the St. Anna Trough in the northern Kara Sea *Journal of Geophysical Research: Oceans* 120 (7), 5158-5178 Pnyushkov, AV, et al. Structure and variability of the boundary current in the Eurasian Basin of the Arctic Ocean, *Deep Sea Research Part I: Oceanographic Research Papers* 101, 80-97

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7. Fig 1. One can use different colors to show different years.
8. Line 111: "original", not "primary".
9. Lines 134-148: The paper by Pnyushkov et al. 2018, Structure and dynamics of mesoscale eddies over the Laptev Sea continental slope in the Arctic Ocean, *Ocean Science* 14 (5), 1329-1347 can be useful in this context.
10. Lines 191-210: Materials of this paragraph should be viewed in the context of the recent paper by IA Dmitrenko et al. (2015) cited by the authors.
11. Lines 217-231: These estimates of water mass parameters may be obsolete considering strong changes which occurred over the recent decade or so (e.g. Polyakov et al. Greater role for Atlantic inflows on sea-ice loss in the Eurasian Basin of the Arctic Ocean, *Science* 356 (6335), 285-291)
12. Line 238: "Strip", not "stripe".
13. Fig. 8. Please use colors to separate profiles.
14. Lines 382-396. Somehow the authors should take into consideration temporal change of water masses at the selected locations vs. spatial changes. They can do that by analyzing repeated NABOS CTD sections and compare temporal and spatial changes.
15. Line 411: Please repeat your conclusion here.
16. Fig. 9: Please provide profiles in color.
17. Lines 432-439: Method of defining the area is not well described.
18. Table 1: Please include year as the third column for each line.
19. Lines 476-478: Please place these estimates in the context of paper by Pnyushkov et al. 2015.
20. Line 493: What authors are referred here? Why the distance of the AW core from C3

the slope is the key parameter for the flow dynamics?

21. Lines 511-522: Please place these results in the context of recent Pnyushkov et al 2018 paper.
22. Discussion of volume transports should incorporate sensitivity of these results to northward extension of sections which varied in time and space.
23. Lines 537-547: This paragraph should be placed in the context of existing mooring-based estimates of water transports across the Barents Sea and Fram Strait.
24. Lines 549-554: This paragraph should be placed in the context of the mooring-based estimates by Woodgate et al. 2001. Note, that my comments 23-24 will encourage the authors to discuss why their estimates are much lower than those coming from mooring observations e.g. Pnyushkov et al., Woodgate et al., Dmitrenko et al. Paragraph, lines 563-587, gives some hint, but discussion is far from complete. Particularly, I am not happy with the authors' attempt to explain their low values of water transports by limited area of sections.
25. Lines 602-625: Please place these results in the context of recent Pnyushkov et al 2018 paper.
26. Line 618: "Pulse", not "impulse".
27. Summary: Please try to avoid sentences like lines 627-628, 632-633. Summary includes materials which were essentially a brief overview of the previous sections. Thus, I do not repeat my comments related to the previous sections here for Summary, but the authors should go through their summary and check whether my criticism in the previous comments is applicable here. ❗

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