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Interactive comment on "Surface waters properties in the Laptev and the East-Siberian Seas in summer 2018 from in situ and satellite data" *by* Anastasiia Tarasenko et al.

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Review of "Surface waters properties in the Laptev and the East-Siberian Seas in summer 2018 from in situ and satellite data" by Anastasiia Tarasenko et al. Submitted to: Ocean Science Manuscript number: 2019-60

Summary: In this paper the authors focus on distribution of surface water masses based on satellite salinity and temperature and in situ measurements at the shelf of the Laptev and East-Siberian seas. They report several features registered by satellite and in situ data in the surface layer, namely, variability of surface salinity and temperature in August-September 2018, inflow of freshwater from the Kara Sea to the Laptev Sea,

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Discussion paper

seasonal cooling of surface water in autumn. The paper is interesting insofar as the authors focus on the Arctic seas which hydrological structure and dynamics remain largely unstudied. Thus, the topic addressed in this manuscript is of great scientific and practical interest. Despite my enthusiasm for the topic, I don't think this article is ready to be published in Ocean Science due to several drawbacks of this work. Generally, this article seems like a cruise report, it describes structure of SSS and SST in the Kara Sea to the Laptev Sea, but lacks scientific novelty and new insights into processes in the study area. I recommend the authors to improve their study by providing more thorough analysis of in situ data including vertical profiles and to focus on certain processes that occur at the shelf of the Laptev and East-Siberian seas, rather that providing brief description of multiple processes.

General comments: 1. The authors define the plume as water mass with salinity less than 30 (e.g., page 10, line 28). However, the majority of works that deal with river plumes in different World coastal areas define river plumes as relatively shallow surface-advected water masses bounded with large salinity gradient at their border with ambient sea. Existence of this salinity gradient determines significantly different dynamics of river plumes (governed by buoyancy force), as compared to ambient sea, which is the main reason to distinguish river plumes as individual water masses. River plumes formed at the shelf of the Laptev and East-Siberian seas generally have sharp salinity gradient at isohalines of 15-25, while water masses with greater salinity are regarded as ambient shelf water. Thus, I recommend the authors to determine salinity border of the Lena plume based on maximal salinity gradient and to distinguish wind-driven dynamics and variability of river plumes and more "typical ocean dynamics" of shelf water mass. 2. In this study you use SSS data from SMOS satellite which spatial resolution is 50 km (page 5, line 18). However, you deal with salinity maps with 15 km spatial resolution (page 5, line 18). Did you reduce spatial resolution only by reprojection? 3. In this study you deal with in situ thermohaline data obtained from the depth of 6.5 m (page 7, line 3). However, salinity at this depth can be significantly different from surface salinity (even more than several units) especially within the river plumes. Thus, your usage of this data to compare and validate satellite data require additional proof, e.g., based on vertical thermohaline measurements. 4. The results of validation of satellite SSS and in situ salinity obtained from the depth of 6.5 m does not seem convincing, especially at the areas influenced by freshwater discharge (Section 3.1.2 and Figure 3). We see underestimation of salinity by several units for almost all measurements. I recommend authors to deal with salinity gradients rather than absolute salinity values, e.g., to show that satellite SSS data reproduces well shows relative salinity differences if it really does. 5. Ranges of temperature and salinity values used to determine different water masses at the study area are heuristic and are not based on any precise idea (Section 5 and Table 1). What is the reason to select T = 3 °C and S = 25 and 29 as borders between water masses? Why you determine 6 water masses? Why not to determine 5 or 7? 6. Reconstructed circulation in the Laptev and East-Siberian sea based on Ekman theory does not seem convincing, especially the presented patchy distribution of upwelling and downwelling areas (Section 4.1.2 and Figure 9e). These results have to be supported by in situ measurements and/or numerical modelling. 7. Propagation of freshened water from the Kara Sea and its presumed missing with Lena plume in the Olenekskiy bay requires additional proof by in situ measurements and/or numerical modelling (page 19, lines 6-9). The role of the Khatanga plume in this process (as well as the plume of the Olenyok River surprisingly not mentioned here) also should be supported by additional data.

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