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Spreading of the Pechora river plume in the southeastern part of the Barents Sea in 2017-2021

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The Barents Sea is a shelf marginal sea of the Arctic Ocean. The river runoff in the Barents Sea is small (260 km³ per year) and does not have a significant effect on hydrophysical processes with the exception of the southeastern part of the sea, where the large Pechora River flows with an annual runoff of 130–160 km³ (Gordeev et al., 1996). Most of the annual Pechora runoff flows into this shallow water area, also called the Pechora Sea, during the summer flood in June-July. Because of this, the hydrological regime of the Pechora Sea in the warm season seems to largely depend on the processes of propagation and mixing of the Pechora plume.

In this work, the study of the structure and variability of the Pechora River plume in 2017-2021 was carried out based on the data of detailed field measurements, wind reanalysis, as well as satellite images for the first time. Seasonal increases in the Pechora plume area (up to 35,500 km²) were recorded in the Pechora Sea in 2018 and 2020. At the same time, the salinity in the plume increased from 9-10 psu near the Pechora Bay to 18-20 psu at the outer boundary of the plume, the plume thickness was 12-15 m. The Pechora plume flowed into the Kara Sea through the Kara Gates Strait it was recorded for the first time. Analysis of the literature data on salinity in the studied region showed that in similar periods in 2017 and 2019, the Pechora plume was noticeably less pronounced, i.e., it had a much smaller area. Apparently, such variability is caused by the influence of external influences (wind, river runoff, tides), which requires further study.