

EGU21-14630

<https://doi.org/10.5194/egusphere-egu21-14630>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Features of the Lena River runoff influence on the adjacent Laptev Sea shelf

Vladimir Rogozhin¹, Alexander Polukhin², Evgeniy Yakushev^{2,3}, and Igor Semiletov^{4,5}

¹Moscow State University, Moscow, Russian Federation (xp70851@gmail.com)

²Shirshov Institute of Oceanology Russian Academy of Sciences, Moscow, Russian Federation (polukhin@ocean.ru)

³Norwegian Institute for Water Research (NIVA), Oslo, Norway

⁴Pacific Oceanological Institute FEB RAS, Vladivostok, Russian Federation

⁵Tomsk Polytechnic University, Tomsk, Russian Federation

The annual runoff of river water into the Laptev Sea is 745 km³, most of the runoff belongs to the Lena River - 525 km³. Long-term variability in the volume of the Lena River runoff play a significant role in the variability of the scale of distribution of freshwater lenses in the Laptev Sea. The processes that take place in the area of intense river runoff have an impact both in the shelf zone and in the open part of the sea due to the transfer of large-area lenses of freshened water. The influence of river runoff is considered from the Lena Delta to the continental slope of the Laptev Sea.

The data on physical and chemical properties of the Laptev Sea shelf used in this investigation was obtained during the expeditions of the Shirshov Institute of Oceanology in 2015 and 2017 and the Pacific Oceanological Institute in 2018-2020.

The distribution of hydrochemical parameters in the Lena Delta area in 2019 was typical for the river-sea mixing zone. The distribution of silicate was mixed, i.e. horizontal stratification prevailed in the near-surface layers, and vertical stratification in the bottom layers. The maximum values were observed in the near-mouth area, reaching indicators over 30 μM / L, which generally coincides with the values of this indicator in 2015 and more than in 2017.

When considering the distribution of specific alkalinity (total alkalinity-salinity ratio), which serves as a proxy of riverine water, it is worth noting the deepening of the boundary by 0.07 units. In 2019, this border was at depths of 20 to 40 meters, which is an atypical indicator for this water area. Apparently, this has happened owing to an increase in the supply of carbonate ions, which is noticeable from an increase in the values of carbonate alkalinity in the Lena River waters (Arctic Great Rivers Observatory data).

The calculation of the parts of fresh water, based on salinity data in 2019, showed that the maximum values were observed near the Lena River delta and amounted to 30-35%. Northward, the part of riverine water was up to 10% only in the surface layer. Comparing with similar calculations performed for the 2015 and 2017 sections, it should be noted that the part of fresh

water has decreased. Perhaps this is due to the inflow of continental runoff in 2019 was the lowest over the considered period.

Funding: The work was carried out within the framework of the Shirshov Institute of Oceanology state assignment (theme No. 0149-2019-0008), with funding of the Russian Scientific Foundation (project No. 19-17-00196) and the grant of the President of the Russian Federation MK-860.2020.5.