PROCEEDINGS OF THE YEREVAN STATE UNIVERSITY
УЧЕНЫЕ ЗАПИСКИ ЕРЕВАНСКОГО ГОСУДАРСТВЕННОГО УНИВЕРСИТЕТА
Geology and Geography **1**, 2026 ***Геология и география***

Special Issue

УДК 55.556

MODERN THERMAL REGIME OF RIVERS IN RUSSIAN ARCTIC AND PERMAFROST AREAS

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Thermal regime of rivers plays a great role in rivers ecological state. However, there are a lot of gaps in our knowledge about thermal regime of rivers and about long-term changes of water temperatures and a river heat flow due to the scare of open-source water temperature data. During past decade study of thermal regime of rivers is focused on Arctic region, primarily on North-East of Russia. Nowadays, we are expanding the spatial coverage of river thermal regime studies on the permafrost (PF) areas as regions with most dynamic climate and landscape changes. Studied area includes territory of Russia Northerner of 60 N, Russia parts of Baikal Lake and Amur River basins, basin of Okhotsk Sea and Russia part of Caucasus. For all these regions, except the Arctic and Caucasus, our investigations of the thermal regime of rivers are first ones for the past 5–6 decades. We used monthly average water temperature data from more than 400 gauges on rivers in different landscape conditions for 1961–2022. Annual and monthly heat flux was estimated for data from 200 gauges. Change-point years for all studied characteristics, mean and standard deviations, changes as after change-point years as in 1991–2020 in comparison with 1961–1990 were estimated. Although, the analysis of air and water temperature relations was carried out. Results are compared for different parts of PF zone and compared with Arctic non-PF areas. The magnitude of changes of river water temperature in the continuous PF zone is significantly lower than in areas with discontinuous PF and in areas without PF. Very low values of the thermal runoff of the North Caucasus are shown. The regions in which local factors play a major role in shaping water temperature compared to climatic ones have been identified, the Baikal basin, for example. For the first time in more than 50 years, riverine heat flux to the Pacific Ocean seas has been estimated. It is shown that the heat flux of the Amur is comparable to that of the Lena, despite its more southerly position, due, apparently, to the mountainous left tributaries in the PF zone.

https://doi.org/10.46991/PYSUC.2026.SI1.026

Keywords: Arctic, Far East, Caucasus, river water temperature, permafrost areas.

Acknowledgment/ Funding: *The research is funding with Russian Scientific Found, project No 24-17-00084.*

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