Geosistemy perehodnykh zon = Geosystems of Transition Zones / Геосистемы переходных зон
2026, vol. 10, No. 1, p. 57–68
http://journal.imgg.ru/archive.htm; https://elibrary.ru/title_about.asp?id=64191
https://doi.org/10.30730/gtrz.2026.10.1.057-068 ; https://www.elibrary.ru/tkestg

Significant SST anomalies in the northwestern Pacific Ocean based on ERA5 reanalysis data

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Abstract. The ERA5 reanalysis data (ocean surface temperature, surface atmospheric pressure and wind speed and direction) for 1998–2023 in the northwestern part of the Pacific Ocean and the Far Eastern seas were analyzed. The main objective of the study was to determine the statistical characteristics of SST anomalies and the nature of the spatial distribution of the most significant ones. The distributions of surface atmospheric pressure and wind speed during their formation were also considered to assess the possible role of meteorological conditions in deviations of thermal conditions from the norm. We found that significant events (deviations of the actual average monthly values, which exceeded twice the value of the standard deviation by at least 5 % of the studied water area) are not rare. Negative anomalies accounted for about 9 %, and positive anomalies accounted for 14 % of all situations considered. These anomalies are unevenly distributed over time: negative anomalies predominated in the initial period, while positive anomalies prevailed in the final period. A period of relative thermal stability was observed from 2003 to 2019. Meteorological conditions during the formation of SST anomalies also differed from normal; however, the mechanism underlying their influence remains unclear. Anomalies in latent and sensible heat fluxes were, in most cases, relatively small.

Keywords:
sea surface temperature, SST anomaly, surface atmospheric pressure, wind speed, latent heat flux, sensible heat flux, northwest Pacific Ocean

For citation: Shevchenko G.V., Lozhkin D.M. Significant SST anomalies in the northwestern Pacific Ocean based on ERA5 reanalysis data. *Geosistemy perehodnykh zon = Geosystems of Transition Zones*, 2026, vol. 10, No. 1, p. 56–68. (In Russ.). https://doi.org/10.30730/gtrz.2026.10.1.057-068 ; https://www.elibrary.ru/tkestg

Для цитирования: Шевченко Г.В., Ложкин Д.М. Значимые аномалии ТПО в северо-западной части Тихого океана по данным реанализа ERA5. *Геосистемы переходных зон*, 2026, т. 10, № 1, с. 57–68. https://doi.org/10.30730/gtrz.2026.10.1.057-068 ; https://www.elibrary.ru/tkestg

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