

INSTRUMENTAL OBSERVATIONS AND STATISTICAL ANALYSIS OF VERTICAL TEMPERATURE PROFILES IN THE SOUTHWESTERN PETER THE GREAT BAY, THE SEA OF JAPAN

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The study is based on data from four moorings stretched out in the north-northwest – south-southeast direction across the isobaths in the southwestern Peter the Great Bay, the Sea of Japan, on 3–14 October, 2022. For this purpose, timeseries of vertical profiles of temperature and its gradient were expanded into empirical orthogonal functions; timescales were estimated using wavelet transform. In all cases, the leading mode captures vertical stratification variability related to the thermocline shoaling or deepening, manifesting itself by concerted oscillations of temperature and its vertical gradient, which occurred on the near-inertial, semi-diurnal and two-diurnal timescales. The near-inertial oscillations were the most intense during most of the time, while the semi-diurnal ones were the most intense on the fourth and fifth days. From the joint wavelet spectra it was found that temperature anomalies moved towards the shallower area and the speed was estimated as equal to 0.44–0.55 and 0.95–1.11 m/s for the near-inertial and semi-diurnal timescales, respectively. The speed on the two-diurnal timescale differs by an order of magnitude between the pairs of two deeper and two shallower moorings, equaling to 1.17 and 0.15 m/s, respectively. The results were interpreted as related to the near-inertial and semi-diurnal internal wave propagation from the continental slope towards the inner shelf and two-diurnal timescale was speculated to be a difference between them caused by non-linearity.

Keywords: thermostring, vertical temperature profile, vertical temperature gradient, internal waves, shelf, Peter the Great Bay, Sea of Japan, empirical orthogonal functions, wavelet transform, spectrum, near-inertial, semi-diurnal, and two-diurnal timescales.

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