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JOINT ANALYSIS OF IN-SITU, SATELLITE, AND MODEL DATA FOR STUDYING HYDRODYNAMIC STRUCTURES AND THEIR BIO-OPTICAL MANIFESTATIONS IN PETER THE GREAT BAY

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A joint analysis of data from shipboard in-situ measurements of hydro-physical and bio-optical characteristics of the water column, satellite data on chlorophyll-a concentration and sea surface temperature, and data from the JCOPE2 regional oceanographic reanalysis is presented to study hydrodynamic structures and their bio-optical manifestations in Peter the Great Bay (Sea of Japan). An approach involving rapid oceanographic transects across structures observed in operational satellite remote sensing data in the upper sea layer was used to validate the results of hydrodynamic modeling, allowing for the acquisition of data arrays to analyze mesoscale and submesoscale variability. In-situ measurements were carried out during the 89th voyage of the R/V Professor Gagarinsky in October 2024 across specific hydrodynamic structures pre-identified from operational satellite data (MODIS, VIIRS) in the visible and infrared ranges. As a result of the research, two zones of influence of anticyclonic eddies of different scales (meso- and submesoscale) were identified. Their locations are consistent across the numerical modeling data JCOPE2 and direct measurement data (shipboard and satellite), which can be used as an indicator of the reanalysis correctness. A significant deepening of the layer of elevated chlorophyll-a concentrations was detected in the area of the submesoscale anticyclonic eddy, characteristic of downwelling.

Keywords: hydrodynamic structures, anticyclonic eddy, temperature, chlorophyll-a concentration, in situ, satellite remote sensing, reanalysis, Peter the Great Bay, Sea of Japan

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