

Water dynamics in straits: impact of atmospheric and oceanic processes

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As a rule, sea straits connect basins with waters considerably differing in physical, chemical and biological characteristics and they are responsible for water exchange between the basins. Straits have their own peculiarities of hydrological regime as distinct from surrounding deep sea or ocean regions. Atmospheric and oceanic processes in strait zones, as well as their orographic and bathymetric features, have the greatest effect on the formation of water structure and origin and development of internal waves, vortices and vortex chains, fronts and rolls. Complex currents accompanying these phenomena manifest themselves on sea surface and can be registered by satellite remote sensing instruments. The analysis of data obtained from ERS-1,2, ENVISAT, Terra/Aqua and NOAA satellites allowed us not only to estimate spatial dimensions of currents in straits but also to retrieve quantitative dependencies characteristic of vortex structures and internal waves. The effect of atmospheric state, especially cyclonic activity, on water circulation in straits is discussed.

The paper focuses on processes in the Bering Strait, Kuril Islands straits and La Perouse Strait. The choice is explained by a large bank of experimental data collected by Space Research Institute (IKI RAS) in these regions. These straits differ greatly in geometric characteristics and hydrodynamic processes going in them. This gives an opportunity to develop a generalized approach to the problem and makes feasible further adaptation of the obtained results for other strait zones.