

Seasonal variability of water masses transport and its link with the anticyclonic circulation in the Kuril Basin

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Recently acquired temperature, salinity and dissolved oxygen data are used to generate bi-monthly climatologies of hydrographic properties and steric height in the Kuril Basin of the Okhotsk Sea, the first climatologies on a seasonal or sub-seasonal scale to be produced in this region. A climatology of current velocity is also produced from drifting float trajectories. These climatologies are used to document the seasonal variability of hydrographic properties and to propose a mechanism for the formation and evolution of the anticyclonic circulation in the Kuril Basin. Freshly ventilated Modified Dense Shelf Water (MDSW) originating from the Okhotsk Sea northwestern shelf is transported along shore to the southern Kuril Islands via the Sakhalin and Hokkaido shelves between November and February due to enhancement of the East Sakhalin Current by an Arrested Topographic Wave (ATW). Along this path, this shallow MDSW subducts under and mix with Soya Warm Current waters along the Hokkaido shelf and is subjected to intense tidal-induced mixing near the Kuril Islands. As a result, the cold, fresh, high-oxygen properties of MDSW are deepened towards the intermediate water level and a local maximum of steric height is generated off the southern Kuril Straits. In March-April, the weakening of the ATW and local wind stress allows for the coastally trapped MDSW to separate from the coast, thus forming an anticyclonic circulation persisting from April through October. In November–December, the circulation collapses possibly due to lateral mixing or barotropic forcing, whereas the along shore buildup and formation cycle restart.

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