

Does (surface) salinity in the Bering Sea change (intermediate-layer) temperature in the Okhotsk Sea?

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This study suggests a link between the surface salinity in the Bering Sea and intermediate temperature in the Okhotsk Sea, which plays an essential role in the interannual variations in the intermediate overturning over the North Pacific Ocean. On the interannual time scale, the variation in the Okhotsk Sea Intermediate Water (OSIW) temperature lags 5-7 years behind that in the surface salinity in the Bering Sea. Far Eastern Regional Hydrometeorological Agency (FERHRI) extended the hydrographic database in the Okhotsk and Bering Seas by adding the unpublished Russian observation data (FERHRI database). We investigated the mechanism of the link between the Bering and Okhotsk Sea by analyzing the FERHRI database and the atmospheric reanalyses data. The results suggest that the atmospheric circulation manifested as the North Pacific Index strengthens the upwelling of salty water from the subsurface layer and weakens the inflow from the less-saline Alaskan Stream, both of which increase the surface salinity in the Bering Sea. After the more (less) saline surface water is advected southward by the East Kamchatska Current from the Bering Sea, this saltier (fresher) water is supplied to the Okhotsk Sea through the Kuril Straits. More (less) saline surface water eventually contributes to the formation of heavier (lighter) dense shelf water (DSW) in the northern shelf of the Okhotsk. The denser (lighter) DSW increases (decreases) the supply of cold water to OSIW, which makes OSIW colder (warmer). The lags among the changes in the surface salinity of the Bering Sea, DSW salinity and OSIW temperature are roughly consistent with the advection durations estimated by using the ocean current velocities.

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