ベーリング海峡通過流量と関連した北西ベーリング海の経年塩分変動
Interannual salinity variations in the northwestern Bering Sea associated with the Bering Strait throughflow

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The relationship between the Bering Strait throughflow (BTF) and sea surface salinity (SSS) in the Bering Sea was investigated mainly using an atmosphere-ocean-ice coupled model, MIROC4h, which includes an eddy-permitting ocean model. The MIROC4h simulated well the seasonal cycle of BTF transport, although it overestimated the transport compared with mooring-based estimates. The interannual variations of SSS in the Bering Sea were correlated with those of BTF transport: SSS in the northwestern Bering Sea was high when BTF transport was large. And there was seasonality in the relationship between SSS and BTF. The SSS anomaly associated with the BTF anomaly became evident from winter to spring, and SSS lagged behind the BTF by a few months. Similar relationship between the BTF and SSS can be seen in an observation dataset and two kinds of ocean data assimilation product, although there were some differences from the MIROC4h in the spatial distribution and the timing of large *r*. Sea surface temperature (SST) also became higher with the larger BTF transport in the cold season, however, the surface density were affected by the SSS anomalies more than the SST ones. BTF transport was strongly correlated with SSH in the eastern Bering Sea, the southwestern Chukchi Sea (CS), and the East Siberian Sea (ESS); there was no time lag between the BTF and SSH. The low SSH along the Siberian coast was uncorrelated with the high SSH in the Bering Sea. The Arctic SSH affected BTF transport and the SSS in the northwestern Bering Sea independently of the SSH in the Bering Sea. The *r* between the SSH and zonal wind stress suggested that shelf waves might be excited by zonal wind anomalies in the Laptev Sea or north of the New Siberian Islands to propagate to the Bering Strait. The low SSH along the Siberian coast associated with high SSS in the northwestern Bering Sea, however, was not confirmed in 10 years of satellite-derived SSH data. The relationship between the Arctic SSH and SSS in the Bering Sea still needs to be further investigated.
We evaluated the salt budget in the northwestern Bering Sea using the MIROC4h data. When the BTF transport in October–March was large, the horizontal salt advection increased and meltwater decreased; both changes contributed to the mixed-layer salinization, but the horizontal advection term dominated north of 62.5°N, and the sea-ice melting term did south of 62.5°N. The residual term, which mainly represented eddy diffusion, had a role to suppress the magnitude of the salinity tendency. The same features can be seen when the SSH in the southwestern CS and the ESS was low in the cold season. In these cases, the near-surface current anomalies across the contours of salinity were reinforced, and the horizontal salt convergence occurred in the northwestern part of the Bering Sea. Furthermore, the anomalous southerlies and currents contributed to the sea-ice retreat. The SSH anomalies in the Arctic Ocean affected the currents in Bering Strait and the northwestern Bering Sea, perhaps through the propagation of shelf waves, to lead to the salinization. The current anomalies in the northwestern part associated with the BTF or SSH anomalies became weaker in the warm season, which produced the seasonality of the correlation.

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