

Does the fresh water supply from the Amur River flowing into the Sea of Okhotsk affect sea ice formation?

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The impacts of ground hydrology on the high-latitude oceans, such as melting glaciers and discharge from rivers in the oceans, can affect global climate by mediating the flow of low-density, fresh water inflow that strengthens the ocean's stratification. This suppresses the thermohaline circulation and also promotes sea-ice formation. Our time series analysis based on sea-ice and river-discharge data indicates that the effect of this fresh water on the sea-ice in the Okhotsk Sea, into which the second largest Siberian River, the Amur, discharges, is relatively unimportant. Interannual variations in the ice extent are negatively correlated with the amount of discharge. We find circumstantial evidence that the inflow of warmer river water tends to raise the sea surface temperature, and that it suppresses ice formation in the following winter. This potential explanation for the negative correlation implies that sensible heat transported by large rivers in high latitudes should be reconsidered in studying global climate change.