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Topic: Recent ocean salinity science advances

Title: Sea Surface Salinity Variability in the Gulf of Anadyr, Bering Sea

Abstract: The Gulf of Anadyr (GA), which occupies the northwest portion of the broad eastern Bering Sea shelf exhibits complex salinity variability, due to the combined influences of river runoff, transport of salty basin water in the Anadyr Current and the mixed salinification and freshening effects of sea ice formation and melt from active seasonal polynyas. An analysis of satellite-derived sea surface salinity (SSS) products from SMAP (Remote Sensing Systems L3 v6.0) and SMOS (Barcelona Expert Center Arctic L3 v4.0) for 2015 through 2023 revealed anomalously fresher SSS patterns in summer 2021. In addition, the timing of the SSS decrease following sea ice melt is well captured by both products. Similar patterns are reproduced in a 2-km resolution coupled ice-ocean model simulation of the Bering Sea using the Regional Ocean Modeling System (ROMS), so the model is analyzed to understand mechanisms driving SSS variability in the GA. In 2021, ice persists in the GA into June, leading to the anomalously fresher surface condition when the ice eventually melts. The gulf-averaged sea ice volume equation term balance analysis is performed to understand mechanisms driving changes in the sea ice volume that in turn drive SSS anomalies. On the seasonal time scale, during the freezing season, sea ice volume in the GA increases primarily due to local thermodynamic production. Transport in and out of the GA is a substantial contributor to shorter term variability. Large ice production and less ice export result in persistent ice in 2021. Melting this ice in the GA creates the SSS anomaly pattern detected from space.

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