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Monthly Arctic sea ice prediction based on a data-driven deep learning model

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There is growing interest in sub-seasonal to seasonal predictions of Arctic sea ice due to its potential effects on midlatitude weather and climate extremes. Current prediction systems are largely dependent on physics-based climate models. While climate models can provide good forecasts for Arctic sea ice at different timescales, they are susceptible to initial states and high computational costs. Here we present a purely data-driven deep learning model, UNet-F/M, to predict monthly sea ice concentration (SIC) one month ahead. We train the model using monthly satellite-observed SIC for the melting and freezing seasons, respectively. Results show that UNet-F/M has a good predictive skill of Arctic SIC at monthly time scales, generally outperforming several recently proposed deep learning models, particularly for September sea-ice minimum. Our study offers a perspective on sub-seasonal prediction of future Arctic sea ice and may have implications for forecasting weather and climate in northern midlatitudes.