

# 2023 PAMIP Webinar Series

## The impact of sea ice-air interactions on climate variability

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University at Albany

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**Time: 3:00 pm (GMT)**

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### Abstract

Arctic sea-ice loss has been linked to enhanced Arctic warming and other changes under increased greenhouse gases, but how Arctic sea ice influences our current climate is less studied. In this talk, I will present some results from our recent work to show that, like the air-sea interactions in the tropics, Arctic sea ice-air two-way interactions play an important role in Earth's climate. I will use three examples to demonstrate the importance of Arctic sea ice-air interactions mainly through CESM1 experiments, but also including analyses of historical data. I will first show that Arctic sea ice-air interactions can amplify the decadal-multidecadal variations through surface flux changes not only in Arctic surface air temperature (SAT) and sea-ice concentration (SIC), but also in North Atlantic SST (i.e., AMO) and Atlantic meridional overturning circulation (AMOC). In the second example, I will show that the recent winter cooling over central Eurasia is partly caused by multidecadal variations amplified by Arctic sea ice-air interactions in the Barents-Kara Seas and other regions. Finally, I will present some results from our new study to show that Arctic sea ice-air interactions can significantly dampen the ENSO amplitude in the tropical Pacific through weakening the advection and thermocline feedbacks, mainly due to the strengthened climatological surface trade winds over the tropical Pacific caused by changes in surface energy fluxes associated with sea ice fluctuations along the marginal ice zones during the sea-ice melting season. This suggests that Arctic sea ice-air interactions can affect both the mean state and variability in the tropical Pacific. Our findings have major implications for future ENSO activity and future AMO/AMOC as Arctic sea ice and thus its interactions with the atmosphere diminish under anthropogenic warming.



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