2023 PAMIP Webinar Series

Response of winter climate and extreme weather to projected Arctic sea-ice loss in very large-ensemble climate model simulations

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Date: September 27th, 2023
Time: 3:00 pm (GMT)

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Abstract

In this talk, I will discuss results from very large initial-condition ensemble simulations performed to advance understanding of mean climate and extreme weather responses to projected Arctic sea-ice loss under $2°$ C global warming above preindustrial levels. These simulations better sample internal atmospheric variability and extremes for each model compared to that from the PAMIP. The mean climate response is mostly consistent with that from the PAMIP multi-model ensemble. This includes tropospheric warming, reduced midlatitude westerlies and storm track activity, equatorward shift of the eddy-driven jet and increased mid-to-high latitude atmospheric blocking. I will show that two resolutions (N144 and N216) of the same model exhibit significant differences in stratospheric circulation and jet latitude response. The response of temperature and precipitation extremes largely follows the seasonal-mean response. We further use sub-sampling to confirm that large ensembles (>=400) are needed to robustly estimate the seasonal-mean large-scale circulation response, and very large ensembles (>=1000) for regional climate and extremes.