

# CGD Seminar Series

## Uncertainty in the winter atmospheric response to Arctic sea ice loss: the role of stratospheric internal variability

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**Time:** 11am – 12pm

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*For live stream information, visit the*

*CGD Seminar Webpage*

### ABSTRACT

Arctic sea ice has declined rapidly over the past four decades and climate models project a seasonally ice-free Arctic Ocean by the middle of this century, with attendant consequences for regional climate. However, modeling studies lack consensus on how the large-scale atmospheric circulation will respond to Arctic sea ice loss. In this study, we conduct a series of 200-member ensemble experiments with the Community Atmosphere Model version 6 (CAM6) to isolate the atmospheric response to past and future sea ice loss following the Polar-Amplification Model Inter-comparison Project (PAMIP) protocol. We find that internal variability of the stratospheric polar vortex plays a dominant role in controlling the wintertime tropospheric circulation response to ice loss. In particular, a strong (weak) stratospheric polar vortex induces a positive (negative) Northern Annular Mode (NAM) in the troposphere, which competes with and obscures the response to sea ice loss, even with 100 ensemble member averages. We also investigate the dynamical mechanisms controlling the stratospheric influence on the tropospheric response to Arctic sea ice loss and evaluate the realism of the model's stratospheric influence. Our results highlight the inherent uncertainty of the large-scale tropospheric circulation response to Arctic sea ice loss arising from stratospheric internal variability. We shall also discuss the implications of our results for the interpretation of observed trends.

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