# PAMIP Webinar Series

## Contributions to polar amplification and its seasonality: perspectives from CMIP5/6 and an idealized single-column model

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

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**Abstract**

As a step towards understanding the fundamental drivers of polar climate change, we evaluate contributions to polar warming and its seasonal and hemispheric asymmetries in Coupled Model Intercomparison Project phase 6 (CMIP6) as compared with CMIP5. We also use an idealized single-column sea ice model (SCM) that captures the seasonal pattern of Arctic warming to investigate the mechanisms supporting this seasonality. For both CMIP5 and CMIP6, CO2 quadrupling experiments reveal that the lapse-rate and surface albedo feedbacks contribute most to stronger warming in the Arctic than the tropics or Antarctic. Increased poleward moisture transport is another important driver of Arctic amplification and the largest contributor to projected Antarctic warming. In comparison with CMIP5, stronger polar warming in CMIP6 results from a larger surface albedo feedback at both poles, combined with less-negative cloud feedbacks in the Arctic and increased poleward moisture transport in the Antarctic. SCM experiments demonstrate that as sea ice melts and exposes open ocean, the accompanying increase in effective surface heat capacity alone can produce the observed pattern of peak Arctic warming in early winter (shifting to late winter under increased forcing) by slowing the seasonal heating rate, thus delaying the phase and reducing the amplitude of the seasonal cycle of surface temperature. While many factors contribute to the seasonal pattern of Arctic warming, this highlights changes in effective surface heat capacity as a central mechanism supporting this seasonality.


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