

2024 PAMIP Webinar Series

Comparing seasonal cycle and trend-based emergent constraints on future sea ice albedo feedback

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Abstract

One of the largest sources of uncertainty in projections of Arctic climate change is the surface albedo feedback, particularly the feedback stemming from sea ice retreat and thinning (i.e., sea ice albedo feedback; SIAF). In prior work, we demonstrated that intermodel spread in SIAF can be reduced through an emergent constraint (EC) using an observable analog for SIAF derived from climatological summer sea ice retreat. This seasonal cycle metric was chosen for its resemblance to the established snow albedo feedback EC, but it is possible that other types of seasonal or trend metrics may prove to be even more robustly tied to SIAF. Here, we use CMIP5 and CMIP6 models to explore the potential value of various other metrics for constraining Arctic SIAF. We find three additional metrics characterizing either properties of seasonal albedo change or the recent trend in Arctic albedo and SIAF, which are well correlated with future SIAF. These additional metrics generally agree with our prior findings that SIAF is likely stronger than expected by the model mean. Lastly, we combine these new constraints with that of past work to update our best estimate of future summer SIAF.



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