



Uncertainty in Arctic climate projections traced to variability of downwelling longwave radiation

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The Arctic region has warmed rapidly over the last decades, and this warming is projected to increase. The uncertainty in these projections, i.e. intermodel spread, is however very large and a clear understanding of the sources behind the spread is so far still lacking. Here we use 31 state-of-the-art global climate models to show that variability of May downwelling radiation (DLR) in the models' control climate, primarily located at the land surrounding the Arctic ocean, explains $\sim 2/3$ of the intermodel spread in projected Arctic warming under the RPC85 scenario. This variability is related to the combined radiative effect of the cloud radiative forcing (CRF) and the albedo response due to snowfall, which varies strongly between the models in these regions. This mechanism dampens or enhances yearly variability of DLR in the control climate but also dampens or enhances the climate response of DLR, sea ice cover and near surface temperature.