EGU2020-4309
https://doi.org/10.5194/egusphere-egu2020-4309
EGU General Assembly 2020

Evaluation of snow albedo feedback simulated by CMIP6 coupled climate models

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As the land surface warms, a subsequent reduction in snow and ice cover reveals a less reflective surface that absorbs more solar radiation, which further enhances the initial warming. This positive feedback climate mechanism is the snow albedo feedback (SAF), which will exacerbate climate warming and is the second largest contributor to Arctic amplification. Snow albedo feedback will increase the sensitivity of climate change in the northern hemisphere, which affects the accuracy of climate models in simulation research of climate change, and further affects the credibility of future climate prediction results.

Using the latest generation of climate models from CMIP6 (Coupled Model Intercomparison Project Version 6), we analyze seasonal cycle snow albedo feedback in Northern Hemisphere extratropics. We find that the strongest SAF strength is in spring (mean: -1.34 $\%K^{-1}$), second strongest is autumn (mean: -1.01 $\%K^{-1}$), the weakest is in summer (mean: -0.18 $\%K^{-1}$). Except summer, the SAF strength is approximately 0.15% K^{-1} larger than CMIP5 models in the other three seasons. The spread of spring SAF strength (range: -1.09 to -1.37% K^{-1}) is larger than CMIP5 models. Oppositely, the spread of summer SAF strength (range: 0.20 to -0.56% K^{-1}) is smaller than CMIP5 models. When compared with CMIP5 models, the spread of autumn and winter SAF strength have not changed much.