

Understanding the seasonal evolution of surface temperature changes over the Arctic Ocean under global warming in CMIP5 models

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The seasonal evolution of temperature changes over the Arctic Ocean under GHG concentration increase has robust characteristics among CMIP5 models. The warming is the strongest in winter and minimum in summer, season when the Arctic Ocean warming is even lower than the one over the Tropics. It is apparently at odds with the large albedo feedback which peaks during summer.

In fact, in order to correctly understand the seasonal evolution of surface temperature changes over the Arctic Ocean, it is necessary to consider temperatures over sea-ice and open-ocean portions separately. The open-ocean surface temperature change is usually small (constrained close to freezing value when sea-ice exists, and having a large heat capacity in any case), whereas it is larger over sea-ice, surface over which the albedo effect is not directly acting. The seasonal evolution of surface temperature changes over the Arctic Ocean is mostly determined by background and anomalous sea-ice fractions and sea-ice temperatures.