



Why is the Arctic warming more?

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Global climate change is amplified in the Arctic, as is evident in palaeorecords from millions of years ago to the last ice age, in recent observations and in climate model experiments. Given a specified forcing, such as a known increase in CO₂ concentrations, uncertainty in the Arctic response is caused both by the unknown global climate sensitivity and the ratio of Arctic to global warming or Arctic amplification. The key role in causing Arctic amplification of climate change is often attributed to the increased absorption of solar radiation caused by the decrease of highly reflective snow- and ice-covered surfaces (surface albedo feedback). However, decomposing Arctic warming in climate models into contributions from individual feedback mechanisms, we find that temperature feedbacks, i.e. the increase in longwave radiation emitted to space due to temperature changes, cause the bigger part of Arctic amplification. We apply different decompositions of feedbacks using radiative kernels based on surface and top-of-atmosphere fluxes. Despite minor differences in the weight of feedback mechanisms, all results support a leading role of temperature feedbacks. All local feedback mechanisms contribute to the inter-model spread in total Arctic warming, while atmospheric heat transport changes reduce inter-model spread.