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Stratospheric polar vortex influence on Northern Hemisphere winter climate variability

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Given the low skill of seasonal forecasts in the Northern Hemisphere, it is important to increase our understanding of interannual climate variability and to look for new sources of long-range predictability, in addition to the global distribution of sea surface temperature (SST). Former studies have suggested the potential contribution of the stratosphere but have never really quantified this influence and compared it to the SST forcing. In the present study, two ensembles of global atmospheric simulations driven by observed SST and radiative forcings have been performed over the 1971-2000 period. In the perturbed experiment, the stratospheric dynamics and temperature is nudged towards the ERA40 reanalyses north of 25°N in order to mimic a “perfect” polar vortex. The comparison with the control experiment reveals a strong improvement in the simulation of the Arctic and North Atlantic Oscillation, with obvious positive impacts on the interannual variability of winter surface air temperature and precipitation, especially over Europe.