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A stratospheric influence on the winter NAO trend.

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The North Atlantic Oscillation (NAO) dominates winter climate variability in the Atlantic region. In recent decades the NAO showed a large positive shift associated with rapid changes in surface temperature over Europe and North America. This shift is not reproduced in global climate simulations of the 20th Century, even with prescribed climate forcings and historical sea-surface conditions. However, we show that the change in the NAO can be fully simulated by imposing observed lower stratospheric changes in a climate model. This result suggests that upper level variability needs to be reproduced in models to fully simulate regional surface climate variations. Although the global mean response is too small to affect the anthropogenic interpretation of global warming, stratospheric circulation changes and the strength of the downward coupling to the surface are strong enough to account for much of the recent change in European and North American climate.