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# Quantifying the contribution of uneven warming to the observed wind stilling in North China for 1961-2016

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Surface mean wind speed has declined (termed stilling) in many regions over the past few decades, with the cause of stilling currently uncertain. Here, wind speed trends in North China and their relationships with the uneven warming are analyzed using data from 690 stations for 1961-2016. Raw wind speed observations were subject to a robust quality control and homogenization protocol using the Climatol package. The results show that surface wind speed has significantly ($p<0.05$) declined by -0.103 m s-1 decade-1 annually, with significant ($p<0.05$) negative trends in all seasons, particularly in spring (-0.137 m s-1 decade-1) and winter (-109 m s-1 decade-1), followed by autumn (-0.086 m s-1 decade-1) and summer (-0.078 m s-1 decade-1). Rapid warming occurred in the high latitude region over the last decades which weakened the pressure gradient between high and low latitude regions and the vertical convection in North China, thus partly causing the wind stilling. Further, this is confirmed by the experiments of the Community Atmosphere Model version 5.1 (CAM5.1), from the CLIVAR Climate of the Twentieth Century Plus (C20C1) Project. The observed declining trend of wind speed is well reproduced in the simulation driven by all radiative forcings (CAM5-All) with uneven warming, but poorly reproduced in the simulation only driven by natural forcings (CAM5-Nat) without uneven warming, indicating the key role of uneven warming in the observed wind stilling.