



Investigating the asymmetric response of the North Atlantic and Pacific storm track to stratospheric forcing

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The stratosphere can have a major impact on surface weather in winter, in particular during stratospheric extreme events, so-called sudden stratospheric warming (SSW) events. The tropospheric response is mostly limited to the Atlantic basin and is characterized by a significant equatorward shift of the tropospheric jet stream over the North Atlantic, leading to a change in weather patterns over Europe, including cold spells over Scandinavia and increased rainfall over the Mediterranean. A significantly weaker response is observed over the North Pacific. This asymmetry between the Atlantic and the Pacific response remains a major open research question. Although several mechanisms have been suggested to explain the downward influence of SSW events, including sensitivity to the SSW type, magnitude or the tropospheric background flow, their role and relative importance for determining the zonal asymmetry of the response remains unclear.

Using reanalysis data from ERA-interim (1979-2014), the characteristics of the Pacific and the Atlantic storm tracks following SSW events are explored. In particular, we focus on SSW events with substantial surface impacts expressed in terms of NAO persistence. Significant differences can be observed in terms of poleward eddy heat in both basins, as well as for transient eddy kinetic energy (EKE). Over the North Atlantic, EKE is found to be significantly reduced following periods of strong SSW events. In the North Pacific, however, the opposite response is observed as EKE increases over the eastern part of the basin in response to SSW events.