



The skill of current climate models in reproducing atmospheric teleconnection patterns and related dynamical feedbacks

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This study evaluates the ability of current climate models to reproduce the low-frequency variability of the mid-tropospheric winter flow of the Northern Hemisphere in terms of atmospheric teleconnection patterns. Therefore, multi-model simulations for present day conditions, performed for the 4th assessment report of the Intergovernmental Panel on Climate Change have been analysed and compared with reanalysis data sets.

The spatial patterns of atmospheric teleconnections are reproduced reasonably by most of the models. The comparison of coupled with atmosphere-only runs confirmed the negligible influence of the forcing by sea surface temperature anomalies on the spatial pattern structure, except for wave-train like patterns. Due to internal climate variability, the models are not able to reproduce the observed temporal behaviour.

Insights into the dynamical reasons for the limited skill of climate models in reproducing atmospheric teleconnections has been obtained by studying the relation between major teleconnections and zonal wind variability patterns. About half of the models are able to reproduce the observed relationship. For these cases, the quality of simulated teleconnection patterns is largely determined by the quality of zonal wind variability patterns. Therefore, improvements of simulated eddy-mean flow interaction have the potential to improve the low-frequency variability in terms of atmospheric teleconnections.