Geophysical Research Abstracts
Vol. 21, EGU2019-16859, 2019
EGU General Assembly 2019

Analysing Northern Hemisphere teleconnections in the SPARC-QBOi dataset using Causal Effect Networks

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Causal Effect Networks (CEN) are a recently developed method of timeseries analysis that can be used to reconstruct causal relationships between various processes within the climate system. The multi-model SPARC-QBOi dataset consists of models with a high stratospheric resolution, an internally generated quasi-biennial oscillation (QBO), and greater stratospheric variability compared to previous datasets (e.g. CMIP5). We apply CEN to the SPARC-QBOi dataset to determine the most important factors affecting the Northern Hemisphere wintertime circulation, and the ability of the models to simulate tropical-extratropical teleconnections involving the QBO - on hemispheric (e.g. high latitude stratosphere) and regional scales (e.g. North-Atlantic/Europe). Processes with variability on weekly, monthly to seasonal timescales are analysed - such as the Polar Vortex, the North Atlantic Oscillation, Arctic sea ice, Siberian snow and sea level pressure, and Large-scale (Rossby) wave fluxes. We also investigate the ability of longer term processes - such as the QBO – to modulate the monthly to seasonal teleconnections.