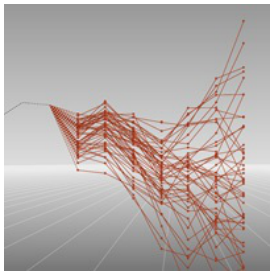

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Analyzing causal pathways of the stratospheric polar vortex using machine learning tools

Thursday, 5 September 2019 14:00 (50 minutes)

Extremely strong and weak phases of the stratospheric polar vortex are known to affect the North Atlantic Oscillation and therefore mid-latitude weather. Troposphere–Stratosphere coupling thus provides an important source of predictability for winter forecast on subseasonal to seasonal timescales. However, the exact mechanisms are still unclear and their representations in climate models vary.
Extracting the physically relevant teleconnection pathways from observation or model data remains challenging. One major issue is to separate the signal from the noise given large internal atmospheric variability. This is compounded by varying dimensions in space and time and competing effects of different processes.
Here, to overcome these current limitations, we apply a novel data-based method, called causal effect networks (Kretschmer et al. 2016), to analyze causal pathways of the stratospheric polar vortex. This approach allows evaluating troposphere-stratosphere coupling with more confidence than using solely correlation analysis. We focus on winter circulation in the North Atlantic/European region and particularly assess the role of stratospheric polar vortex variability to predict the North Atlantic Oscillation.

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