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Using Bayesian Networks to investigate the influence of ongoing Arctic climate change on midlatitude circulation and extreme weather.

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Recent Arctic change may be having an impact on the weather we experience daily. The Arctic is warming at twice the rate of the Northern Hemisphere, a phenomenon known as Arctic Amplification. Rapid changes to the Arctic environment and climate have occurred in a period of increasingly common wavy jet stream patterns, leading to persistent weather at midlatitudes. This project examines links between Arctic changes and mid-latitude extreme weather over the past 38 years using Bayesian Networks to examine the past and projected rise in extreme weather events. Two innovative approaches are included: the relative contribution of Arctic processes to midlatitude circulation is investigated through the inclusion of tropical and midlatitude drivers, and hidden variables are incorporated into the networks to capture underlying state shifts.
Novel statistical approaches to this are essential as a large degree of uncertainty remains in the field, in part due to the recent occurrence of pronounced Arctic warming and amplified atmospheric patterns. Given that model approaches have provided a range of conflicting results in this study area, statistical analyses of observed and future changes will play a key role in furthering the field. Understanding the relative importance of drivers of extreme weather is a difficult but essential question to answer; billions of people living at mid-latitudes are at risk of being exposed to extreme weather patterns caused by wavier atmospheric flow, which has been the predominant atmospheric configuration of recent winters.