



PRESS RELEASE

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Measuring “weather whiplash” events in North America: a new large-scale regime approach

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Weather whiplash -- abrupt and disruptive shifts in weather, such as from drought to flood or heat wave to cold snap -- are expected to occur more frequently as global temperatures continue to rise.

When weather conditions flip suddenly after a long period of the same pattern – for example, from a long hot and dry period to a parade of storms, or from abnormally mild winter temperatures to extreme cold – major disruptions to human activities, energy supplies, agriculture, and ecosystems often ensue. These shifts are dubbed “weather whiplash” events, but measuring and defining them has proved challenging. In this study we demonstrate a new approach to measuring the frequency of these events based on major and rapid transitions in continent-wide weather regimes. While the frequency of whiplash events in recent decades has not changed substantially, our analysis of future model projections indicates robust increases will occur as the globe continues to warm under a thicker blanket of greenhouse gases. In particular, we find that whiplash will increase the most when the Arctic is abnormally warm, while events will decrease when the Arctic is in a cold regime, which will occur less often as the globe continues to warm.

Examples of weather whiplash during 2022 so far are as numerous as they are devastating: A hot, long drought in western U.S. states during early summer was broken by record-breaking flash flooding. Exceptionally wet and cool conditions during June in the Pacific Northwest were replaced by a heat wave in July. A record-warm early winter for most south-central states was followed by a cooler-than-average January and February. A spell of 67 consecutive hot, dry days in Dallas, TX, was broken by the heaviest rains in a century.

“The spring and summer of 2022 has been plagued by weather whiplash events,” noted lead author, Jennifer Francis, Senior Scientist at the Woodwell Climate Research Center. “A warming



planet increases the likelihood of longer, more intense droughts and heat waves, and we're also seeing these spells broken suddenly by heavy bouts of precipitation, which are also fueled by the climate crisis. These sudden shifts are highly disruptive to all sorts of human activities and wildlife, and our study indicates they'll occur more frequently as we continue to burn fossil fuels and clear-cut forests, causing greenhouse gas concentrations to rise further," she remarked. Co-author Judah Cohen, Principal scientist at Verisk AER, added, "We know the Arctic region is experiencing the most rapid changes in the global climate system. Evidence is growing that these profound changes are contributing to more extreme weather events outside the Arctic, and this influence will only increase in the future."