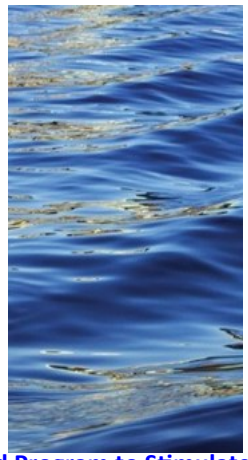
OKLAHOMA EPSCoR UPDATE

Promoting Innovative Research



OK NSF Established Program to Stimulate Competitive Research | July 2021

How Do Cold Air Outbreaks Occur and How They Evolve in the Great Plains?

Cold air outbreaks (CAOs) are usually large-scale and long-duration of extreme cold periods. CAOs can be harmful to agriculture, energy industry, infrastructure, and human health. Part of the Southern Great Plains lies in Oklahoma, which is a region with warm climate that are likely to be less well-prepared to mitigate the effects of CAOs.

Millin **Furtado**

Hence, Ollie Millin, graduate student, and Dr. Jason Furtado, Associate Professor, from the School of Meteorology at the University of Oklahoma is studying the wintertime CAOs in the Great Plains, including the Southern Plains region.

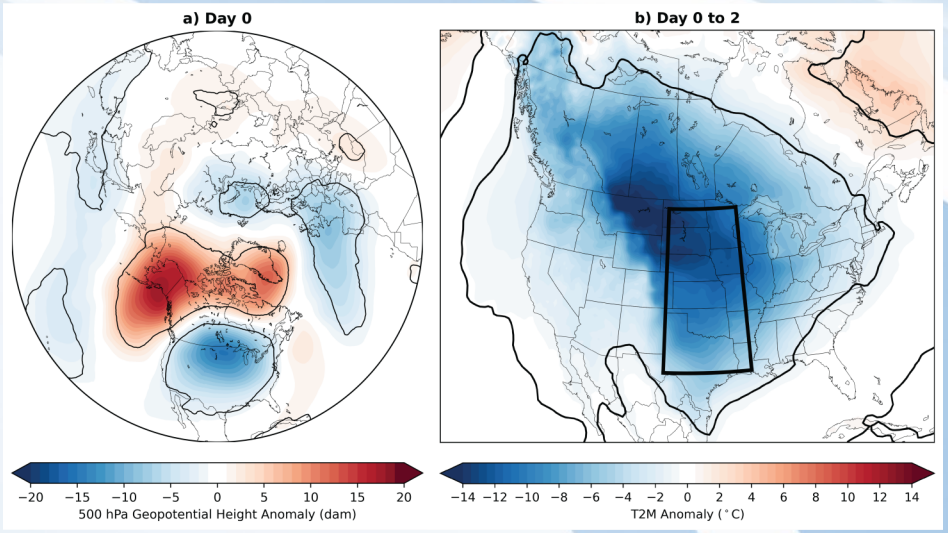
"We are currently investigating the development of these large-scale extreme cold events that can be impactful, like the February 2021 CAO in the Southern Plains," Millin said.

"More specifically, we have defined a set of 37 CAOs in this region that are at least 5 days in length between January 1, 1950 and February 28, 2021," Millin added.

The research team investigates how these extreme cold events form, how they evolve, and the potential for their predictability on the sub-seasonal to seasonal (S2S) timescale of two weeks to two months. As seen earlier this year, there were widespread power outages across the Southern Great Plains. So, these events can carry significant socioeconomic, environmental, and infrastructural impacts. Therefore, studying how CAOs change over time and the potential for S2S predictability could aid in providing enhanced lead time and preparation for these events especially in the Southern Great Plains.

During this summer, the team is preparing a manuscript for publication using the results from the first-year study period. The team is also planning to use a suite of numerical weather models to assess how well they predict these CAOs on the S2S timescale, as well as looking into other atmospheric variables that may yield signals that can act to enhance predictability potential.

This work was supported in part by the National Science Foundation under Grant No. OIA-1946093 through OK NSF EPSCoR.



The figure shows the average pattern for the 37 defined CAOs of a) the 500 hPa geopotential height anomalies (dam) across the Northern Hemisphere for the start day of the CAO, and b) the 2m temperature anomalies (°C) over North America for the first three days of the CAOs. The formation of these CAOs is in association with a strong blocking high over Alaska and Greenland, which we have found to be the two dominant patterns at the start of the CAOs. The intense cold of these events is demonstrated by daily average temperatures 5-10°C below average across Texas and Oklahoma, with temperatures less than 14°C below normal in parts of the northern Great Plains. Black box in panel b) is the region that was used to define the CAOs, and the black contours represent statistical significance at the 95th percentile.

Upcoming Events:

OK NSF EPSCoR
SEMINAR: UNDERSTANDING DIVERSITY & INCLUSION
July 26, 2021 @ 12 Noon