

Changes in weather patterns creating more severe storms

June 1 2011, By John Harrington Jr.

(PhysOrg.com) -- A Kansas State University climate expert attributes the increase in the number and severity of tornadoes and severe storms in 2011 to a change in weather patterns.

John Harrington Jr., professor of geography, is a synoptic climatologist who examines the factors behind distinctive [weather events](#). He credits the increased tornado production this year to jet stream patterns in the [upper atmosphere](#). The patterns have created synoptic events such as the April tornado outbreak in Alabama and recent tornado in Joplin, Mo. While these events are not unprecedented, they are significant, he said.

"To put them in all in one year, that's what has people talking about this stuff," Harrington said. "The fact that this is happening all in one year and in a relatively short time frame is unusual."

Special circumstances are necessary for the creation of [tornadoes](#) in the Great Plains, Harrington said. A humid atmosphere with moisture from the Gulf of Mexico and the right jet stream pattern coupled with surface convergence help to spawn a thunderstorm. Uplift from the jet stream helps to create the towering clouds associated with severe thunderstorms. Add a wind pattern set up with air filtering into the storm from the south at low levels, from the southwest at mid-levels and the northwest at higher levels, rotation of the [thunderstorm cloud](#) begins and its possible for a tornado to form.

"Unfortunately in terms of death and destruction, we've had too many of

those events this year," Harrington said.

Forecasting tornadoes far ahead of time differs from the more advanced hurricane and [weather prediction](#) methods. The National Weather Service's Climate Prediction Center does not predict tornadoes, rather it attempts to predict jet stream patterns a month or so in the future.

In the wintertime the jet stream tends to flow above the southern United States. It migrates northward by the summertime. The area receiving the most tornadoes tends to shift with jet stream location as well. Oklahoma usually has a higher frequency of tornadoes in April, while Kansas experiences most of its tornadoes in May, Harrington said.

Synoptic patterns are different in autumn as the jet stream migrates back south, with much drier air across much of the U.S. While this does not preclude fall tornadoes from occurring, they are rare events. Connecting the surface conditions with the jet stream flow pattern helps a weather forecaster understand the likelihood for severe storms.

"That's pretty important in terms of understanding the kind of environment that will produce the necessary thunderstorms that rotate," Harrington said.

Extreme examples of weather have not been isolated to tornadoes. Heat waves, blizzards and [severe storms](#) have been increasingly more frequent or more severe according to U.S. data, Harrington said. These changes can be attributed to changes in the climate system.

The increase in severe weather events is drawing attention, he said.

"We have these good historical precedents for specific synoptic events, but they're starting to come more frequently together. That's what is very interesting, is that this weather system seems to be getting more

variable."

Provided by Kansas State University

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