Weather Extremes And Climate Change

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In the scientific community, it is widely accepted that the global climate is changing, and that human activities which produce "greenhouse gases" are a principal cause. Greenhouse gases have a strong capacity to trap heat in the lower atmosphere, even though they are present at trace concentrations. This trapped heat is driving many of the recent changes in the Earth's climate, including rising temperatures in the oceans, on Earth's surface, and in the lower atmosphere.

In fact, the global near-surface temperature has warmed by nearly one degree Fahrenheit since the 1970's. This may not sound like much, but that is a lot of additional energy being added to the global climate system. This extra energy increases the risk of certain types of weather extremes.

Warming of only 1°F wouldn't even be noticeable to you and me. But when that heat is added throughout the global system of land-atmosphere-ocean, all that extra energy changes the dynamics of climate.

A few metaphors may be helpful. We've all had having a fever. Even though a 1° or 2°F rise in body temperature isn't much, we can feel pretty sick. Another metaphor: consider a basketball court where we raised the height of the court by just six inches. While six inches isn't much, we can expect to see quite a few more "dunks" (the extremes).

Scientists can say with confidence that the risk of certain weather extremes is increasing, because of human-influenced climate change. Among those risks that may be of concern to Kentucky are:

- Hotter daytime high temperatures
- Warmer nighttime temperatures
- More intense precipitation events (resulting in increased risk of floods)
- Increased severity of drought
- Rare events – such as one hundred year floods – may become more commonplace.

Kentuckians have experienced notable weather extremes in recent years, including the heat wave/drought of 2012, excessive rainfall in western Kentucky in 2011, and an unusual hard mid-spring freeze in April of 2007, among others. Were these events due to climate change? It is scientifically very difficult to link any particular weather event with human-influenced climate change. Also, studies that attempt to do so are commonly not conducted in Kentucky. But the risk of these weather extremes is increasing.

Another metaphor may be helpful. One of the uncles I grew up with smoked cigarettes his whole life, and he died of lung cancer. Did smoking cause his lung cancer? We will never know – maybe he would have developed lung cancer even if he hadn't smoked. But we do know that, sadly, his risk of lung cancer increased because he smoked.

Just as with lung cancer and smoking, the risk of certain types of extreme weather events is increasing because of human-influenced climate change. It isn't so important to link specific weather events to human-influenced climate change. What is important is that the risk of certain weather extremes is known to be increasing.

A brief video, entitled "Weather on Steroids", illustrates this concept with another sports metaphor: http://www2.ucar.edu/atmosnews/attribution/steroids-baseball-climate-change.

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