# Weather extremes in a changing climate

Gerald A. Meehl

Weather extremes are reviewed in the context of behavior in present-day climate compared to climate change projections for the future. A relatively small shift in the average produces a very large change in extremes—more extreme heat and less extreme cold, and more record high maximum temperatures and fewer record low minimum temperatures. Global warming by itself doesn't cause extreme conditions, but it makes naturally occurring events more extreme. In a future warmer climate, there are projected increases in heat wave intensity, duration and frequency; a decrease in frost days (nighttime temperatures below freezing); increased precipitation intensity, but increases in dry days in some locations that combine to produce areas of both average increase (midlatitudes) and decrease (subtropics) of precipitation. For future hurricanes, the indication so far is for fewer total storms, but the ones that form would be more intense. However this result is still relatively uncertain because better modeling tools are needed to study this problem. The current ratio of 2 to 1 for record daily high maximum temperatures to record daily low minimum temperatures over the U.S. is symptomatic of an ongoing warming of average temperatures. This ratio is projected to increase as the climate warms, with one estimate for the A1B emission scenario of about 20 to 1 by mid-century, 50 to 1 by late century.