Nighttime Heat Waves On The Increase In The Pacific Northwest

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In western Washington and Oregon, it might not be so easy to sleep this summer. Nighttime heat waves are becoming more frequent, and records show that on average, heat waves tend to strike around the last week of July.

A new study from the University of Washington, published in the Journal of Applied Meteorology and Climatology, shows that the region west of the Cascade Mountains saw only three nighttime heat waves between 1901 and 1980. The number of nighttime heat waves, however, quadrupled in the last three decades to 12.

When the daily low is in the top one percent of the temperatures on record for at least three nights in a row, the event is considered a nighttime heat wave. In Seattle, this temperature is around 61.5 F.

“In general, minimum daily temperatures have been warming faster than maximum temperatures, so we’re not surprised to see a trend in the minimum events,” said Karin Bumbaco, a research scientist at the Joint Institute for the Study of the Atmosphere and Ocean (JISAO). “Still, we were surprised to see this significant increase in the frequency of nighttime heat waves.”

Bumbaco worked with Nicholas Bond, both from the Office of the Washington State Climatologist, to investigate nighttime heat waves after dealing with questions from the public during the July 2009 heat wave, which broke local temperature records and caused a run on fans and air conditioners in the area. The public wanted to know how that heat wave event compared with historical heat waves.

The researchers compiled the data with the help of Kathie Dello, PhD student at Oregon State University and Deputy Director of the Oregon Climate Service. The team studied temperature readings from 1901 to 2009 in the region west of the Cascade Mountains in Washington and Oregon. They sifted through the records, looking for instances where the daytime high or nighttime low temperature hit the top 1 percent of readings for at least three consecutive days.

The heat wave of 2009 set daytime temperature records, but the string of warm nights is what caught the attention of the research team. By definition, it was a three-day daytime heat wave in the Pacific Northwest. But the eight consecutive hot nights represented the longest nighttime heat wave in observational records.

“It was hard to cool down at night, there wasn’t much relief at all,” Bumbaco said.

Scientists have known for a while that the Pacific Northwest heat waves happen when ocean breezes are replaced with air flow from the east that warms up as it flows down the western slope of the Cascade
Mountains. The scientific team found another trait common to nighttime heat waves, however: high humidity. The records indicate that during high humidity, when water vapor in the air serves as a blanket to trap heat, the nighttime heat waves occur.

“Forecasters already do a good job at predicting when heat is coming into the region, but this might help differentiate between hot days versus hot nights,” Bumbaco said.

The team predicts that climate change will bring longer, more extreme and more frequent heat waves during the day and night, even though they found no significant trend in the historical record of daytime events.

Bumbaco said that even though the recent June 2013 hot spell included just two extremely hot days, temperature readings at Sea-Tac Airport show it would qualify as another nighttime heat wave.

The study also did some preliminary research into the health effects of heat waves, which account for about 1,500 deaths each year in the US. The researchers found a 50 percent increase in hospitalizations in the region coded as being related to heat on dates identified as heat waves. The 2009 event, and a 2006 event that had the warmest nights on record, showed the most heat-related hospital admissions in the region. The findings of this study support previous research that suggests nighttime heat has the most impact on human health.

Despite the hospitalizations and the run on air conditioners, the people of the Northwest are unlikely to draw much sympathy from other areas where the summer temperatures reach the triple digits. The researchers, however, say there is cause for concern. The usually mild temperatures of the region mean that the residents are not acclimatized to extreme heat, and most of them do not own air conditioners in their homes, so they are unprepared to deal with it.