

# Predicting and Planning for Heat Waves

By Richard Shrubb

While climate scientists are able to formulate ideas about what weather would be like in winter using the El Niño weather pattern, they did not previously have accurate tools available to predict when summer heat waves would occur. They do now with research on the Pacific Extreme Pattern.



Karen McKinnis photo by Valeria Lazzari (Novorod)

In early 2006, Karen McKinnis, a paleoclimatologist and lead author, and other researchers from the National Science Foundation-sponsored National Center for Atmospheric Research (NCAR) published their findings in the science journal *Nature Geoscience* that when warmer-than-average waters in the eastern Pacific Ocean meet up with cooler-than-average seas, it's likely a heat wave will follow.

The NCAR findings give forecasters the ability to make medium rather than short-term summer heat wave predictions. "The odds that extreme heat will strike during a particular week — or even on a particular day — are more than triple, depending on how well-formed the pattern is," writes Laren Sandler, NCAR senior science writer and public information officer.

Using what is termed the Pacific Extreme Pattern, scientists will have an indication up to 50 days in advance as to when a

heat wave may happen in the eastern United States. "This will allow authorities to prepare for, rather than react to, unusually hot weather. As with violent winter storms, heat waves in summer pose serious threats, including deaths, wildfires, air pollution, and electricity blackouts. A heat wave is usually regarded as three consecutive days where the temperature reaches or exceeds 90° F (subject also to humidity).

A bit of scientific background: El Niño is a weather pattern originating in an area of the Pacific Ocean near the Equator, becoming unusually warm during autumn and winter and affecting weather in the U.S. According to Professor Edmund K.M. Chang, a climatologist at Stony Brook University, "El Niño's peak is usually in winter. In the cool season the effect is much stronger in mid-latitudes than in the warm season when it isn't transmitted so effectively."



Meteorologists and climatologists know that El Niño has some sway after winter ends. "In summer, when El Niño's direct impact on the mid-latitudes is weak," says Chang, "it does have impacts on the tropical Atlantic, modulating Atlantic hurricane activity, and this can have significant impacts."

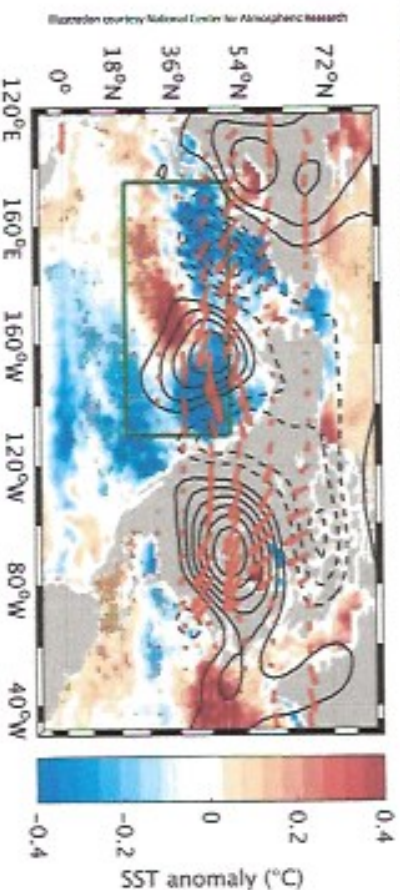
Thus, climate scientists use El Niño to predict both the risks of violent winter storms hitting the region and the possibilities of hurricanes impacting the northern U.S. However, hurricanes and heat waves are different extreme weather situations, so the relationship discovered by NCAR between specific Pacific



waters and intense heat on the other side of the world becomes a vital forecasting tool.

Why does this particular patch of warm water in the Pacific lead to killer heat waves in the eastern half of the U.S.? Chang says, "This is not fully understood. They think that the warm water warms the atmosphere above. This would generally cause

He continues, "If you are a utility company or government, you can start to prepare. If you are a utility company you can prepare for increased energy demand and things like that." Localities will create cooling spaces for those in need and power supplies can be ready for peaks in energy demand and prevent devastating blackouts.



a high-pressure area in the upper atmosphere. A low pressure forms to the northeast and disturbed weather is dispersed to the east where a high pressure forms. High pressure usually suppresses precipitation and that is usually when we have hot weather."

Spotting a Pacific Extreme Pattern doesn't guarantee that the public will be hearing about the threat of a heat wave six weeks or more in the future. As with all weather predictions, accuracy increases the closer you get to the event, within 10 days of a heat wave, meteorologists will be raising red flags about a potential threat to the public.

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