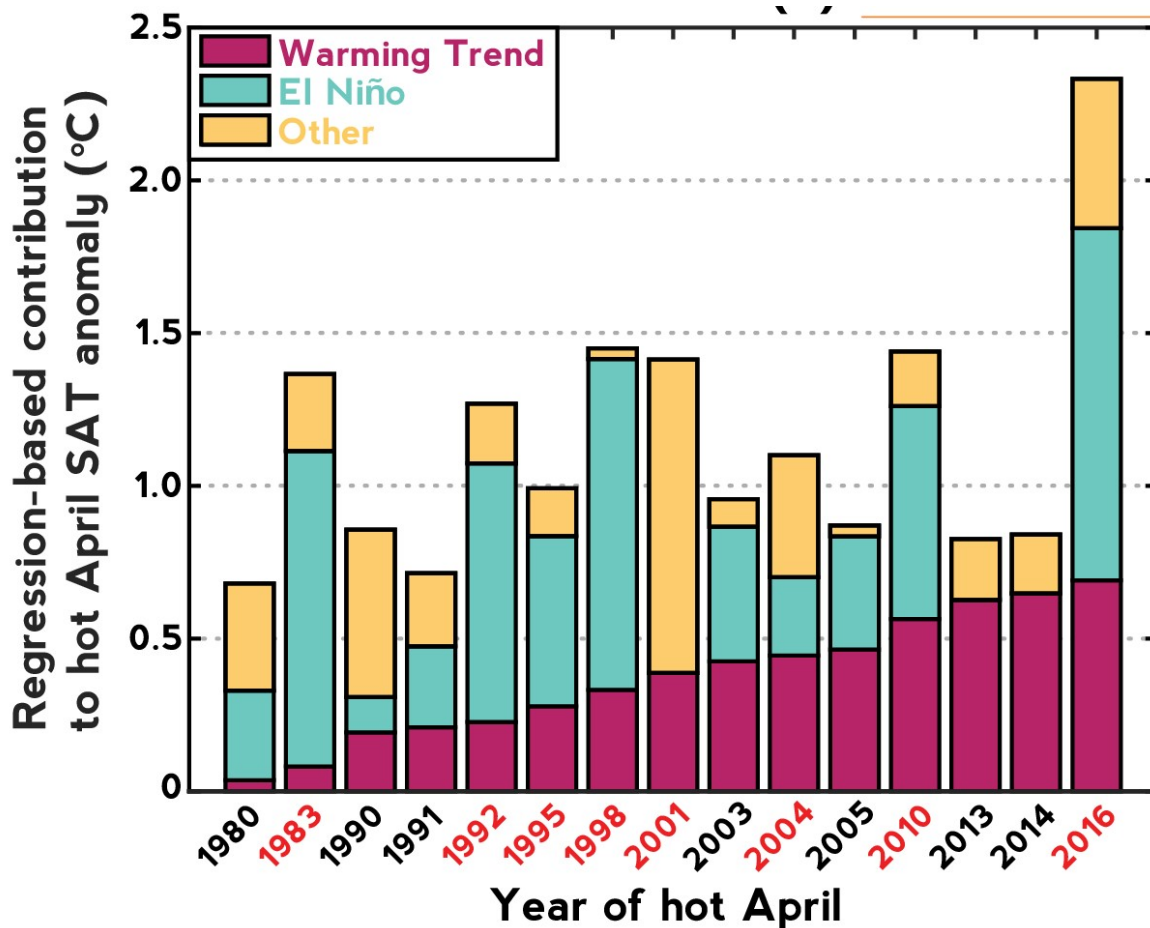


# El Nino and global warming combine to cause record-breaking heat in Southeast Asia

June 6 2017



This graph shows the relative contribution of El Niño (green bars) versus global warming (red bar) for the 15 hottest Aprils on record in mainland Southeast Asia. Credit: Kaustubh Thirumalai

Scientists at The University of Texas Institute for Geophysics (UTIG) have found that a devastating combination of global warming and El Niño is responsible for causing extreme temperatures in April 2016 in Southeast Asia.

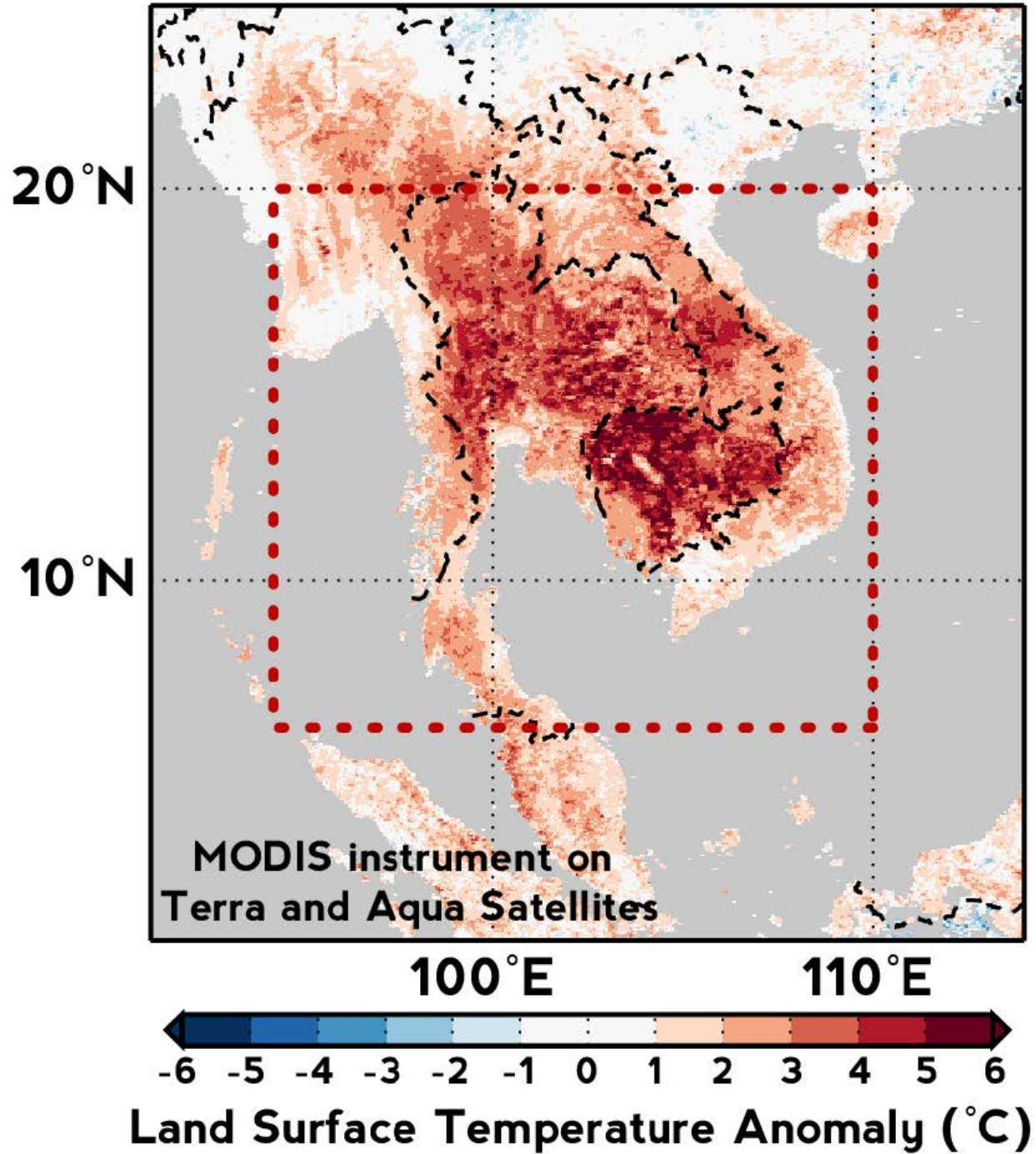
The research, published on June 6 in the journal *Nature Communications*, shows that El Niño triggered the heat, causing about half of the [warming](#), while [global warming](#) caused one-third and raised the heat into record-breaking territories, according to the team's analysis. El Niño is a climate pattern that impacts the tropical Pacific, and usually brings warmer temperatures to Southeast Asia in April.

In April 2016, [high temperatures](#) in mainland Southeast Asia broke all previous records, exacerbating energy consumption, disrupting crop production and causing severe human discomfort in Cambodia, Thailand and other countries in the region. The especially high temperatures of 2016 made the researchers interested in investigating the factors behind such extreme heat, including the impact of the record-breaking El Niño of 2015 and whether ongoing global warming played a significant role in the event.

The researchers used computer model simulations designed to disentangle the natural and human-made causes of the [extreme heat](#). They also used observations from land and ocean monitoring systems and found that long-term warming has played an increasing role in rising April temperatures in Southeast Asia. Since 1980, this trend has caused a new [temperature](#) record each April following an El Niño.

"The El Niño system primes mainland Southeast Asia for extremes, although long-term warming is undoubtedly exacerbating these hot Aprils," said UTIG postdoctoral fellow Kaustubh Thirumalai, who led the study. UTIG is a research unit of the UT Austin Jackson School of Geosciences.

# April 2016 Satellite-derived Temperature Anomaly



Satellite data shows that temperatures in April 2016 soared to as much as 6-7

degrees Celsius (about 11-13 degrees Fahrenheit) higher on Southeast Asia's mainland than the average April temperature of the region during 2000-2006. Credit: Kaustubh Thirumalai

The researchers used statistical techniques to quantify the contributions from El Niño and from long-term warming. Their analysis looked at the 15 hottest April temperatures over the past 80 years. All of them occurred after 1980, and all of them but one coincided with El Niño. They found that while the impact of El Niño fluctuated over the years, the impact of global warming has steadily increased over time.

"Though almost 50 percent of the April 2016 event was due to the 2015-16 El Niño, at least 30 percent of the anomaly was due to long-term warming, and there's definitely more to come in the future," Thirumalai said.

Looking at the model predictions for the next 50 years, the researchers found that the [impact](#) of climate change could amplify the effects of each El Niño, leading to temperature records being broken more often.

"Because of long-term warming, even a weaker El Niño than the 2015-16 event in the mid-to-late 21st century could cause bigger impacts," said co-author Pedro DiNezio, who is a research associate at UTIG.

Despite all the evidence pointing to worsening extremes, the researchers emphasized that preparedness could allow societies in this region to cope with climate change.

"The silver lining is that these can be predicted a few months in advance since they happen after the peak of an El Niño," Thirumalai said.

**More information:** *Nature Communications* (2017).  
[nature.com/articles/doi:10.1038/ncomms15531](https://doi.org/10.1038/ncomms15531)

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