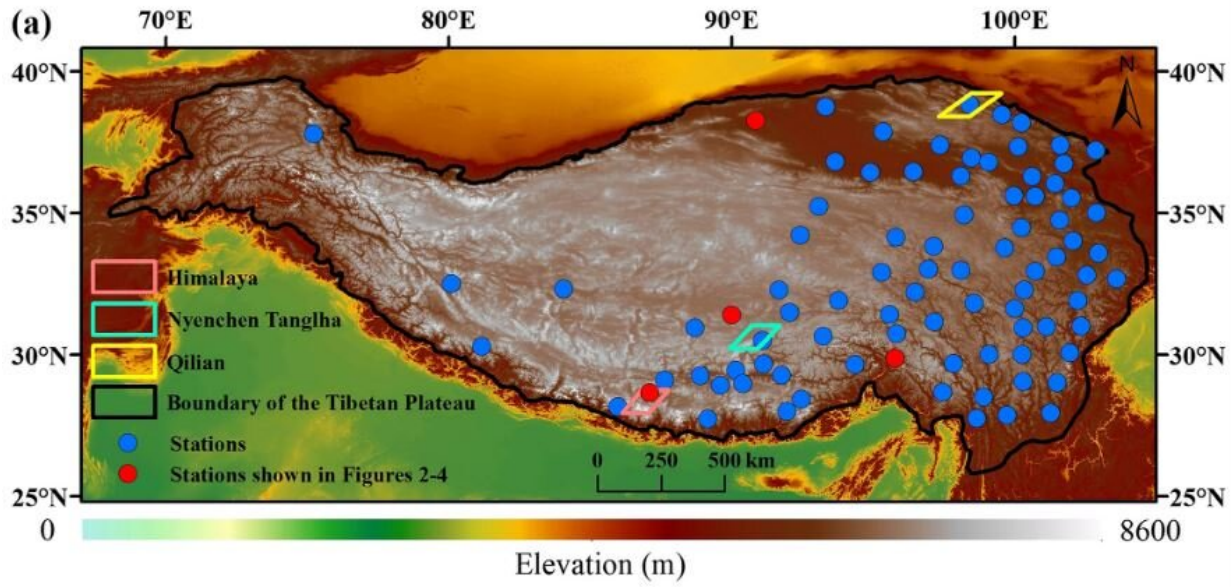
Feeling heat on the roof of the world

June 6 2019



Map of the Tibetan Plateau showing the 87 Chinese Meteorological Administration stations used to develop the model. The three mountain ranges selected for further analysis are represented by colored boxes. Credit: Pepin, et al., 2019 / AGU

The Tibetan Plateau, also known as the "roof of the world," is getting hotter. This process is especially fast in places marked by retreating snow, according to new research by scientists from the University of Portsmouth and the Institute of Tibetan Plateau Research of the Chinese Academy of Sciences (ITPCAS).

"It is critically important to understand what is happening as a result of global warming at high elevations on the plateau where nearly all of the current snow and ice in the region exists. Changes in these mountain snow reserves are critical for the supply of water to billions of people in both China and India, and they are threatened by climate change," said Nick Pepin, lead author of the study in the AGU's *Journal of Geophysical Research: Atmospheres*.

Earlier research indicated that the rate of warming can be amplified with elevation, such that high-altitude environments often experience more rapid changes in temperature than lower ones. This phenomenon, known as Elevation-Dependent Warming, drove the scientists to explore temperature trends at high elevations across the Tibetan Plateau, where temperature readings are scarce yet crucial for understanding global warming.

Direct measurements of air temperature are unavailable in remote higher elevation regions, since harsh conditions often prohibit setting up manned weather stations. Scientists have to rely on satellites for information in higher elevation regions.

The raw satellite data, though potentially useful, is not representative enough for temperature trend analysis since clouds potentially confuse the data. Also, local factors such as vegetation and concrete/grasses can obscure the wider picture.

This is where the team's research came in. They made a customized model so that precise air temperatures in Tibetan mountains could be deduced from satellite data.

With this model, the researchers found a marked peak in warming rates around 5,000-5,500 meters (16,000-18,000 feet) in the Nyenchen Tanglha Mountains, one of the major ranges in the central part of the

plateau. This warming is particularly strong during the day. The disappearance of snow cover seems to be the most obvious reason for this increased warming.

"Snow reflects sunlight during the day. So when it is reduced it causes even more warming, especially at the height where it is disappearing fastest," said Pepin. During the night there is also enhanced warming more broadly at higher altitudes (up to 6,500 meters / 21,000 feet), which is thought to be related to changes in both cloud patterns and moisture.

More information: Nick Pepin et al. An Examination of Temperature Trends at High Elevations Across the Tibetan Plateau: The Use of MODIS LST to Understand Patterns of Elevation-Dependent Warming, *Journal of Geophysical Research: Atmospheres* (2019). DOI: 10.1029/2018JD029798

This story is republished courtesy of AGU Blogs (http://blogs.agu.org), a community of Earth and space science blogs, hosted by the American Geophysical Union. Read the original story here.

Provided by American Geophysical Union

Citation: Feeling heat on the roof of the world (2019, June 6) retrieved 27 April 2024 from https://phys.org/news/2019-06-roof-world.html