

Researchers report human-perceived temperature rising faster than actual air temperature

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To predict how humans will be affected by climate change, geographers and climatologists led by Professor David Chen Yongqin from the Department of Geography and Resource Management at The Chinese University of Hong Kong (CUHK) and Dr. Li Jianfeng from the Department of Geography at Hong Kong Baptist University (HKBU) studied the apparent temperature (AP), the temperature equivalent perceived by humans. They found that AP increased faster than air temperature (AT) over land in the past few decades, especially in the low latitude areas, and the rise is expected to continue in the future. This finding was recently published in *Nature Climate Change*.

Scientists have developed and used Global Climate Models (GCMs) to simulate the global [climate](#) and make projections of future AT and other climatic variables under different carbon emission scenarios in the 21st century. However, GCMs do not directly project how the change of other climatic factors, such as humidity and wind, affects human perception.

Professor Chen said, "Among the extensive and far-reaching impacts of global warming, human health and labour productivity are most directly affected by thermal discomfort and heat-related morbidity and mortality. Our study of the faster increases in apparent [temperature](#) has produced important findings for this kind of [climate change impact](#) assessment, providing a strong scientific support for more stringent and effective

[climate change mitigation](#) efforts to combat global warming."

Dr. Li said the latest research findings give a better understanding of changes in human-perceived equivalent temperature, and indicate global warming has stronger long-term impacts on human beings under both extreme and non-extreme weather conditions, suggesting that climate change adaptation cannot just focus on heat wave events, but should be extended to the whole range of effects of temperature increases. The team will continue to explore the related issues.

The research team used four reanalysis datasets of the past climate and outputs from seven GCMs to estimate the human-perceived equivalent temperature AP, from AT, humidity and wind. Findings showed that the global land average AP increased 0.04°C per decade faster than AT before 2005, because of the concurrent increases in AT and humidity. This trend was projected to increase to 0.06 °Cper decade and 0.17°C per decade under Representative Concentration Pathway 4.5 scenario (RCP4.5) and RCP8.5, respectively, and reduce to 0.02°C per decade under RCP2.6. The faster increases in AP are more significant in low latitude areas (tropical and sub-tropical regions) than the middle and high latitude areas. Study also indicated that the number of days with extremely apparent temperature will substantially increase in 2081 to 2100 compared to the period between 1981 and 2000, mainly due to the remarkable increase in the frequency of extremely hot days in summer.

Taken together, a key conclusion is that the world, as perceived by human beings, will become hotter than that just indicated by air temperature under [global warming](#). This conclusion clearly implies that cities and communities, especially those located at tropical and sub-tropical regions like Hong Kong, will face bigger threats from hot weather and therefore greater efforts for [climate change](#) mitigation and adaptation are vital and urgent.

In this study, Professor Chen and Dr. Li collaborated with AXA Professor Gabriel Lau Ngar-Cheung from the Department of Geography and Resource Management at CUHK, and Professor Thian Yew Gan from the Department of Civil and Environmental Engineering at the University of Alberta in Canada.

Provided by Hong Kong Baptist University

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