Climate change may lead to more landfalling tropical cyclones in China

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Tropical cyclones (TCs) can bring strong wind, heavy rain and storm surge. Meteorologists are concerned that the effects of global warming may change how these storms impact humans.

Scientists use global climate models (GCMs) in climate change studies to simulate future changes in temperature, precipitation, etc. However, due to their coarse resolutions, many models cannot properly simulate small-scale weather and climate systems like TCs, which means that they cannot capture all the dynamic processes within a TC.

A study led by Prof. Gao Xuejie from the Institute of Atmospheric Physics (IAP) of the Chinese Academy of Sciences (CAS) highlights ways to use regional climate models (RCMs) rather than GCMs to better simulate TC activity through the rest of the century.

The study was published in *Advances in Atmospheric Sciences*.

"We conducted an unprecedented new set of RCM (RegCM4) simulations at 25-km grid spacing driven by five global models over East Asia," said Prof. Gao, the corresponding author of the study. "This provides a good opportunity to conduct studies on the topic of TCs in the western North Pacific (WNP), which is the most active basin of TC activity."

The team began by evaluating the performance of RegCM4 model, which reproduced recent and present-day TC activity throughout the WNP. They found that the model reproduced major features of observed TC activity throughout the region.

"Although it underestimated their intensity as most climate models did," said Prof. Gao. Recent studies showed that future TC intensity is the most difficult variable for models to simulate. Data also suggested that by the end of the 21st century, the annual mean frequency of TC genesis and occurrence frequency is projected to increase, by 16% and 10%, respectively. Even with models underestimating future TC intensity, simulated TCs tend to be stronger. Additionally, RCM projections indicated more TC landfalls within most coastal provinces of China,

with an increase of ~18% over the whole Chinese territory. There are still large uncertainties in projecting future changes in TC activity, due to the limitation of the current climate models, and complexity of the TC systems, particularly concerning their genesis and occurrence," said Prof. Gao. "But most climate models agree with the increased intensity of future TCs, indicating higher risks associated with TCs in the future."

More information: Jie Wu et al, Projection of the Future Changes in Tropical Cyclone Activity Affecting East Asia over the Western North Pacific Based on Multi-RegCM4 Simulations, *Advances in Atmospheric Sciences* (2021). DOI: 10.1007/s00376-021-0286-9

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