Half-degree less warming can avoid precipitation extremes

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Just a half-degree Celsius could make a major difference when it comes to global warming, according to a new paper published by a collaborative research team based in China.

The study, which appears in *Nature Communications* on August 8, 2018, confirms the significance of the incremental global warming limits articulated by the Paris Agreement, an accord structured within the

United Nations Framework Convention on Climate Change. A total of 175 parties (174 countries and the European Union) agreed to work to stop global warming from increasing more than 2 degrees C, and every effort is to be made to limit the increase to 1.5 degrees C and prevent the last half of a degree of warming. The half-degree Celsius is so significant that it could be the barrier preventing extreme precipitation events, according to Tianjun Zhou, the corresponding author on the paper.

Zhou is a senior scientist at the State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics at the Institute of Atmospheric Physics in the Chinese Academy of Sciences. He is also a professor at the University of Chinese Academy of Sciences.

"As the climate warms, both the mean state and the variability of extreme precipitation are projected to increase, inducing more intense and dangerous extreme events," Zhou said. "Limiting global warming to 1.5 degrees C, compared to 2 degrees C, would reduce areal and population exposures to once-in-10-year or once-in-20-year extreme precipitation events by approximately 20 to 40 percent."

Zhou and his team combined CMIP5, an archive of comprehensive climate models, with socio-economic projections to investigate future climate changes and the accompanying impacts. The researchers specifically examined extreme precipitation events in the global monsoon region, which sprawls north and south from the Earth's equator and includes nearly two-thirds of the world population. This region is more impacted by extreme precipitation than any other land mass on Earth.

The scientists found that by reducing the global warming limit by 0.5 degrees C, a significant number of extreme precipitation events and their

impacts could be avoided.

"Realizing the 1.5 degrees C low warming target proposed by the Paris Agreement could robustly benefit the populous global monsoon region, in terms of lower exposure to precipitation extremes," Zhou said, referring to the severe floods, landslides and debris flows that can result from excessive rain. "[Our results] are robust across climate models, different definitions of dangerous events, future greenhouse gas emissions scenarios, and population scenarios."

The researchers will continue to study the physical processes of how 0.5 degrees C less warming affects dangerous precipitation extremes. They're also calling others to attention and action in regions that are the most sensitive to the 0.5 degrees C additional warming.

"Among the global land monsoon regions, the most affected sub-regions, the South African and South Asian monsoon regions, are already among the most vulnerable to adverse impacts of climate change," Zhou said. "Our results call attention to more effective adaption activities in these sensitivity regions."

More information: Wenxia Zhang et al, Reduced exposure to extreme precipitation from 0.5 °C less warming in global land monsoon regions, *Nature Communications* (2018). DOI: 10.1038/s41467-018-05633-3

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