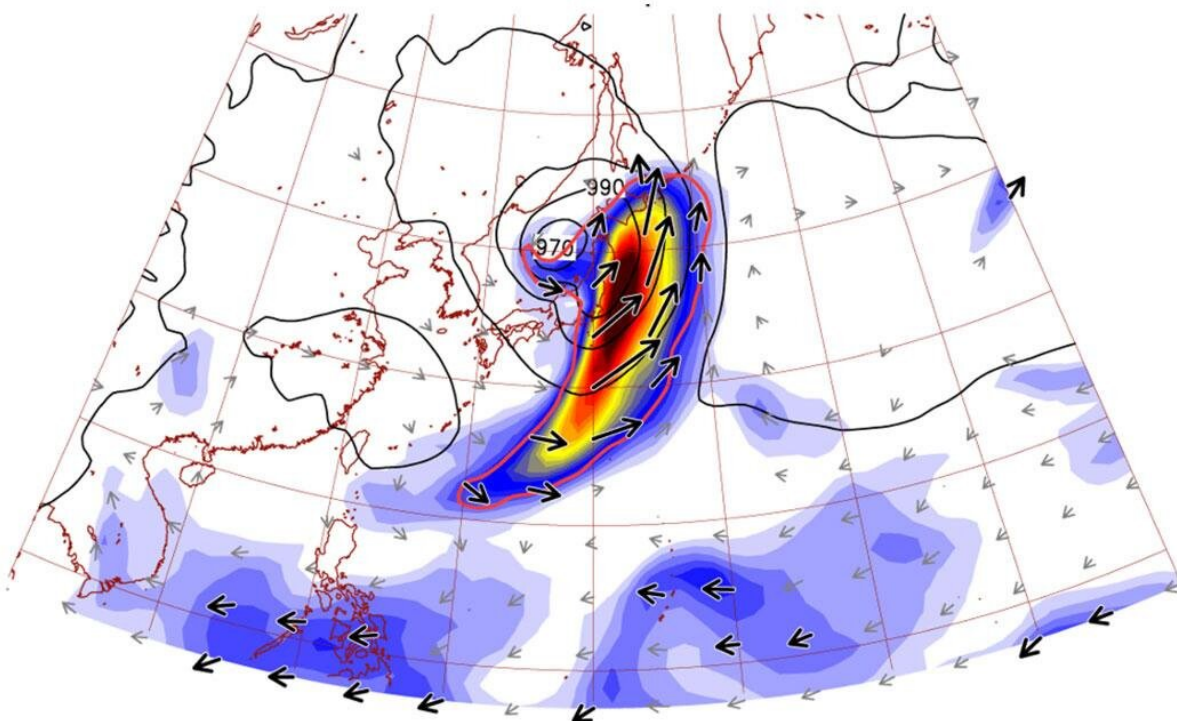


# 'Rivers' in the sky likely to drench East Asia under climate change

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With a warming climate, atmospheric rivers will likely bring record-breaking precipitation events to mountainous parts of East Asia such as the Japanese Alps, according to a new University of Tsukuba modeling study. Credit: University of Tsukuba

It's been becoming more and more clear that global warming means more than just warmer temperatures. Extreme weather events are

becoming more frequent and more intense in many different parts of the world, creating an urgent need to predict and prepare for these changes.

In a new study published in *Geophysical Research Letters*, a research team led by the University of Tsukuba has reported on model results predicting more frequent and severe extreme rainfall events over East Asia caused by a weather phenomenon called "atmospheric rivers."

As the name suggests, atmospheric rivers are long, narrow bands of concentrated [water vapor](#) flowing through the atmosphere. When one of these bands meets a barrier, such as a [mountain range](#), it can produce extreme levels of rainfall or snowfall.

Portions of East Asia have experienced damaging extreme events like this frequently in the last decade, sometimes with severe societal costs, and understanding how this phenomenon is likely to develop in the future as the climate continues to change is crucial.

"To investigate the behavior of atmospheric rivers and extreme precipitation over East Asia under projected climate warming, we used high-resolution global atmospheric circulation model simulations as well as regional climate model downscaling simulations," study first author Professor Yoichi Kamae explains. "We compared simulations based on historical meteorological data from 1951 to 2010 with future simulations based on the year 2090 under a climate scenario with 4 degrees Celsius of warming of the global-mean surface air temperature."

The future simulations predicted strengthened water vapor transport and increased precipitation, including unprecedented, record-breaking rainfall events in parts of East Asia, greatly affected by atmospheric river phenomena.

The greatest amounts of atmospheric river-related precipitation occurred

on the southern and western slopes of mountains in East Asia, including in Japan, the Korean Peninsula, Taiwan, and northeastern China, with the greatest rainfall on the southwestern slopes of the Japanese Alps.

Because of computational limitations in integrating the models, the geographical scope of this study was limited to East Asia. However, Professor Kamae says, "Our findings are likely also applicable to other regions of the mid-latitudes where interactions between [atmospheric rivers](#) and steep mountains play a major role in precipitation, such as in western North America and Europe. These regions may also experience more frequent and intense extreme precipitation events as the climate warms."

**More information:** Y. Kamae et al, Atmospheric Rivers Bring More Frequent and Intense Extreme Rainfall Events Over East Asia Under Global Warming, *Geophysical Research Letters* (2021). [DOI: 10.1029/2021GL096030](#)

Provided by University of Tsukuba

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