VIEWpoint 新观点

More frequent extreme rainfall likely for Eastern China

Image: Alvin Leopold, Unsplash

Explainer

An explainer on research from the Climate Science for Service Partnership (CSSP) China for decision-makers in China // No. 18

Focus

Extreme rainfall in Eastern China impacts people, agriculture, property and infrastructure. The main impact is through flooding which, as well as direct impacts, has indirect impacts, particularly on vulnerable people. For example, damage to infrastructure may make it more difficult for poorer people to travel to work and so reduce their income. The Evaluating Extreme Rainfall in China (EERCH) project investigated changes in extreme precipitation on 5-day timescales during summer and, through a workshop in China, the anthropogenic impact on three hydrological extreme events that took place in 2019 in China.

Importance

Almost every year, floods in China cause considerable economic losses and serious damage to both urban developments and farms. As the most populated nation and one of the fastest growing economies in the world, the requirements for hydro climatological information and availability of reliable prediction of extreme precipitation are of critical importance.

Such information is required for a range of applications, including, flood frequency analysis and water resources planning, design and system operation. The ability to characterise and predict extreme precipitation events in China depends on a better understanding of the mechanisms.

Approach

The four most important patterns of extreme rainfall in China were identified, corresponding to North Eastern China, North and South of the Yangtze River and Southern China. Analysis of observations of rainfall and atmospheric circulation enabled understanding of the mechanisms that drive observed extreme rainfall events. State-of-the-art climate models were evaluated to understand what changes might be occurring over the historical period and what will happen in the rest of the 21st century.

Two long-lasting flooding and one drought event were analysed to see if human-driven climate change had modified the probability of these events. It was found that the probability of long-lasting extreme rainfall had been reduced by human influences.

Human influences, likely aerosol emissions, had increased the likelihood of the May–June 2019 severe low precipitation event in southwestern China by approximately six times,

Next steps

The main driver of the year-to-year variability in extreme 5-day rainfall was circulation changes rather than changes in the moisture content of the atmosphere. This suggests some potential to predict such extreme precipitation and thus reduce the damage from such events.

Over the 21st century planners can expect Eastern China to be much more likely to suffer from extreme 5-day rainfall with an increase in impacts unless mitigation measures are taken. The probability of a current 1-in-20-year event becomes significantly more frequent. Depending on the pattern being considered, 1-in-20 years events increase to roughly 1-in-15 to 1-in-8 year events at 3 degrees of warming.

References

Lu, et al (2021). DOI: 10.1175/BAMS-D-20-0128.1 Li et al, (2021) **DOI:**10.1175/BAMS-D-20-0135.1 :1175/BAMS-D-20-0128.1 **Hu et al (2021) DOI:**10.1175/BAMS-D-20-0127.1

Tian et al: Physical processes of summer extreme rainfall interannual variability in Eastern China. Part 1 (Submitted to Climate Dynamics) & Freychet et al, Part 2 (In prep. for Clim. Dyn.)

www.viewpoint-cssp.org

VIEWpoint 新观点

Produced by VIEWpoint, a CSSP China project from the Institute for Environmental Analytics, highlighting research and improving the uptake of climate services developed in the partnership, through accessible resources.

Institute for Environmental Analytics

SUSTAINABLE DEVELOPMENT GOALS