VIEWpoint 新观点

Increasing summer rainfall intensity during the past four decades observed in China

Image: Pexels, Pixabay

Explainer

Accessible research from Climate Science for Service Partnership (CSSP) China, for decision-makers No.14

Focus

Climate change increases the moisture-holding capacity of the atmosphere and consequently the potential risks of extreme rainfall and flash floods. The maximum hourly summer rainfall intensity has increased by about 11.2% on average, found from the analysis of continuous hourly gauge records for 1971–2013 from 721 weather stations in China. Depending on the region, the risk of droughts (due to decreased rainfall) and flash floods (increased limited duration high-intensity rainfall) increased. Moisture availability alone cannot explain the rate of intensification of precipitation extremes.

Importance

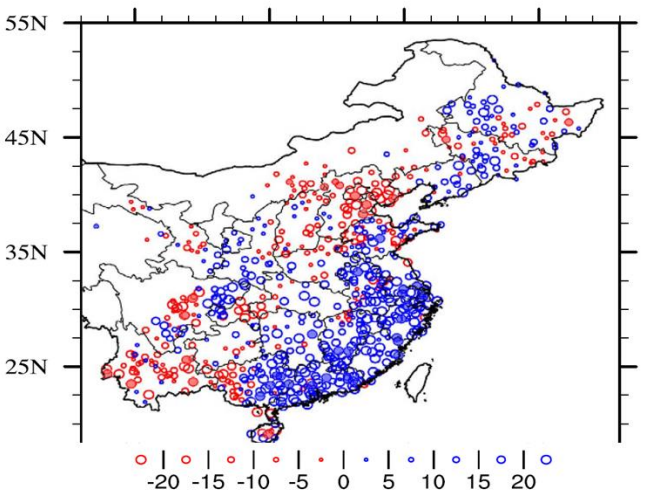
Urban flooding has increased over China in recent decades due to rapid urbanisation and outdated drainage systems being unable to cope.

Increasing extreme precipitation accompanies a rapidly warming climate. During the period 1971–2013, the regionally averaged maximum summer hourly precipitation has increased by 11.2% over China. A survey by the residential development department in China has found that 62% of 351 Chinese cities were flooded at least once between 2008 and 2010. Continuing climate change will further strengthen the hydrological cycle with increased mean rainfall and extremes, and may increase flash-floods. Without forward-looking measures, the implied economic damage may be devastating.

Previous analysis has considered only daily precipitation records, but hourly and daily precipitation records can lead to very different conclusions. Existing studies use either a small number of observational sites or a short period of time.

Approach

721 weather stations were selected from over 2,400 observational sites for the summer months of June, July, and August (when the bulk of the rainfall occurs) over the period 1971–2013 to ensure missing data at each site are no more than 5%.



Linear trends (mm/10y) of summer total precipitation

The hourly quality controlled daily mean surface air temperature and precipitation data in China were analysed for 1971 to 2013.

Next steps

This work infers that it is probably the extreme convective summer rainfall which continues to intensify, but further investigation is urgently needed. The summer total precipitation has shown contrasting patterns with strong upward trends over Southeast China but decreasing trends over North and Southwest China, increasing the risks of flash-floods and droughts (above). Moisture availability alone cannot explain the rate of intensification of precipitation extremes.

References

Xiao et al., 2016 DOI:10.1038/srep38506

www.viewpoint-CSSP.org

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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