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Climate simulations capture observed year to year fluctuations in rainfall

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What are the new findings?

Computer simulations of climate are able to reproduce many characteristics of the changes in rainfall that have been observed since 1979. Simulations of the atmosphere (using observed sea surface temperatures as input) are able to capture the observed year to year variations in rainfall over tropical land areas including tropical Africa, the Amazon and South East Asia. We also discovered a discrepancy between satellite data and simulations over the oceans, especially before 1996. In the computer simulations we found global rainfall increases by around 2% for each °C of warming but observations suggest a stronger response.

Why are these findings important?

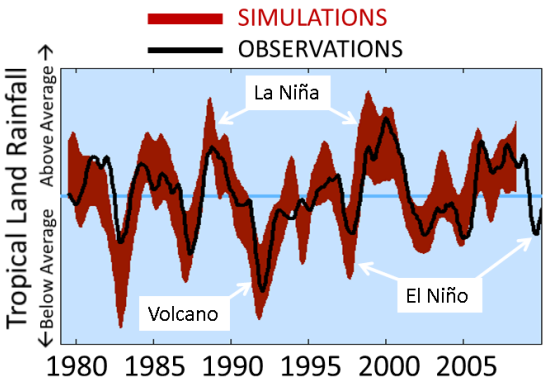
Flooding and drought in recent years, for example over the UK and Australia, underline how vulnerable societies are to changes in rainfall patterns. Projecting how the global water cycle will change in a future climate is only possible using detailed computer simulations, the realism of which must be confirmed using observations. Our comparisons help to build confidence in the realism of the changes in rainfall projected by these simulations which is of importance to policy makers and planners. Yet they also suggest that the simulators may underestimate variation in rainfall over the oceans in the current climate. More research is necessary to improve the satellite observations, as well as the simulators.

How did we discover this?

We analysed computer simulations of climate produced by a number of research centres across the world, including the UK Met Office and NASA. We compared the simulated rainfall with observations from satellite measurements and rain gauges since 1979, involving collaborating with scientists from NASA to understand the strengths and weaknesses of the observations.

This research was funded by the NERC Changing Water Cycle projects “PREPARE” and “PAGODA”.

Dr Richard Allan is a lecturer at the Department of Meteorology in the University of Reading. He works on the global water cycle and how this may change in the future.



Above: Computer simulations that are given observed sea surface temperatures as input are able to capture observed fluctuations in rainfall over tropical land: there is more rainfall than average during La Niña and less rainfall during El Niño and after volcanic eruptions.

Find out more:

- Learn More
- See Richard Allan’s webpage
- Email R.P.Allan@reading.ac.uk
- Take a look at the journal article

Liu et al. (2012) Geophysical Research Letters, doi: 10.1029/2012GL052093
Liu and Allan (2012) Journal of Geophysical Research, doi: 10.1029/2011JD016568

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