Record UK rainfall in winter 2013-14 caused by tropics, stratosphere and climate warming

June 22 2017

Credit: Teodoro S Gruhl/public domain

New research has revealed the causes of the UK's record rainfall and subsequent flooding during the 2013-14 winter.

Using carefully tailored atmosphere/ocean model experiments, the research team found that a combination of unusual tropical conditions,

the stratospheric polar vortex, and climate warming were behind the extreme rainfall, which led to severe flooding across many parts of the UK.

The team, comprising researchers from the Met Office and the University of Oxford, publish their results today in the journal *Environmental Research Letters*.

Lead author Jeff Knight, from the Met Office, said: "The record rainfall in the UK in winter 2013-14 resulted from persistently very low atmospheric pressure over the North East Atlantic Ocean, which was part of a disrupted pattern in the atmosphere across the Northern Hemisphere.

"We assessed contributions to conditions near the UK from various possible remote forcing regions, using sets of experiments with state-of-the-art atmosphere/ocean models. In these regions we constrained winds and temperatures to be similar to those observed in winter 2013-14. The results show that influences from the tropics were likely to have played a significant role in producing the record UK rainfall, including a role for the tropical Atlantic sector."

To assess the role played by climate change in the unusual conditions, the research team turned to historical meteorological observations to conduct an analysis segregating the contribution of pressure patterns and other factors, like ocean temperatures, to rainfall variability.

Jeff Knight said: "Our analysis shows that climate change likely did make a contribution to the record rainfall in 2013-14 through a long-term increase in UK winter rainfall that is not associated with changing weather patterns. The size of this contribution is only 10-15% of the excess rainfall actually observed in winter 2013-14, however, so the main cause of the extreme UK winter appears to be the unusual

atmospheric dynamics linking the UK with the tropics and the stratosphere."

"However, what is much more difficult to answer is whether climate change has already altered the weather patterns themselves. If the risk of the type of low-pressure patterns that brought so much wet weather has already increased then climate change's effect might be considerably larger. It is also worth noting that even a small shift in average rainfall could make the frequency of events like winter 2013-14 substantially greater in the future climate."

More information: Jeff R Knight et al, Global meteorological influences on the record UK rainfall of winter 2013–14, *Environmental Research Letters* (2017). DOI: 10.1088/1748-9326/aa693c

Provided by Institute of Physics

Citation: Record UK rainfall in winter 2013-14 caused by tropics, stratosphere and climate warming (2017, June 22) retrieved 25 April 2024 from https://phys.org/news/2017-06-uk-rainfall-winter-tropics.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.