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Extreme precipitation in the Netherlands: an event attribution case study

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Attributing the change in likelihood of extreme weather events, particularly those occurring at small spatiotemporal scales, to anthropogenic forcing is a key challenge in climate science. While a warmer world is associated with an increase in atmospheric moisture on a global scale, the impact on the magnitude of extreme precipitation episodes has substantial regional variability. Analysis of individual case studies is important in understanding the extent of these changes on spatial scales relevant to stakeholders but thorough event attribution must take a number of considerations into account.

Here, we present a probabilistic attribution analysis of the extreme precipitation that fell in large parts of the Netherlands on 28 July 2014. Using a step-by-step approach, we aim to produce a clear statement about the changes in intensity and likelihood of such as event as a result of anthropogenic global warming while also highlighting the multi-dimensionality of the attribution question.

An established method based on extreme value theory is applied to observational data in addition to global and regional model ensembles following a robust model evaluation step. By synthesizing the results from observations and various different models, we find that a 2014-type event is more likely as a result of anthropogenic climate change, with the increase in the magnitude of precipitation extremes comparable with what would be expected in a warming world according to the Clausius-Clapeyron relation. We conclude with a discussion of the potential application of our approach to similar attribution studies.