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Attribution of precipitation changes in African rainforest

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Global climate change is almost certainly affecting the magnitude and frequency of extreme weather and hydrological events. However, whether and to what extend the occurrence of such an event can be attributed to climate change remains a challenge that relies on good observations as well as climate modelling. A number of recent studies have attempted to quantify the role of human influence on climate in observed weather events as e.g. the 2010 Russian heat wave (Dole et al, 2011; Rahmstorf and Coumou, 2011; Otto et al, 2012). The overall approach is to simulate, with as realistic a model as possible and accounting as far as possible for modelling uncertainties, both the statistics of observed weather and the statistics of the weather that would have obtained had specific external drivers of climate change been absent. This approach requires a large ensemble size to provide results from which the statistical significance and the shape of the distribution of key variables can be assessed. Also, a sufficiently long period of time must be simulated to evaluate model bias and whether the model captures the observed distribution. The weatherathome.net within the climateprediction.net projects provides such an ensemble with many hundred ensemble members per year via volunteer distributed computing.
Most previous attribution studies have been about European extreme weather events but the most vulnerable regions to climate change are in Asia and Africa. One of the most complex hydrological systems is the tropical rainforest, which is expected to react highly sensible to a changing climate. Analysing the weatherathome.net results we find that conditions which are too dry for rainforests to sustain without damages occurred more frequently and more severe in recent years. Furthermore the changes in precipitation in that region can be linked to El Nino/ La Nina events. Linking extreme weather events to large-scale teleconnections helps to understand the occurrence of this events and provides insights for developing forecast methods, also in a region with sparse observational data.
We present an important step towards quantifying the link between climate change and extreme weather which is central both to the formulation of evidence-based adaptation policies and to a realistic assessment of the true cost of greenhouse gas emissions, other forms of pollution and land-use change.

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