Detection and attribution of changes in regional temperature extremes with a focus on Africa

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Abstract

Regional-scale information on climate change is crucial for planning robust adaptation options, specifically over vulnerable and resource-limited regions such as the African continent. We assessed trends in temperature extremes and heat waves and their emergence from natural variability over different regions of Africa. The analysis of observations and reanalyses showed increasing trends in both temperature extremes and heat waves over all regions of Africa in 1980-2018. Furthermore, we detected early emergence of heat wave occurrences from natural variability since 2000, with varying trend strength and time of emergence depending on the data sets. Currently, we investigate the contribution of multiple anthropogenic and natural forcings to the observed changes in temperature extremes using CMIP6 model simulations. We analyze the change in percentage of extreme days per season for October-March (ONDJFM) and April-September (AMJJAS). Spatial and temporal trends are quantified using multi-model means of all-forcings simulations and of single forcing simulations (aerosols, greenhouse gases, natural-only). The attribution of trends is based on a new statistical approach (Ribes et al., 2017) considering uncertainties not only in amplitude but also in response patterns of climate models. Preliminary results of the attribution analysis show that anthropogenic climate change has the largest contribution to the changes in temperature extremes in different regions of Africa.

Keywords: extreme temperatures, time of emergence, attribution, anthropogenic climate change

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