



Irrigation mitigates against heat extremes

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Irrigation is an essential practice for sustaining global food production and many regional economies. Emerging scientific evidence indicates that irrigation substantially affects mean climate conditions in different regions of the world. Yet how this practice influences climate extremes is currently unknown. Here we use gridded observations and ensemble simulations with the Community Earth System Model to assess the impacts of irrigation on climate extremes. While the influence of irrigation on annual mean temperatures is limited, we find a large impact on temperature extremes, with a particularly strong cooling during the hottest day of the year (-0.78 K averaged over irrigated land). The strong influence on hot extremes stems from the timing of irrigation and its influence on land-atmosphere coupling strength. Together these effects result in asymmetric temperature responses, with a more pronounced cooling during hot and/or dry periods. The influence of irrigation is even more pronounced when considering subgrid-scale model output, suggesting that local effects of land management are far more important than previously thought. Finally we find that present-day irrigation is partly masking GHG-induced warming of extreme temperatures, with particularly strong effects in South Asia. Our results overall underline that irrigation substantially reduces our exposure to hot temperature extremes and highlight the need to account for irrigation in future climate projections.