



Irrigation versus 20th century warming

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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 temperature extremes is still largely unknown. Here we use gridded observations and ensemble simulations with the Community Earth System Model to assess the impacts of irrigation on hot extremes. While the influence of irrigation on annual mean temperatures is limited, we find a large impact on present-day temperature extremes, with a particularly strong cooling during the hottest day of the year (-0.78 K over irrigated land). We furthermore provide observational and model evidence that expanding irrigation has partly masked GHG-induced warming of hot extremes, with particularly strong effects over South Asia. This effect only occurs because irrigation massively expanded during the 20th century. If irrigation expansion would plateau, the masking effect would disappear, possibly leading to accelerated warming in intensely irrigated regions. Our results overall highlight that irrigation has reduced human exposure to hot extremes, and suggest that this benefit may be lost towards the future.