



Examining the relationship between soil moisture and summer extreme temperatures in East China

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Soil moisture conditions affect energy partitioning between sensible and latent heat fluxes, resulting in a change in surface temperatures. In this study, relationship between antecedent soil moisture conditions (as indicated by the 6-month Standardized Precipitation Index (SPI)) and several temperature indices are statistically quantified using the quantile regression analysis across East China to investigate the influence of soil moisture on summer surface temperatures. These temperature indices include percentage of hot-degree days (%HD), hot wave duration (HWD), daily temperature range (DTR), and daily minimum temperature (Tmin). Our results demonstrate that soil moisture had a significant impact on %HD and HWD at higher quantiles in all regions except East, suggesting that drier soil moisture conditions tend to intensify summer hot extremes. It was also found that hot extremes (%HD and HWD at higher quantiles) had increased substantially from 1958 to 2010. Soil moisture also significantly affected the DTR in all regions, but tended to have more impacts on the DTR in soil moisture-limited regimes than in energy-limited regimes. This study provides observational evidence of soil moisture influences on hot extremes in East China.