Geophysical Research Abstracts
Vol. 13, EGU2011-5164, 2011
EGU General Assembly 2011

Observed relationships between extreme sub-daily precipitation, surface temperature, and relative humidity

Rhys Hardwick-Jones (1), Seth Westra (2), and Ashish Sharma (2)

(1) WMA Water, Sydney, Australia (rhys@wmawater.com.au / +61 2 9262 6208), (2) Water Research Centre, University of New South Wales, Sydney, Australia (s.westra@unsw.edu.au / +61 2 9385 6139)

Expected changes to future extreme precipitation remain a key uncertainty associated with anthropogenic climate change. Recently, extreme precipitation has been proposed to scale with the precipitable water content in the atmosphere, which assuming relative humidity stays constant, will increase at a rate of $\sim$6.8% per degree Celcius as indicated by the Clausius-Clapeyron (C-C) relationship. We examine this scaling empirically using data from 137 long-record pluviograph and temperature gauges across Australia. We find that scaling rates are consistent with the C-C relationship for surface temperatures up to between 20 degrees Celcius and 26 degrees Celcius and for precipitation durations up to 30 minutes, implying that such scaling applies only for individual storm systems. At greater temperatures negative scaling is observed. Consideration of relative humidity data shows a pronounced decrease in the maximum relative humidity for land surface temperatures greater than 26°C, indicating that moisture availability becomes the dominant driver of how extreme precipitation scales at higher temperatures.