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Runoff responses to long-term rainfall variability in creosotebush shrubland

A. Parsons (1), L. Turnbull (2), and J. Wainwright (3)

(1) Sheffield University, Sheffield, United Kingdom (a.j.parsons@sheffield.ac.uk), (2) Arizona State University, Tempe, USA (Laura.Turnbull@asu.edu), (3) Durham University, Durham, United Kingdom (john.wainwright@durham.ac.uk)

We investigate how precipitation has changed between two periods (1977 1985 and 2003 -2008), and the effects of precipitation change on runoff dynamics in a creosotebush catchment in the southwestern USA. Analysis of rainfall characteristics show that between these two periods there is an overall increase in annual rainfall, which corresponds with a long-term increase in precipitation. Analysis of the frequency-magnitude distribution of precipitation events during these two periods indicates that there has been an increase in the occurrence of smaller rainfall events, and a reduction in the frequency high-magnitude rainfall events. These changes in rainfall characteristics have had a significant effect on runoff dynamics with a large increase in the return period for a runoff event of a given magnitude between the two periods. Results from this study suggest that, contrary to what might be expected, an overall increase in rainfall does not result in an overall increase in runoff because of a concurrent change in the frequency-magnitude distribution of rainfall events, with more
frequent, smaller rainfall events causing a reduction in runoff generation.