

# Observed Changes in the Distributions of Daily Precipitation Frequency and Amount over China from 1960–2013

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In this study, daily precipitation (P) records for 1960 – 2013 from 632 stations in China were homogenized and then applied to study the changes in the frequency of dry ( $P=0$ ) and trace ( $0<P<0.1\text{mm/day}$ ) days and all precipitation events ( $P\geq 0.1\text{mm/day}$ ), and the frequency and accumulated amount of precipitation at different intensities. Over China as a whole, very heavy precipitation ( $P\geq 50\text{mm/day}$ ) events have increased significantly from 1960 – 2013, while light ( $0.1\leq P<10\text{mm/day}$ ) and moderate ( $10\leq P<25\text{ mm/day}$ ) events have decreased significantly, accompanying the significant increases of dry days and decreases of trace days. This indicates a shift from light to intense precipitation, implying increased risks of drought and floods over China since 1960. Although the consistent increases of dry days and decreases of trace days and light and total precipitation days are seen over most of China, changes in other precipitation categories exhibit clear regional differences. Over the Yangtze River valley (YZ) and Southeast China (SE), very heavy precipitation events have increased while light precipitation events have decreased. However, positive trends are seen for all precipitation categories over Northwest (NW) China, while trends are generally negative over Southwest (SW), Northeast (NE) and North China (NC). To examine the association with global warming, the dependence of the precipitation change for each intensity category over China on global-mean temperature was analyzed using interannual to decadal variations. Results show that dry and trace days, very light and very heavy precipitation events exhibit larger changes per unit global warming than medium–intensity precipitation events.

Key words: dry days, trace days, precipitation frequency, global warming