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Changes in classified precipitation in the urban, suburban, and mountain areas of Beijing

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Abstract: In this paper, based on hourly precipitation observations in 1977–2013 in the Beijing area, China, hourly precipitation in summer (June–August) is classified into three categories: light (below the 50th percentile values), moderate (the 50th to 95th percentile values), and heavy (above the 95th percentile values). The characteristics of the classified precipitation changes are analyzed and the results reveal that both light and moderate precipitation decreased significantly during the research period which mainly caused the decrease in summer totals, but heavy precipitation showed no pronounced trend. Since 2004, the contribution of heavy rainfall to the summer total precipitation in the urban area increased as compared to the suburban area, which is opposite to light rainfall. There are obvious differences in the diurnal variations of classified precipitation. Light precipitation shows a double peak structure in the early morning and at night, while moderate and heavy rainfall show a single peak at night. Light precipitation at the early morning peak time decreased significantly in the whole Beijing area. Compared with the suburban area, light precipitation in the urban area occurred less frequently whereas heavy precipitation occurred more frequently at evening peak time after 2004. The asymmetry of the rainfall is obvious, especially, for heavy precipitation. The asymmetry of heavy precipitation events in the urban area exhibits a significant increasing trend.

Keyword: Hourly precipitation; Classified precipitation; Diurnal variation; Asymmetry; Beijing

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