

## Topographic effects on spatiotemporal variations of short-duration rainfall events in warm season of central North China

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Statistical analyses of the hourly station rainfall observation over the recent 8 years show that rainfalls in the warm season (May-October) of the central North China are dominated by short-duration rainfall events (lasting less than or equal to 6 h) and the southeastward delayed diurnal phases of total rainfall revealed by previous studies are mainly contributed by the propagating short-duration rainfall rather than the long-duration rainfall as that along the Yangtze River Valley. The spatiotemporal features of rainfall events are highly correlated with elevation heights. The largest frequency of short-duration rainfall events locates in the southeastern inner periphery of Taihangshan and Yanshan mountains. Rainfall over the northwestern mountains often occurs in the afternoon. Some rainfall events propagate southeastward and influence the rainfall in the southeastern foothills and plain. The rainfall with short duration time mainly begins around the late evening in the southeastern plain, and even later in coastal regions. The understanding of topographic effects to rainfall events is discussed based on reanalysis and station data. Results indicate that the topography influences the diurnal varied surface or low-level temperature, moisture and wind fields, which benefit rainfall events occurring in the afternoon over the northwestern mountains firstly and the southeastward propagation afterward.

Keywords: Short-duration precipitation, Topographic effects, hourly precipitation data