



Stronger spatial concentration of heavy storms over urbanized areas

Dashan Wang (1), Xianwei Wang (1), Lin Liu (2,3)

(1) School of Geography and Planning, Guangdong Provincial Engineering Research Center for Public Security and Disasters, And Guangdong Key Laboratory for Urbanization and Geo-simulation, Sun Yat-sen University, Guangzhou, China (wangdash@mail2.sysu.edu.cn; w, (2) Department of Geography, Guangzhou University, Guangzhou, China (liulin1@gzhu.edu.cn), (3) Department of Geography, University of Cincinnati, Cincinnati, OH, USA

Urban areas have higher exposure and vulnerability to heavy precipitation events and rainfall variability, and the thermodynamic and dynamical mechanisms of urbanization on the enhancement of extreme rainfall has attracted extensive attention. However, whether and how the spatial organization of heavy precipitation storms vary between urban areas and rural areas is less understood. In this research, high-resolution gridded precipitation data, urban extent data and history records of waterlogging events are used to quantitatively investigate the spatial characteristics of precipitation events over Guangzhou city, Southern China during 2008-2015. Analysis reveals that urban and rural areas have different spatial organization of precipitation events. The spatial extent of precipitation events reduces as the urban extent of the event center increases. Heavy storms that centered in urbanized region have stronger concentrated organization, while the effects of urban environments on the organization of normal precipitation events are less obvious. Moisture in heavy storms becomes more concentrated under the UHI effects, result in a greater intensity and amount of precipitation in urbanized areas. Redistribution of heavy storms is evident when it passes through urban areas. This study highlights the important role of urban environments in modulating the processes of extreme precipitation and the spatially concentrated signatures of heavy storms in a warming climate.