



How pollutions modify rainfall diurnal variation over Beijing-Tianjin-Hebei region during early summer: implication to heavy rainfall

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Beijing-Tianjin-Hebei region (BTH) is the heaviest polluted domain in China. In early summer (June 1- July 20) before northeastern China rainfall season starts, the aerosol optical depth (AOD) over BTH is high that can reach above 1.5. Using 11-year aerosol and meteorological datasets, this study found that the late-afternoon rainfall (the first peak of diurnal variation) is significantly enhanced in the polluted days particularly for heavy rainfall. In contrast, the early-morning rainfall (the second peak of diurnal variation) is much suppressed in the polluted days. Discussions further assume the lower-level absorbing aerosol heating could increase the lower troposphere instability and facilitate the convection occurrence in late afternoon, while both the reduced mountain breeze and decreased atmospheric instability could suppress the early-morning rainfall generation under pollution.