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Diurnal cycles of rainfall amount, frequency, intensity, duration and seasonality over the United Kingdom

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The diurnal variations in the rainfall amount, frequency and intensity, rainfall events with different durations, and their seasonality, were analysed using the hourly rainfall data collected at 90 stations in the United Kingdom (UK) from 1998-2015. The average rainfall amount in the entire UK presented two comparable peaks in the early morning and late afternoon, which reflected contributions from the frequency (the early morning) and intensity (the late afternoon), respectively. The rainfall peaks were closely related to their location and the duration of the rainfall. The early-morning peaks were more prevalent in rainfall events lasting for more than 6 hours and at coastal stations; however, the rainfall events lasting for 1-6 hours and at inland stations usually reached their hourly maximum values in the late afternoon. For the rainfall amount and intensity, more nocturnal rainfall peaks were found over the southern plains in winter. From spring to autumn, only the rainfall at the coastal stations or the stations on islands reached their maximum values between midnight and the early morning. For the rainfall frequency, regional differences were more apparent in spring and summer, and the hourly rainfall frequency in the UK mainly peaked around 06 Greenwich Mean Time (GMT) in autumn and 11-13 GMT in winter. These results enriched our knowledge about the hourly rainfall features over the UK.