

Heavy daily-rainfall characteristics over the Gauteng Province

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Abstract

Daily rainfall over the Gauteng Province, South Africa, was analysed for the summer months of October to March using 32-yr (1977 to 2009) daily rainfall data from about 70 South African Weather Service stations. The monthly and seasonal variation of heavy rainfall occurrences was also analysed. Three 24-h heavy rainfall classes are defined considering the area-average rainfall. A significant rainfall event is defined when the average rainfall exceeds 10 mm, a heavy rainfall event when the average rainfall exceeds 15 mm and a very heavy rainfall event when the average rainfall exceeds 25 mm. January months have the highest monthly average rainfall as well as the highest number of heavy and very heavy rainfall days. The month with the second-highest number of heavy and very heavy rainfall days is February followed by March and October. December has the second-highest monthly average rainfall and the most days with rain. However, it is also the month with the lowest number of heavy and very heavy rainfall days. The highest 24-h rainfall recorded at a single station during the 32-yr period was 300 mm in December 2006. However, rainfall exceeding 115 mm at a single rainfall station in the Gauteng Province is very rare and does not occur every year. January months receive these events more than any other month but this only transpires in approximately a third of years. The central and north-western parts of the Province experience the most events where the rainfall at a single station surpasses 75 and 115 mm. With regard to seasonal rainfall, the 1995/96 summer rainfall season had the highest seasonal rainfall during this 32-yr period followed by the 1999/2000 season. The 1995/96 season had above normal rainfall in both early and late summer but the 1999/2000 season was dry in early summer and very wet in late summer. Significantly high seasonal rainfall is associated with above-normal rainfall in late summer.

Keywords: widespread heavy rainfall, Gauteng, daily rainfall, weather forecasting, summer rainfall, climatology of heavy rainfall