



A hail climatology for South Africa

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South Africa experiences severe hail storms from time to time. These events mostly occur in the early austral summer months (September to December) and often over the elevated terrain of the eastern escarpment and Highveld. The hail events in the early summers of 2012/13 over the Gauteng Province were particularly severe. Gauteng has the highest population of all provinces and is the economic heartland of South Africa. The number of hail related insurance claims quadrupled in 2012/13 placing the insurance industry under financial strain and a need arose to understand the occurrence of extreme hail events better. Part of understanding the risk of severe hail, a hail climatology was proposed over South Africa. In the 1970s a thorough hail climatology was created over the Highveld of South Africa by using volunteer observers. This climatology was expanded to the entire eastern South Africa in the 1980s but with a very limited number of observation points. In order to create an updated hail climatology an adaptation of the hail model HAILCAST was implemented on Era re-analysis data from 1979–2016. This climatology is not reliant on surface observations of hail but uses the thermodynamic properties of the Era data to determine hail sizes. Studies have shown that thunderstorms are very sensitive to slight changes in surface temperature and moisture. In order to compensate for this uncertainty the hail model is run several times with different input data, creating ensemble forecasts. The ensembles are produced by adding perturbations of $+1.5^{\circ}\text{C}$, 0.5°C , -0.5°C , -1.5°C to Era surface temperature and dewpoint temperature at each grid point. The average hail size is the arithmetic mean of the hail sizes of each ensemble member. The hail climatology will be presented with special emphasis on the probability of extreme events.