South African Weather Service

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20 September 2023

First Spring thunderstorms cause widespread wind damage

Late yesterday, Tuesday, 19 September 2023, the development of the first thunderstorms of the season was eagerly awaited by residents of the Free State, Gauteng and North West. These storms, however, were characterised by widespread reports of strong, damaging surface winds across the abovementioned provinces as well as very modest amounts of rainfall.

Radar and satellite remote sensing data provided little or no indication of possible severity of storms, however, a feature which proved to be significant was that, given the very dry conditions at the surface, the convective cloud base of the thunderstorms was at an abnormally high altitude above the ground. While this type of storm development can occur at any time of the year, early summer season storms are notorious in terms of frequently being associated with strong, damaging winds caused by "dry microbursts". Moreover, such storms are not typically associated with delivering much rainfall at all, which explains the popular term "dry thunderstorms".

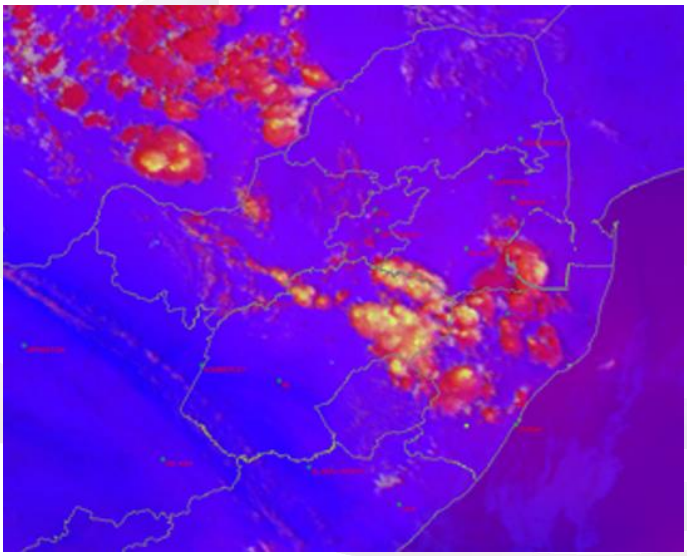

Figure 1: "Convective Storms" RGB satellite image indicating active thunderstorms (bright orange) over the north eastern Free State, southern Gauteng, and parts of the North West province on the 19 September 2023, 16h00 SAST. Source: Eumetsat, 2023.

What is a dry microburst? A microburst is a localised column of sinking air (also known as a downdraft) within a thunderstorm and is usually less than or equal to 4 kilometers in diameter. Microbursts can cause extensive damage upon reaching the Earth's surface, and in some instances, can be life-threatening. In the case of a dry microburst, the precipitation evaporates aloft within the downdraft, causing the downdraft air to become colder and denser, thus accelerating the cold air towards the ground, under the influence of gravity. This phenomenon is typically associated with high cloud base thunderstorms, as was the case yesterday. This weather phenomenon has a capability of uprooting trees as well as lifting off entire building roofs, as indicated in the photos of storm damage below.

Earlier yesterday afternoon, observed wind speed exceeded 50 knots (114 km/h) over Harrismith, Free State between 16h15 and 16h35 SAST, which is consistent with the typical strength of a dry microburst. Later in the evening, towards 21h00 strong surface wind gusts of 40 to 46 knots, in association with thunderstorm activity, were reported over the central and southern parts of North West.. Much later still, in the period between 21h00 and 22h00, reports of extremely strong winds as well as widespread blowing dust were reported at many localities across Gauteng, including (but not limited to) Soshanguve, Mamelodi, the greater Pretoria area and Centurion. Wind measurements suggest gusts slightly in excess of 100 km/h at these localities. Interestingly, although thunder was heard, generally very little precipitation arrived at ground level.

Figure 2: Some photos of wind damage which occurred over north-eastern Free State yesterday.

Significant damage was reported over the eastern and the north-eastern parts of Free State, eastern and the south-eastern parts of North West. In Bethlehem, over 50 houses were reported to have been affected by the adverse weather conditions. Moreover, significant wind damage was reported to have occurred at Moruleng Mall, approximately 60 km from Rustenburg. There were also numerous reports of

wind-related damage such as uprooted trees, damage to farming equipment and blown off roofs from various parts of the eastern Free State yesterday afternoon.

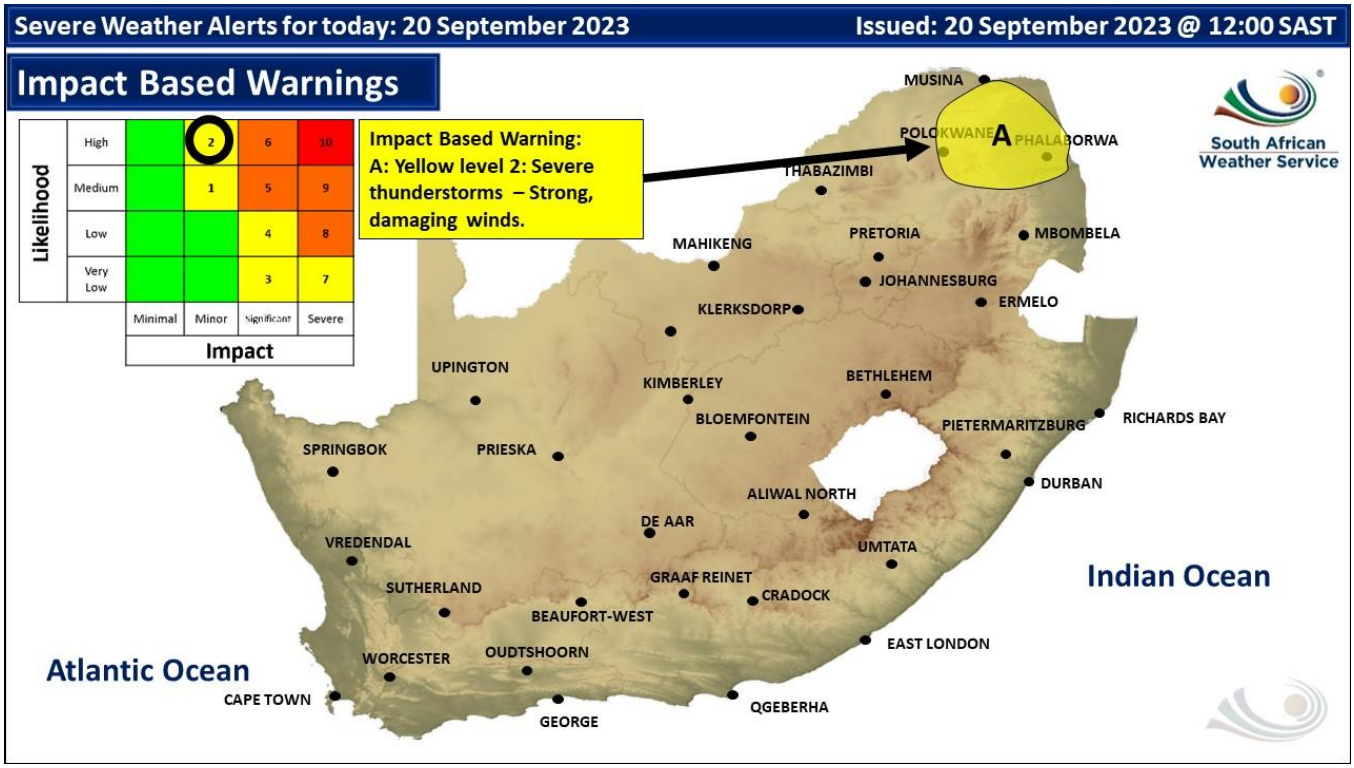

Figure 3: The Yellow Level 2 Impact Based Warning (a high likelihood of minor impacts) for thunderstorms associated with strong, damaging surface winds, valid for the eastern and north-eastern parts of Limpopo today. Source: SAWS.

The areas favourable for thunderstorm development have shifted further to the east since yesterday. The South African Weather Service (SAWS) therefore expects isolated thunderstorms to redevelop over parts of eastern and north-eastern provinces today, however no further storms are anticipated over North West, Free State or Gauteng. Some of these storms, especially over the eastern and north-eastern parts of Limpopo (as indicated in Figure 3, below) are expected to be at risk of developing dry microbursts later today, Wednesday 20 September, causing strong damaging surface winds, in much the same way as described earlier. A Yellow level 2 warning has been issued in this regard, as indicated in Figure 3.

The public is urged to remain vigilant and follow weather updates on radio, television, Facebook and X.

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