SOUTH-AFRICA’S MOST DEVASTATING HAILSTORM: AN SYNOPTIC SCALE UNDERSTANDING OF EVENTS

HD = PD + GDP + HDF

HD = Hail Damage Potential
PD = Population Density
GDP = Gross Domestic Product
HDF = Hail Day Frequency

*Seemingly the perfect combination for devastation during a severe storm

On 28 November 2013 “the most devastating storm in South-African history” occurred over Johannesburg, resulting in over ZAR1.6 Billion in damages (US$ 100million).

Over South-Africa hailstorms generally occur during the summer months of October through to March, characterized by a trough or low pressure system over the Highveld, not much different than normal thunderstorm producing conditions.

Future Research—WRF
High-Resolution WRF Simulations of hailstorm case studies through Yellowstone Supercomputer—first for South-Africa.

Future Research—Synoptic Typing, COST733class

Johannesburg, Gauteng, located in the South-African Highveld is known as the economic hub of Africa.

Johannesburg has the most reported severe hailstorms in the country, from 1911-2012 Johannesburg had 33 severe hailstorms – far more than any other city in the country.

Synoptic Environment
In October and November 2013 several severe hailstorms caused havoc across the Gauteng Province. November was characterized by above average rainfall. In the days leading up to the 28 Nov storm a surface (850HPa) trough extended across the interior of South-Africa, with a ridge high-pressure system to its east, this allowed a influx of warm moist air from the Indian Ocean. The presence of a upper trough at 500HPa may have a high level of wind shear.

Upper-Air Sounding
Radiosonde data (University of Wyoming) showed several key variables associated with hailstorms. K-Index (42.50), Showalter (-4.70) and Lifted Index (-2.70), CAPE (185.5), TT (54.60), BRN (2.03) and the SWEAT index (356.5) all indicated highly unstable conditions in the atmosphere, ideal for the development of a supercell.

Radar Observations
Radar data of the storm day recorded reflectivity values upwards of 75dBZ. Several hook echoes and bounded weak echo regions where also recorded.

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