

A Sample of ZDR Columns from Storms with Giant (4''+) Hail Reports using GR2ver3

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The presence of differential reflectivity (ZDR) columns for 21 cases of giant hail (diameter ≥ 4 in) and 18 cases of smaller hail (0.5 to 2.5 in) was ascertained with GR2Analyst Version 3 (GR2ver3). User-defined products (UDPs) were developed for GR2ver3 to calculate the maximum ZDR above the -10°C , -15°C , and -20°C levels for this purpose. ZDR columns are proxies for updrafts and can be identified as areas of $\text{ZDR} > 1$ above the environmental melting level (given sufficient reflectivity). Larger ZDR columns hypothetically are associated with larger hail because hail growth depends, in part, on residence time and trajectories in the hail growth zone. ZDR columns were subjectively identified using these three UDPs.

All but one of the 21 giant hail cases were associated with enhanced ZDR-column swaths prior to the large-hail reports. Moreover, the enhanced ZDR swaths often were visible at the -15°C and -20°C levels (91% and 76% of the time, respectively). Nevertheless, in some cases there were enhanced ZDR swaths associated with nearby non-hail-producing storms (i.e., false alarms), or the storm that produced the giant hail didn't always have the largest/strongest ZDR swath relative to nearby storms. Comparatively, the storms that produced smaller hail still had enhanced ZDR-column swaths 39–78% of the time (depending on how the ZDR column was classified). These ZDR-column swaths were less apparent at the -15°C and -20°C levels (50% and 17% of the time, respectively), providing some potential diagnostic utility. Plotting swaths of ZDR columns can be useful for monitoring the potential for storms to produce giant hail.