Other NIDS Products

Drawn from the

**OK-First NIDS Product Suite**

http://okfirst.ocs.ou.edu/train/nids/nidsproductsuite.html
Precipitation accumulation

- The Rainfall Accumulation products attempt to estimate the amount of rainfall that has fallen in a given area under the radar's umbrella. A given rainfall product should generally be compared with a product from another radar or with rain gage reports, if they're available.

- PRODUCTS: We receive two (2) Rainfall Accumulation NIDS products:
  - N1P
    - Accumulation in the past hour
  - NTP
    - Storm total precipitation accumulation
## Rain Rate vs. Reflectivity

<table>
<thead>
<tr>
<th>Reflectivity (dbZ)</th>
<th>Rain Rate (inch/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0.01</td>
</tr>
<tr>
<td>20</td>
<td>0.02</td>
</tr>
<tr>
<td>25</td>
<td>0.04</td>
</tr>
<tr>
<td>30</td>
<td>0.09</td>
</tr>
<tr>
<td>35</td>
<td>0.21</td>
</tr>
<tr>
<td>40</td>
<td>0.48</td>
</tr>
<tr>
<td>45</td>
<td>1.10</td>
</tr>
<tr>
<td>50</td>
<td>2.50</td>
</tr>
<tr>
<td>55</td>
<td>5.68</td>
</tr>
<tr>
<td>60</td>
<td>12.93</td>
</tr>
</tbody>
</table>

Rain generally falls with reflectivities beginning at 20 dBZ. Echoes above 55 dBZ usually contain large hail.

Copyright 2000 Oklahoma Climatological Survey.
This NIDS product contains the KFWS radar’s estimate of rainfall for all volume scans collected between 7:45 and 8:45 p.m. on May 5, 1995. Sixteen deaths occurred in Dallas which were attributed to flash flooding. Scan by scan analysis of the rainfall indicates that this 3.1” of rainfall occurred in about 15 to 20 minutes -- with rainfall rates of nearly 10 inches per hour in the very urbanized area of Dallas.

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The radar begins accumulating storm-total precipitation from the time the radar first detects precipitation. The radar continues to accumulate until no precipitation is observed for one hour in the entire radar scope. In long-duration events (e.g., tropical systems), the radar can accumulate rainfall for days or even weeks in one storm-total product.

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Comparing Rainfall Totals from Different Radars

Data scales in the precipitation products are controlled by local NWS offices and can be different from radar to radar.

Red in the Tulsa product represents 6 inches.

Magenta in the Springfield product represents 6 inches.

Radars are very good at depicting the pattern of rainfall accumulation, but sometimes have difficulty in determining the amount of rainfall. Therefore, it is often a good idea to compare rainfall totals from different radars and from different sources like raingages. Because the scales can differ between radars in the rainfall products, care must be taken to insure proper interpretation.
Occasionally the radar can overestimate the rainfall amount. This often occurs when frozen precipitation particles fall through the melting layer of the atmosphere. When this happens, the precipitation particles become coated with water and appear to the radar as very large raindrops, even though they are just melting snowflakes. Because the melting layer is at one given altitude, as the radar sweeps around, it appears as a circular band of enhanced reflectivity or rainfall estimates centered around the radar.
Echo Tops

- The Echo Tops product the approximate elevation where the top of a given precipitation core is located.

- Products: We receive one (1) echo top product.
  - NET
    - NIDS echo tops
**Echo Tops Circular “Stair-Step” Pattern**

It is not likely that the echo tops are actually alternating between 25,000 and 30,000 feet.

A cloud layer at this height appears circular.

Usually in radar interpretation, a circular pattern on an individual scan or a volumetric product (like echo tops or rainfall), translates into something related to height, a layer, or a particular radar tilt. This is because, as shown to the left, the radar beam at a given tilt intercepts a horizontal cloud layer in a circular pattern.

In the case of the echo top product, the echo tops are calculated using the center point of the beam. The algorithm picks the beam that is closest to the echo top. At relatively far ranges, the vertical distance between the beams from two successive tilts is large enough that the echo top appears to “jump” between the two tilts.
Vertically Integrated Liquid (VIL)

- Vertically Integrated Liquid, or VIL, is a calculation that converts a column of reflectivity into its liquid water equivalent.

- Products: We receive one (1) VIL product.
  - NVL
    - NIDS VIL
Two Methods to Calculate VIL

Cell Based VIL

Cell-based VIL in Composite Reflectivity Storm Table Product

Grid Based VIL

Grid-based VIL in VIL product

Cell-based VIL may have a different value than the corresponding Grid-based VIL. Cell-based VIL may read higher in a highly tilted storm.

Copyright 2000 Oklahoma Climatological Survey. Portions from the National Weather Service/Operational Support Facility.
On this day, two different air masses were in place over Oklahoma, separated by a cold front. South of the cold front, the air was warm and moist, which made the freezing level higher than north of the front. With a high freezing level, a larger updraft is required to keep precipitation particles high enough to freeze to make large hail. A larger updraft means that more reflectivity will be present in a vertical column than with a smaller updraft.
Cone-of-Silence Effects on VIL

Vertically Integrated Liquid (3:52 p.m.)

Vertically Integrated Liquid (4:53 p.m.)

VILs are 40 to 60

VILs are 20 to 40

In these two VIL images, separated by an hour, the VIL values decrease near the radar site. While it is possible that the decrease was caused by weakening storms, it is also possible that the decrease was caused by the storms entering the cone-of-silence, where no data is obtained by the radar.
Composite Reflectivity

The Composite Reflectivity is the maximum base reflectivity value that occurs in a given vertical column in the radar umbrella. NEXRAD scans in several pre-defined “volume coverage patterns” (VCPs), where the radar makes a 360-degree horizontal sweep with the radar antenna tilted at a given angle above the horizontal, then changes the elevation angle, and completes another 360-degree sweep, and so on. Composite reflectivity gives a plan view of the most intense portions of thunderstorms; compared with Base Reflectivity to help determine the 3-D structure of a thunderstorm.

Products: We receive one (1) composite reflectivity product.
- NCR
  - NIDS composite reflectivity
Composite Reflectivity is the maximum reflectivity in a vertical column.

Echoes south of Moore and east of Newcastle appear in Composite Reflectivity but not in Tilt 1 of Base Reflectivity. These echoes must be observed at some level above Tilt 1.

Be careful when interpreting Composite Reflectivity. It masks low-level features, like hook echoes!