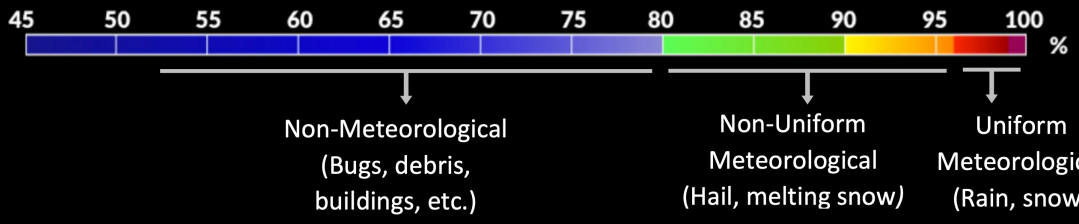
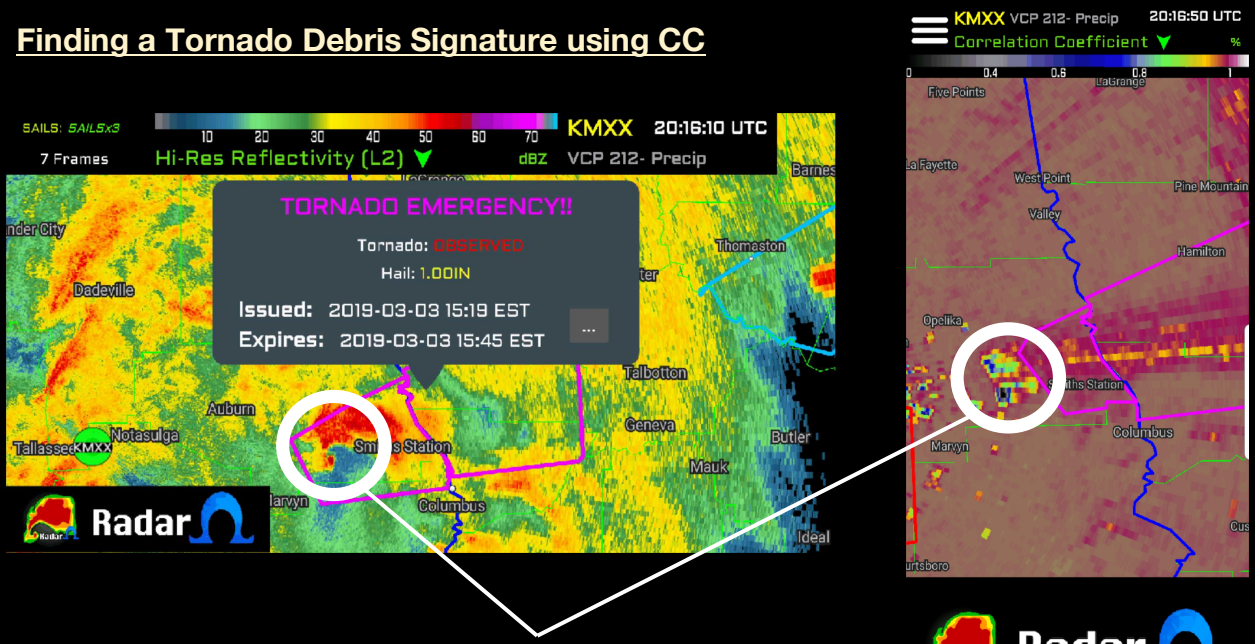
Correlation Coefficient

What is Correlation Coefficient (CC)?

Correlation Coefficient measures how similarly the vertical and horizontal pulses behave within a certain volume. If the changes are the same in both planes then the values will be closer to 100%, but if they are different in both planes then the correlation will be lower. Usually non-meteorological objects will have values of less than 80%, such as a TDS (tornado debris signature), birds, buildings, and insects. Values between 80% - 97% are typically going to be things like hail and melting snow. Higher values will denote uniform meteorological things, like rain or snow. These are values 97% and above. Here's a look at the scale just from 45%-100%.



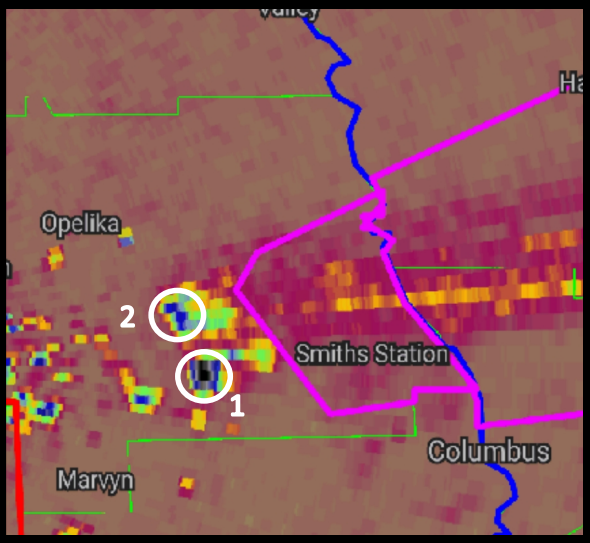
Finding a Tornado Debris Signature using CC



Hook Echo and Tornado Debris Signature

In order fully and accurately diagnose a Tornado Debris Signature, you really should be using Differential Reflectivity, Velocity, Correlation Coefficient, and Reflectivity. In this case, you can clearly see the hook echo, the tornado has been observed and on the ground. In the photo on the right, the Correlation Coefficient is showing a circular feature with values bottoming out near 0% which still falls in the Non-Meteorological range such as debris.

Correlation Coefficient



In this image you can actually see where it looks like there are two separate debris signatures, however, in this case this is actually where debris has been lofted up into the atmosphere (1) and is falling north of the tornado (2).

It is important to note that there are seemingly a lot of other drops in the correlation coefficient, however, looking at the reflectivity it can be seen there are not any other echoes in this region. It's difficult to diagnose a TDS with just still images of Correlation Coefficient for this reason. Because these other "holes" in the Correlation Coefficient are actually still when the image is animated, interestingly enough. You can see this below. The green box has the stagnant CC readings, while the TDS makes its way to the GA border. This case is from the Lee County Tornado on March 3, 2019.