# User Guide

*Last Updated: October 19th, 2017*

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****NOTE- THIS USER GUIDE WILL CONTINUE TO GROW, EXPECT MORE INFORMATION TO BE ADDED ON A CONSTANT BASIS*****

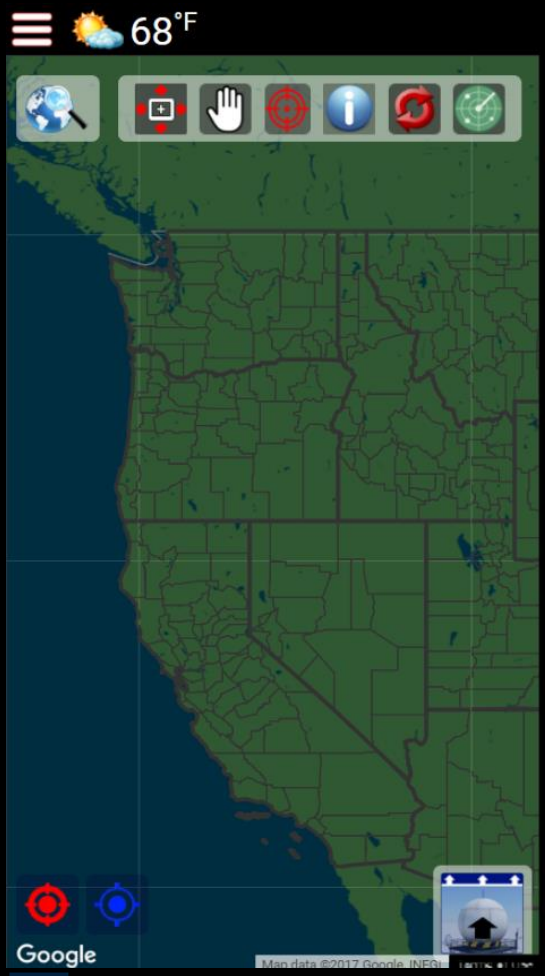
*If you have any questions that this guide does not provide, please feel free to email us at*


**Support@stormmapping.com**

# Getting Started

The controls between the desktop and mobile versions of Storm Mapping are the same. This user guide will show the controls of Storm Mapping using both the mobile and desktop versions.

## Map Controls Overview




This control is used to serach for any city, zipcode & address. When you have data layers turned on such as the storm archive, weather toggle and NEXRAD, any location you search will populate data around that point.

The rectangle select tool allows you to search data for any geographical area you choose. Search storm archive data, weather toggle data & MRMS data. Simply click the icon and select the area you want data to populate for.

Use the hand tool to deactivate other map controls. When you click the hand icon, you are ensuring that you are able to pan around the map without other previously activated functions preventing this.

The target tool allows you to drop a target onto any location on the map. When you do this, data will populate for any data layer you have toggled on. The target icon also allows you to retreive current weather conditions and forecasts for any point within the United States.

Toggle on the weather information layer to view temp, dewpoint, pressure, wind speed/direction, visibility & conditions. Use the slider to toggle weather information for the last 48 hours

Force refresh of data layers

Toggle on/off NEXRAD towers

Static GPS Icon

LIVE GPS Icon - Updates every 20 seconds
Mobile Only

Toggle NEXRAD products
Switch between reflectivity, velocity..etc
Control NEXRAD Animations

# Side Menu Overview


- OUTLOOKS
- CUSTOMIZE MAP VIEW
- WEATHER ALERTS
- NATIONAL MOSAICS
- MRMS DATA LAYERS
- STORM ARCHIVE
- NEXRAD IMAGE ARCHIVE
- DRAWING TOOLS

Expand/Collapse Side Menu

Save Current Map View as Default

View Account Settings/Subscription

Change Account Password Used to Access Desktop Only available for Tracker+

### OUTLOOKS

When signficant weather is possible in the medium range forecast, Storm Mapping will highlight custom outlooks. These will be drawn onto the map and will highlight the following hazards: Severe Weather, Tropical Weather & Signficant Winter Weather. These outlooks are created by Storm Mapping. For official information on watch/warnings, always consult your local National Weather Service.

### CUSTOMIZE MAP VIEW

Choose what you want your map to look like. You can add/remove county/state borders, add/remove city layer, determine if you want a dark/light map. Storm Mapping provides you several differnet customization options that suit your visualization needs.

### WEATHER ALERTS

The Storm Mapping weather alerts layer allows you to choose what type of alerts you want to display. Toggle the alert layer on/off or change the opacity of the layer.

### NATIONAL MOSAICS

View different radar products on a national level. While these products are much lower resolution, this is a great way to get an overall sense of the precipitation patterns over a larger region

### MRMS DATA LAYERS

Currently the only MRMS products available are Maximum Expected Hail Size. We will be adding many more MRMS products in the near future

### STORM ARCHIVE

The storm archive will allow you to search tornado, hail & wind damage reports from the SPC. Depending on what your subscription level is, the storm archive will also allow you to view enhanced hail detection products, as well as the Storm Mapping thunderstorm intensity index.

### NEXRAD IMAGE ARCHIVE

The NEXRAD image archive allows you to view radar images for any time period you choose. This is great for researching past severe weather events.

### DRAWING TOOLS

The drawing tool manager allows you to draw on the map using several different drawing tools. This is useful to use in combination with the many customization layers of Storm Mapping combined with other data layers.

# Radar Products Overview

## WSR-88D Radar Tower Status:


Radar Tower Selected & On


Radar Tower Off


Radar Tower Offline for maintenance

**WSR-88D Radar Tower**


## Terminal Doppler Weather Radar Status:


Radar Tower Selected & On


Radar Tower Off


Radar Tower Offline for maintenance

**Terminal Doppler Weather Radar**


What's the difference between a WSR-88D and a TDWR?

A WSR-88D (Weather Surveillance Radar, 1988, Doppler) is the National Weather Service's radar. There are about 158 currently in the U.S. This type of radar is also called NEXRAD (***Nex***t Generation ***Rad***ar), because it is the first radar to be able to detect and measure both precipitation and velocity. This allows NWS and other meteorologists to detect things like tornadoes just by looking at the radar imagery. It can detect heavy precipitation out to about 155 miles from the radar, and 90 miles for most precipitation.

A TDWR (Terminal Doppler Weather Radar) is a radar designed by the Federal Aviation Administration. It sometimes provides support to local NWS offices, but mainly they are placed near major airports to help with flight control. This is in case there are hazardous aviation conditions such as downbursts, wind shear, or gust fronts. The TDWR's provide **short-range** but high resolution data around the airport for nearby features. They also update every minute on the lowest elevation scan, which can be critical for mesoscale features.

How about the difference between Level II and Level III data?

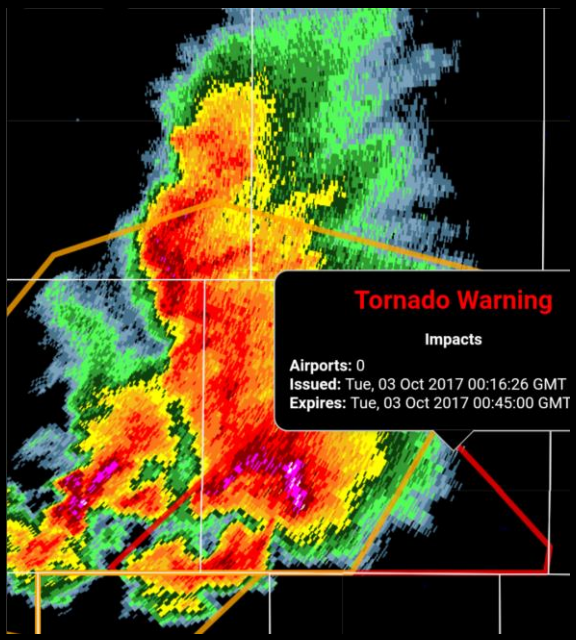
Level II data is high resolution data that is the first processing of the Level I raw data from the radar. Level III data is derived products from the Level II products.

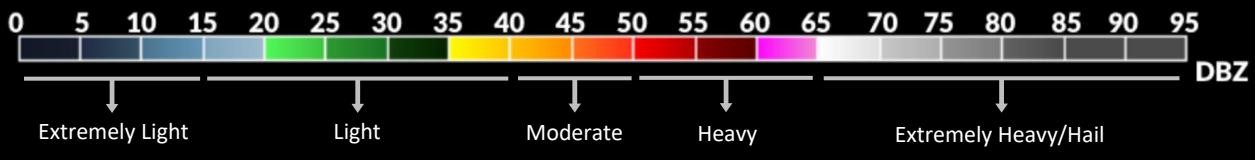
| Level II Storm Mapping Products | Level III Storm Mapping Products |
|---|---|
| • Base Reflectivity<br>• Super-Res Reflectivity<br>• Base Velocity<br>• Super-Res Velocity<br>• Differential Reflectivity (ZDR)<br>• Correlation Coefficient (CC) | • Storm-Relative Velocity<br>• Echo Tops<br>• Vertically Integrated Liquid (VIL)<br>• 1hr Storm Total Precipitation<br>• Storm Total Precipitation |

Product Description & What They're Used For

**Reflectivity**:

This shows the intensity of an echo. Reflectivity shows the amount of power sent back to the radar and is measured in units of dBZ. The operational scale is usually from about -30 to +80 dBZ, but we use 0 to 95 dBZ to allow for an easier to read image without the lower values because of ground clutter. Reflectivity's primary use is for storm-by-storm surveillance. It can also be used to help identify severe weather signatures and other boundaries. Reflectivity will also show non-precipitation phenomena such as birds, bats, insects, smoke, volcanic ash, chaff, etc.

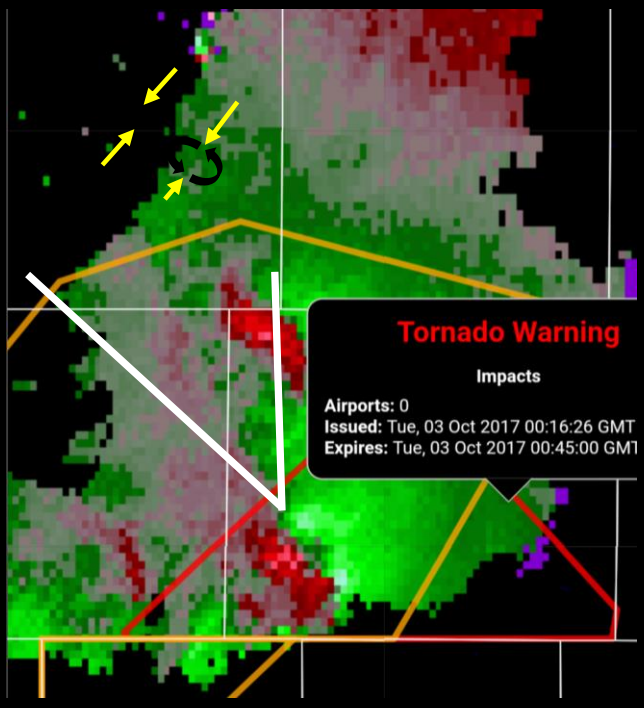


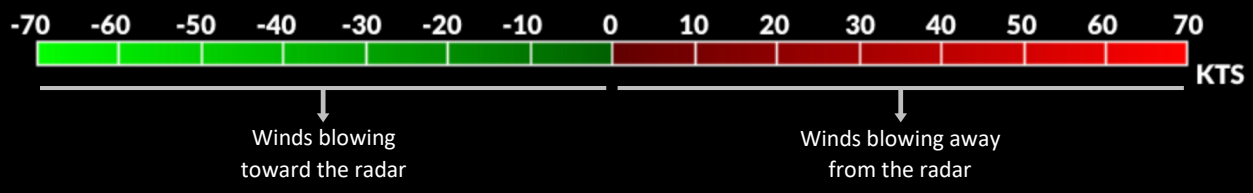
When using reflectivity, the intensity of the precipitation can be observed as well. A good rule of thumb is the following:

| dBZ | Intensity of Precipitation |
|---|---|
| 0-15 dBZ | Extremely Light |
| 15-40 dBZ | Light |
| 40-50 dBZ | Moderate |
| 50-65 dBZ | Heavy |
| 65+ dBZ | Extremely Heavy/Hail |

**Velocity:**




Velocity, or radial base velocity, measures the radial velocity of the storms in question. This means that the radar can only measure winds blowing towards or away from the radar. Typically one would want to use velocity to identify the winds in a gust front or a squall line, because the winds are usually pretty uniform (either towards or away from the radar). Another way to use velocity is to potentially identify tornadoes, or at least areas of strong rotation. When there is a tight couplet of negative and positive values, then that is an area of rotation. The higher the values on both ends of the spectrum, the more likely you will see a tornado warning placed by NWS. Sometimes this rule doesn't always work. A good rule of thumb is the closer to the radar the better. Otherwise, you risk the radar beam looking to high into the atmosphere and seeing mesoscale rotation that doesn't reach to the surface. A better way to look at strong rotation or confirmed tornadoes is using Storm Relative Velocity, which we will cover in the next section.

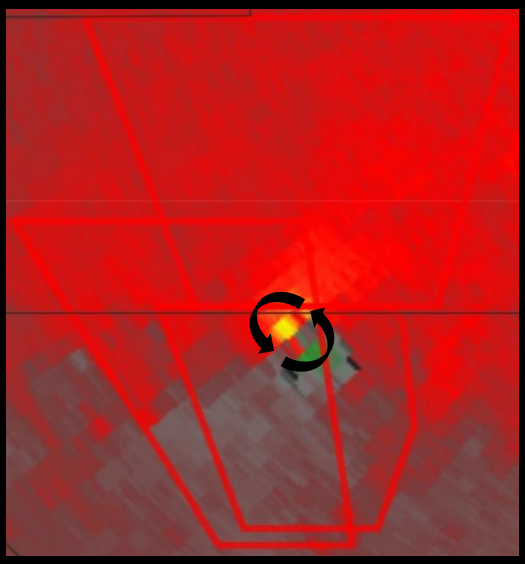



*Velocity units are in knots (KTS). 1kt = 1.15 MPH*

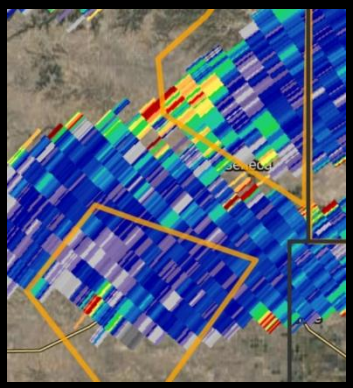
**Storm Relative Velocity (SRV)**:

Storm Relative Velocity is defined as the storm motion minus the base/radial velocity. This makes it a lot easier to identify rotation in storms. This is because the storm motion is subtracted out, and only shows the radial component of the wind. The reason that this is different than radial velocity is because radial velocity takes in account the motion of the entire storm, so it is better to use SRV with fast moving storms. Otherwise base/relative velocity could have the true winds or shear masked as less or more.

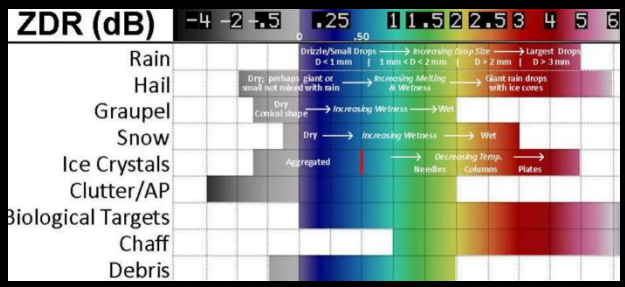
**Storm Mapping uses units of MPH for Storm Relative Velocity. Remember that 1 MPH ≈ 0.87 KTS**




**Differential Reflectivity (ZDR)**:

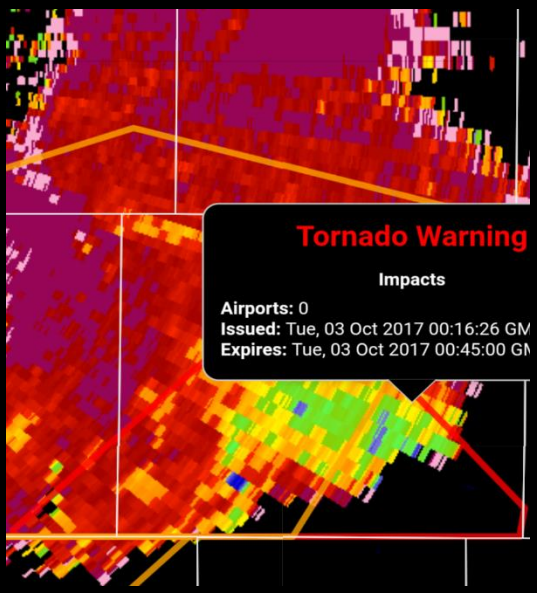


ZDR is a great tool to determine the type of precipitation is present, or if the echo is something non-meteorological. ZDR is a dual-pol product and measures the difference between the horizontal and vertical reflectivity values. Near 0 dB indicates spherical targets, and usually can be interpreted as hail or something non-meteorological. Positive dB means the objects are oblate, like how raindrops are larger near the bottom of them. So positive values usually indicate large heavy raindrops. Negative dB values mean objects are more vertically oriented. These meteorological vertically oriented objects are typically ice and sometimes very large hail. Other uses for ZDR include finding the melting layer, tornadic debris, rain vs. snow, and updrafts.

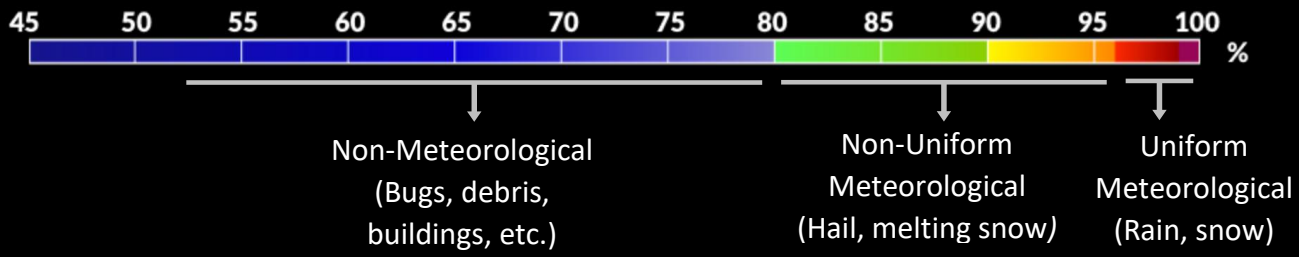




*Differential Reflectivity is in units of dB.*

**Correlation Coefficient (CC):**

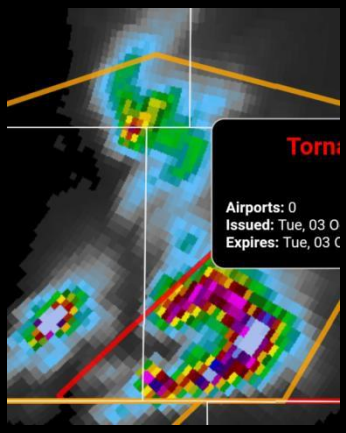


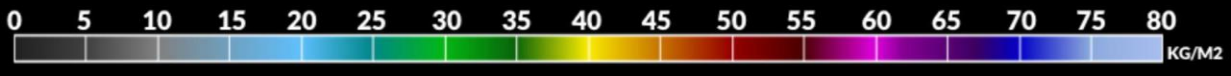

Correlation Coefficient measures how similarly the vertical and horizontal pulses behave within a certain volume. If the changes are the same in both planes then the values will be closer to 100%, but if they are different in both planes then the correlation will be lower. Usually non-meteorological 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.




**Vertically Integrated Liquid (VIL):**

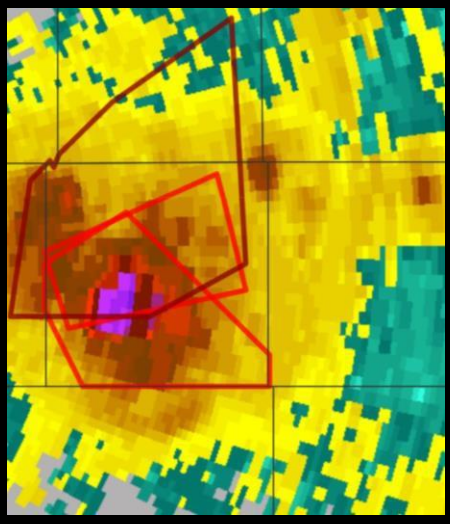
Vertically Integrated Liquid is a measures the amount of water in a column, derived from the radar reflectivity. It has limitations during different seasons, and should be used as an estimate. But there are a few things that VIL is good tool to use when determining what is going on within a storm. Most use VIL to determine hail size or where hail is eminent, especially when using it in combination with correlation coefficient. The larger the VIL value, the stronger the updraft meaning there is likely hail. VIL also can help identify wet microbursts, which are strong damaging wind limited to about 2.5 miles in diameter. When VIL values rapidly fall from scan to scan, this typically means we can assume that it is a collapsing thunderstorm (lack of an updraft) and is a wet microburst.




**Units are in $kg/m^2$ and values will differ depending on the season**

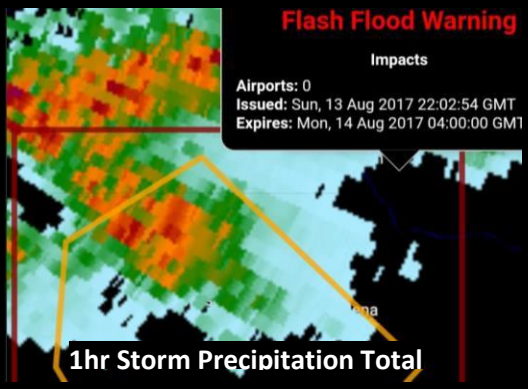
**Echo Tops**:



Echo Tops indicate the maximum height of precipitation. Echo tops have to be between 5,000 feet and 70,000 feet with reflectivity values of 18.5dBZ to be reported by the radar. Usually the higher the echo tops, the more intense a storm is with stronger updrafts. The stronger the updrafts, the more likely there is large hail and convective wind gusts. It should be noted that tall storms that are close to the radar will be underreported or not reported at all, because the radar beam won't reach the top of the storm.

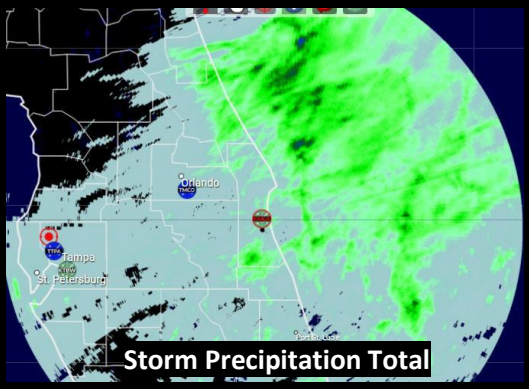
**Units in kilofeet (thousands of feet)**


**1hr Storm Total Precipitation & Storm Total Precipitation**:




**1hr Storm Precipitation Total**

This is used for estimating the 1hr precipitation accumulation. It is most useful for NWS Employees issuing things like flash flood watches, warnings, and statements. Other uses can be for Short Term Forecasts and Hazardous Weather Outlooks, as well as a general estimation for soil saturation and basin run-off.


**Storm Precipitation Total**

This is a continuously updated product of the total precipitation in a storm, since the beginning of a storm. It will no longer be updated once there is a one hour break in the precipitation. The uses are nearly the same as the 1hr Storm Precipitation Total, but can also provide as an aid in post- analysis for flood reports.