NWSTC RADAR Pre-Course Material

The 88D RADAR and Products

Topics covered in this section

Introduction to the WSR-88D System

Radar Beam Characteristics

Weather Radar Equation

Transmitting & Receiving Characteristics

Non-Standard Beam Consequences

Data Collection

Introduction to Base and Derived Products

Base Reflectivity (Z)

Base Velocity and Storm-Relative Velocity Map (V & SRM)

Base Spectrum Width (SW)

Correlation Coefficient (CC)

Differential Reflectivity (ZDR)

Specific Differential Phase (KDP)

Introduction to the WSR-88D System

This section gives you a big picture of the system, The system drawing is for an operator, don't hold on it too tight.

Points to focus on are:

RADAR Data Acquisition Unit (RDA)

- Transmitter
- Antenna
- Receiver (dated photo, but function is correct)
- Signal Processor (There is an issue with the image (wrong component), but the ideas are correct)

Wideband Communications

- Understand that this is between the RDA and RPG (RADAR Product Generator)

RADAR Product Generator

- Understand that this is the product generator

Master System Control Function

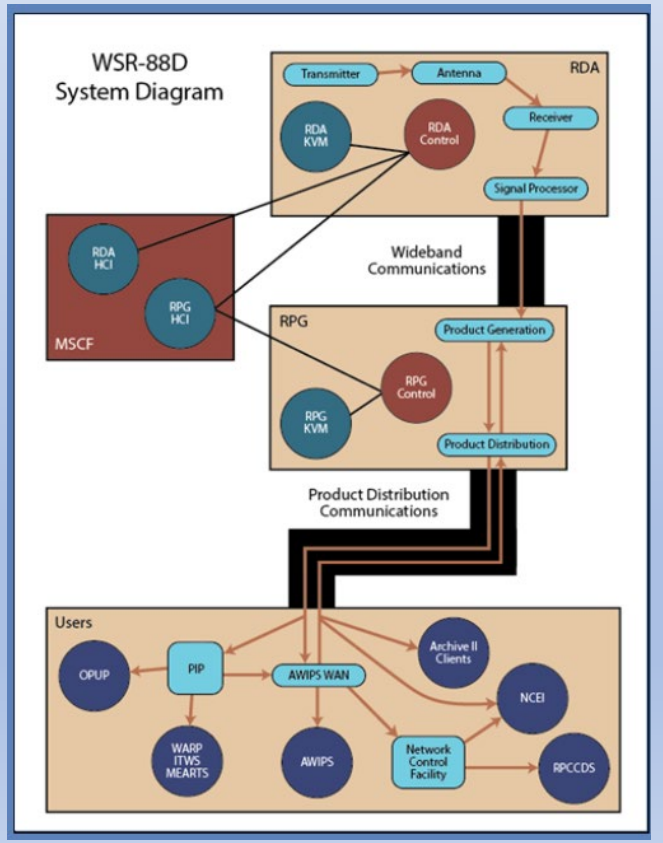
- Understand that this is the remote-control terminal for the RPG

Introduction to the WSR-88D System (continued)

The system drawing used in this system shows the users in the bottom of the drawing. Don't focus on this drawing. Relationships are covered elsewhere.

The class will address the product distribution, don't focus on this.

The quiz is optional and not tracked by the RADAR class for maintenance technicians



https://training.weather.gov/wdtd/courses/rac/intro/88d/story.html

Radar Beam Characteristics

This provides a discussion of how the weather RADAR signal interacts with targets

Points to focus on are:

Discrete Pulses

Beam Width

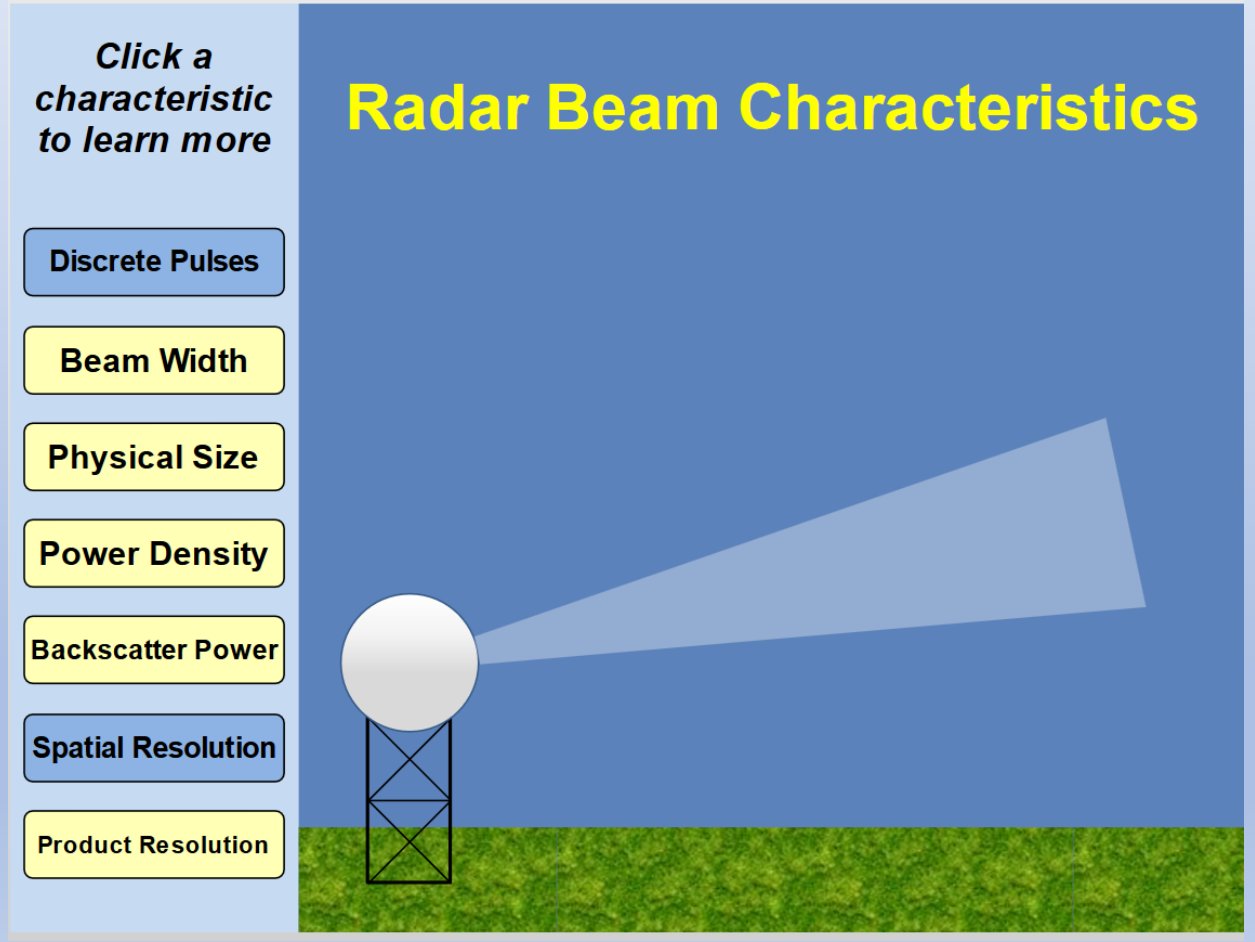
Physical Size

Power Density

Backscatter Power

Spatial Resolution

https://training.weather.gov/wdtd/courses/rac/principles/beam-char/story.html



Weather Radar Equation

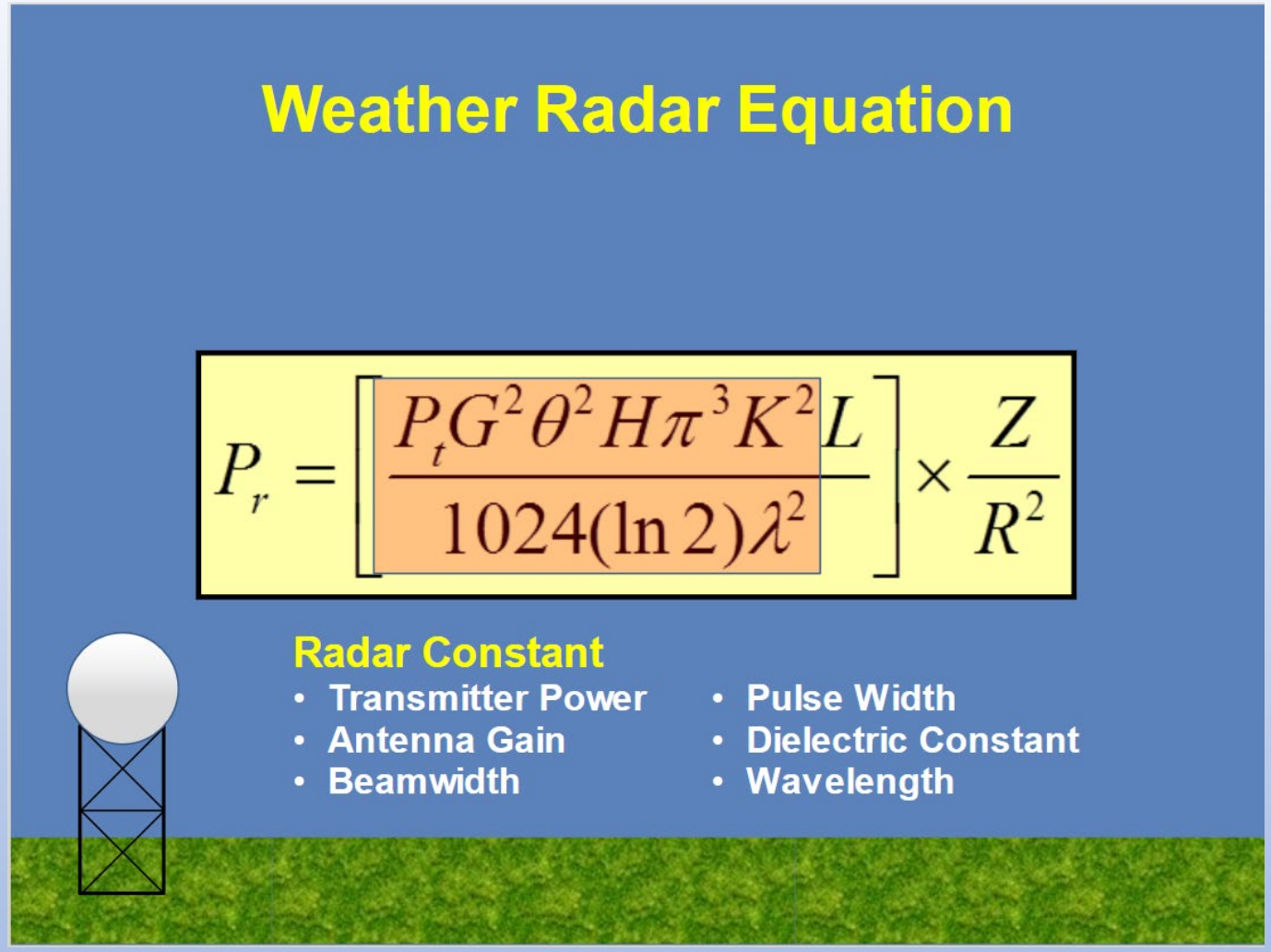
This shows the variables in measuring precipitation reflectivity.

Don't sweat the math.

Some students want to know what “Z” is in the dBZ scale.

The equation uses values measured by technicians

Transmitted power and Pulse Width are measured



Notice how the math attempts to make targets at different ranges show as the same power. This is shown in “Range Effects”

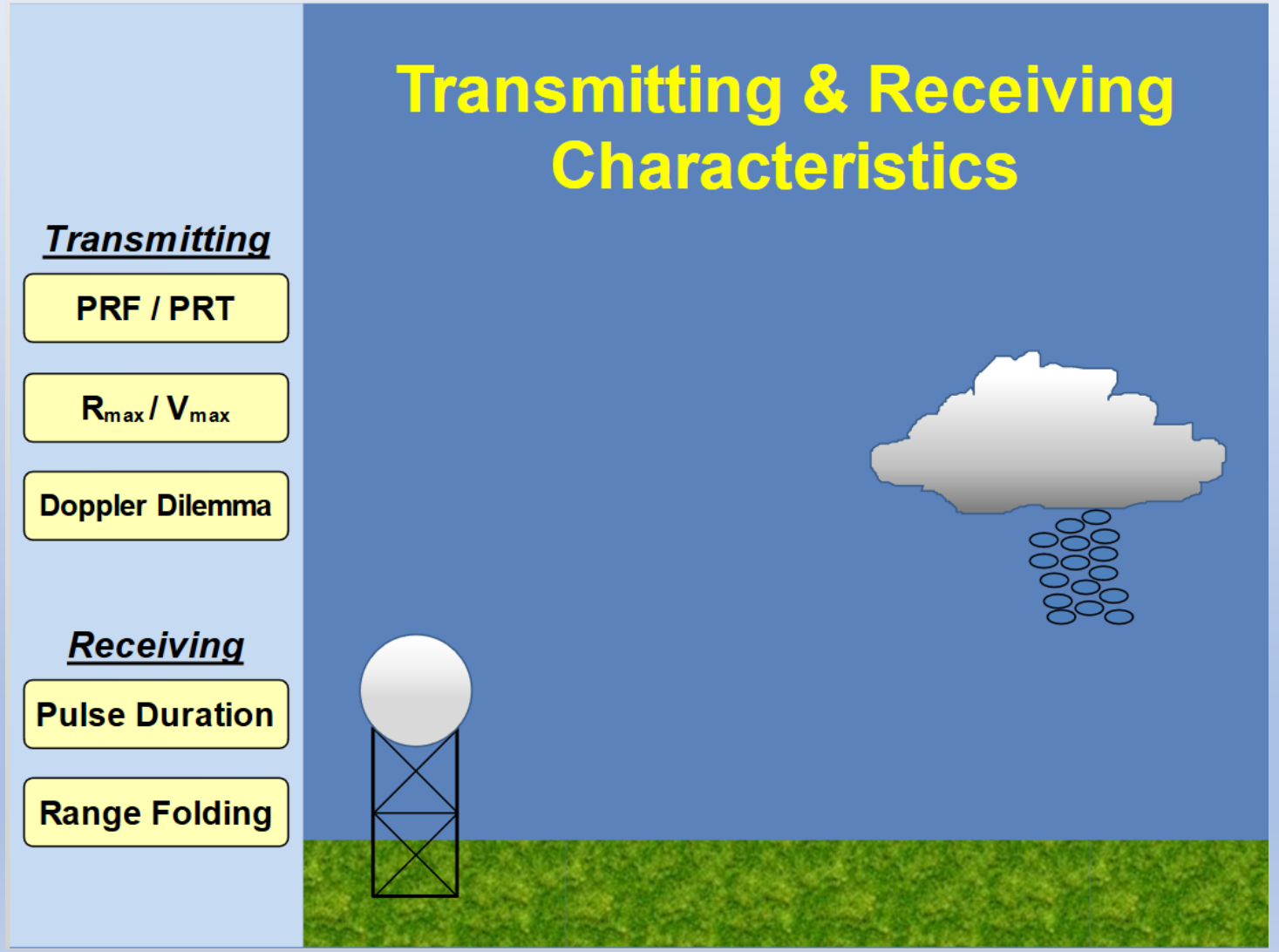
https://training.weather.gov/wdtd/courses/rac/principles/radar-eqn/story.html

Transmitting & Receiving Characteristics

Range and Velocity measurement trade offs.

“The Doppler Dilemma”

Points to focus on are:
Pulse Repetition Frequency (PRF)
Pulse Repetition Time (PRT)
Doppler Dilemma
Long and short pulse operation
Range Folding



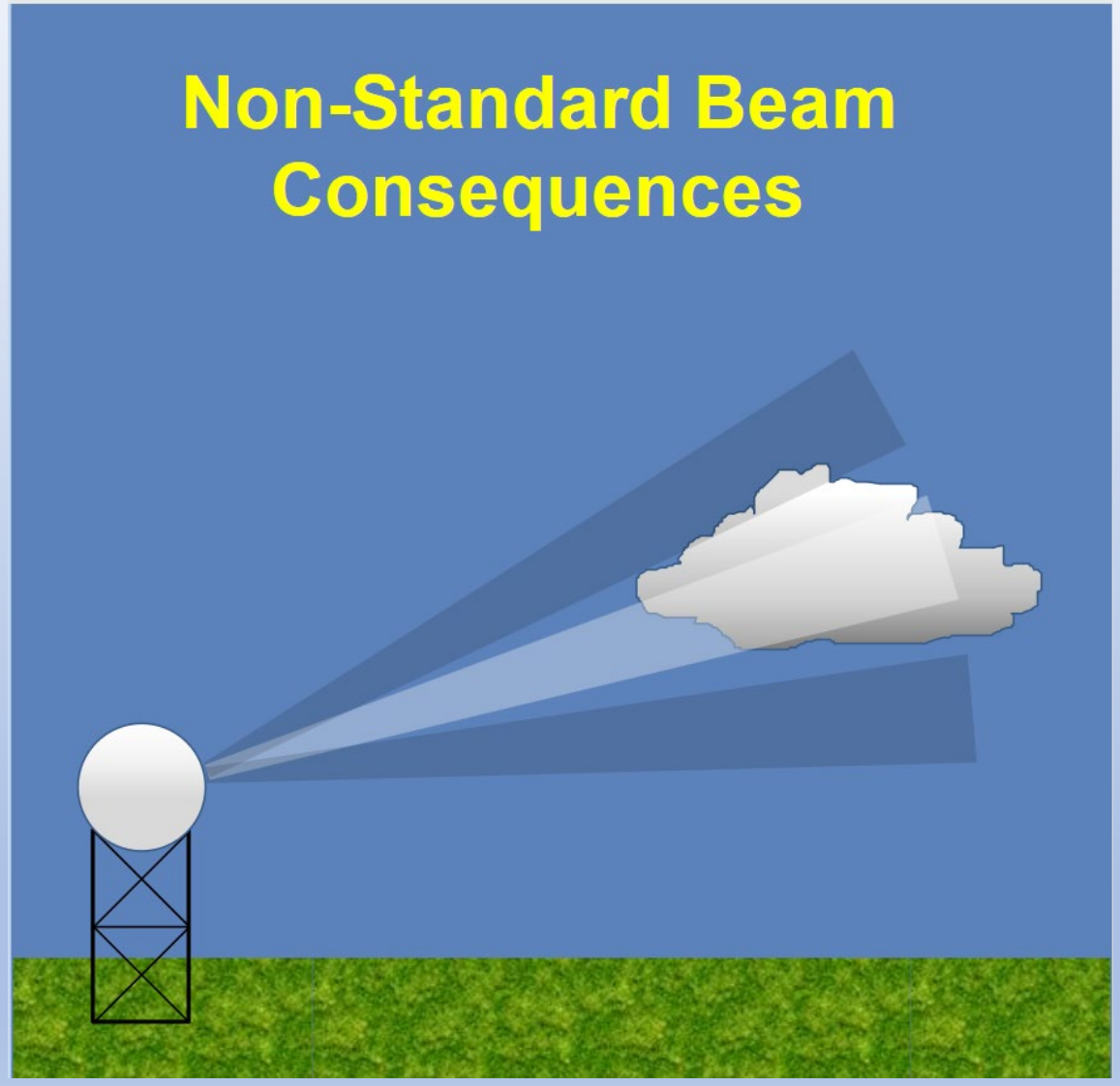
https://training.weather.gov/wdtd/courses/rac/principles/trans-rec-char/story.html

Non-Standard Beam Consequences

How side lobes and the beam heights effects RADAR returns.

This section explains why the RADAR can present targets in the wrong places.

There are no points to focus on in this section.



https://training.weather.gov/wdtd/courses/rac/principles/non-std-beam/story.html

Data Collection

Clear Air and Precipitation Modes. Volume Coverage Patterns. Waveforms are processing modes

Points to focus on are:

Clear Air Mode

Precipitation Mode

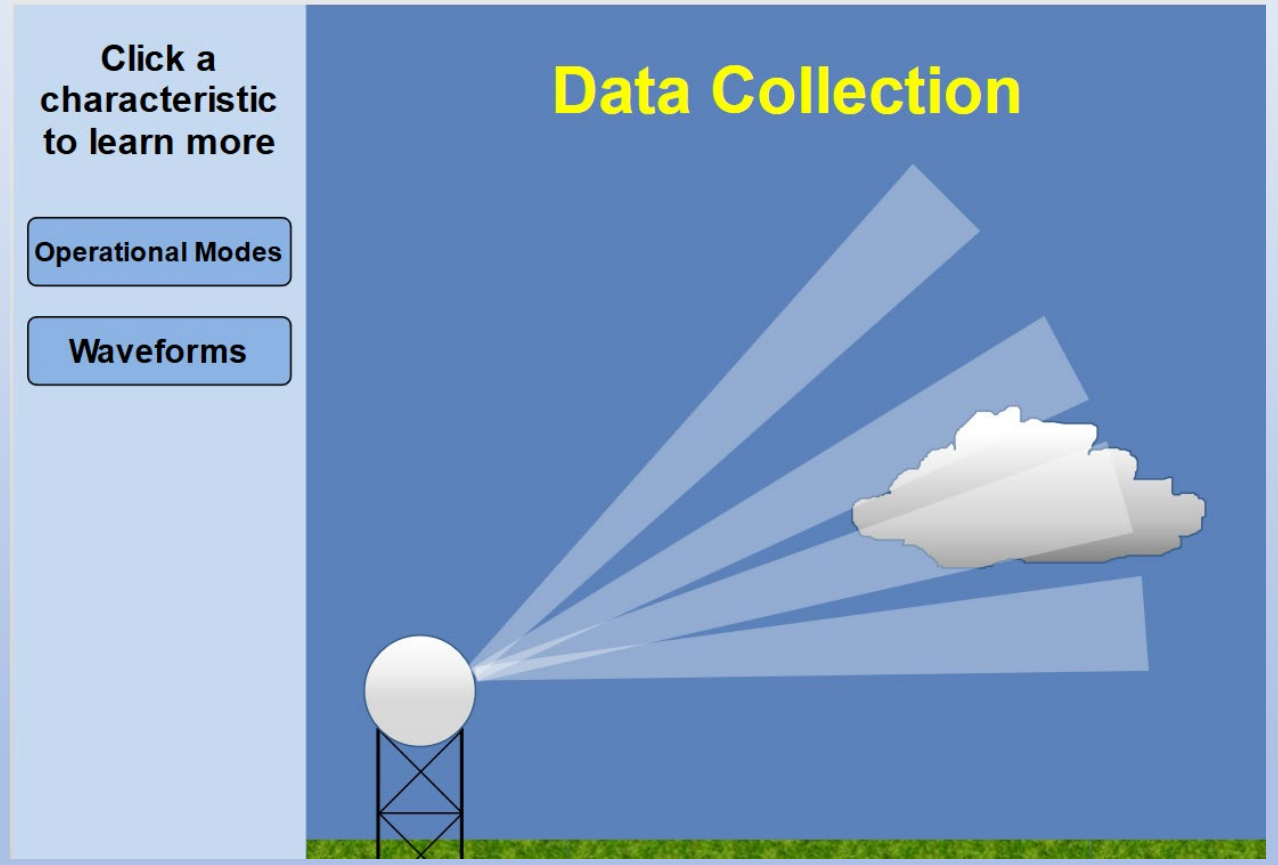
Volume Coverage Patterns VCP (general concept, not numbers)

Contiguous Surveillance (CS) (Low PRF, Maximum range)

Contiguous Doppler (CD) (High PRF, Maximum velocity measurement)

Split Cuts (CS rotation followed by a CD rotation)

Batch Cuts (alternating between long and short PRT/PRFs)



https://training.weather.gov/wdtd/courses/rac/principles/data-collection/story.html

Introduction to Base and Derived Products

This is an introduction on what this RADAR produces

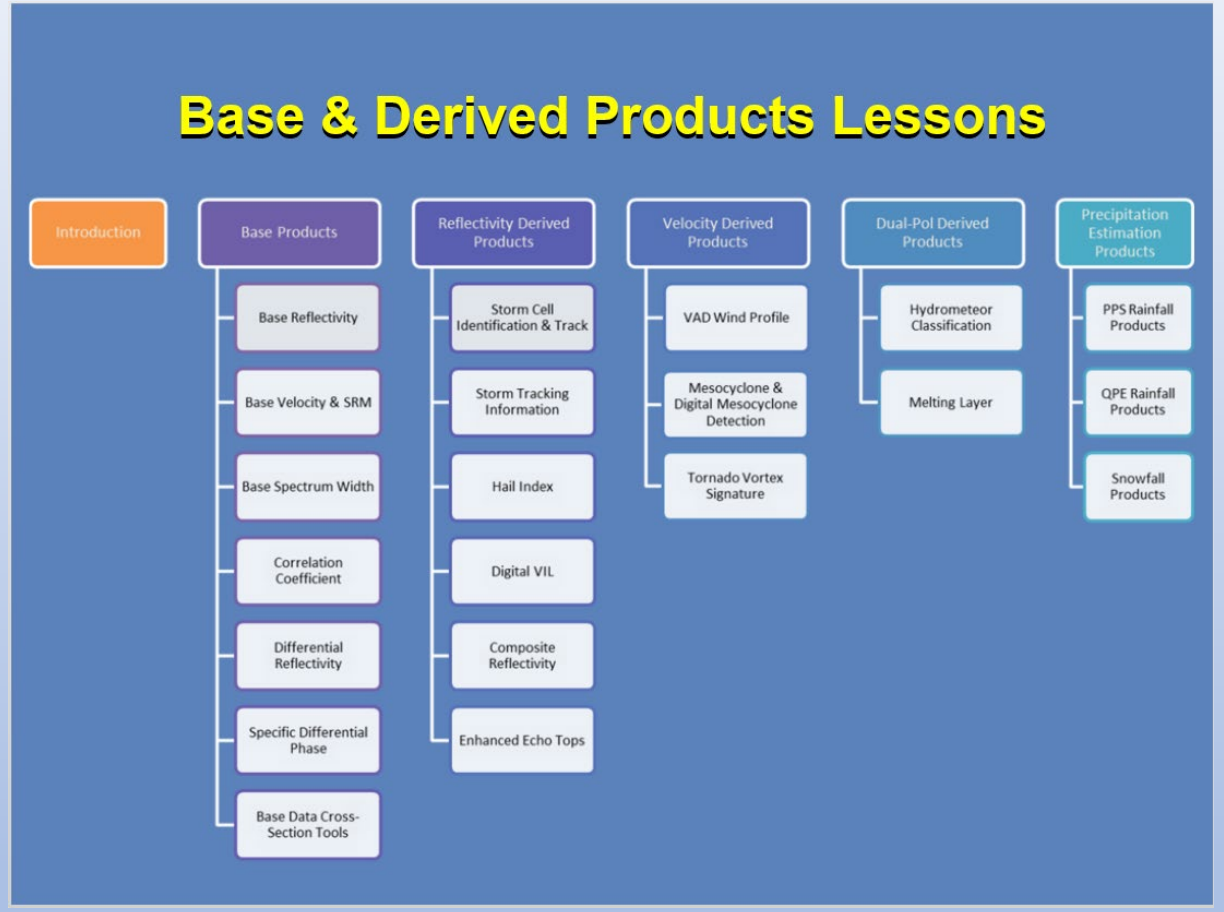
Note that we will not cover most of the product that are created, just the ones that explain the operation of the RADAR

Points to focus on are:

Base Vs Derived Products

Adaptable Parameters

Routine Product Sets (RPS) are outside the goal of us using this class



https://training.weather.gov/wdtd/courses/rac/products/intro/presentation_html5.html

Base Reflectivity (Z)

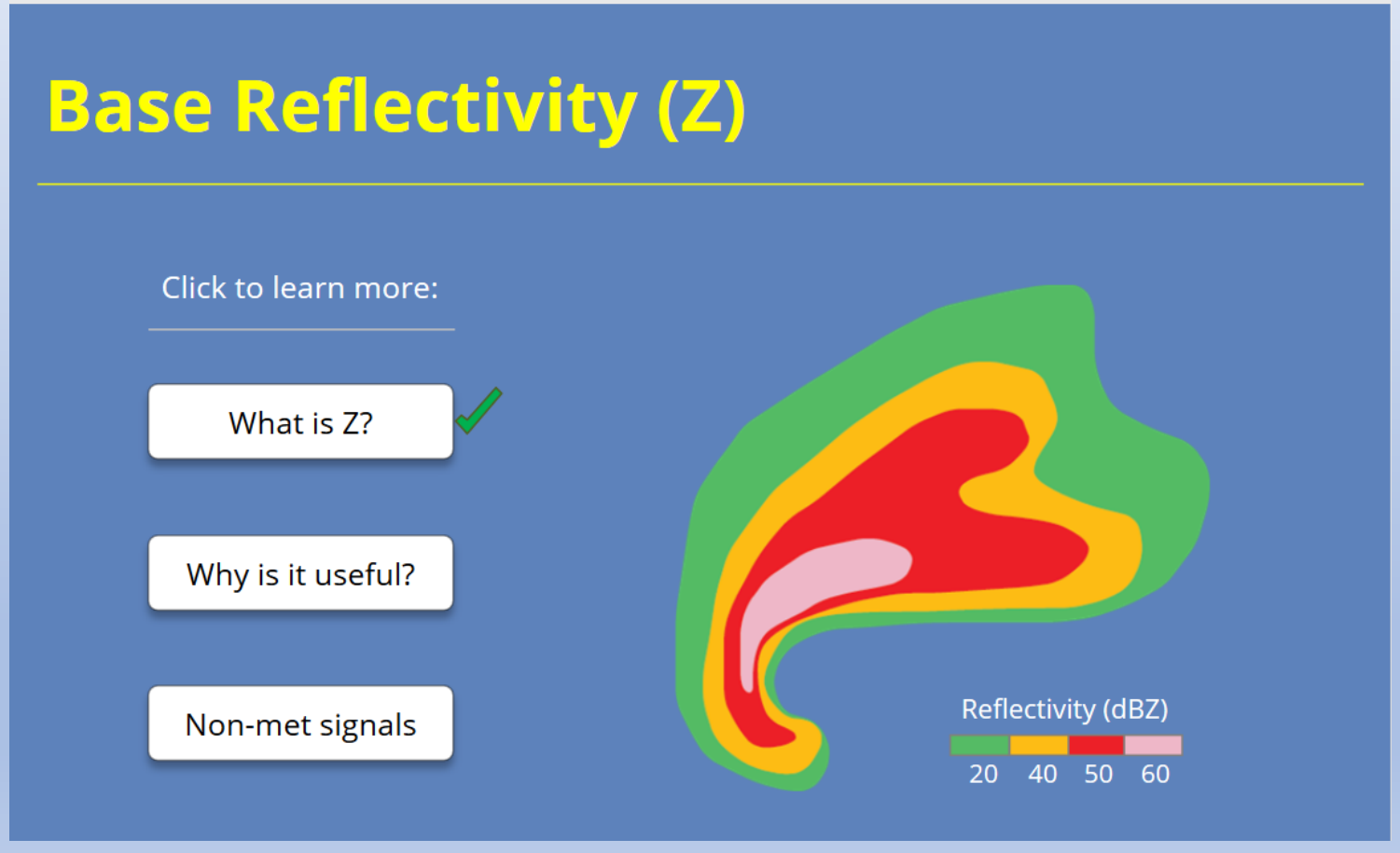
This explains how reflective is the target weather

Do not do the with the “Additional Info”, it is about AWIPS use

Points to focus on are:

What is “Z”?

What is “Z” used for?



https://training.weather.gov/wdtd/courses/rac/products/z/story.html

Base Velocity and Storm-Relative Velocity Map (V & SRM)

This is the apparent velocity of our target relative to the RADAR site

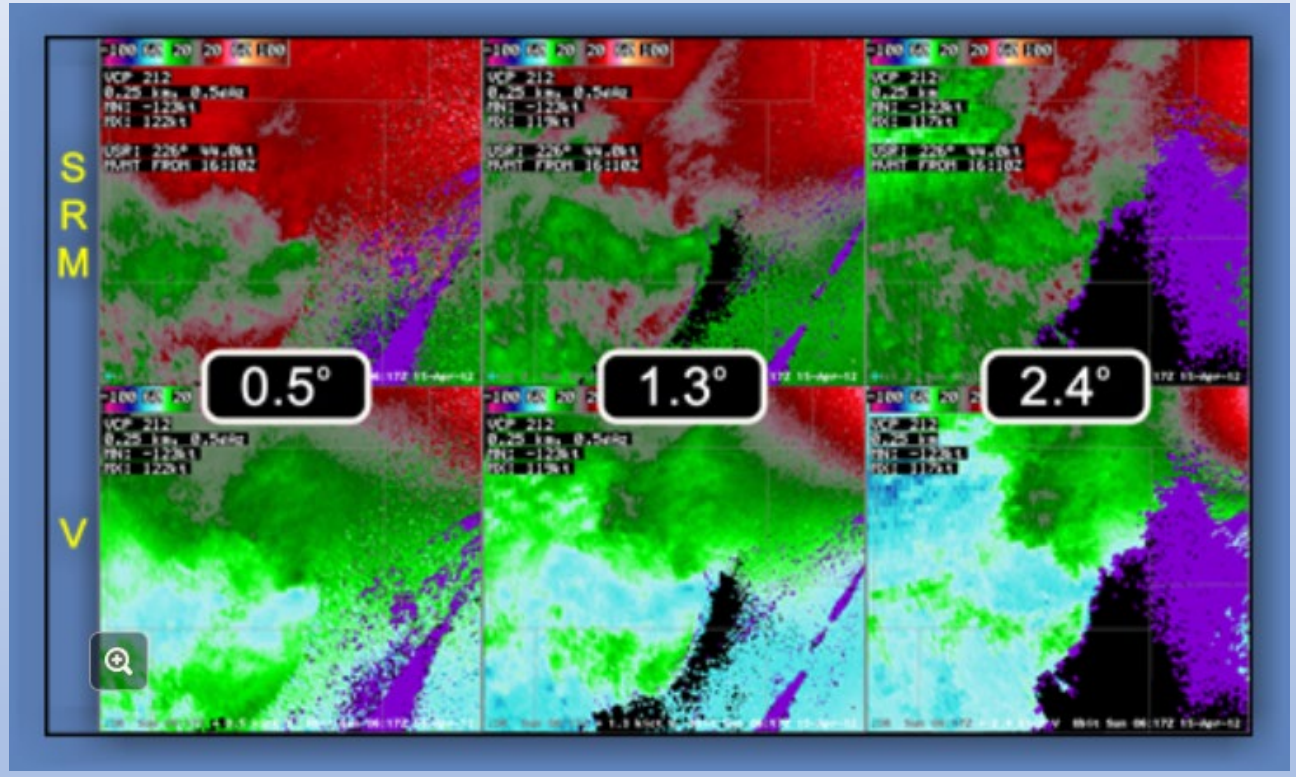
Do not do the with the “Additional Info”, it is about AWIPS use

Points to focus on are:

Base Velocity (V)

Storm-Relative Velocity Map (SRM)

The wind is only true when the wind is directly to or from the RADAR



https://training.weather.gov/wdtd/courses/rac/products/v-srm/story.html

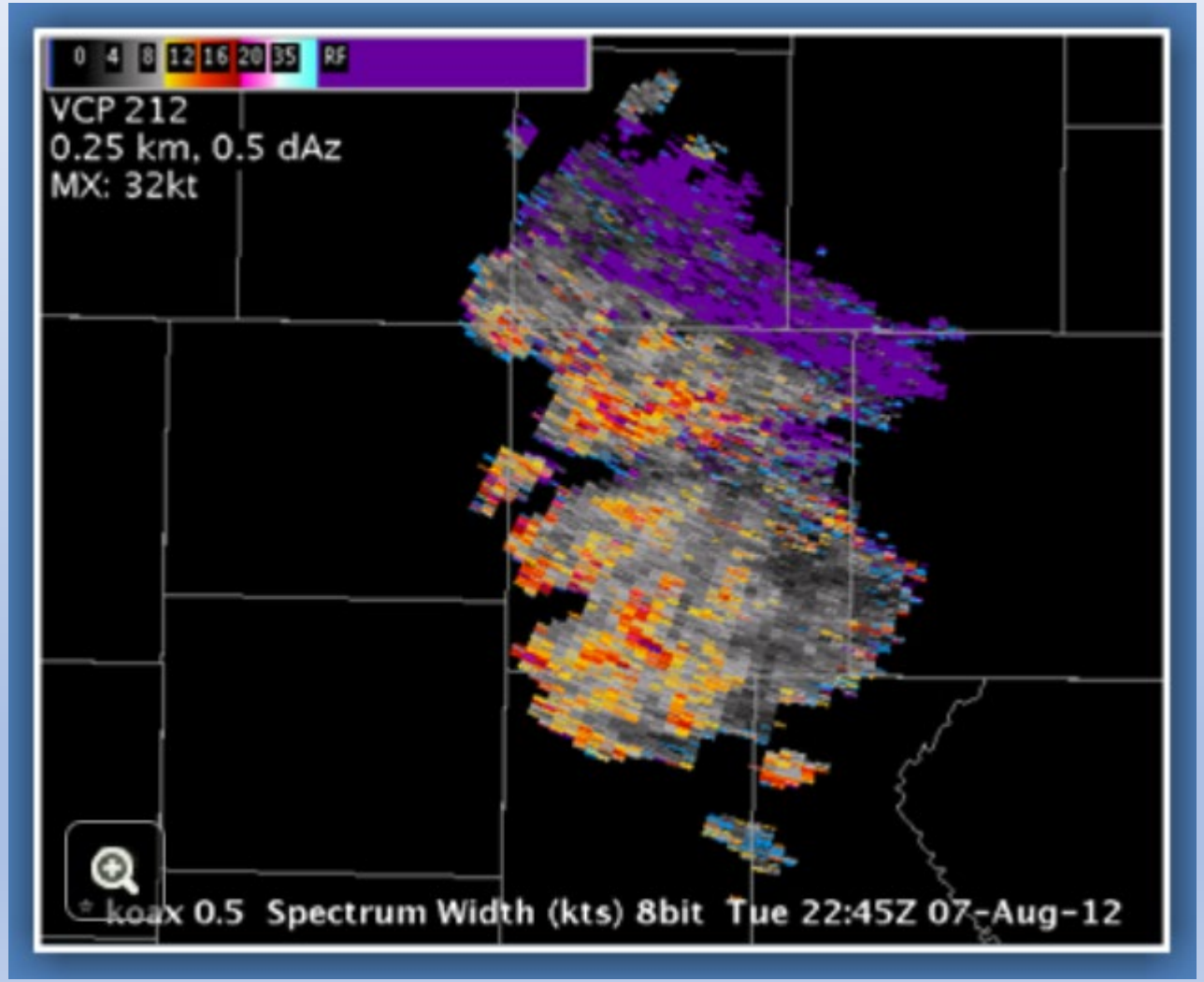
Base Spectrum Width (SW)

What is the range in apparent velocities of our target relative to the RADAR site

Do not do the with the “Additional Info”, it is about AWIPS use

Points to focus on are:

What is “SW”?



https://training.weather.gov/wdtd/courses/rac/products/sw/story.html

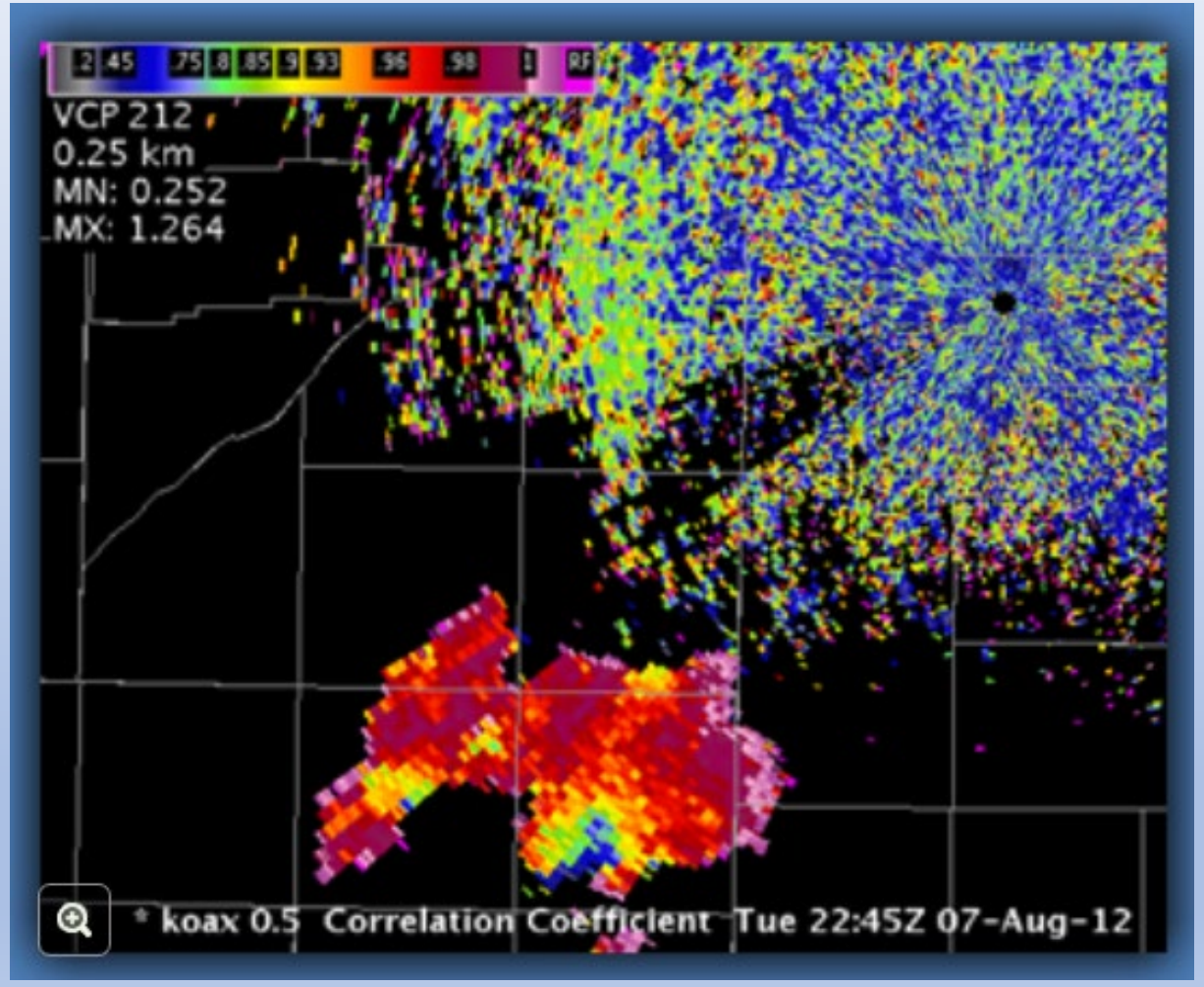
Correlation Coefficient (CC)

How similar are the RADAR targets to each other in an area of the atmosphere

Do not do the with the “Additional Info”, it is about AWIPS use

Points to focus on are:

What is Correlation Coefficient (CC)?



https://training.weather.gov/wdtd/courses/rac/products/cc/story.html

Differential Reflectivity (ZDR)

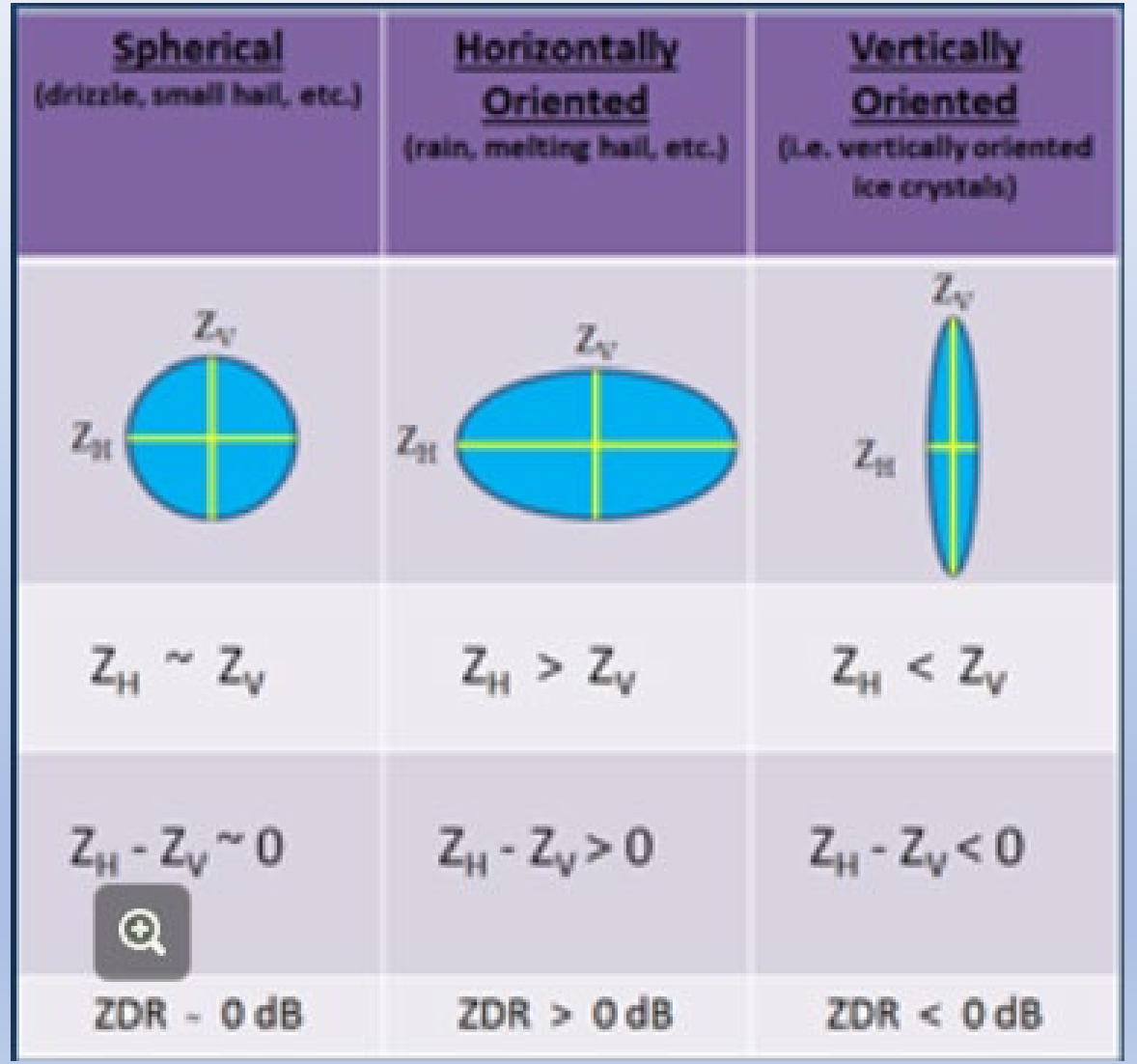
This is the relationship between the vertical and horizontal cross sections of our targets. The term ZDR is used a lot in dual polarization topics.

Do not do the with the “Additional Info”, it is about AWIPS use

Points to focus on are:

What is Differential Reflectivity (ZDR)?

https://training.weather.gov/wdtd/courses/rac/products/zdr/story.html



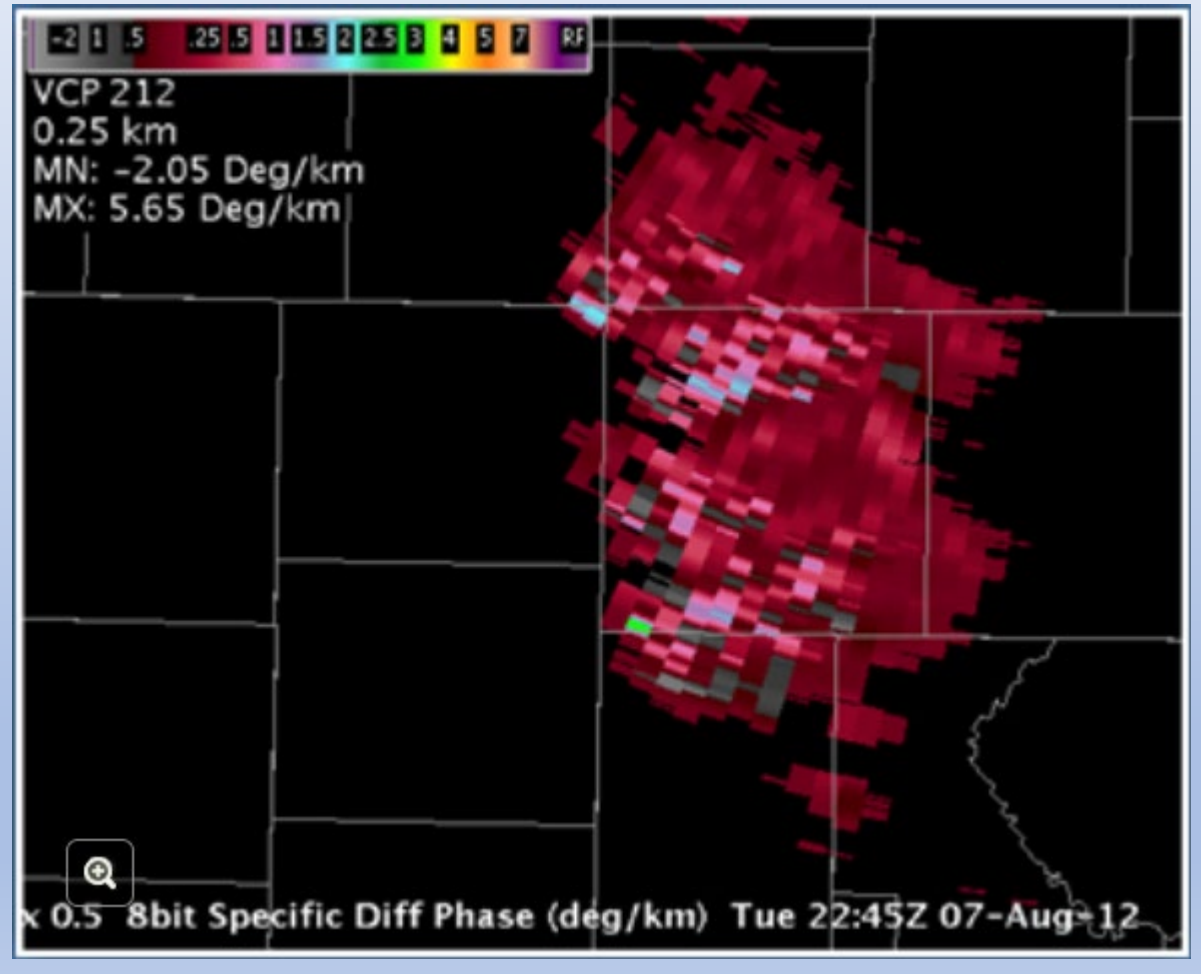
Specific Differential Phase (KDP)

The relationship between the vertical and horizontal phase shifts created by targets

Do not do the with the “Additional Info”, it is about AWIPS use

Points to focus on are:

What is Specific Differential Phase (KDP)?



https://training.weather.gov/wdtd/courses/rac/products/kdp/story.html

Do not do the with the “Additional Info”, it is about AWIPS use

The End