

# Tornado Detection Lab

## Summary

Students will apply the Doppler velocity relationship to Doppler radar imagery and use this relationship to determine where a tornado is on radar imagery.

## Group Size

Small Groups

## Materials

### FOR TORNADO TRIVIA:

- Tornado trivia sheets (3 for each team)
- Tornado trivia questions (can be aloud or projected on the board)
- Small prizes/candy for the winners

### FOR THE LAB:

- Tornado lab
- Colored pencils or crayons
- Tornado radar images

## Background for Teachers

The Doppler effect occurs with sound or light waves interacting with moving objects. The frequency of the wave appears to be higher when an object is approaching and lower as it recedes.

Doppler radar sends out pulses of (radio) waves and the response that comes back when the radiation bounces off a target (raindrop, bug, hailstone . . .) can tell you several things: how many "targets" there are, how big (approx) they are, how fast they are moving, and if they are moving (radially) towards or away from the radar. The last item is crucial for tornado detection/rotation detection in storms. A tornado, from the viewpoint of a radar, is an intense juxtaposition of "coming towards" and "going away" as it spins. This is evident in radar imagery as a strong "yin-yang" shaped couplet of high velocities of opposite signs.

## Student Prior Knowledge

The Doppler effect, definition of velocity, basic understanding of tornadoes.

## Instructional Procedures

### TORNADO TRIVIA:

This is intended to be like "pub trivia." Assemble the class into teams of 3-5. Allow each team to pick a name. Hand out three answer sheets to each table. There will be 3 rounds of 5 questions each. Project the questions (in Trivia PDF) on the board and/or read them aloud. Questions can be modified for simplicity. After each round, collect the sheets and determine a winner.

### FOR THE LAB:

Now that tornadoes have been "introduced," have a student explain the concept of the Doppler effect. Introduce radar imagery and explain briefly how radars work. Take the explanation one step further to relate the Doppler effect to the VELOCITY product. Have 2 students come forward to demonstrate a tornado spinning, and with utmost patience, get the class to guess how a radar would see a tornado. Once the "going away" and the "coming towards" pairing has been made, show the velocity imagery on the board. Have different students come forward and circle the tornado locations on the projected

radar images. Have them then fill out the tornado lab (coloring necessary on reverse page).

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