Name: **Date:**

Activity 3.5.2
Doppler Radar in a Shoebox
"Velocity (Doppler) Mode"

Objectives:

To create a model to simulate storm tracking by modern weather radar.

To transform a concealed 3-dimensional shape into a full-color, 2-D image using a color key corresponding to that used by professional meteorologists.

To use the model to distinguish between areas of storm intensity (precipitation levels) and internal air circulation.

To use the model to predict the direction and movement of a storm system.

Materials, per student team (for both Activity 3.5.1 and 3.5.2):

- 1 shoe box with lid
- Tape
- Glue
- Assorted materials of varying hardness (rocks, styrofoam, cardboard, marshmallows, foam rubber, crumbled aluminum foil, Play Doh, etc.)
- Metal coat hangers (cut and bent straight), knitting needles or wooden skewers
- Awl, leather punch or other sharp object to punch holes in the shoe box lid (caution in appropriate use)
- Crayons or colored pencils
- Activity 3.5 Worksheet (grid for box lid)

Procedure for Activity 3.5.1 — Reflectivity Mode:

A. Follow the set-up instructions (steps 1-5) and procedures for Activity 3.5.1 but this time use materials of only *two* types of hardness. For simplicity's sake, in one small section of the shoebox arrange the harder materials in a semi-circular (half-moon) pattern on one half of a relatively small circular area and the softer materials in a semi-circular pattern on the opposite half of the area. Remember that air circulation due to low pressure within a storm in the northern hemisphere is counter-clockwise and inward in direction.

B. In the equivalent of steps 6-10, use green to represent the softer materials (hardness of 1 or 2) and use red to represent the harder materials (hardness 3 or 4).

IMPORTANT NOTE TO TEACHERS AND STUDENTS:

Since we're simulating the velocity (Doppler) mode of weather radar, the colors in the resulting patterns have different meanings than used in the reflectivity mode. In the velocity (Doppler) mode, red represents air moving away from the radar source and green shows air flowing towards the radar source.

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C. In the velocity (Doppler) mode, vorticity (rotation of air within a storm) can be identified by red representing air moving away from the radar, and green showing air flowing towards the radar. When both green and red appear side-by-side within a storm on the Doppler image, this suggests a rotating column of air, the surest signature of a developing tornado.

D. Your challenge is to locate the direction of the radar source in each storm model and label it on the second grid. Compare and contrast your radar models to WSR-88D images found on the Internet.