1. The visible satellite image for 2240 UTC 22 May 2011 for the se KS/ne OK/sw MO/nw AR region is given above.
   a. The somewhat circular cloud arc indicated by the letter A is a portion of the _anvil_____ of the Joplin tornadic supercell. (9 pts)
   b. The textured area indicated by the arrow from the letter B represents a portion of this thunderstorm that has ascended into the stratosphere. This is known as an _overshooting top_____.(9 pts)
KSGF (Springfield MO) 1/2 degree reflectivity (left) and storm relative velocity (right)
2. (Extra Credit—Either you get it right or you don’t, no partial credit. Full sentences on the back, and no credit unless you explain carefully) How does the motion/track of the Joplin tornado correspond (or not correspond or both) to the motion of the thunderstorm you’d expect based upon your answer to Homework 8. (20 points)

The expected motion of the Joplin thunderstorm (from Homework 8) would correspond at least initially to the 500 mb wind flow (as a storm track), or about 40 knots from southwest to north east. The tornado motion does appear to correspond to that for most of the track, but is more westerly than southwestely, and then takes a final turn to the south.

3. The paired radar image above shows the \( \frac{1}{2} \) degree reflectivity and the \( \frac{1}{2} \) degree storm relative velocity plots from the KSGF radar at 2243 UTC, the time when the tornado itself was entering its most intense phase.
   a. On the reflectivity images, identify the meteorological significance of the areas indicated by the Locations.
   Location A _____ Debris ball or probable location of tornado__________
   Location B ______ hook
   Location C ____ Forward Flank Downdraft or FF Rain Area_______
   b. On the storm relative velocity image on the right, four radials from the radar site (off to the northeast) are drawn. With arrows, indicate
the sense of the motion vectors right at the locations D, E, F, and G, indicating the relative magnitude by the length of the arrows.

c. On the storm relative velocity image on the right, four radials from the radar site (off to the northeast) are drawn. What is the magnitude of the motion (in knots) either to or from (indicate which) the radar at locations D, E, F, and G
Location D ________35 kts inbound______________________________
Location E _______95 kts inbound______________________________
Location F ____120 kts outbound______________________________
Location G ______25 knots outbound____________________________

d. On the storm relative velocity image on the right, the sharp color shift between locations E and F indicates the location of the center of the center of mesocyclone (tornado vortex signature)______________________________. (The answer here is NOT “tornado” but there are two possibilities that could be equally correct.)