ATMO 489
Radar Meteorology

Laboratory #8
11/6/06
Doppler (Radial) Velocity Interpretation

Due: By beginning of next lab

(40 points)

1. (24 points) In order to gain practice in interpreting complex three dimensional flow patterns in and around precipitation from single Doppler radar data, Doppler radial velocity patterns along a plan position indicator (PPI) scan (i.e., fixed elevation angle and varying azimuth angle) have been simulated from simplified horizontal and vertical wind field patterns (Brown and Wood 1987)[1].

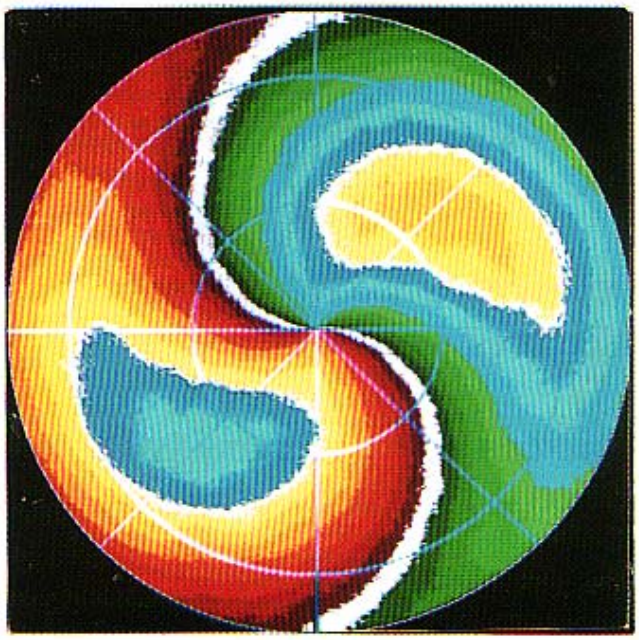
You can assume that each simulated PPI scan was taken at a low elevation angle (e.g., ≈ 1°). The radar location is at the center of the display. The light blue lines are circles of constant range. Each range ring is about 50 nm (92.6 km) from the radar. The PPI scan samples up to about 24,000 ft (7.3 km) in height and about 124 nm (230 km) in range. (See slide 14 in lab 6 notes) Unless otherwise noted (e.g., 1d), a complete PPI scan is shown (i.e., 360° in azimuth).

Negative Doppler velocities (blue-green color) in knots (kts) are toward the radar and positive (yellow-red) are away from the radar. For your reference, the radial velocity color bar for each PPI scan below is.

Sketch and qualitatively describe (in your own words) the wind field inferred from each PPI scan of radial velocity. You can sketch *approximate* vertical profiles (i.e., magnitude and direction) OR the plan view (i.e., wind barbs on the plane of the PPI scan) of the wind field as shown in the examples from our lab notes.

[1] Brown, Rodger & Vincent Wood, 1987: A Guide to Interpreting Doppler Velocity Patterns, NSSL, Norman OK.

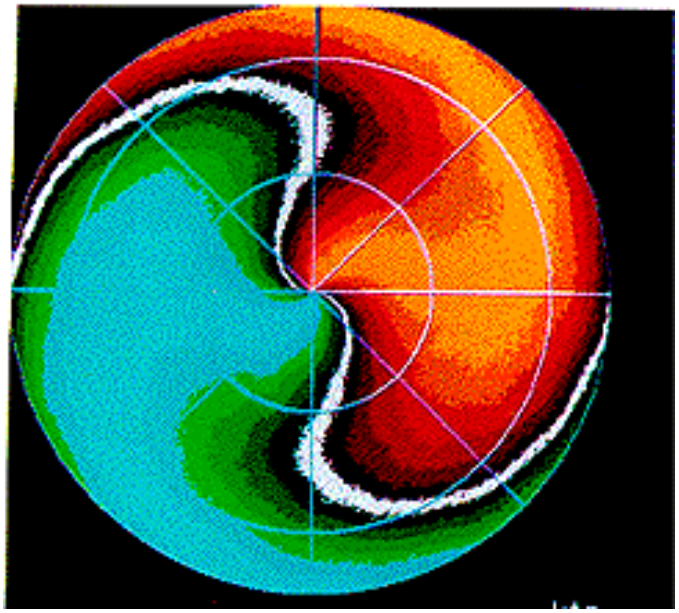
A. (4 points)



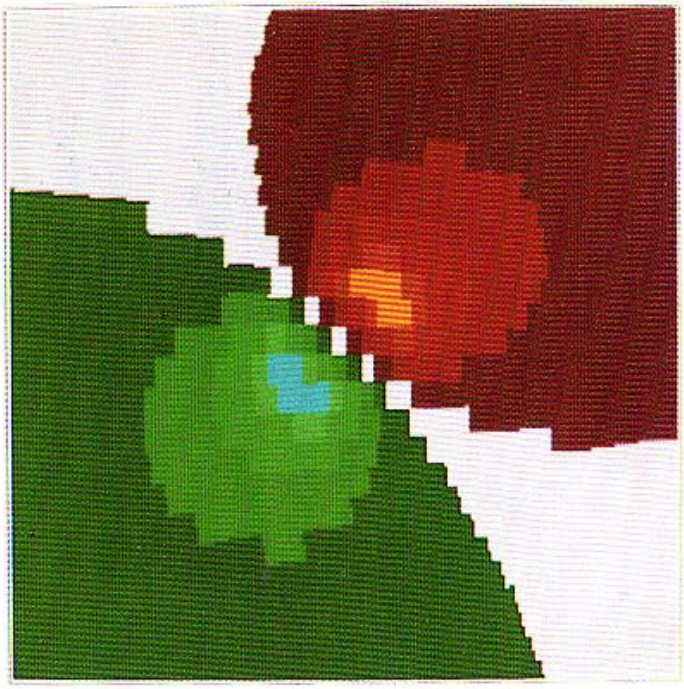
B. (4 points)

C. (4 points)

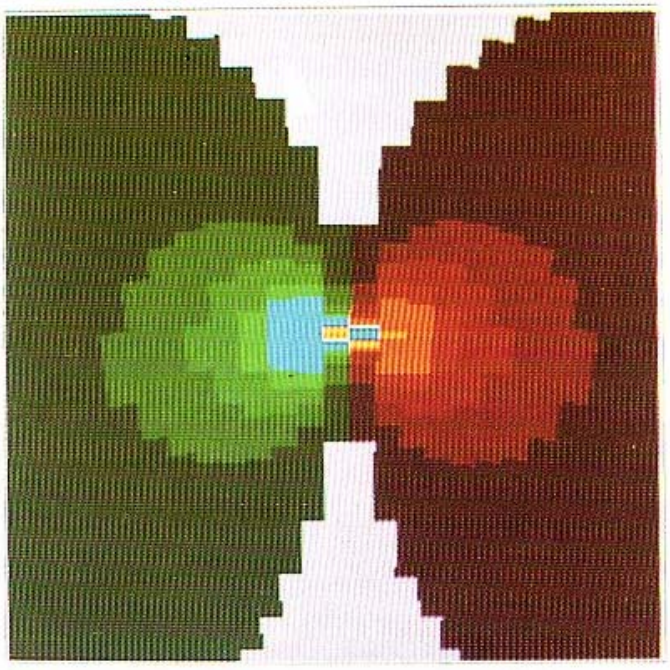
D. (4 points)



E. (4 points) The following image is a small portion (27 nm x 27 nm) of a low level PPI scan that is zoomed in on a particular velocity feature of a severe convective storm that is to the north of the radar (see slide 13 in lab notes).



F. (4 points) The following image is a small portion (27 nm x 27 nm) of a low level PPI scan that is zoomed in on a particular velocity feature of a severe convective storm that is to the north of the radar (see slide 14 in lab notes).



2. (16 points)

Use *the NCAR-RAP Real Time Weather Data* web site for viewing this morning's Weather Surveillance Radar – 1988 Doppler (WSR-88D) Doppler velocity and radar reflectivity (factor) data –

NCAR RAP:
http://www.rap.ucar.edu/weather/radar/

Select End date: 06 Nov 2006 (or "today" during the lab day.)
Select End time: 1600 UTC
Select Loop duration: 4 hours

Note – This NCAR-RAP archive maintains the WSR-88D data for 6 days and then it is gone. Please plan accordingly for completing this lab!

a. (3 points) Select 0.5° reflectivity (PPI) for KSHV (Shreveport, LS) WSR-88D and loop all PPI images. Describe what you see, including the structure of the precipitation system.

b. (3 points) Select 0.5° (radial) velocity (PPI) for KSHV WSR-88D and loop all PPI images. Describe the velocity pattern that you see, focusing especially on the large scale pattern.

c. (4) Using the KSHV radial velocity loop only, speculate on the synoptic feature(s) that might be causing this wind pattern. Be sure to justify your answer with the available data and your knowledge of Doppler velocity patterns.

d. (4 points) Using any Internet available weather observations and analysis, verify your answer from part c above. Provide the sources (e.g., web addresses) of your data and explain how the weather observations and/or analysis either confirms or rejects your speculation regarding the wind pattern based on the KHGX velocity data. Make a plot of the best observation/analysis and hand in with your assignment.

e. (2 points) When looping the velocity PPI data, the purple areas are marked by RF (range folding). Define and describe range folding. Explain the impact of RF on interpreting the Doppler velocity data and short-term prediction of weather.