Lab 1: Scalar Analysis

Objective: We will begin to apply the concepts of scalar analysis. In today's lab, you will analyze a 500 hPa and a 300 hPa chart.

Materials: A No. 2 black pencil, eraser, colored pencils.

Procedure:

1) Review the handout on scalar analysis that was handed out earlier.
2) Beginning with the 500 hPa chart:

   What is the range of 500 hPa geopotential heights?

   Determine what contours you will be drawing, using the handout as a guide. Note that the map contours may lie outside of the values listed on the handout, however you still need to contour those values.

   Begin by using your No. 2 black pencil, lightly draw isohypses using a contour interval of 60 meters. Use your eraser frequently. Finalize your isohypses using a black colored pencil.

   Tip: Recall the geostrophic wind concepts, and that the height gradient is directly proportional to the wind speed.
3) What is the temperature range on the 500 hPa chart?

   Now add isotherms using a contour interval of 2°C. Begin by using your No. 2 black pencil, drawing lightly, and using your eraser frequently. Finalize isotherms using a red colored pencil.

4) Make sure you label all high and low height centers using an 'H' (blue) and 'L' (red), respectively, and all contours.
5) Make sure you label all warm and cold centers using an 'W' (red) and 'C' (blue), respectively, and all contours.
6) Now do the following using the 300 hPa chart:
   What is the range of 300 hPa geopotential heights?

   Determine what contours you will be drawing, using the handout as a guide. Note that the map contours may lie outside of the values listed on the handout, however you still need to contour those values.

   Draw isohypses using a contour interval of 60 meters. Begin by using your No. 2 black pencil, drawing lightly, and using your eraser frequently. Finalize your isohypses using a black colored pencil.

7) Now add isotachs using a contour interval of 10 kts. Finalize isotachs using a color of your choice. Shade all values above 65 knots, using different color shades (of your choice) for different contour intervals.
8) Make sure you label all high and low height centers using an 'H' (blue) and 'L' (red), respectively, and all contours.
9) Station KOUN also reported a 1000 hPa height of 132 meters valid at the same time as your maps above. Answer the following:

   What is the 1000 hPa to 500 hPa thickness at KOUN?

   What is the average virtual temperature in the 1000 hPa to 500 hPa layer?

   Suppose the 1000 hPa to 500 hPa thickness was 5400 meters. What would the average virtual temperature be?

10) Write a paragraph discussing the important upper-level weather features you have analyzed. In your discussion, also describe and justify what you think the weather conditions are at the surface in relation to the 500 and 300 hPa level analyses.

This lab is due at the beginning of class on Monday 8/27.