453 Lab: CAPE, CIN, DCAPE, Cap Strength, BRN and Hodographs
Due: Thursday, April 3, 2003

- Use the attached sounding data. Plot the data on a skew-t diagram. You are working in groups, and will thus receive a grade as a group.

**CAPE**
- Using the sounding data and create a method for finding the CAPE of that sounding. There is more than one way to do this. Look in your course reader for examples of methods.
  - Explain your method for calculating the CAPE. Did you use text data or a plotted sounding? Why? Your explanation should be written so that if I didn't know how to calculate CAPE, I could do so by following your example.
  - Include all calculations and/or spreadsheets you may have used.
  - Does your value agree with the value calculated on the sounding data? Why might your value be different?
  - Based on the CAPE, what could be the maximum speed of the updraft?

**CIN**
- If you wanted to calculate the convective inhibition rather than the CAPE, what would you do differently?
  - What is the CIN for this sounding?
  - What sort of vertical motion would be needed to overcome that amount of CIN?
- Shade in areas of CAPE and CIN on your skew-t in different colors.
DCAPE
• Determine what level you wish to start your downdraft from. What reasoning did you use in making this decision?
• Shade in the DCAPE region of your skew-t. (Note: DCAPE may overlap some of the area already shaded, so you may need to develop a creative coloring scheme.)
• Estimate the amount of DCAPE on the sounding.
• Based on your value for DCAPE what is the maximum possible downdraft speed that could occur? Why might this estimate be different from observed downdraft speeds?

CAP Strength
• Is there an inversion capping the boundary layer?
• What is the strength of this "cap"?
• What is the convective temperature? Is it feasible that the surface would reach this temperature?
• Why is the cap strength important in determining whether severe weather will occur?

Hodograph and Helicity
• From the same sounding, plot the winds on a hodograph.
• What is the value of helicity from the sounding? How is this value related to the hodograph? (i.e. How would the hodograph look different for higher or lower values of helicity?)
• When considering severe weather, how does this value for helicity compare with the value you obtained for CAPE?
• What value would you get on the Energy-Helicity Index?

Bulk Richardson Number
• From the sounding, what is the BRN value?
• How is this value related to potential for supercell development?
Using what you have learned about CAPE, CIN, DCAPE, helicity, cap strength, and BRN:

- If the information on this sounding was the only information you had, how likely do you think it is that severe weather will develop?
- If severe weather were to develop would you expect it to be air mass thunderstorms, a squall line, or supercells? Why?