ENVS 110 The Earth's Climate – Atmospheric Lapse Rates

We talked about adiabatic lapse rates in class and in this exercise you will compare an actual temperature profile to the predicted adiabatic lapse rate. Before you begin this exercise you should review the appropriate paragraphs on adiabatic and atmospheric lapse rates in the textbook

You can look at live temperature data from the Mt. Washington Auto Road at

http://www.mountwashington.org/weather/arvp/

Mount Washington (in the Presidential Range in New Hampshire) is the highest hill in the eastern United States and the site allows you to obtain temperature and relative humidity data from five weather stations between 1600ft and 6288ft (the summit of Mt. Washington).

1. Go to the website and create a table that shows how air temperature and relative humidity change with elevation. Make sure to write down the date and time of your observation.

2. Create a graph of temperature vs. elevation as well as relative humidity vs. elevation. Where do you think clouds (if any) start to form? Can you estimate the dew point from your graph?

3. Now add the adiabatic lapse rate to your graph. Start out with the temperature at 1600 ft and decrease air temperature by 5.5°F for every 1000 ft of elevation gain. Does the actual temperature profile follow the adiabatic lapse rate? If not does temperature decrease more or less rapidly with elevation?

4. If applicable, can you explain the differences between adiabatic lapse rate and actual temperature variations ?

5. Now go to your favorite weather site and check out the dew point for the Bretton Woods ski area or some other weather station close by (e.g., Gorham NH). Does it agree with your dew point estimate from 1. ? When will form, when air temperature drops below the dew point 9i.e. rel. humidity reaches 100%) or when air temperature comes close to the dew point (i.e. relative humidity approaches 100%) ?