EVST201a/G&G 140a

The Atmosphere, Ocean and Environmental Change

Problem Set #4 (Due Friday Oct 7)

1) Explain the approach to saturation for
   a) Radiation fog
   b) Cloud chamber in class
   c) Tornado
   d) Altostratus cloud
2) Explain why most clouds do not precipitate. How long would it take a cloud droplet to fall to earth?
3) If T=10C and RH=80%, estimate the partial pressure of water vapor. What is the dewpoint?
4) Define and describe three cloud types: altostratus, nimbostratus, cumulonimbus.
5) Describe the physical processes that could cause snow. Be systematic in your discussion. Sketch the cloud system.
6) Describe the physical processes that could cause freezing rain. Be systematic in your discussion. Sketch the cloud system.
7) Estimate the monthly amount of evaporation from a moist vegetated surface if the average temperature is 15C. (use the approximate formula from lecture)
8) If a thunderstorm drops 2 cm of rain over an area of 10 by 10km, determine the amount of latent heat released inside the cloud. (Hint: $L = 2.5 \times 10^6 \, J/kg$)
9) What is the fundamental difference in the energy source between a hurricane and a mid-latitude frontal cyclone?
10) Compute the magnitude and direction of the Coriolis Force acting on a 1000kg car driving towards Hartford from New Haven at 60mph.
11) If the sea-level pressure increases towards the east at a rate 1mb per 200km, what is the direction and speed of the wind in the free atmosphere? What assumption have you made?
12) Examine the national composite weather radar picture by going to the website http://radar.weather.gov/Conus/index_lite_loop.php. Then zoom into a region of the country with strong radar echoes. Describe what the radar echo represents physically. Describe the weather system giving the echoes. Attach a print of the zoom image to your report.
13) Examine a 500mb weather map by going to http://www.rap.ucar.edu/weather/upper/upaCNTR_500.gif
    What do the solid lines, dashed lines and barbs represent? Is there a general relationship between isobar (or isoheight) spacing and wind speed? What physical law controls this relationship. Why do the winds run parallel to the isobars? Attach the map to your report.