San Francisco State University
ERTH 260

Name _____
Spring 2018

In-class Exercise 2: The Significance of the Dew Point Temperature

100 points
Due Wednesday 7 February 2018

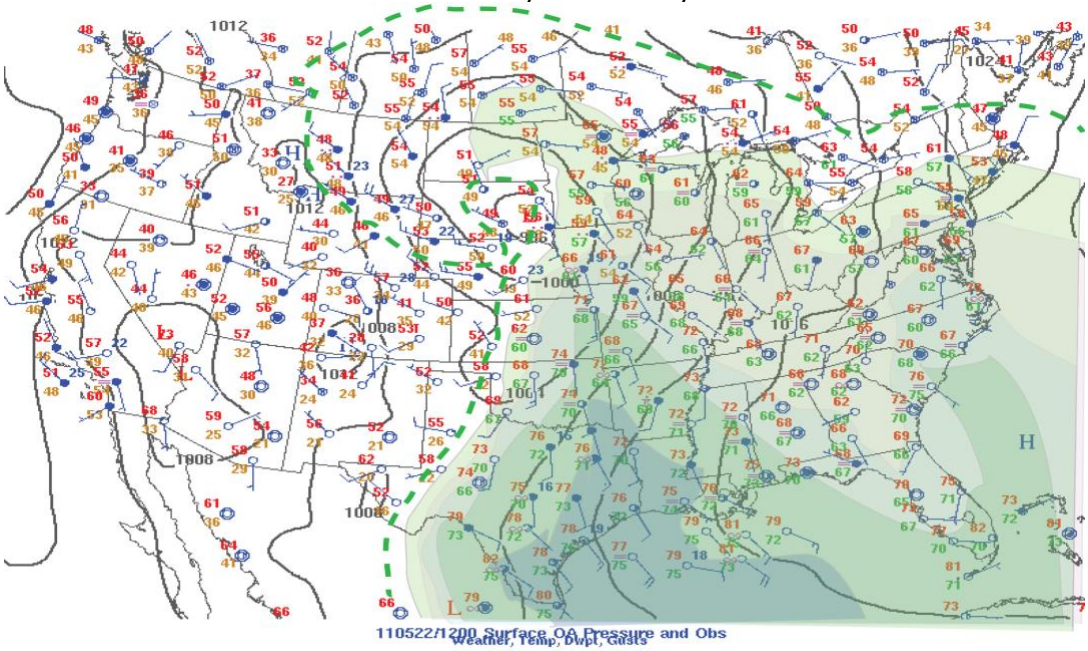

Figure 1: Surface weather map with dew points (F) plotted in green numbers for 12 UTC 22 May 2011. Contours are at 5F intervals with 50F on the outer dashed contour and 75F or greater in the darkest green shaded area.

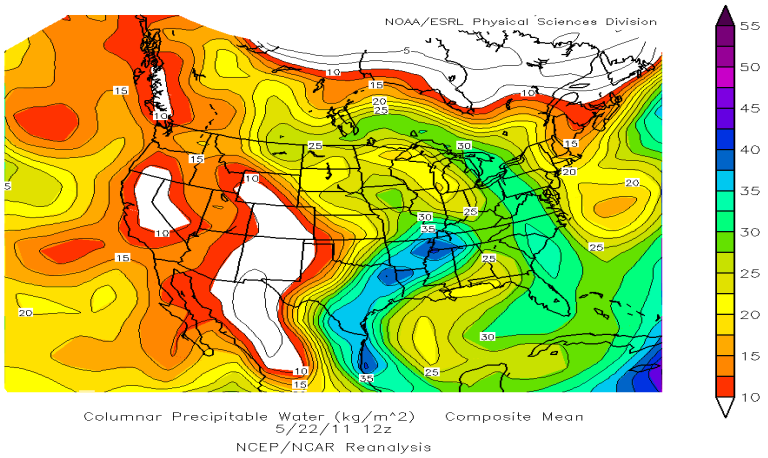

Fig. 2: Precipitable Water plot for 12 UTC 22 May 2011.

1. To what extent do these two charts illustrate the general rule of thumb "...the higher the dew point temperature, the greater the amount of water vapor present." Comment in detail. Your answer should be paragraph length and consist of four or five complete sentences that relate what we talked about in class to Figs. 1 and 2. (30 points)

2. Meteorologists often make the connection between areas of high water vapor and cloudiness/ precipitation, for obvious reasons. We have not yet begun to discuss the ways in which water vapor can be converted to clouds/precipitation. But examine the infrared satellite image of the United States shown below. Also, look at the concept diagram below that.

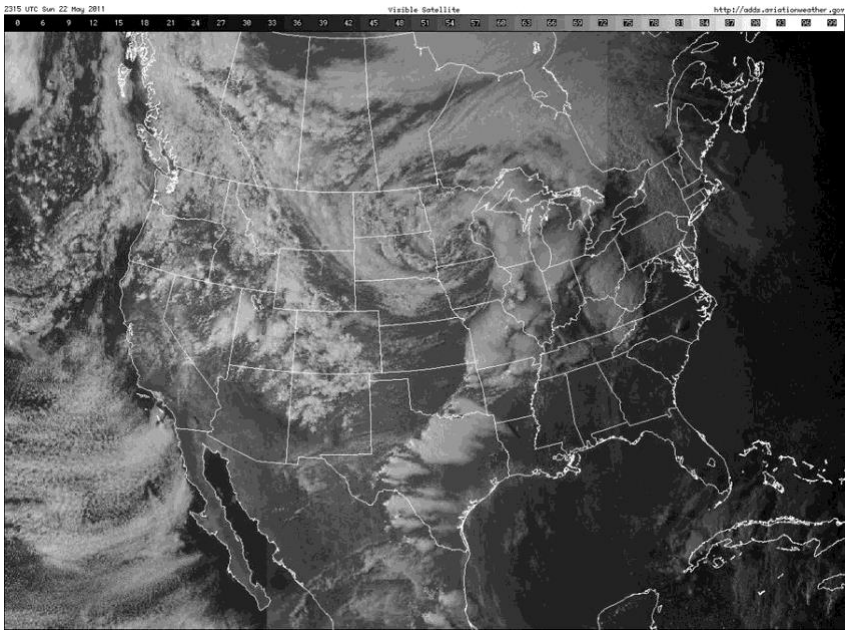

Fig 3. Visible Satellite Image for 2351 UTC 22 May 2011.

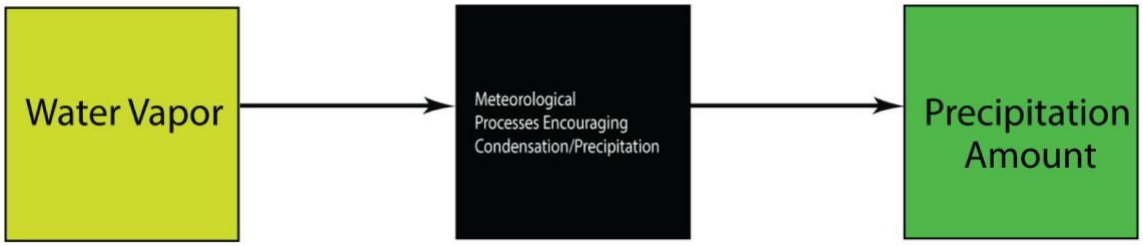

Fig. 4. Concept diagram showing the conversion of water vapor to clouds/precipitation, without worrying about the processes that perform this function.

To what extent is the assumption that the location of areas experiencing large amounts of water vapor also are experiencing clouds and precipitation correct in this case. To answer this, assume that the coldest cloud tops are producing precipitation, and mention at least two areas on the satellite image paired with the same areas on the the precipitable water and dew point images in Figs. 1 and 2. Your answer should be paragraph length and consist of four or five complete sentences. (20 points)

3. We will now examine the concept diagram's (Fig. 4) implications about the relative strength of the factors in the middle box if we know something about water vapor amounts and precipitation amounts. (50 pts)

Access the following website: https://www.esrl.noaa.gov/psd/data/composites/day/.

Make the following choices (if not indicated below, just leave the default values)

- Variable: Precipitable Water
- Analysis Level: Surface
- Date: 2017 01 08
- Shading Type: Shaded w/overlying Contours
- Scale Plot Size (%): 150
- Region of the Globe: Custom
- Lowest Latitude: 5; Highest Latitude 55
- Western most Longitude: 200; Eastern most Longitude, 250.

A. The program will take a few seconds and return a graphic.
    i. Do this at home so you can save the graphic to your desktop or harddrive and print it out and attach it to the lab when you turn it in. (15 pts)
    ii. Describe the qualitative aspects of the pattern in a couple of sentences.(5 pts)

B. Now leave everything as before, except choose as the variable: Precipitation Rate. The program will take a few seconds and return a graphic.
    i. Do this at home so you can save the graphic to your desktop or harddrive and print it out and attach it to the lab when you turn it in. (15 pts)
    ii. Describe the qualitative aspects of the pattern in a couple of sentences.(5 pts)

C. What inferences can you make about the location of the meteorological processes that form clouds and precipitation for this case? (10 pts)