

**ERTH 260: Inclass Exercise #5**  
**Working With Weather Maps and Soundings:**  
**Finding Pressure Features and Fronts**  
**Due Wednesday 28 February 2018 (100 points)**

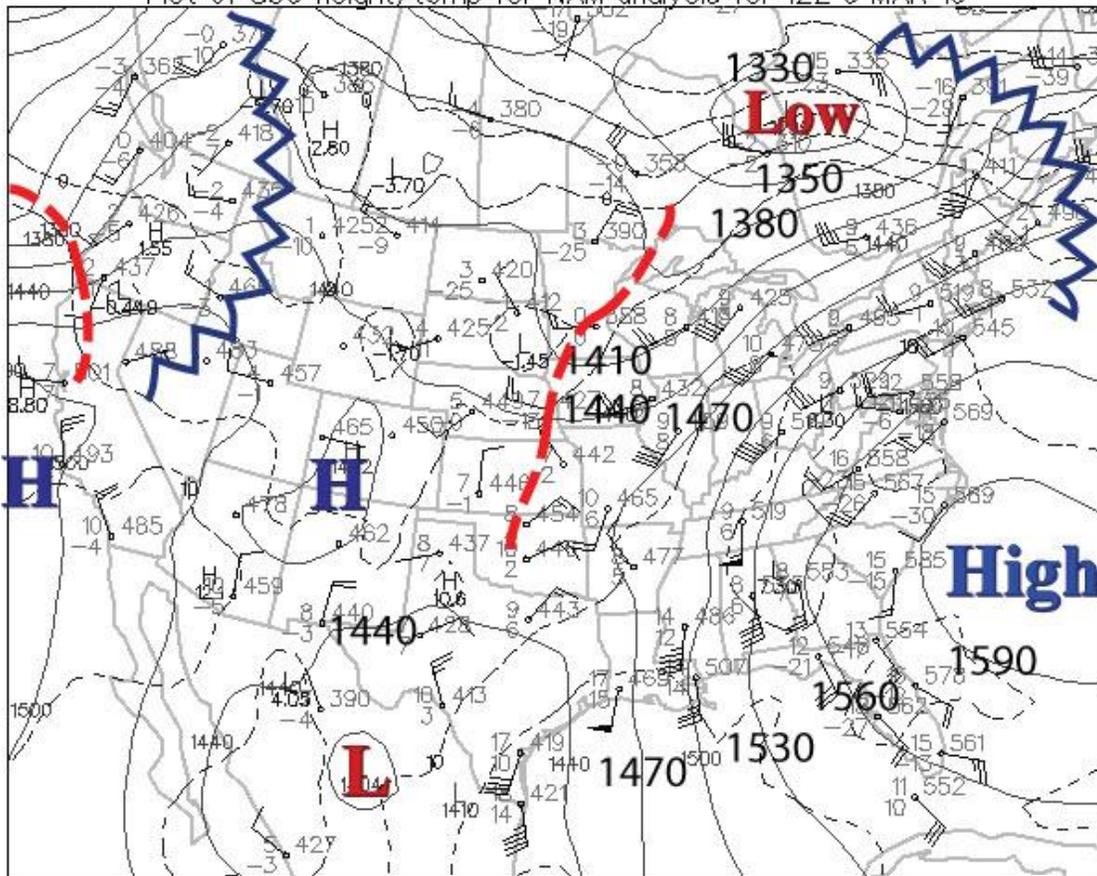
All students are to do the analyses exercises and answer the questions, but only the students indicated will be asked to explain to the class

1. Upper air charts. (15 pts):

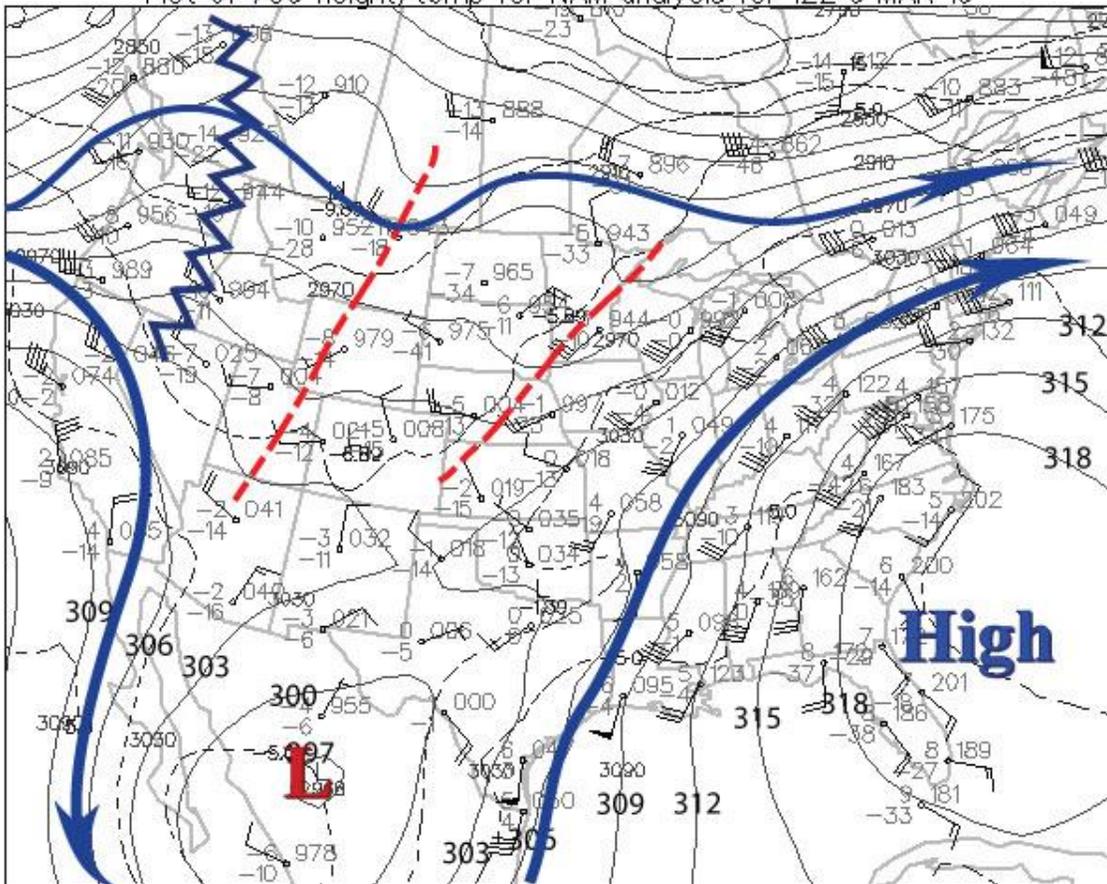
Indicate by drawing on your chart (conventionally with proper colors) the following:

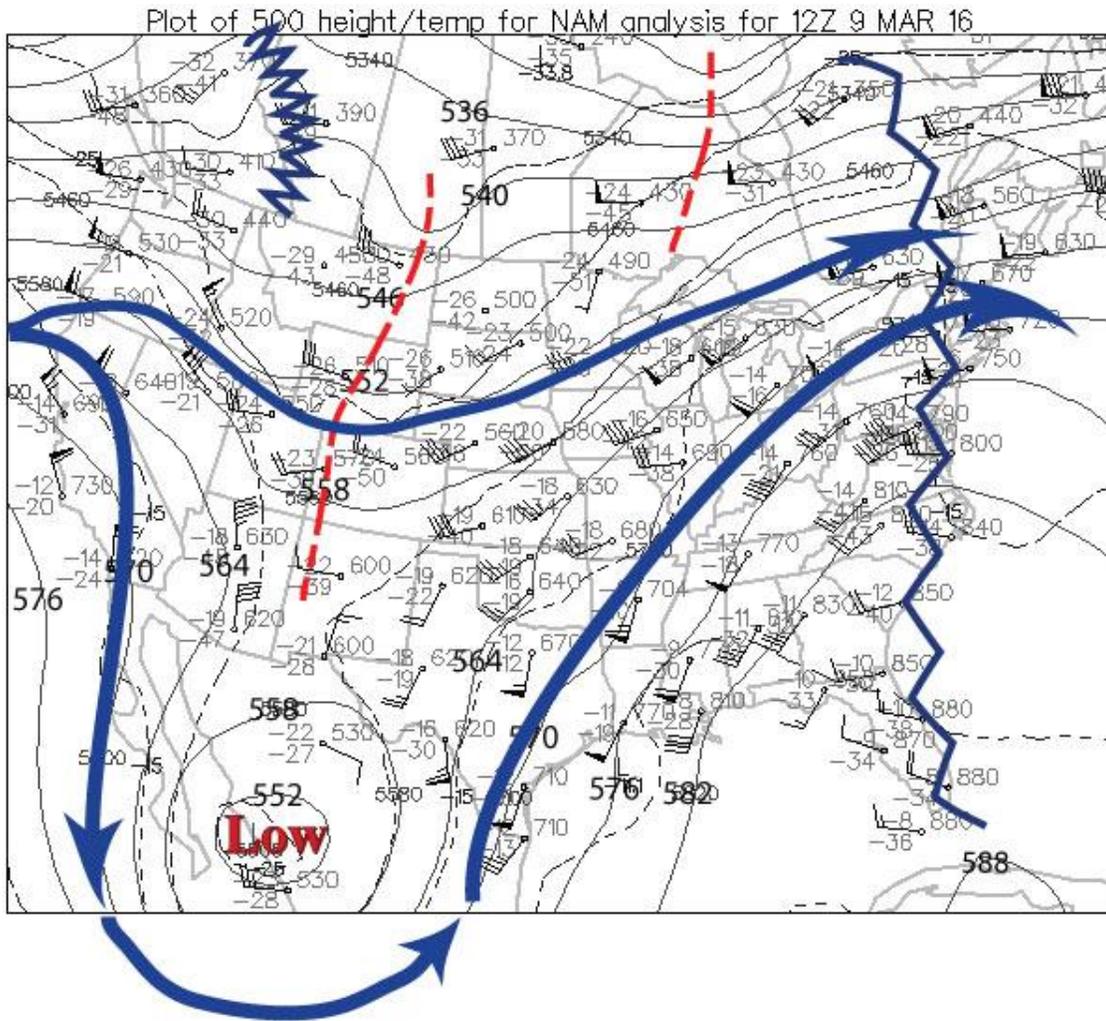
- a. 850 mb – one cyclone, one anticyclone and a trough, besides the ones analyzed; (5 pts)
- b. 700 mb - one cyclone and one anticyclone, jet stream(s); (5 pts)
- c. 500 mb – one trough, one ridge, one cyclone and one anticyclone, jet stream(s); (5 pts)

Plot of 850 height/temp for NAM analysis for 12Z 9 MAR 16



Plot of 700 height/temp for NAM analysis for 12Z 9 MAR 16

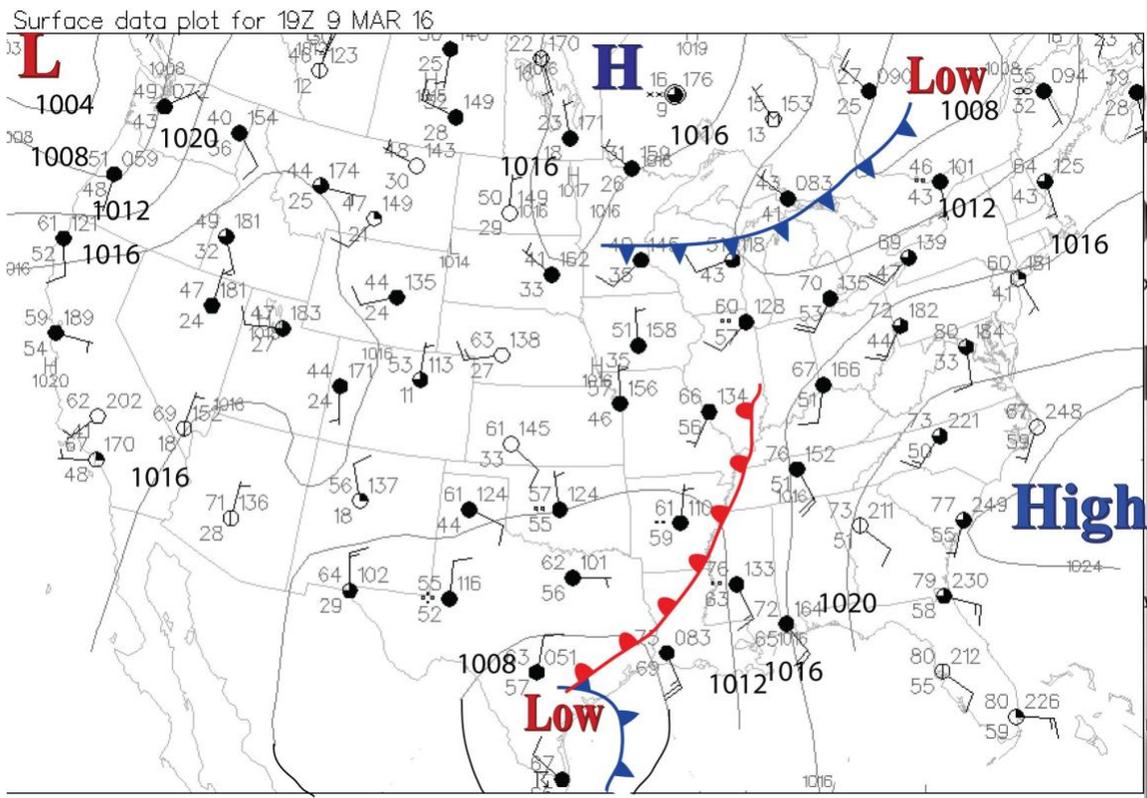




2. Surface Weather Map: Examine the attached surface weather map: (30 pts)

Note the question marks at the center of three pressure systems and the boundary indicated by a solid bold line. (30 pts)

- (a) Put values on the isobars that are unlabeled. (10 pts)
- (b) Label the boundaries A, B, and C with the correct symbols (10 pts)
- (c) Label the pressure systems indicated by question marks appropriately. (10 pts)



3. Soundings: Examine the two attached soundings. KILX is Lincoln, Illinois, and KINL International Falls, Minnesota (see map for locations). (20 pts)

(a) Explain why the soundings indicate a layer of high clouds is probably over both radiosonde sites. (5 pts)

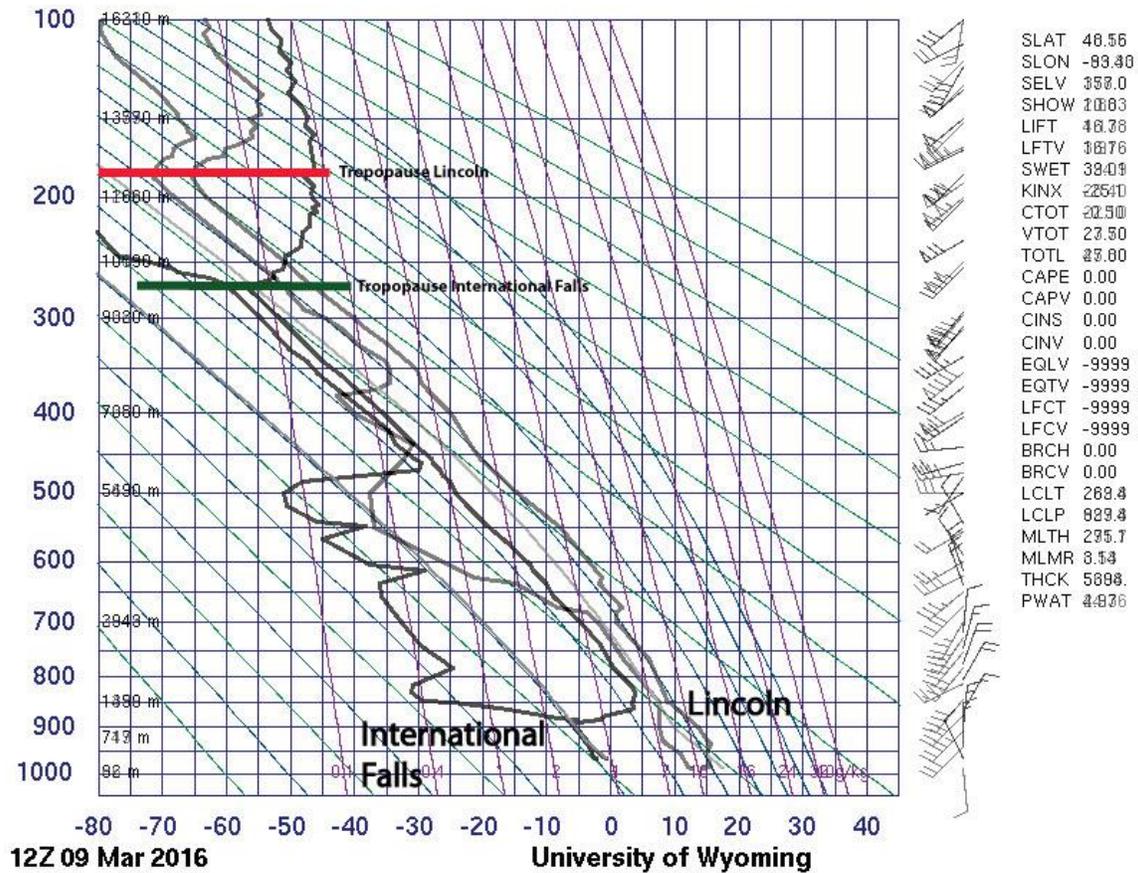
**The soundings both have a layer in the upper troposphere in which the temperature and dew point are very close together, indicating high relative humidities there. This is consistent with a layer of high clouds being present at both places.**

(b) Indicate the Tropopause on both soundings. (5 pts)

**See soundings.**

(c) The definition of a front is "...a boundary between air masses that have different temperature characteristics and that have large horizontal (~1000s km) and vertical (~through Troposphere) extent..." Comment on how the soundings suggest that there is a front between the two stations. (10 pts)

The environmental lapse rate represents the actual change in temperature with height at a station, and this is shown as the dark line on the right on the two soundings. For there to be a front between the stations, there should be a systematic difference in temperature at all elevations until the Tropopause. For the case considered here, the temperatures at Lincoln are systematically higher at all levels. Hence, there is a front between Lincoln and International Falls, and this corresponds to the surface boundary shown on the surface map.



4. Meteogram: Examine the attached meteogram for San Antonio TX (see surface map for location). The data indicates that a boundary passed through San Antonio between 06 and 07 UTC (15 pts)
  - (a) Explain how the temperature, present weather, rainfall, and wind information indicate that a front moved passed San Antonio at that time. (5 pts)

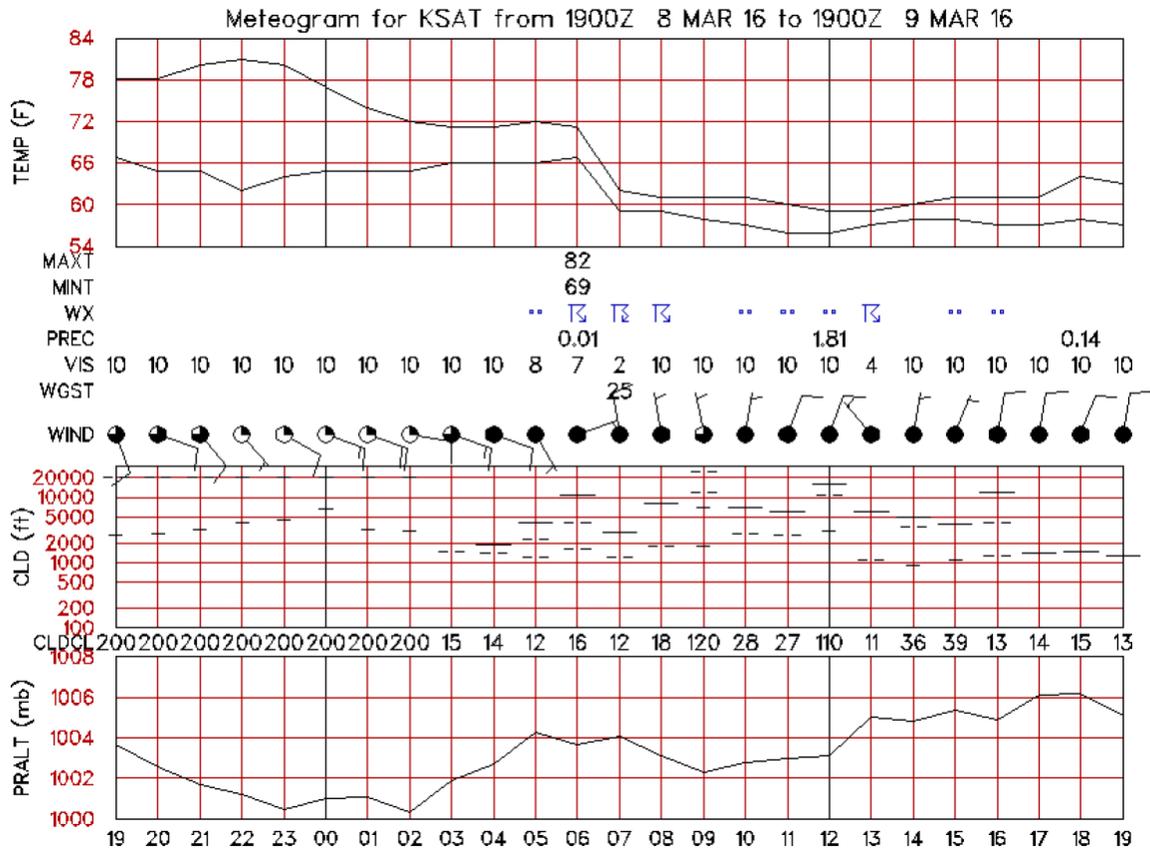
**Between 06 and 07 UTC the following occurred at San Antonio: the temperature sharply fell, thunderstorms were observed, and the wind shifted from southeast to north northwest. The temperature fall is something we'd expect with a front, since there is warm air on one side of a front and cold air on the other side. Warm air is usually associated with southerly winds and cold air with northerly winds. Normally, cloudiness and precipitation occur with fronts, and the thunderstorm observations are consistent with that.**

(b) Explain what type of front moved through San Antonio at that time, using the temperature and wind information. (5 pts)

**Ahead of cold fronts in wave cyclones, winds are generally southerly and northwesterly behind, as cold air moves in from the north. Also, temperatures should fall abruptly with the passage of a cold front. So the temperature and wind information at San Antonio is consistent with the passage of a cold front.**

(c) Explain whether your analysis of the type of front is consistent with your answer in 2(b) above. (5 pts)

**I analyzed a surface cold front off the Gulf Coast in 2(b). So my answers here are consistent with that.**



## 5. Student Presentations

Give a brief overview of what you did, using your map as illustration. Student names that are bold faced are the coordinator for the group (arbitrarily chosen and will rotate throughout semester). Presentations are on Friday 24 February, lab hour of class (20 points)

- Part 1: **Linda** (a), Allen (b) and Kellen (c)
- Part 2: **Emma** (a) (b) and Tanay (c)
- Part 3: **Nicolas** (a), Rami (b), and Cynthia (c)
- Part 4: **Yan Tung** (b) and Wyndham (a) (c)