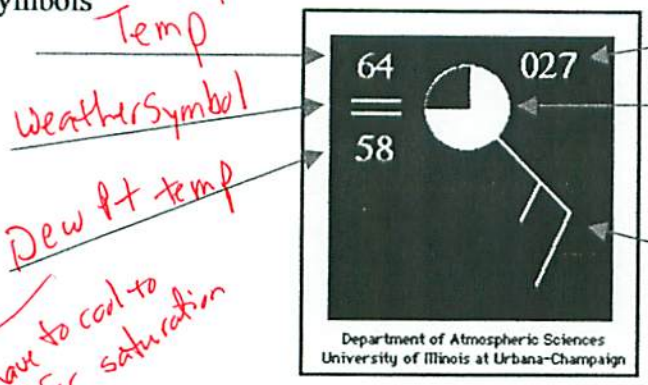
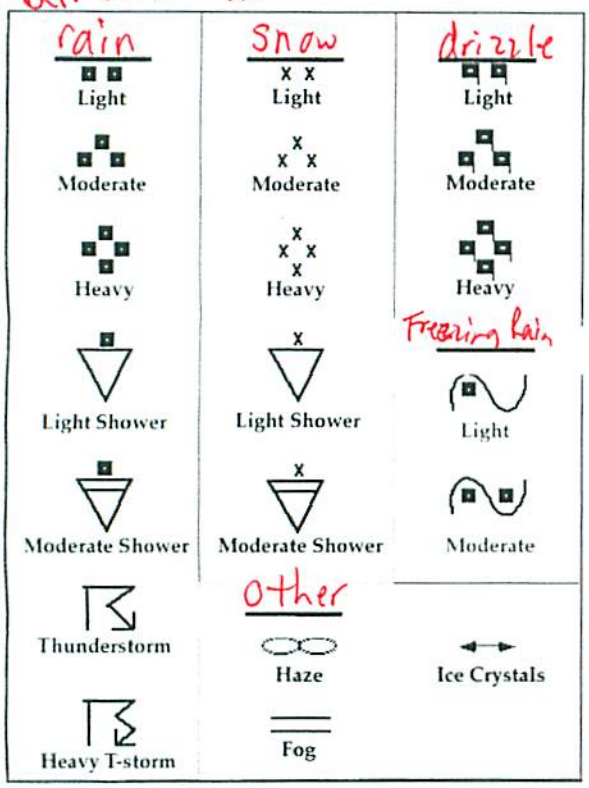
Weather Map Symbols



(1)

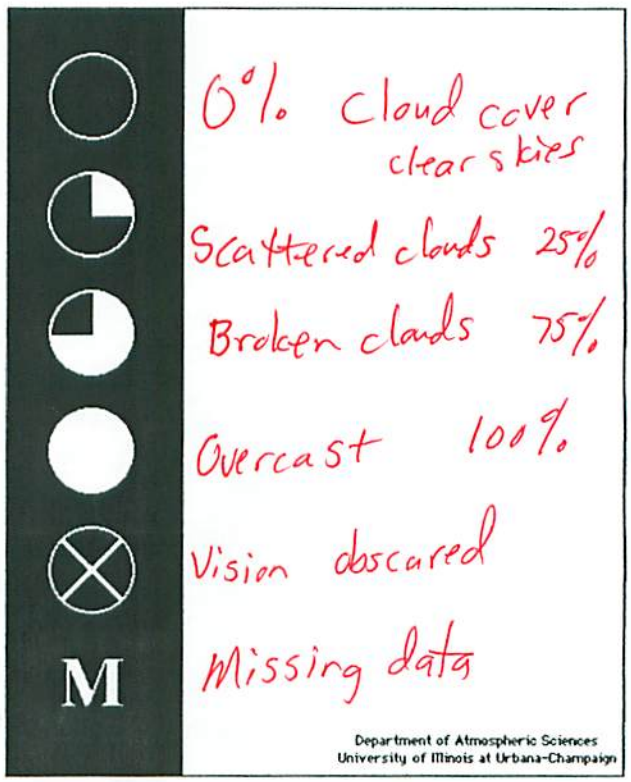
the temp air would have to cool to for saturation

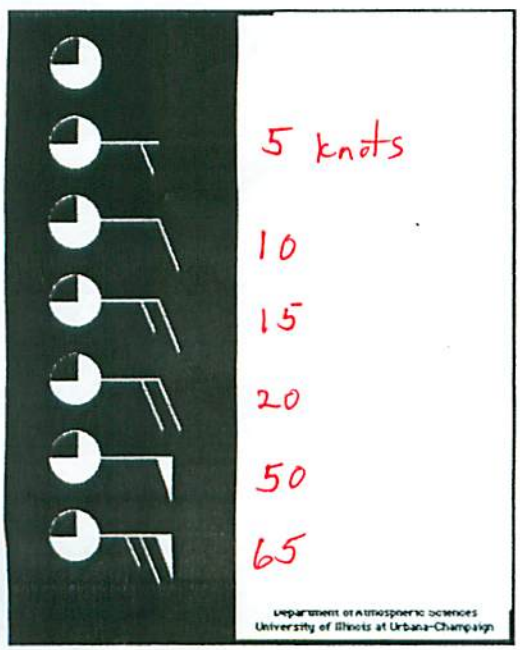


Dew point is temp air has to cool to for saturation

Relative Humidity is actual / saturation density
density

When air temperatures & dew points are close, the air has a high relative humidity which means the air almost saturated with moisture



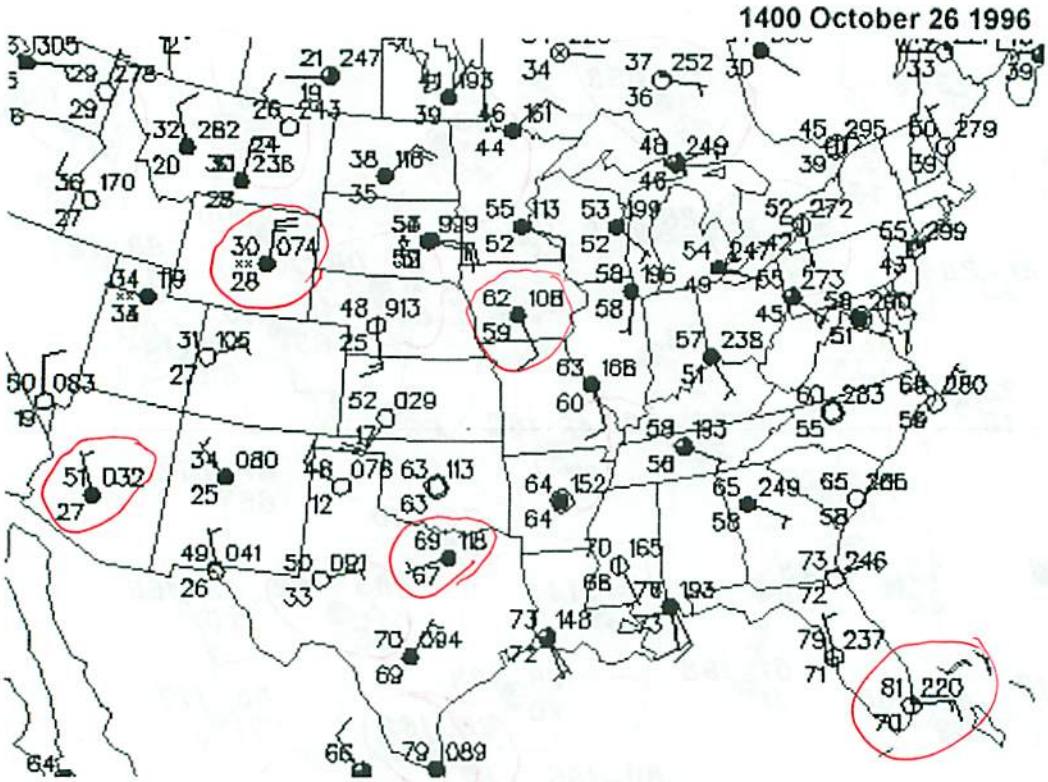


1 knot = 1.15 miles/hr

http://ww2010.atmos.uiuc.edu/(Gh)/guides/maps/sfcobs/home.rxml

2

Reporting on Weather Conditions:
Use the map of surface observations to answer the following questions.



1) What is the temperature in Des Moines, Iowa? 62 °F

2) What is the dew point temperature in Phoenix, Arizona? 27 °F

3) What is the pressure in Dallas, Texas? 1118 mb

4) What is the report of cloud cover in Chicago, Illinois? Overcast

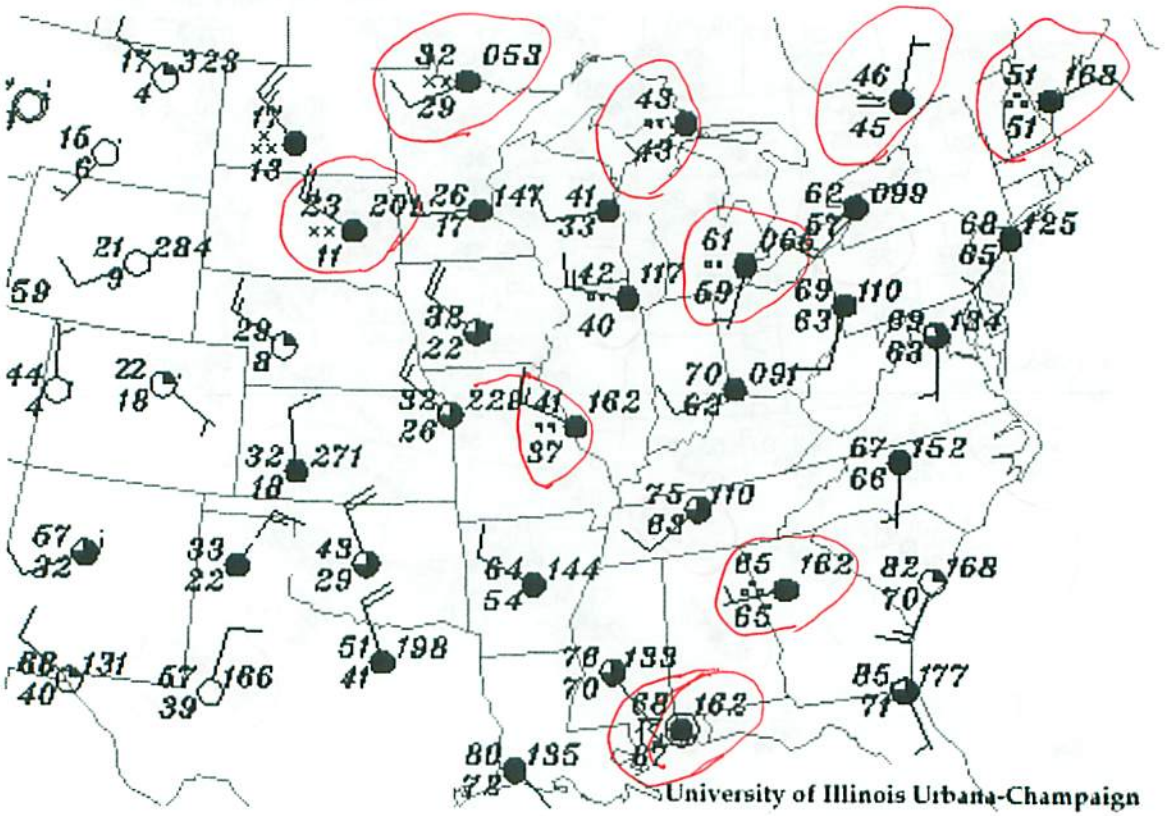
5) What is the report of current weather (weather symbol) in Casper, Wyoming? light Snow

6) What is the speed and direction of the wind in Miami, Florida? 15 knots, From east going west

3

Reporting Weather Conditions:

1) Below is a map of surface observations, and for each station that used a weather symbol in the station report, give the name of the city and the type of weather reported at that time. For each type of precipitation identified, indicate its intensity (whether its light, moderate or heavy). There are a total of 11 cities for which this data must be recorded.



Example: #1: Bismark, ND -- Moderate Snow

2. International Falls, MN light snow
3. Sault Ste Marie, MI light rain
4. Ottawa, Canada fog
5. Portland, ME moderate rain
6. Detroit, MI light rain
7. Chicago, IL light rain
8. Huron, SD light snow
9. St. Louis, MO light drizzle
10. Atlanta, GA moderate rain
11. Pensacola, FL ~~[illegible]~~ clear

Standard Time:
When converting from Coordinated Universal Time (UTC), first use the conversion table below.

From UTC to Local Time:

Eastern Standard Time (EST)	UTC - 5 hours = EST
Central Standard Time (CST)	UTC - 6 hours = CST
Mountain Standard Time (MST)	UTC - 7 hours = MST
Pacific Standard Time (PST)	UTC - 8 hours = PST

Next, the local time is converted from a 24 Hour Clock to an AM/PM time.

Some Examples:

UTC Date	UTC Time	Local Time -->	24 Hour Clock	AM/PM Time	Local Date
May 2nd	1459		959 (EST)	9:59 AM (EST)	May 2nd
May 2nd	1800		1300 (EST)	1:00 PM (EST)	May 2nd
May 2nd	2300		1800 (EST)	6:00 PM (EST)	May 2nd
If the local time on the 24 hour clock is less than 0000, then you have crossed over to the previous day. So for example, -0400 becomes 2000 the day before.					
May 3rd	0000		1800 (CST)	6:00 PM (CST)	May 2nd
May 3rd	0100		1800 (MST)	6:00 PM (MST)	May 2nd
May 3rd	0200		1800 (PST)	6:00 PM (PST)	May 2nd

Daylight Saving Time:
When converting from UTC to Daylight Saving Time, the conversions are similar but the UTC Time is one hour less than when converting than its Standard Time counterpart. First use the conversion table below.

From UTC to Local Time:

Eastern Daylight Time (EDT)	UTC - 4 hours = EDT
Central Daylight Time (CDT)	UTC - 5 hours = CDT
Mountain Daylight Time (MDT)	UTC - 6 hours = MDT
Pacific Daylight Time (PST)	UTC - 7 hours = PDT

Next, the local time is converted from a 24 Hour Clock to an AM/PM time.

Some Examples:

UTC Date	UTC Time	Local Time -->	24 Hour Clock	AM/PM Time	Local Date
May 2nd	1459		1059 (EDT)	10:59 AM (EDT)	May 2nd
May 2nd	1800		1400 (EDT)	2:00 PM (EDT)	May 2nd
May 2nd	2300		1900 (EDT)	7:00 PM (EDT)	May 2nd
If the local time on the 24 hour clock is less than 0000, then you have crossed over to the previous day. So for example, -0400 becomes 2000 the day before.					
May 3rd	0000		1900 (CDT)	7:00 PM (CDT)	May 2nd
May 3rd	0100		1900 (MDT)	7:00 PM (MDT)	May 2nd
May 3rd	0200		1900 (PDT)	7:00 PM (PDT)	May 2nd

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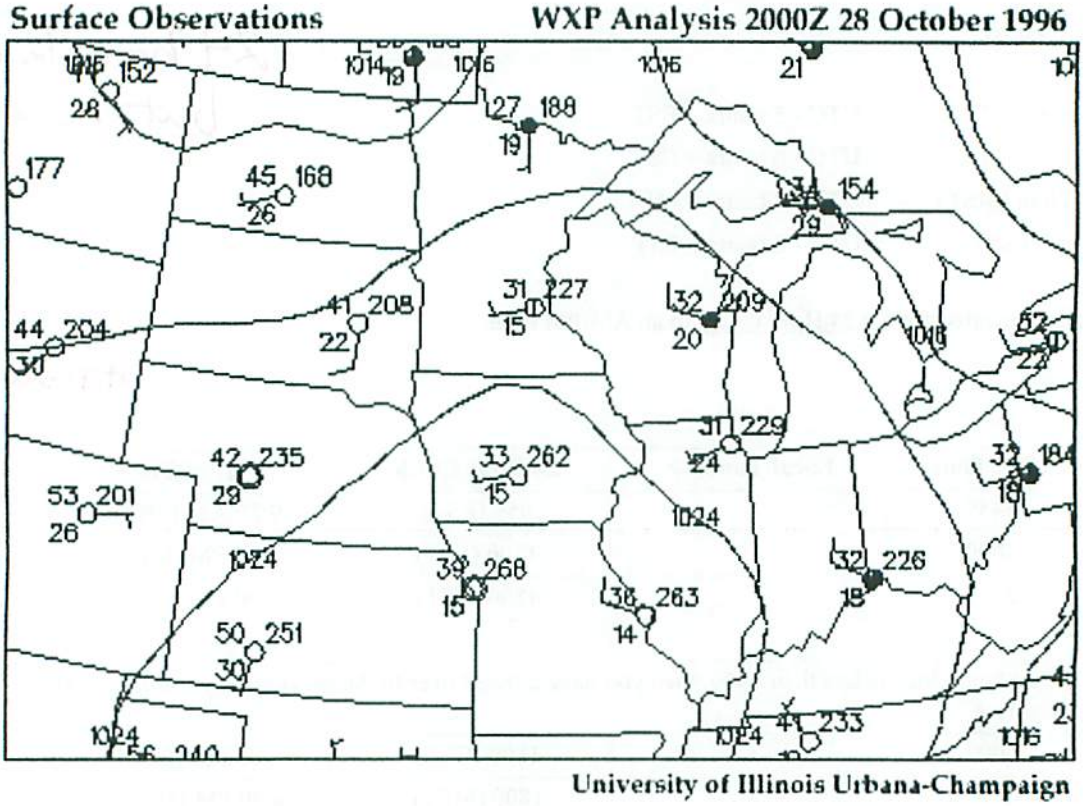
Converting From UTC to Local Date and Time:



1) Convert from 2000Z 28 October 1996 UTC to Central Standard Time (CST) for Chicago, Illinois.

-6 20 − 6 = 14 1400 (CST) 2pm

2) Convert from 2000Z 28 October 1996 UTC to Eastern Standard Time (EST) for New York City, New York.

-5 1500 (EST) 3pm

3) Convert from 2000Z 28 October 1996 UTC to Pacific Standard Time (PST) for San Francisco, California.

-8 1200 (PST) 12 noon

4) Convert from 2000Z 28 October 1996 UTC to Mountain Standard Time (MST) for Denver, Colorado.

-7 1300 (MST) 1 pm

5) Convert from 0500Z 29 October 1996 UTC to Central Daylights Savings Time (CDT) for Chicago, Illinois.

-5 0000 (CDT) midnight

6) Convert from 0500Z 29 October 1996 UTC to Eastern Daylight Savings Time (EDT) for Nashville, Tennessee.

-4 0100 (EDT) 1 am

7) Convert from 0500Z 29 October 1996 UTC to Pacific Daylight Savings Time (PDT) for Boise, Idaho.

-7 2hr -0200 2200 (PT) 10/28

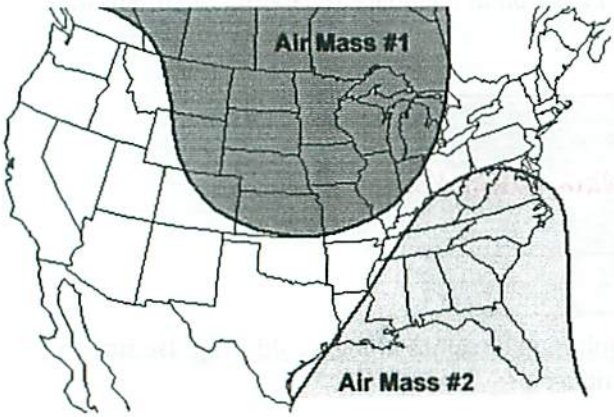
8) Convert from 0500Z 29 October 1996 UTC to Eastern Standard Time (EST) for Miami, Florida. 10 pm

-5 0000 EST midnight

6

Characteristics of Air Masses:

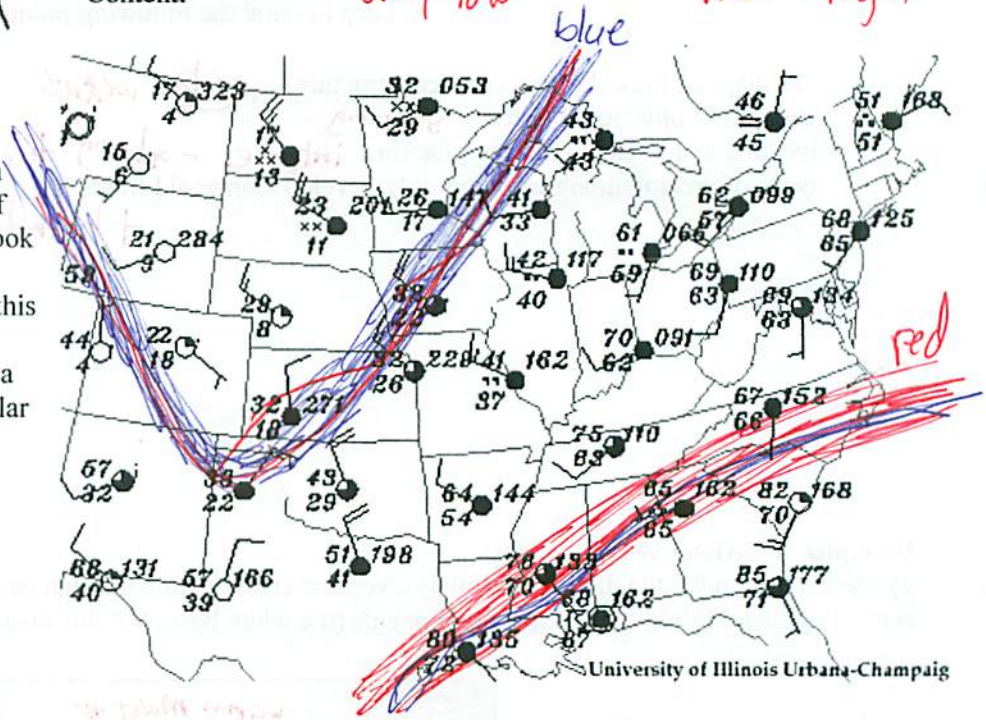
1) The diagram below depicts two types of air masses that commonly influence weather in the United States. For each air mass, identify the following characteristics.



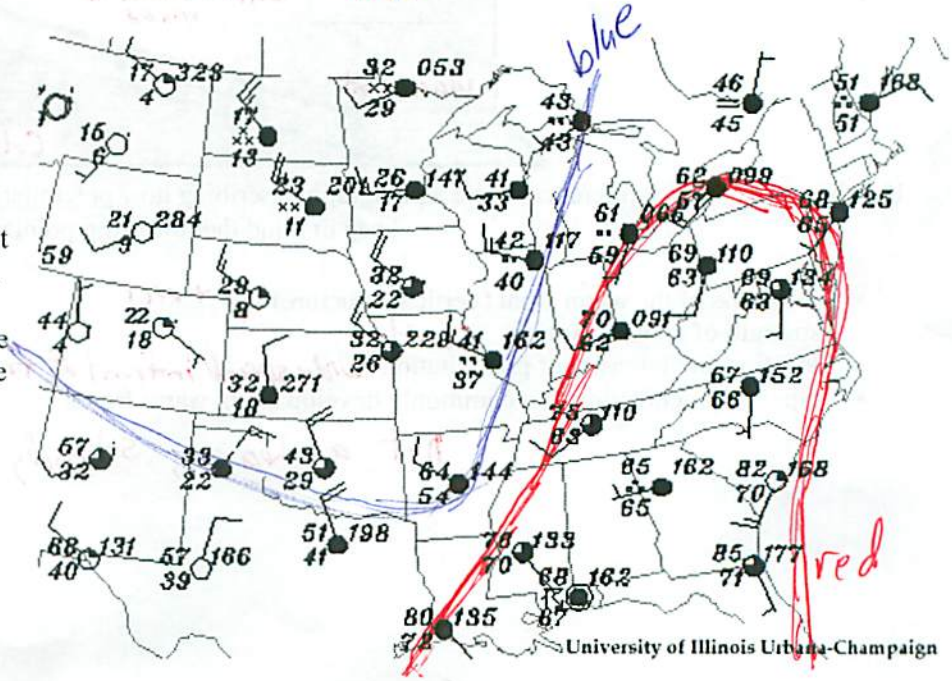
	Air Mass #1	Air Mass #2
Type of Air Mass:	cP	mT
Source Region:	Canada	Caribean
Relative Temperature:	Cold	warm
Wind Direction:	south	north
Moisture Content:	dry-low	wet-high

Find the Air Masses:

2) One way of identifying a tropical air mass on the weather map below is to look for a region of higher temperatures. To find a polar air mass, look for a region of colder temperatures. The image below is a map of surface observations and for this part of the activity, use the temperature field to draw two lines; a red line to outline the edge of a tropical air mass and a blue line to identify a polar air mass.



3) Now examine the regions you have outlined. Look particularly close at the wind barbs for wind direction and also examine the reports of dew point temperature. In question #1, you determined typical wind direction and dew point temperatures associated with a tropical air mass and a polar air mass. Use this additional information to again identify the tropical and the polar air masses in the diagram below. Label the edge of a tropical air mass with a red line and use a blue line to indicate the outer edge of a polar air mass.



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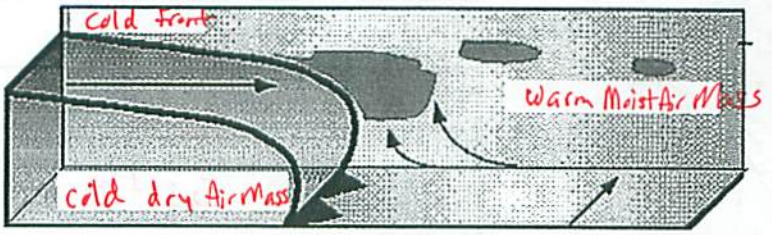
Precipitation Along Cold Fronts: http://ww2010.atmos.uiuc.edu/(Gh)/guides/crclm/act/fpr.rxml

1) The diagram below is a vertical cross-section through two air masses and the frontal boundary separating them. Fill in the missing components (the white boxes) of this diagram.



Using this animation for reference, write a paragraph describing how precipitation develops along a cold front. Be sure to keep in mind the following points:

- the shape of the cold front (vertical structure) wedge: wedge
- strength of upward motions strong
- location and intensity of precipitation intense - along front
- types of precipitation that commonly develop along cold fronts thunderstorms

Precipitation Along Warm Fronts:

2) As in question #1, the diagram below is a vertical cross-section through two air masses and the frontal boundary separating them. Fill in the missing components (the white boxes) of this diagram.

Use this animation for reference, write a paragraph describing how precipitation develops along a warm front. Be sure to keep in mind the following points:

- the shape of the warm front (vertical structure) up + over
- strength of upward motions gentle
- location and intensity of precipitation widespread in front of front - steadier rain
- types of precipitation that commonly develop along warm fronts not as heavy, steady rain overcast

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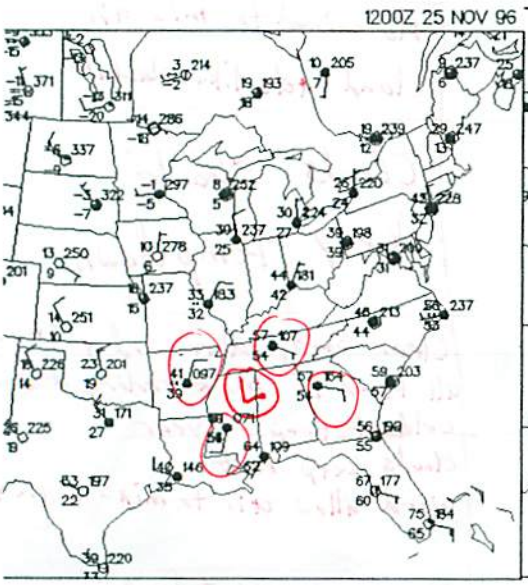
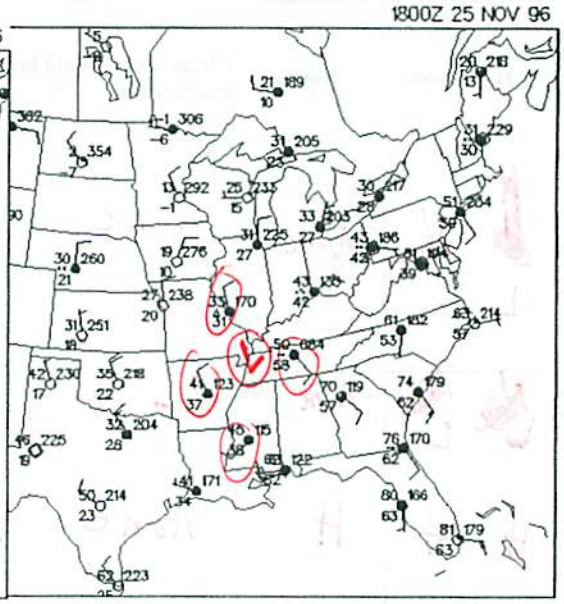
Storm Tracking:

1) For each of the following three surface maps, (Map #1, Map #2, and Map #3), use the wind barbs to determine the location of the cyclone center. Mark its position on the blank map for each map, using the correct symbol to represent the center of a cyclone. For each position, also indicate the date and time.

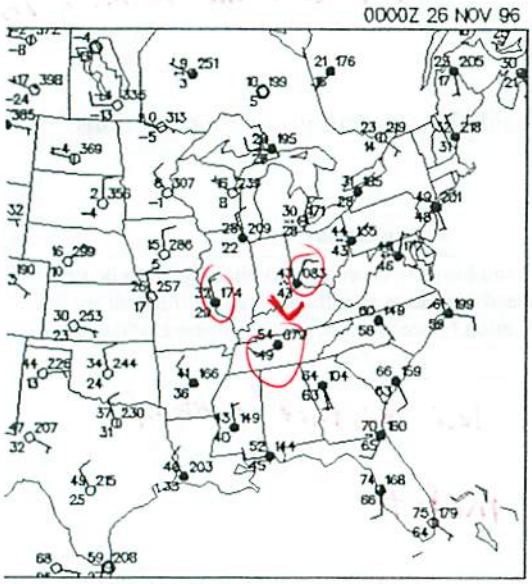
Map 1

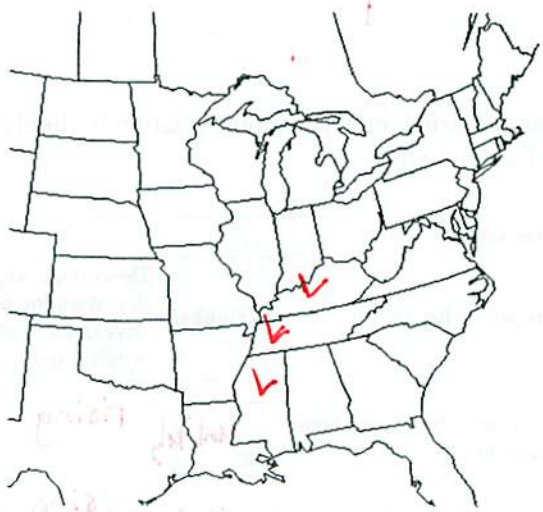


Map 2



Map 3





2) What was the cyclone's general direction of movement? NE

3) In what state was the storm located in for map #1? Mississippi What about maps #2 and #3? Tennessee Kentucky

4) What general statement could you make about the movement of this center of Low pressure?

It is moving northeast crossing 3 states in 12 hrs

Forecasting Scenarios:

For each of the following weather scenarios, indicate what impact each component (cloud cover | winds | advection | snow cover) will have on forecasted temperatures. Indicate whether each weather condition will lead to lower (L) or higher (H) temperatures or indicate "None" if it is not a factor.

Weather Scenario	Cloud Cover	Winds	Temperature Advection	Snow Cover	Your Thoughts
Example Scenario: Night time forecast, cloud cover, no winds, no snow cover.	**H**	**None**	**None**	Cloud cover should keep temps warm.	No wind to mix air cloud acts like blanket
Scenario 1: Day time forecast, cloudy skies with calm winds, no significant temperature advection and no snow cover.	L	None	None	None	Clouds should keep temp down
Scenario 2: Night time forecast, snow cover, clear skies, no wind.	L	L	None	L	Clear skies, calm winds, snow all lead to max cooling of E surface ~~coldest temp of year~~
Scenario 3: Night time forecast, cloudy skies, no snow cover, windy and warm advection.	H	H	H	none	clouds keep heat in wind allow air to mix - warm ↓
Scenario 4: Day time forecast, cloudy skies, windy, cold advection and no snow cover.	L	L	L	none	Clouds lower heat absorption wind: mix air. colder air above mixed down and cold air coming in

Forecasting Scenarios:

4) For the following weather scenarios, indicate if precipitation is "likely" or "unlikely" to occur given the conditions described in each scenario. Explain why.

Weather Scenario		Precipitation?
Example Scenario: Boulder, CO, a city on the east side of the Rockies. Downslope winds are expected.	**Unlikely**	Downslope winds (or wind blowing down the mountain) tend to be very dry, warming as it descends, creating an unfavorable environment for the development of precipitation (since rising air in the presence of downslope winds is unlikely).
Scenario 1: A cold front is approaching from the west, but the air both ahead of and behind the front is very dry.	Unlikely	rising air low moisture content
Scenario 2: A warm front is approaching and the air behind and ahead of the front is very moist.	likely	rising air moist
Scenario 3: Upslope winds are expected in Boulder, CO and the air has been very moist for the past couple of days.	likely	air will rise (upslope) & has a lot of moisture
Scenario 4: The trend for the latest batch of precipitation is a steady eastward movement of 30 miles/hour. The latest position is roughly 700 west of here. Will precipitation arrive within 24 hours?	likely	$\frac{700m}{hr} \cdot \frac{hr}{30m} = 23$ hrs