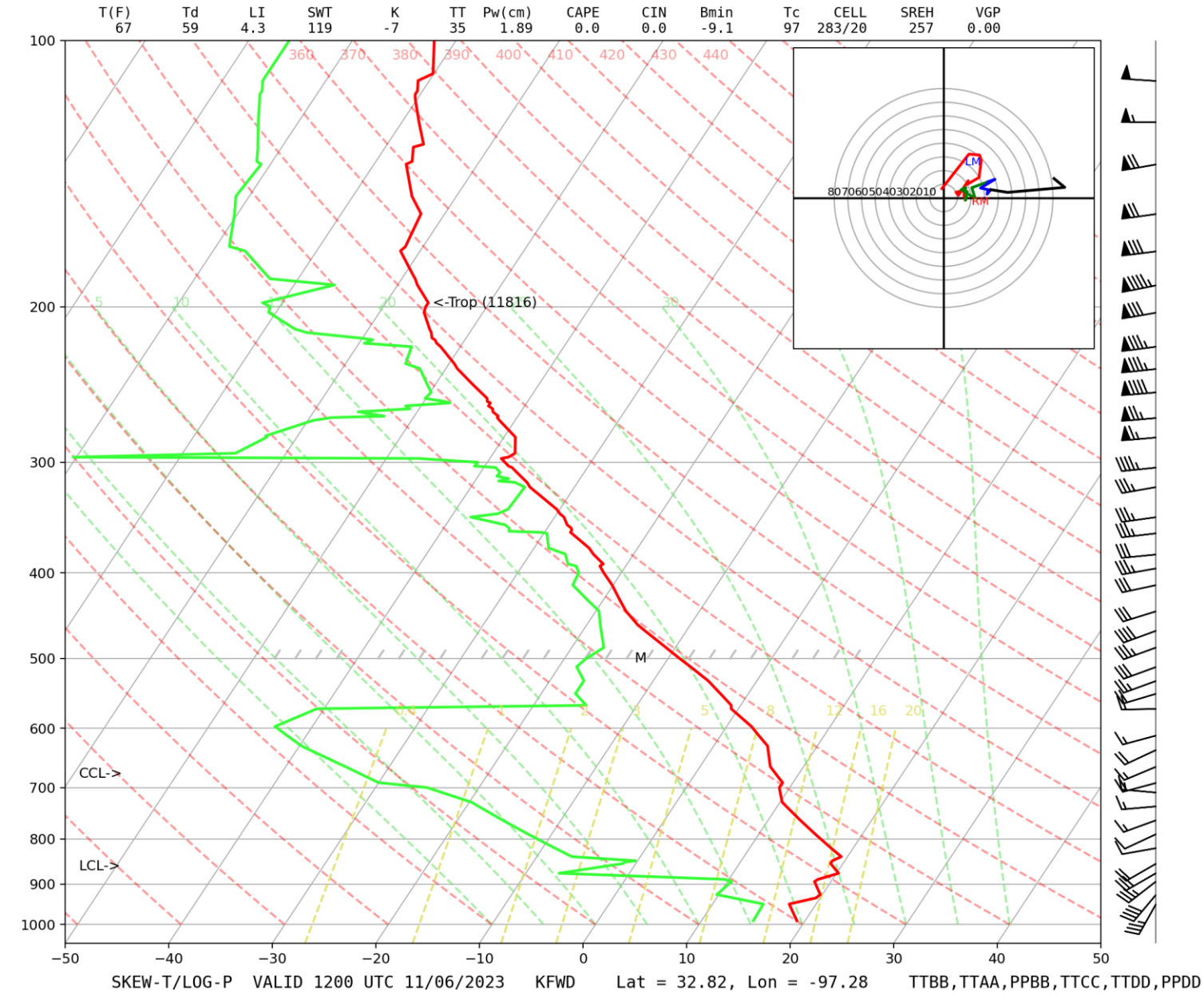


SKEW-T Chart to reference for the analysis that follows on the next several pages….Balloons are launched at 6 AM and 6 PM local time around the world every day. The balloons carry an Instrument package.

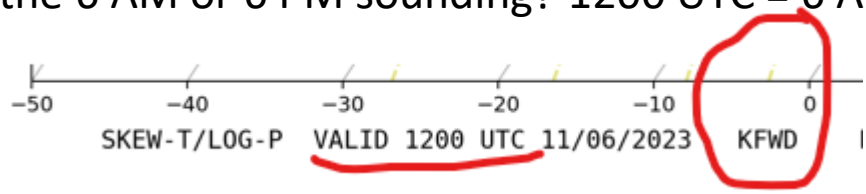
Caution: Air masses change, so if your analysis of the day turns out all wrong, likely the air mass changed after 6 AM. Sorry Charlie!!! Also, Ft Worth isn't Hamilton, so Hamilton may have a totally different air mass over it.

0600 Local Time on 11/6/2023

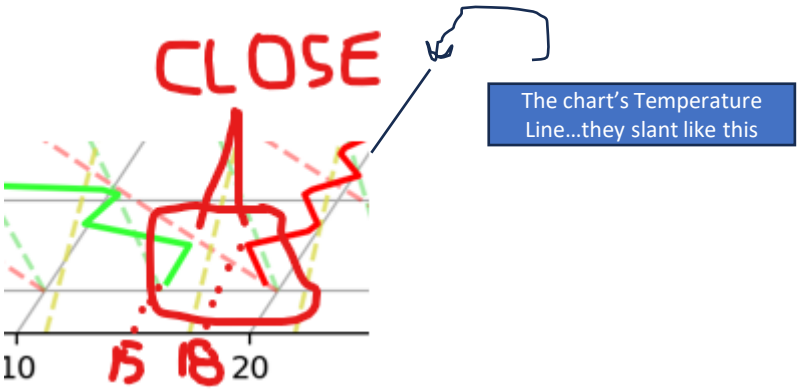
Questions / Answers / Analysis

1. Is this the Ft. Worth atmospheric balloon sounding? Yes
2. How do you know? Chart Legend = KFWD = Ft, Worth, TX

Is it the 6 AM or 6 PM sounding? 1200 UTC = 6 AM = 1200 Zulu

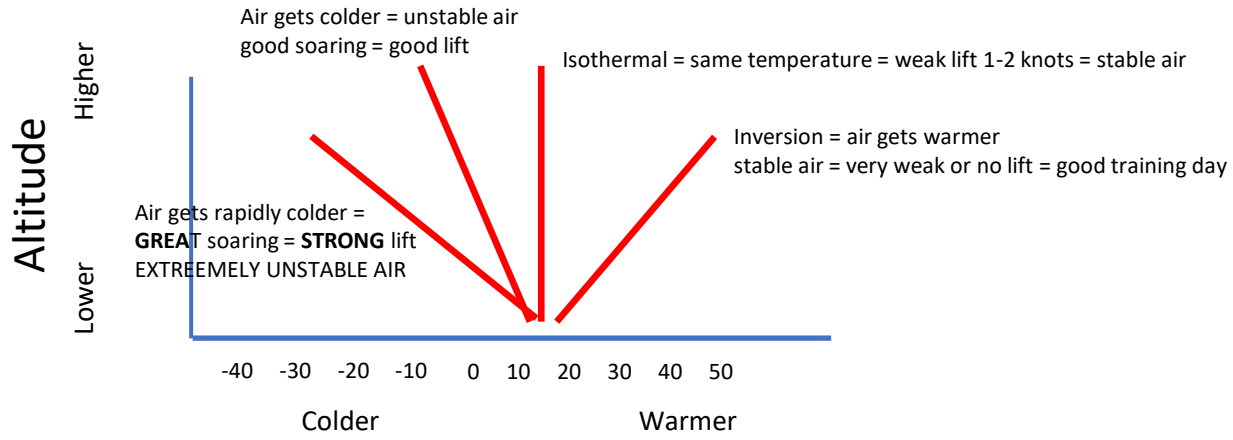


3. Are low-level cu (cumulus clouds) possible early in the morning with thermals? Yes. There is a low level lapse rate (meaning the air gets colder as you go up (red air temperature line leans to the left), and the dew point (green line) is close to the temperature line, so visible condensation is likely. Since the air gets colder as you go up, there likely will be thermals when there is energy from the sun heating the ground. When the dew point and air temperature are within about 3.5 °F, visible moisture is likely to form. Remember, you must move parallel to the black slanted chart temperature lines (see the red dotted lines I drew).

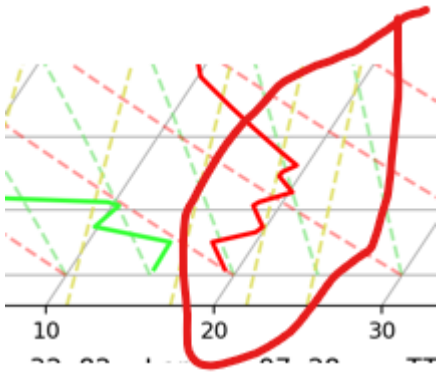


Again, the heavy read line is the balloon measured air temperature, and the heavy green line is the balloon measured dew point.

4. Is there an inversion from 950 mb to 850 mb? Yes
Remember, air typically gets colder as you go higher. The sun heats the ground and then the ground heats the air. Naturally, as you get farther from the earth, the air will get colder….typically. But, sometimes the air gets warmer. This is inverted from normal, so it is called an inversion. Note: The more rapidly the air gets colder, the stronger the lift.

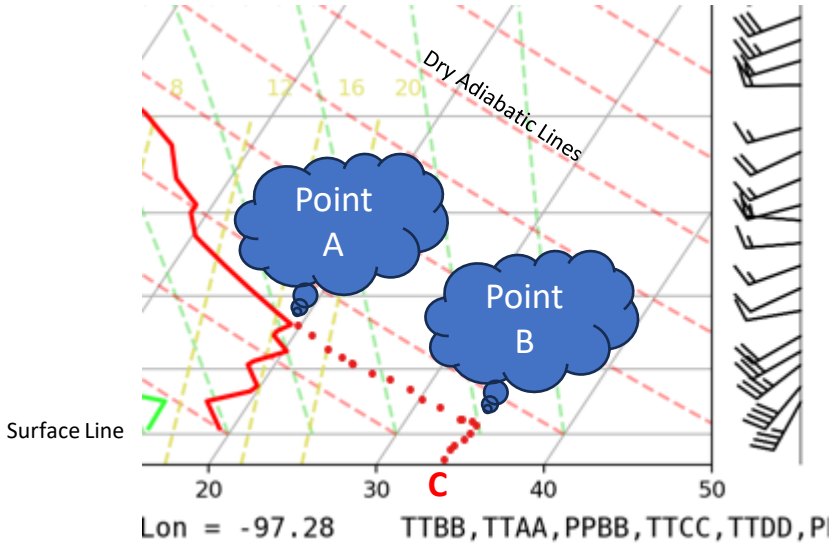


The Skew-T chart day has an inversion…see below. The temperature line leans to the upper right = inversion



So, when can we go soaring? When will thermals start (or not)?
5. What surface temperature will break through the inversion? What is this "trigger temperature"…the temperature needed to "trigger" lift?

5. Continued….To find the trigger temperature, reference the chart excerpt below and do the following:

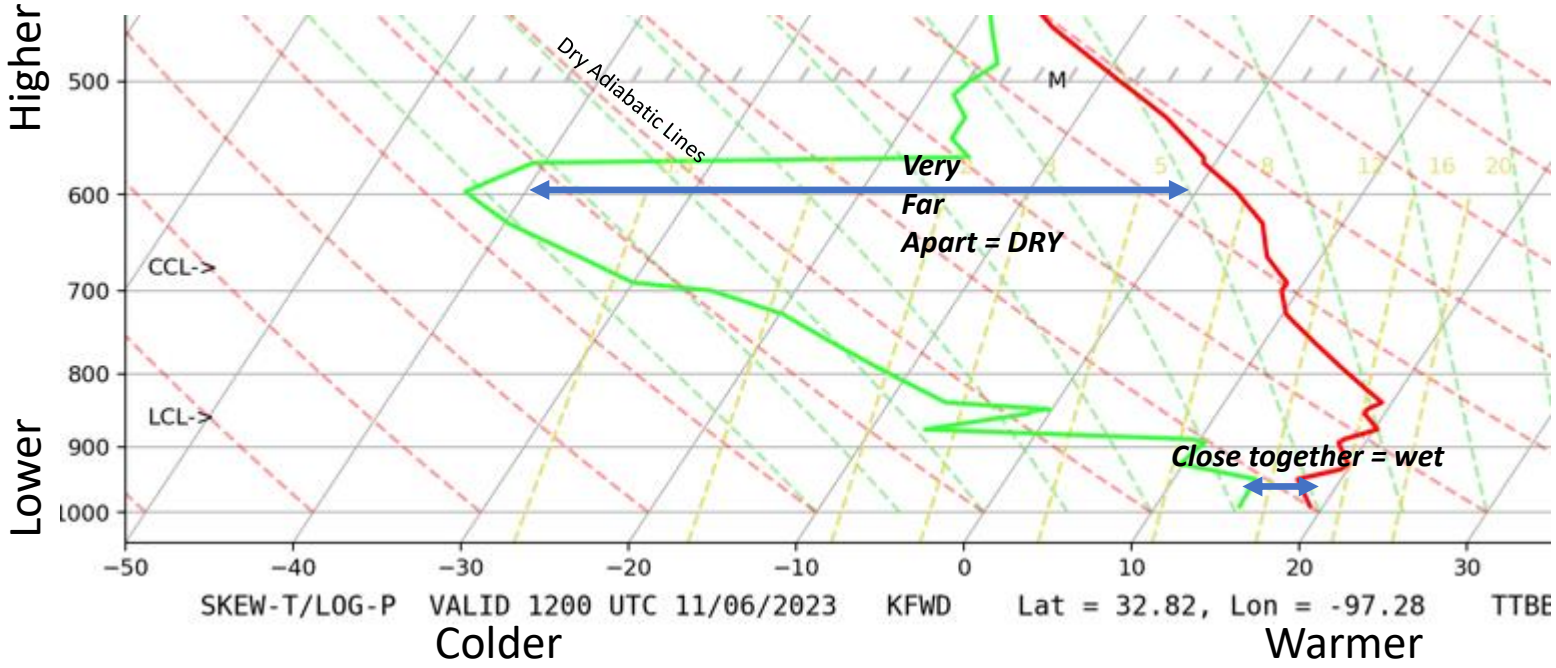


(A) Locate the top of the inversion…where the air temperature stops getting warmer (Point A).

(B) Draw a dotted line parallel to the dry adiabatic lines all the way down to the surface (Point B).

(C) Then parallel the chart's temperature lines down to the bottom chart axis (Point **C**). Read this temperature = it is about 34 °C or 93 °F. This is the trigger temperature = 93 °F. You may have lift before 93 °F, but it won't be strong, and it won't go very high… typically. Unless you like to work weak lift down low in a HOT cockpit….wait for 93 °F to take off.

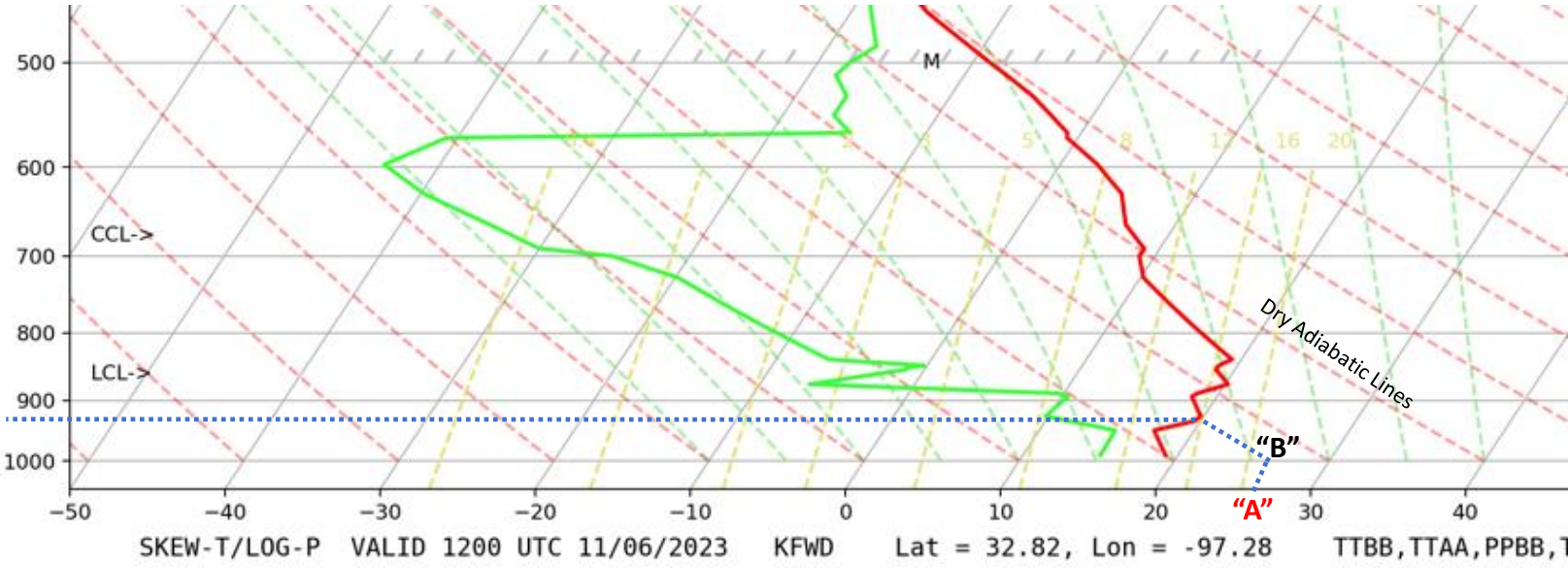
6. Is it moist or dry above the inversion? Reference the chart excerpt below…



The green line is the dew point. The red line is the air temperature. If the dew point and air temperature are close together = moist air. If the lines are far apart = dry air. If within about 3.5 °F apart, visible moisture (clouds or fog) can form. So the chart tells us that down low the air is moist….up high, the air is dry. Where do you think the clouds will be (down low or up high). Answer: Down low where the air is moist. The air is DRY above the inversion….VERY DRY.

7. As the day warms up and the thermal get higher, the thermals will move into DRY air. Therefore, the early morning low clouds (cu) will dry up and go away. The afternoon will be without cumulus clouds.

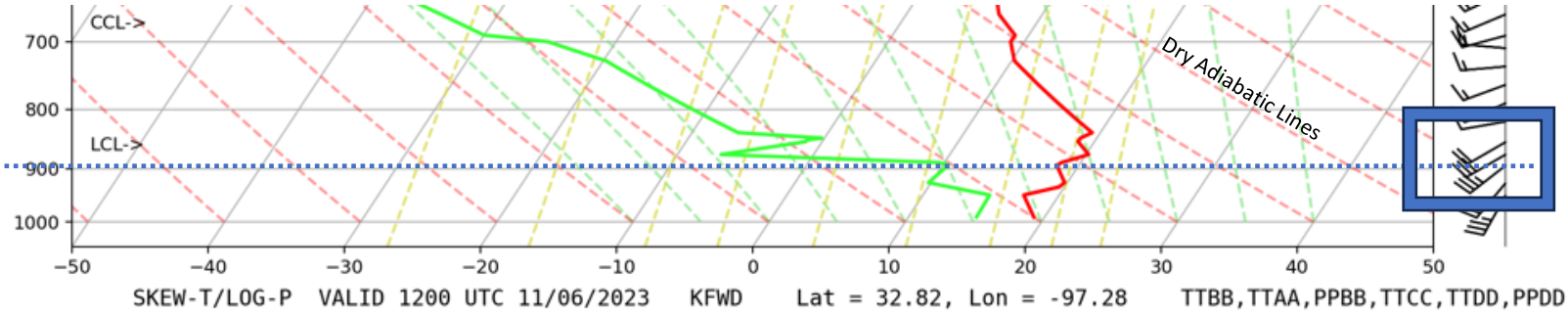
7. The high temperature for 11/6/2023 in Ft. Worth is forecast to reach 80 °F or 27 °C. How high will the thermals reach? Reference the chart excerpt below….



A) Locate the day's forecast high temperature = **"A"**
B) Parallel the chart's temperature lines up to the surface at "B"
C) Parallel the chart's dry adiabatic lines until it touches the red air temperature line.
D) Read the altitude on the left side. This is as high as the lift will get at the day's forecast high temperature = 980 mb or 920 ft MSL or about 200 ft AGL at Ft. Worth. Basically, when you get off tow, you must descend to find any lift. LOL.

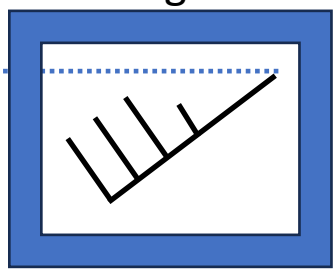
9. Will 27 °C break the inversion? No…not even close.
10. Will you have cu? No…the air is too dry aloft if the thermals can even rise that high. (Note: Low thermals might just stay in the moist air, so you just might have low cu all day long….especially if it didn't warm up very much. Maybe a cirrus cover will keep it cool…who knows.
11. Overall, this is a VERY stable air mass. Weak lift, if any. It's a good training day. Stay home, if you intended to soar. The caveat…Hamilton may be in a totally different air mass. Stay home and you might miss the best day of the year! Next page….last question.

12. At 900 mb, how strong are the winds and from which direction are they blowing? Reference the chart excerpt below….

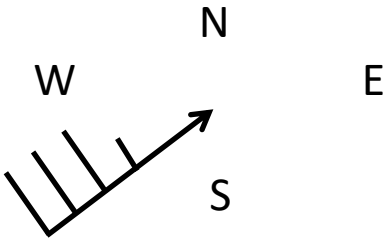


Look in the rectangle and view the wind barbs. This is showing a wind of 35 knots blowing FROM the south west.

900 mb



Think of the wind barbs as arrows with tail feathers. The long line = 10 knots and the short line = 5 knots This "arrow" is traveling up and to the right, so the wind is blowing from the lower left to the upper right = **<u>from</u>** the SW. See below. This day, I did see a few small and low-down cu form about 9 AM. They were moving very fast to the NE.



Google: ***upper air sounding rap*** for the SKEW-T plots
Google: ***pressure altitude calculator*** for the calculator that converts mb to feet of altitude MSL. Be sure you click on the tiny mb selection button, or you will be way off.