

Use the attached data from Miami, FL at 00 Z 11 Sep 2007 to answer the following questions:

- Plot the sounding data on the Skew T, Log P diagram provided on page 4. Plot each (T, P) and (Td, P) data pair on the diagram with pencil. Use a straight edge to “connect the dots” for both temperature and dewpoint. When complete, use distinct colors (e.g., red [blue]) pencil/pen to indicate the temperature [dew point] profile. **In addition, please plot winds on the right side at mandatory levels (1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, and 100 hPa).** Hint: A wind staff pointing in the direction from which the winds are coming from shows wind direction. A North wind is from 360 ° or 0 °, and East wind is from 90 °, a South wind is from 180 °, and a West wind is from 270 °. (20 points)
- Find mixing ratio, saturation mixing ratio, relative humidity, potential temperature, equivalent temperature, and equivalent potential temperature at 700 mb and 500mb, respectively. Please don't forget units. (12 points)

Enter your answers below:

level	Mixing ratio	Saturation mixing ratio	Relative humidity	Potential temperature	Equivalent temperature	Equivalent potential temperature
700mb						
500mb						

3. Lifting Condensation Level (LCL)

- In your own words, define the lifting condensation level (LCL) (3 points).
- Find the LCL by lifting a parcel from the surface and label it on your diagram (2 points). Describe your procedure in words (3 points). What is the pressure (mb) and temperature (°C) of the LCL? (4 points)

Answer:

4. Level of Free Convection (LFC)

- In your own words, define the level of free convection (LFC). (3 points)
- Find the LFC using a lifted surface parcel and label it on your diagram (2 points). Describe your procedure in words (3 points). What is the pressure (mb) and temperature (°C) of the LFC? (4 points)

Answer:

5. Equilibrium Level (EL)

- In your own words, define the equilibrium level (EL). (3 points)
- Find the EL and label it on your diagram (2 points). Describe your procedure in words (3 points). What is the pressure (mb) and temperature ($^{\circ}\text{C}$) of the EL? (4 points)

Answer:

6. *Environmental Lapse Rate (Γ)*. The environmental or temperature (T) lapse rate (Γ) is the decrease of temperature with height (z) where T is measured from a radiosonde and plotted as above. Mathematically, $\Gamma = -dT/dz$. The dry adiabatic lapse rate (Γ_d) is $9.8^{\circ}\text{C km}^{-1}$ and is indicated by dry adiabats on the skew T. The moist adiabatic lapse rate (Γ_m) depends on the amount of moisture present and typically varies from $3\text{--}7^{\circ}\text{C km}^{-1}$ in the lower troposphere and is shown by moist adiabats on the Skew T, Log P diagram. From the given Miami sounding data, calculate the environmental lapse rate (Γ , $^{\circ}\text{C km}^{-1}$) in the 700 mb to 500 mb layer. (10 points)

Answer:**7. "Positive Area" and CAPE (Convective Available Potential Energy)**

- In your own words, define the CAPE (4 points).
- Identify, highlight (with hatching), and label the positive area on the diagram for a lifted surface-parcel. Describe your procedure (4 points).

Answer:**8. Convection Condensation Level (CCL)**

- In your own words, define the convection condensation level (CCL) (2 points).
- Find the CCL and label it on your diagram (2 points). Describe your procedure in words (2 points). What is the pressure (mb) and temperature ($^{\circ}\text{C}$) of the CCL (4 points)?
- Describe what is the convective temperature (T_c) in your own words and estimate it ($^{\circ}\text{C}$) from your diagram. (4 points)

Answer:

72202 MFL Miami Observations at 00Z 11 Sep 2007

PRES	HGHT	TEMP	DWPT	RELH	MIXR	DRCT	SKNT	THTA	THTE	THTV
hPa	m	C	C	%	g/kg	deg	knot	K	K	K
1016.0	5	29.4	23.4	70	18.21	80	4	301.2	355.0	304.4
1000.0	147	28.0	23.5	77	18.63	80	8	301.1	356.2	304.5
970.0	417	25.4	22.8	86	18.40	81	10	301.2	355.5	304.5
949.0	610	24.6	19.6	74	15.37	100	14	302.2	347.9	305.0
933.0	759	23.4	18.4	74	14.49	103	14	302.5	345.6	305.1
925.0	834	22.6	18.5	78	14.71	105	14	302.4	346.1	305.1
912.0	957	22.2	17.2	73	13.72	105	15	303.2	344.2	305.7
884.9	1219	20.1	14.7	71	12.00	105	14	303.7	339.6	305.9
873.0	1336	19.2	16.1	82	13.36	105	14	303.9	343.9	306.4
854.0	1526	18.4	13.9	75	11.82	105	14	305.0	340.6	307.2
850.0	1566	18.0	13.2	74	11.34	105	14	305.0	339.2	307.1
848.0	1586	18.0	13.3	74	11.44	105	14	305.2	339.7	307.3
842.0	1647	18.0	9.0	56	8.63	105	13	305.8	332.1	307.4
828.0	1791	16.6	10.6	68	9.78	105	12	305.8	335.5	307.6
824.3	1829	16.6	9.1	61	8.88	105	12	306.2	333.3	307.8
818.0	1894	16.6	6.6	52	7.53	107	12	306.9	330.0	308.3
808.0	1999	16.0	8.0	59	8.40	111	12	307.3	333.1	308.9
789.0	2201	14.6	5.6	55	7.28	118	12	307.9	330.4	309.3
775.0	2352	14.0	-2.0	33	4.28	126	13	308.8	322.5	309.6
774.0	2363	14.0	1.0	41	5.34	126	13	309.0	325.8	309.9
746.0	2673	12.2	-0.8	41	4.86	118	12	310.3	325.7	311.2
702.0	3179	8.8	-2.2	46	4.66	132	9	311.9	326.9	312.8
700.0	3203	8.6	-1.4	49	4.96	130	9	312.0	327.8	312.9
652.0	3785	4.2	0.5	77	6.12	178	5	313.4	332.9	314.6
606.0	4378	2.4	-4.6	60	4.51	206	17	317.9	332.8	318.8
549.0	5167	-2.9	-10.9	54	3.05	195	24	320.8	331.1	321.4
500.0	5900	-7.9	-11.8	74	3.11	180	24	323.3	334.0	323.9
446.0	6786	-12.5	-13.6	91	3.02	170	11	328.3	338.8	328.9
400.0	7610	-18.5	-20.7	83	1.85	155	13	330.9	337.5	331.2
353.0	8533	-24.1	-28.7	66	1.02	177	8	335.4	339.2	335.6
300.0	9700	-33.1	-40.1	49	0.39	150	3	338.6	340.2	338.7
250.0	10950	-43.7	-54.7	29	0.09	310	12	341.0	341.4	341.0
200.0	12410	-56.3	-66.3	27	0.03	30	12	343.4	343.6	343.5
171.0	13386	-64.5	-73.5	28	0.01	24	14	345.6	345.6	345.6
150.0	14180	-68.3	-76.3	31	0.01	50	16	352.2	352.3	352.2
125.5	15240	-69.1	-77.1	31	0.01	110	17	369.1	369.2	369.1
100.0	16590	-71.7	-79.7	29	0.01	60	7	388.9	389.0	388.9

