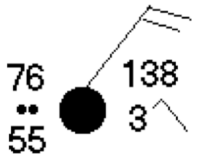
Lab 1 for GEOL 1147 (Introduction to Meteorology Lab)

1. What are the differences between Z time and local standard time at Houston in winter and summer?

2. What is the corresponding local time in Houston, TX, for weather observation reported at 1900 Z on Jan 15, 2013?

3. You are asked to investigate the weather conditions at Houston at 7:00 PM on Jul 10, 2012. To get this information, you have to know the right day and time for this situation in coordinated universal time (UTC). What is the correct UTC day and time?

4. Please list temperature, dew point, wind direction, wind speed, cloud cover, pressure, and pressure change for the weather station model on the right.



5. The following lists observations at HOUSTON on Dec 12-13, 2012.

Observations for HOUSTON WILL HOBBY, TX (HOU)
Location: 29.65N, 95.28W, 14 meters; Time: *1853Z 12 Dec 2012 to 1853Z 13 Dec 2012*

STN	TIME	PMSL	ALTM	TMP	DEW	RH	DIR	SPD	VIS	CLOUDS	MIN	MAX
	DD/HHMM	hPa	inHg	F	F	%	deg	kt	mile		F	F
HOU	13/1853	1026.5	30.30	61	30	31	100	3	10.0	CLR		
HOU	13/1753	1027.3	30.32	59	26	28	110	8	10.0	CLR	43	59
HOU	13/1653	1028.0	30.34	57	29	34	100	8	10.0	CLR		
HOU	13/1553	1028.0	30.35	55	33	43	100	10	10.0	CLR		
HOU	13/1453	1027.7	30.34	50	38	63	80	7	10.0	CLR		
HOU	13/1353	1027.2	30.32	46	36	68	70	6	10.0	CLR		
HOU	13/1253	1026.6	30.30	43	34	70	80	6	10.0	CLR		
HOU	13/1153	1026.2	30.29	43	33	68	70	6	10.0	CLR	38	45
HOU	13/1053	1025.8	30.28	43	33	68	70	5	10.0	CLR		
HOU	13/0953	1026.1	30.29	44	33	65	80	5	10.0	CLR		
HOU	13/0853	1026.1	30.29	44	33	65	100	4	10.0	CLR		
HOU	13/0753	1026.1	30.29	40	31	70	80	4	10.0	CLR		
HOU	13/0653	1026.5	30.30	39	30	70	0	0	10.0	CLR		
HOU	13/0553	1026.6	30.30	41	31	67	0	0	10.0	CLR	40	52
HOU	13/0453	1026.8	30.31	41	31	67	0	0	10.0	CLR		
HOU	13/0353	1026.6	30.30	42	30	62	0	0	10.0	CLR		
HOU	13/0253	1026.5	30.30	44	30	58	0	0	10.0	CLR		
HOU	13/0153	1025.8	30.28	47	28	48	0	0	10.0	CLR		

HOU	13/0053	1025.5	30.27	50	29	44	130	4	10.0	CLR	
HOU	12/2353	1025.0	30.25	52	28	40	130	4	10.0	CLR	
HOU	12/2253	1024.7	30.25	58	20	23	90	4	10.0	CLR	
HOU	12/2153	1024.7	30.25	59	19	21	80	3	10.0	CLR	
HOU	12/2053	1025.0	30.25	60	20	21	50	5	10.0	CLR	
HOU	12/1953	1025.4	30.27	59	22	24	40	8	10.0	CLR	
HOU	12/1853	1026.2	30.29	57	26	30	70	3	10.0	CLR	

The observations for HOU are arranged chronologically, with the most recent observation at the top of the page and the oldest observation at the bottom. The data that is displayed represents the weather at HOU over the last 24 h (note that some observations may be missing). Across the top of the table are column headers that describe the type of data given in each column of the table.

PMSL: (Sea level pressure) The atmospheric pressure (corrected to the equivalent pressure at sea level) is given in hecto-pascals (hPa; hundreds of Pascals) and is numerically identical to pressures expressed in millibars (mb). Standard sea level pressure is 1013.25 mb.

TMP: (Temperature) The temperature is given in degrees Fahrenheit. A reported value of –99 represents no data. Recall that the normal melting point of ice and the boiling point of water at sea level are 32°F and 212°F, respectively.

DEW: (Dewpoint) The value of the dewpoint (or dewpoint temperature) reflects the humidity of the air.

DIR: (Wind Direction) The wind direction is reported in degrees with 360° representing a wind *from* the north, 90° representing a wind *from* the east, 180° representing a wind *from* the south, and 270° representing a wind *from* the west. Intermediate values are used to represent a wind which is coming from a direction other than the four cardinal directions (for example, a southwest wind would be reported as 225°).

RH: (**Relative Humidity**) The relative humidity gives the amount of water vapor in the air as a percentage of the maximum possible at the prevailing temperature.

SPD: (Wind Speed) Wind speed is reported in *knots* (kts), a unit with which you may not be familiar. A knot is a nautical mile per hour. (1 knot = 1.15 miles per hour)

CLOUDS: (Cloud Cover) Cloud cover is reported as a variety of categories, such as CLR or OVC. When clouds are present their height is often given in hundreds of feet by a three digit appendix to the three letter descriptor. Thus SCT036 means that there are scattered clouds at 3600 feet.

a) What were the maximum and minimum temperatures for Houston during the 24 hours listed in the table? When were these temperature reported (list UTC and local times)? Use the temperature column (headed TMP) to determine these values.

b) What are the temperature, dewpoint, and relative humidity at 10:53AM, Dec 13, 2012 (UTC)?

c) Plot time series of temperature, dewpoint temperature, relative humidty, and dewpoint depression (difference between the temperature and the dewpoint) versus Houston local time using Excel file, Hou.xls. Local time is listed in the first column in Hou.xls. What is the relationship between the relative humidity and dewpoint depression?

Instruction: In EXCEL, go to **insert Chart**, then **Scatter**, then choose **Smooth Marked Scatter**. Then click **Chart, Source Data**. Click on the small icon to the right of **x values**. This allows you to select the column in the spreadsheet pertaining to your x-axis. Then choose time for your x-axis (highlight all values in the Local_T column), and temperature for the y-axis (highlight all values in the TMP column) using the same procedure in selecting TMP values as you did for Local_T. Give this series a name ('temperature') and **add** a second series. This time, plot time (Local_T) on the x-axis, and again dewpoint (DEW) on the y-axis. **Next** you can label the x- and y- axis using Toolbox and you can take various steps to improve the layout of the chart. You can change the scales for x-axis and y-axis by double clicking the axis. You can give the two lines different colors, but that is not needed. They can both be black. If you desire, you can change the background color from grey to white by right clicking the figure and choosing "Format Plot Area". Choose "No Fill".

d) What UTC and local time during the 24 hours was the difference between the temperature and the dewpoint (the dew point depression) reaching a maximum?

e) What is the minimum value for the relative humidity during the 24 hours? When is the relative humidity reaching a minimum?

f) What is maximum wind speed in knots? When is the wind reaching the maximum value?

g) Use observation at 11:53PM, Dec 13, 2012 (UTC) to make a station plot of the data.