

WEATHER AND CLIMATE
COMPLETING THE WEATHER OBSERVATION PROJECT
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Introduction

The Weather Observation Project is an important component of this course that gets you to look at real data, analyze, and interpret it through graphs and, then, communicate your results through a written summary. Moreover, the project is an assignment that emphasizes the practice of science. This essay has been prepared to help you begin your analysis and interpretation as well as outline how you will write the summary. Be sure to refer to the requirements provided through the course website.

Creating Graphs with Microsoft Excel

After you record the data for the project, you will create the graphs required for the project. The first graph displays the maximum, mean, and minimum temperatures for the month you observed. This graph is to be a line graph since the data are continuous. The second graph displays the precipitation for the month and is to be the column (bar) type since the data are not continuous.

Use the Microsoft Excel file (Weather Observation Sheet) provided through the course website and insert the recorded data if you have not already done so. Once the data are inserted, save the file. To create the temperatures graph, follow the procedures below.

1. Highlight the three temperature columns including the headers.
2. Click the Chart Wizard icon in the toolbar menu of the Excel program. The Chart Wizard dialog window opens.
3. STEP 1 of 4-CHART TYPE
 - a. For a temperature chart you will select the LINE option under Chart Type
 - b. Click Next.
4. STEP 2 of 4-CHART SOURCE DATA
 - a. Make sure that the graph in the dialog window has three lines.
 - b. Click Next.
5. STEP 3 of 4-CHART OPTIONS
 - a. Click the Titles tab.
 - i. Insert the title of the chart, "Maximum, Mean, and Minimum Temperatures."
 - ii. Insert the x-axis title, "Date."
 - iii. Insert the y-axis title, "Temperature (F)."
 - b. Click the Legend tab.
 - i. Deselect Show Legend.
 - c. Click Next.
6. STEP 4 of 4-CHART LOCATION
 - a. Select 'as new sheet' and enter the title "Temp."
 - b. Click Finish.
7. Your graph will now be displayed in a new sheet.
8. Modify the chart according to the requirements.
 - a. Click the title of the chart "Maximum, Mean, and Minimum Temperatures" and add a new line for each of the following, "Month Year," "Station ID," and "City, State."
 - b. Right click each data line and select "Format Data Series."
 - i. Change the color of the line to black.
 - ii. Change the weight of the line so that all lines are different.
 - iii. Change the style of the line to further differentiate the lines.
 - iv. Click Ok.
 - c. You will now need to create a textbox to insert your name, department, university, and due date.
 - i. If the Drawing toolbar is not present on the program, right click the toolbar area and select Drawing.
 - ii. On the Drawing toolbar click on the Textbox icon and draw a small box in the lower right-hand corner of the chart.
 - iii. Insert the information.
9. Make sure that the text size on the chart is 12 or 10.
 - a. Click on the different components of the chart and change the font size to 12 or 10.
10. Make sure that all dates are provided.
 - a. For the charts, it is not necessary to insert the Date (i.e. 10/12/2005). If the date is shown, right click on the x-axis and select "Format Axis."
 - i. Click the Number tab.
 1. Select General under Category.
 2. Click Ok.
 - b. Numbers 1, 2, 3, etc. should now show on the x-axis.
11. Repeat these procedures for the Precipitation graph except:
 - a. Choose Column option for Chart type instead of Line.

Calculating and Checking the Data

Once you have created your graphs, look at the temperature graph for errors. If all three data lines generally run parallel to each other, the data should be correct, visually. If there are large dips or the lines cross each other, there is a problem with the data. Check your Weather Observation Sheet to locate the errors and correct them. In addition, you will need to make sure all data are correctly recorded and placed in the appropriate columns.

After checking the graph for errors and problems, you will begin to identify the obvious data—maximum and minimum temperatures and when they occurred. After you have visually acknowledged the extreme temperatures, use the Weather Observation Sheet to calculate the important meteorological parameters listed in Table 1. The maximum, minimum, and other meteorological variables will be used in the second paragraph of your summary (discussed in detail later).

Table 1. Calculating Meteorological Values

<i>Meteorological Variable</i>	<i>Calculation</i>	<i>Meteorological Variable</i>	<i>Calculation</i>
<i>Maximum Temperature</i>	Note highest temperature in Maximum column	<i>Minimum Temperature</i>	Note lowest temperature in Minimum column.
<i>Precipitation</i>	Add all precipitation values together	<i>Monthly Mean Temperature</i>	Add all daily mean temperatures and divide by the number of variables (i.e. 30 or 31)
<i>Maximum Precipitation</i>	Note highest precipitation value and what day it occurred	<i>Average Barometer</i>	Add all daily barometric pressure values and divide by the number of variables (i.e. 30 or 31)
<i>Average Humidity</i>	Add all daily relative humidity values and divide by the number of variables (i.e. 30 or 31)	<i>Average Dew Point</i>	Add all daily dew point values and divide by the number of variables (i.e. 30 or 31)
<i>Maximum Wind Speed and Direction</i>	Note highest wind speed and the wind direction	<i>Average Wind Speed</i>	Add all daily wind speed values and divide by the number of variables (i.e. 30 or 31)
<i>Overall Cloud Type</i>	Note the number of	<i>Overall Cloud Cover</i>	Note the percentage

	cloud types and determine the one that occurs the most		of cloud cover by indicating the frequency of each. Indicate the one that occurs the most.
<i>Overall Weather Picture</i>	Summarize the month. Was it cold, hot, warm, wet, dry, etc.?		

Check for errors in your calculations. For example, precipitation is not an average. This variable must be a total. Although you may indicate the average maximum temperature by adding all the maximum temperatures and dividing by 30 or 31, the maximum temperature for the month must be the highest temperature listed in the maximum temperature column. This is the same procedure for the minimum temperature.

Resolution is also a very important factor in displaying your data. Table 2 indicates the proper resolution in the data sheet and summary for each type of variable. If your data are not displaying the proper resolution in the Weather Observation Sheet, slightly widen the column or highlight the column and click Format in the menu bar. Select Cells. Then, click the Number tab. Under Category, select number and choose the appropriate decimal place for that column. If you see ‘#’ in some cells, this indicates that the value is too large to display in the column. In this case, slightly widen the column to display the value.

Table 2. Proper Resolution of Meteorological Variables in the Weather Observation Sheet.

<i>Meteorological Variable</i>	<i>Data Sheet Resolution</i>	<i>Meteorological Variable</i>	<i>Data Sheet Resolution</i>
<i>Temperature, Dew Point</i>	XX.X	<i>Precipitation</i>	X.XX
<i>Barometric Pressure</i>	XXXX.X	<i>Humidity</i>	XX

Writing the Summary

The summary is the most important component of the Weather Observation Project. The outline below has been provided to help you write your two-page summary.

1. First Paragraph
 - a. Describe:
 - i. Month you are analyzing.
 - ii. Station location and identification.
 - iii. Variables recorded for the month.
 - iv. Time of the observation.
2. Second Paragraph
 - a. Describe:
 - i. Important meteorological values from Table 1.
 - ii. Overall character of the weather for the month.
3. Third Paragraph
 - a. Describe
 - i. Significant meteorological features
 1. Note and indicate why the important meteorological parameters occurred by correlating to the surface maps.
 2. Indicate any unique weather situations that occurred throughout the month.
4. Fourth Paragraph
 - a. Summarize
 - i. The overall character of the month.

There are important rules to observe when writing the summary. This project is to be as scientific as possible. In other words, you are not writing the project as an opinion paper, or literary type. Do not write, "I thought this project was..." or "The class was to observe the weather for the month of..." In addition, the summary is not a conceptual paper where you describe, for example, "Cold dense air creates a high pressure that diverts," or "The maximum temperature occurs between 2 and 4 in the afternoon." The purpose of the project is to get you to describe what happened during the month, not to regurgitate concepts learned in the course. Your ability to describe the meteorological conditions of the month will force you to recall the concepts when interpreting the data. The style of the summary is to be concise yet detailed.

In addition to the writing style, there are several grammatical rules to observe. The use of contractions in formal papers is improper, therefore, do not use, "don't," or "can't." Properly spell out the words (i.e. "do not," or "cannot"). Moreover, do not use abbreviations. It is a common problem among students that the word 'precip' is an actual word. This is an abbreviation. Spell out all words such as precipitation, temperature, humidity, or barometric pressure. Numbers that are indicating meteorological values are not to be spelled out (i.e. eighty-five degrees). Any time you use values, use Arabic numbers (i.e. 85°F). In addition, do not spell out degrees. To insert the degree (°) sign, press 'Ctrl+shift+2,' then, hit the spacebar and type

‘F.’ Table 3 indicates the proper format to follow when inserting meteorological values in your summary. Always use the proper unit symbols instead of words when inserting values in the summary.

Table 3. Format of Meteorological Variables in the Text.

<i>Meteorological Variable</i>	<i>Text Format</i>	<i>Meteorological Variable</i>	<i>Text Format</i>
<i>Temperature, Dew Point</i>	XX°F	<i>Precipitation</i>	X.XX”
<i>Barometric Pressure</i>	XXXX.Xmb	<i>Humidity</i>	XX%

Another common problem in written summaries is when the author states, ‘The temperature for the month was normal.’ This statement is untrue if you did not look at past monthly data. In other words, to make this statement true, you need to look at the month of October for the last 30 years. Simply stating that the month was normal is not accurate because you are not basing it on past data, but your own experience. Remember, this summary is to be as scientific as possible. If you want to determine the data is normal, above normal, or below normal, find departure data for that particular month.

Conclusion

The Weather Observation Project is designed to provide you with an understanding of how scientists collect, analyze, interpret, and write about the weather. From start to finish you will have completed a scientific paper. If you follow the above procedures, guidelines, and rules, your paper will be successful. It is suggested that you review the examples of previous Weather Observation Projects from the course website as well as the requirements outline. This project will change the way you observe or think about the weather. Moreover, it will enhance your abilities to recognize patterns and increase your writing skills.