**Temperature – Climate versus Weather**

**Cover sheet**

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*Description:*

Students learn what climate data is available for their area and how to access and use that data. Students will learn how to read and interpret climatological graphs.

*Context:*

Undergraduate Freshman/Sophomore level course in Physical Geography - the Atmosphere. Mostly non-majors.

Need for exercise:

Computer with web browser and internet connection. Basic math and statistics. Reading graphs.

A weekly exercise to help students understand concepts presented in class; an online "lab" that students work on independently.

*Goals:*

Understanding how climatological averages and ranges are determined from data and graphs. Reading graph and determining maximum and minimum temperature to determine range of temperatures, and monthly means.

*Overall Description:*

To prepare for this exercise, students read textbook chapter on temperature (Geosystems, Christoperson 2009) and they read about the differences between weather and climate. The classroom lecture includes definations of daily mean temperature, monthly mean temperature, mean monthly temperature, range of temperatures, and climatological averages. The students need to read graphs and determine values from the graphs. Simple addition and division are used. The data set used is from the Southern Regional Climate Center and is accessed via the internet. I used the data set from current month (March 2010) and we discussed the past winter and whether or not it was colder than the climatology averages. This helps students understand the difference between weather from climate. The activity is part of an online activity in Moodle, a classroom management software program used at LSU.

**Adjust your questions to the current month!**

*Evaluation:*

5-question quiz given online in classroom management software. Quiz is open book and open internet.

**Temperature – Climate versus Weather**

This week we are discussing temperature. Collections of temperature data are used to determine climatology. The day-to-day changes in temperature are considered “weather” whereas the long term averages, maximum, minimum, and range of temperatures are used to define climatology for a particular location. In the activity, you will learn more about temperature data and how to determine maximum and minimum values, monthly averages, and range.

We will use data from the Southern Regional Climate Center that is located in the Department of Geography and Anthropology at LSU.

Go to the web site

<http://www.srcc.lsu.edu/stations/>

You will see a Google Maps in the center of the screen. On the left side under Observations stations, type in Baton Rouge in the box. You will see a list of stations under the map. Find the Baton Rouge Ryan Airport, the station number is 160549. Click on the station number and Map of Stations changes to Station Information with a small map to the right. The station information includes the latitude and longitude of the station, elevation, and a list of the variables available for this station. Write down these variables, you may need this for the quiz.

There is a blue bar with four buttons to click on under Observation Stations.

Click on Annual Plots. The screen changes to a graph with the data for 2010. The red shaded area is the climatological range. The red vertical lines are the maximum and minimum reading for each day and the black line is the daily average. The temperature values are in degrees Fahrenheit. Click on previous year at the top to view 2009. From this graph, you can visually see what days were warmer or colder than the climatological average. You can print the plot by clicking on the Plot button under the blue bar.

From these graphs, answer the questions:

1) Was the beginning of January in 2009 colder or warmer than average?

2) Which month(s) had the highest daily maximum readings?

3) Which month(s) had the lowest daily minimum readings?

4) Which month(s) had days where average daily temperature greater than the climatological average?

5) What do the dashed lines represent?

6) Which January was colder, 2090 or 2010?

Click on Monthly Summaries on the blue bar under Observations stations. The monthly summaries provide the actual data. tmax is the maximum daily temperature and tmin is the minimum daily temperature. From the tmax and tmin you can determine daily average (tmax+tmin)/2. From the daily averages, you can determine monthly mean, etc. Monthly mean = sum of daily averages / # of days in the month. You can determine the range for each day by subtracting the maximum from the minimum.

Calculate the daily average for each day in March 2009 (top of the summary sheet) then answer the questions below.

7) What day(s) had the coldest minimum temp in March 2009? Warmest minimum temp?

8) What day(s) had the warmest maximum temp in March 2009? Coldest maximum temp?

9) What day(s) had the coldest average daily temp? Warmest average daily temp?

10) What is the Monthly Mean temperature?

Click on Climate Normals on the blue bar under Observations stations. The top graph is the 30-year climatological averages for 1971 to 2000 with the monthly average minimum and maximum. The maximum and minimum for month is the monthly range. For each month, subtract the maximum from the minimum for determine the range.

11) How does March 2009 compare to the 30-year average? Is the Monthly mean temperature you determined less than, within, or greater than the climatological average?

12) What month(s) are on average colder?

13) What month(s) are on average warmer?

14) What month has the highest range of temperature? The lowest range?

Record your answers in your notebook; you will need these for the quiz.

Quiz:

1. What is the Monthly Mean Temperature for March 2009?
2. **65.3 degrees F**
3. 21.8 degrees F
4. 54.0 degrees F
5. 76.2 degrees F
6. What is the lower dashed line on the Annual Plot?
7. Freezing point of water
8. The climatological minimum value for 1971-2000
9. Has no meaning, plotting error
10. The latitude of Baton Rouge
11. What day(s) had the coldest minimum temp in March 2009? Warmest minimum temp?
	1. March 2 and March 8
	2. March 3 and March 30
	3. March 18 and March 9
	4. March 2 and March 31
12. How does Monthly Mean temperature for March 2009 that you calculated compare to the 30-year climatological average and range?
	1. Less than climatological range
	2. Greater than climatological range
	3. Within climatological range
	4. Outside climatological range
13. What month has the highest range of temperature? The lowest range?
	1. October and July
	2. July and January
	3. Feb and April
	4. May and September

Figures from web site used in exercise.





