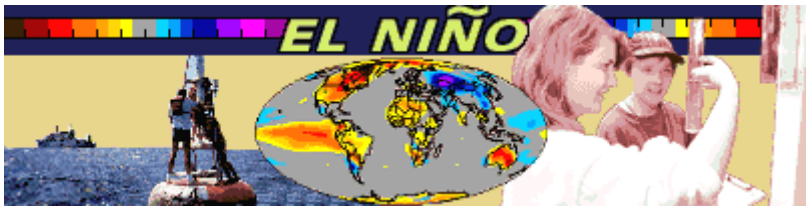


Looking for the Effects of El Niño in GLOBE Student Data

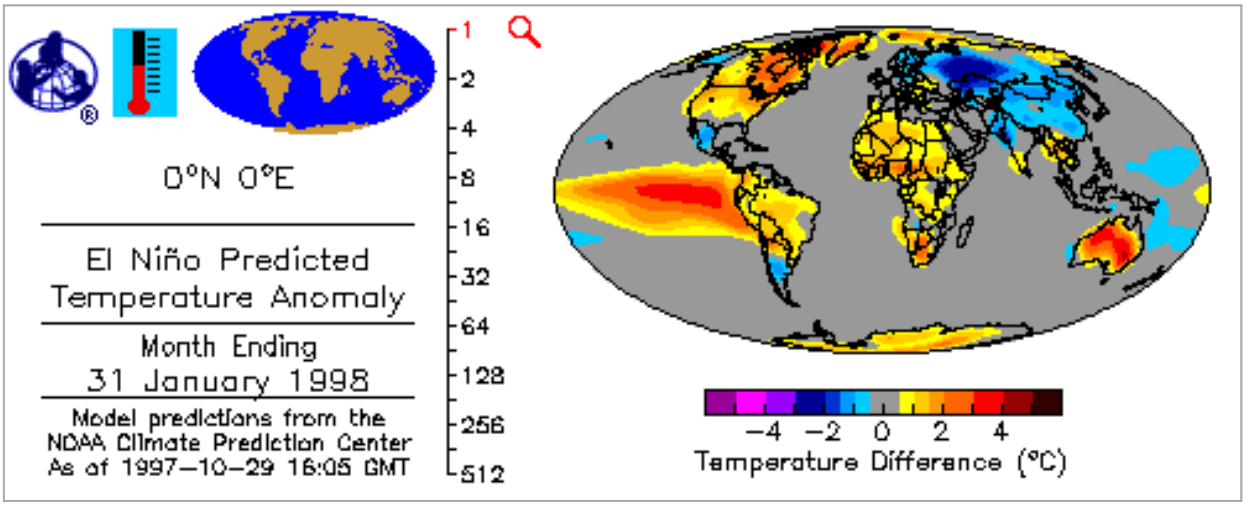
Scientists at NOAA developed models to predict the global effects of El Niño. Their predictions can be used with GLOBE data to test the accuracy of their model. In the GLOBE El Niño Experiment, launched in September 1997, the predictions were used as hypotheses and tested using the data collected following the GLOBE measurement protocols.

The GLOBE visualizations included a special set of model prediction maps designed to support the GLOBE El Niño Experiment. Included in the maps were predictions for the monthly temperature and precipitation anomalies from the experimental NOAA model. These predictions were made during October 1997.

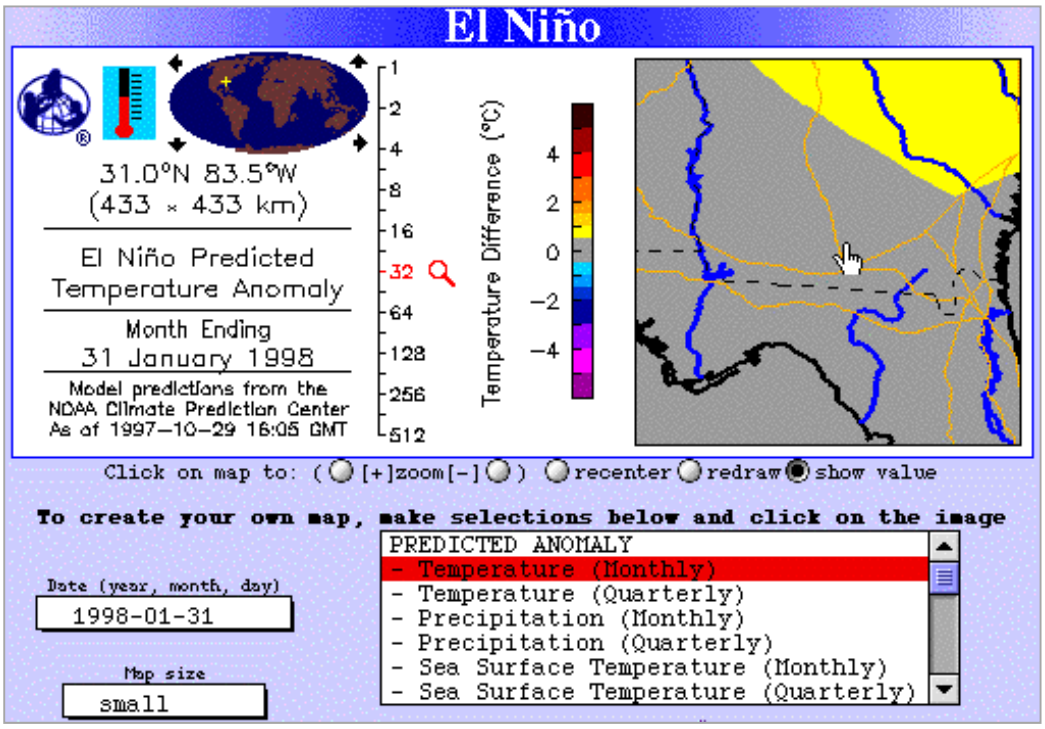
Look through the following small local analysis to help get started with El Niño. First, looking through the GLOBE Student Data Archive, we found the Hahira Middle School in Hahira, Georgia, USA. They took their temperature and precipitation measurements everyday during January 1998; this made it easy to calculate monthly average temperature and total precipitation. They didn't have any snow, therefore we only needed to consider the rainfall data in this example. Read through the steps below to see how we performed the analysis:

Step 1: Find the predicted temperature anomaly

The first piece of information needed was the predicted temperature for January 1998 for the location of the chosen school. Here is the visualization of the global temperature anomaly prediction for January.



To look at Georgia and the panhandle region of Florida in the United States, zoom in centered roughly on the Hahira Middle School.



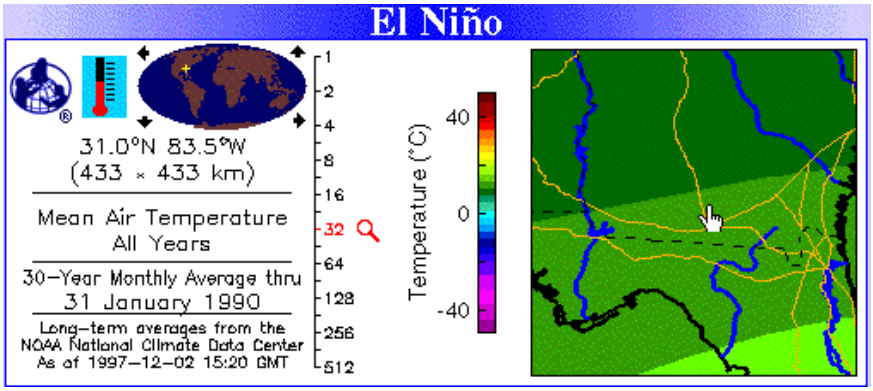
In this region temperature is predicted to be about normal for January 1998. To get the specific value predicted for the location of the school, check the "show value" button below the map and click on the map. At this resolution some streams and major highways are shown and this made it easier to click on the approximate location of the school. When I clicked, we got the following:

The location was about 31.1 degrees N latitude and 8 3.4 degrees W longitude (or -83.4 degrees longitude). Now we have the value of +0.4 ^{o}C as the predicted anomaly for monthly average temperature.

Step 2: Find the long-term average temperature

So what is normal for this place at this time of year? The visualizations also give this information. I chose the long-term average January temperature data for all years (the thirty years from 1961 to 1990).

Clicking on the same location on the map, we found that the average air temperature was 9.3 ^{o}C, so the monthly average temperature for January 1998 is predicted to be 9.7 ^{o}C (9.3 + 0.4 = 9.7 ^{o}C).

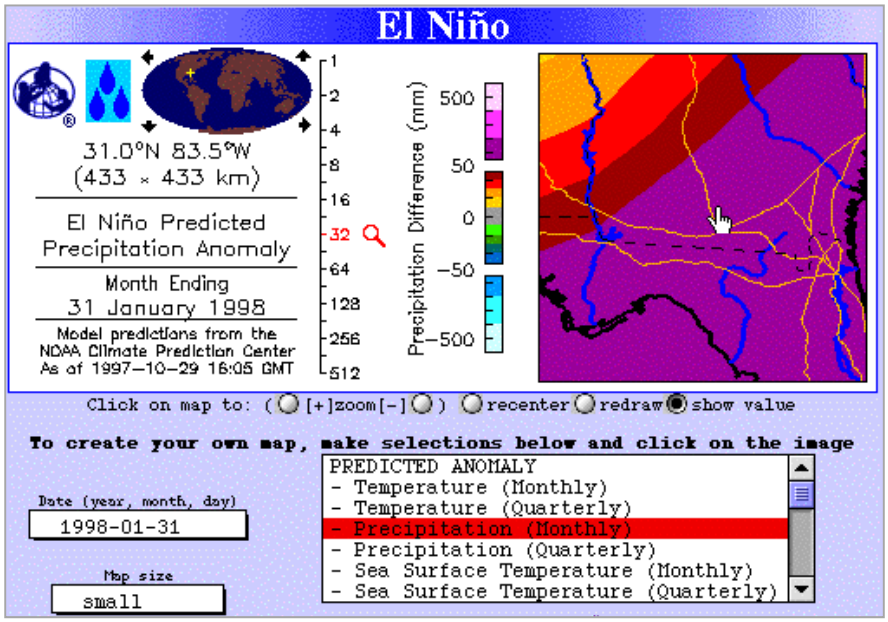


Step 3: Find the predicted precipitation anomaly

What about rainfall? We repeated the process but selected precipitation instead of temperature, providing the following map:

By selecting "show value" and clicking on the map we got the following information:
64.2 mm Reference Precipitation (Monthly) (1998-01-31) [Predicted Anamoly]

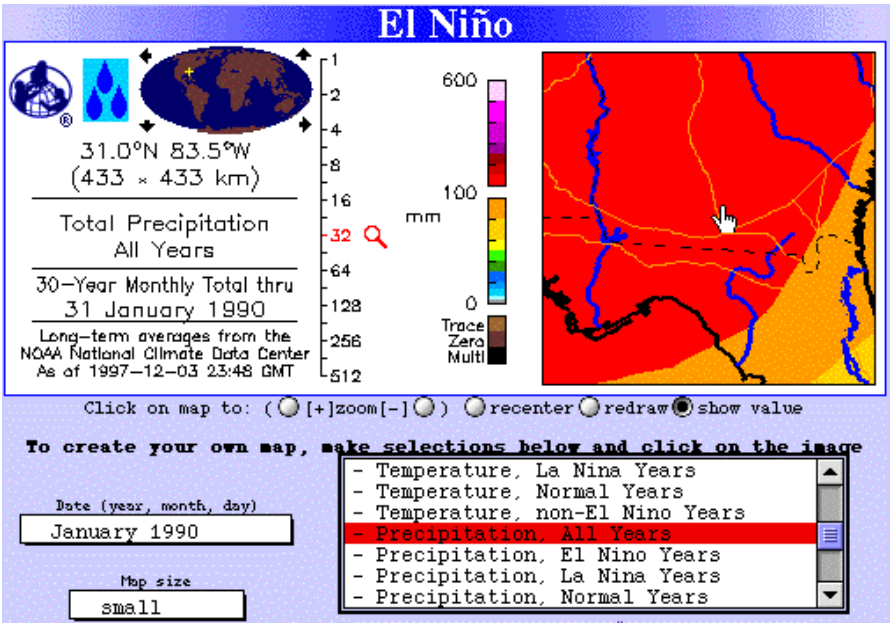
Now we have a predicted anomaly for monthly average precipitation of 64.2 mm above normal.



Step 4: Find the long-term average precipitation

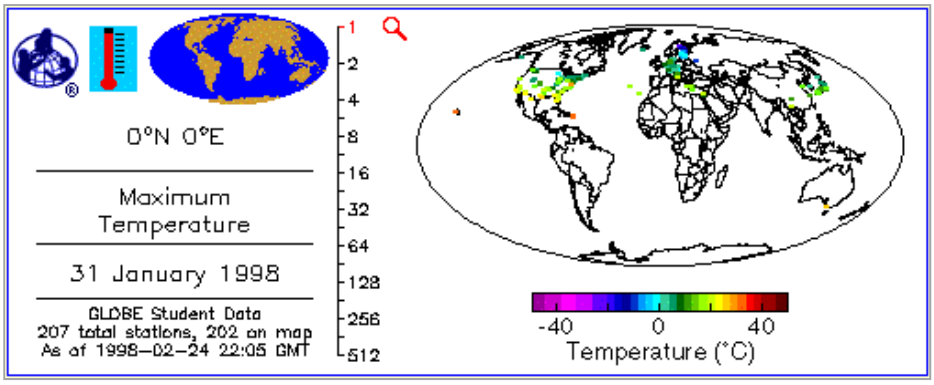
So what is the normal precipitation for this place at this time of year? As before, we looked at the long-term average January precipitation data for the 30 years between 1961 and 1990.

By selecting "show value" and clicking on the same location on the map, we found that the average precipitation was 118.8 mm, so the total precipitation for January 1998 is predicted to be 183.0 mm (118.8 + 64.2 = 183.0 mm).

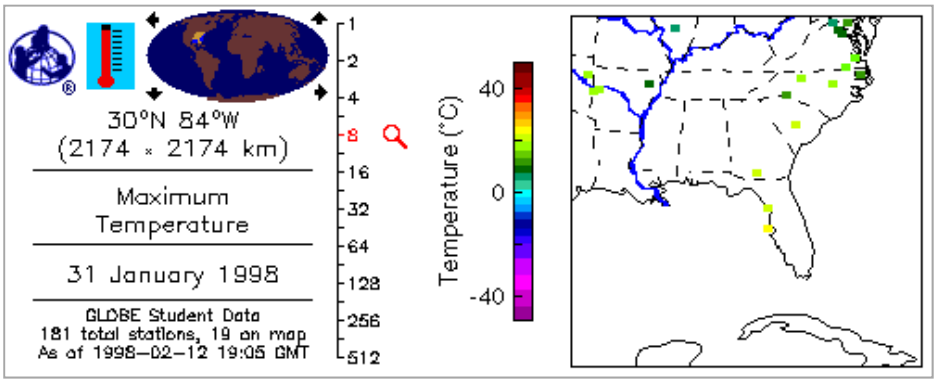


Step 5: Find the GLOBE school temperature and precipitation data

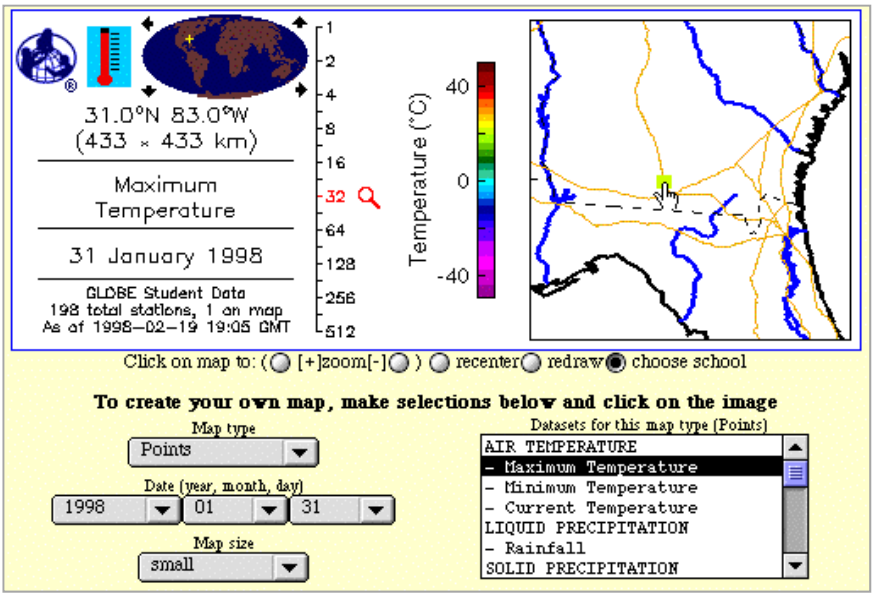
After we found the predictions, we then searched for the GLOBE measurements for temperature and precipitation made by Hahira Middle School. We went to the normal visualizations for maximum temperature for January 31, 1998:



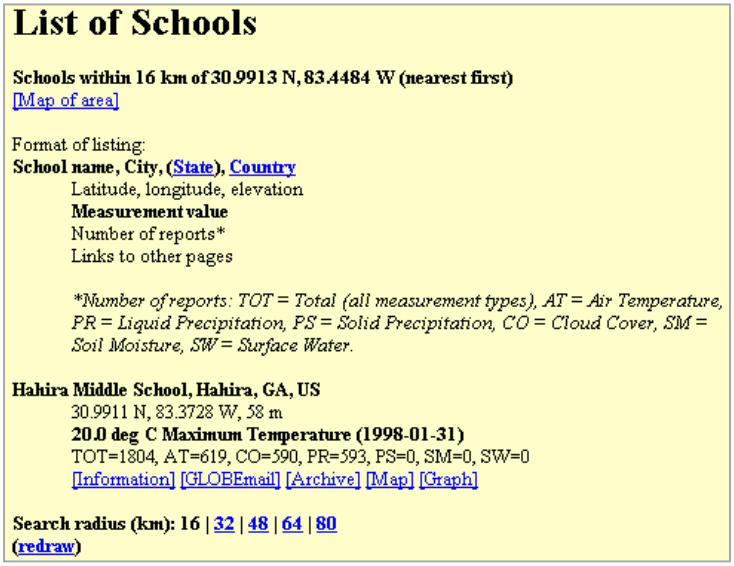
We first zoomed in to the Southeastern U.S.:



Then, we zoomed in on Hahira Middle School:



To see a graph of the school's data, in the above screen, we selected the button "choose school" from just below the map and then clicked on the green dot representing the school on the map. The following screen came up:



List of Schools

Schools within 16 km of 30.9913 N, 83.4484 W (nearest first)
[Map of area]

Format of listing:
School name, City, (State), Country
Latitude, longitude, elevation
Measurement value
Number of reports*
Links to other pages

**Number of reports: TOT = Total (all measurement types), AT = Air Temperature, PR = Liquid Precipitation, PS = Solid Precipitation, CO = Cloud Cover, SM = Soil Moisture, SW = Surface Water.*

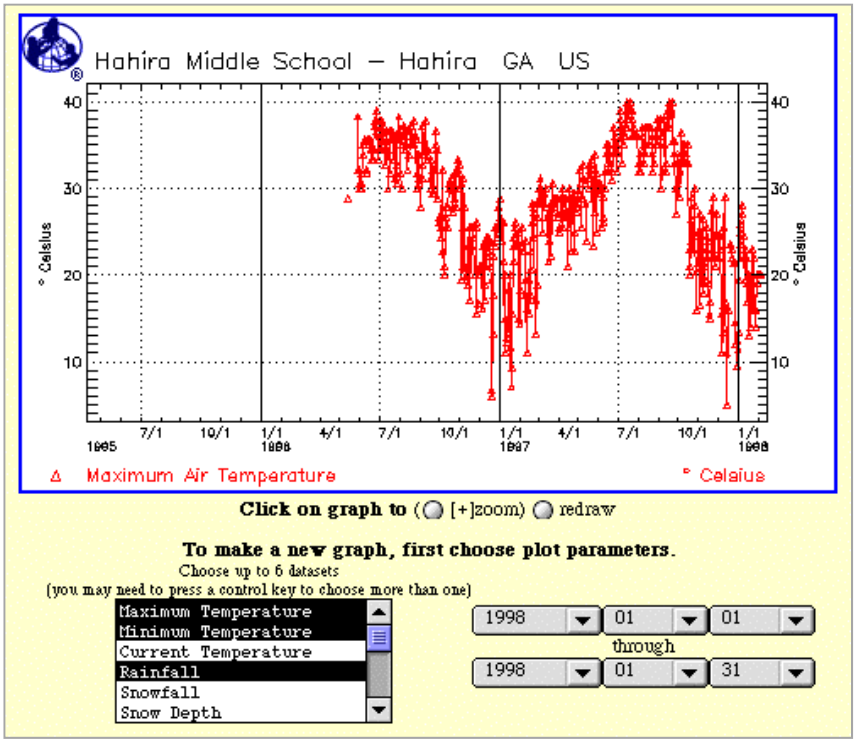
Hahira Middle School, Hahira, GA, US
30.9911 N, 83.3728 W, 58 m
20.0 deg C Maximum Temperature (1998-01-31)
TOT=1804, AT=619, CO=590, PR=593, PS=0, SM=0, SW=0
[Information] [GLOBEmail] [Archive] [Map] [Graph]

Search radius (km): 16 | 32 | 48 | 64 | 80
(redraw)

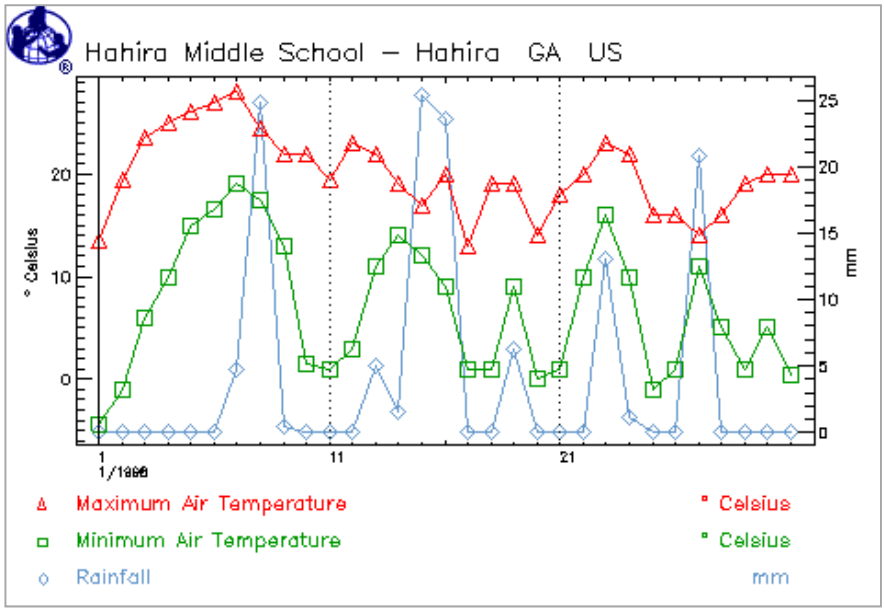
Now you can see the name and location of the selected school, in this case Hahira Middle School.

Step 6: Graph the GLOBE school data

To make a graph of the data from Hahira Middle School, we clicked on "Graph" and got the following:



We then chose January 1 to January 31, 1998 for the dates and selected maximum temperature, minimum temperature, and rainfall as the parameters to graph. We then clicked on the graph and got the following graph of the data for January, 1998:



Step 7: View the GLOBE school data

To calculate the monthly average values, we needed the table of data. To get such a table, we clicked on "Show table" and received the following data:

31 days in this time series

Date	MaxTemp	MinTemp	Rain	# of days
YYYYMMDD	deg C	deg C	Mm	
19980101	13.5	-4.5	0.0	1
19980102	19.5	-1.0	0.0	1
19980103	23.5	6.0	0.0	1
19980104	25.0	10.0	0.0	1
19980105	26.0	15.0	0.0	1
19980106	27.0	16.5	0.0	1
19980107	28.0	19.0	4.8	1
19980108	24.5	17.5	24.8	1
19980109	22.0	13.0	0.4	1
19980110	22.0	1.5	0.0	1
19980111	19.5	1.0	0.0	1
19980112	23.0	3.0	0.0	1
19980113	22.0	11.0	5.0	1
19980114	19.0	14.0	1.6	1
19980115	17.0	12.0	25.4	1
19980116	20.0	9.0	23.6	1

19980117	13.0	1.0	0.0	1
19980118	19.0	1.0	0.0	1
19980119	19.0	9.0	6.2	1
19980120	14.0	0.0	0.0	1
19980121	18.0	1.0	0.0	1
19980122	20.0	10.0	0.0	1
19980123	23.0	16.0	13.0	1
19980124	22.0	10.0	1.2	1
19980125	16.0	-1.0	0.0	1
19980126	16.0	1.0	0.0	1
19980129	19.0	1.0	0.0	1
19980127	14.0	11.0	20.8	1
19980128	16.0	5.0	0.0	1
19980130	20.0	5.0	0.0	1
19980130	20.0	5.0	0.0	1
19980131	20.0	0.5	0.0	1

Step 8: Average the GLOBE school data

The average temperature for each day is approximately equal to the average of the maximum and minimum temperatures for that day. The average temperature for the month is calculated by summing these daily values and dividing by 31 (the number of days).

The total monthly precipitation is simply the sum of the rainfall data for all the days in the month. If the school had experienced snow, the sum of the water equivalent of the snow for each day would be added to the sum of the rainfall data to get the total precipitation value.

The results are as follows:

Parameter	30 year normal	Observed	Difference	Predicted Anomaly	Measurement Accuracy
Monthly Average Temperature (^{o}C)	9.3	13.5	+ 4.2	+ 0.4	+/- 0.6 ^{o}C
Monthly Total Precipitation (mm)	118.8	126.8	+ 8.0	+ 64.2	+/- 1.1 mm

South Georgia was warmer than normal during January 1998 and had precipitation which was only about 7% above normal. This differs from the predictions which were for a much wetter January with temperatures about normal.