Scientific Computing

Assignment 1: Looking for Climate Change, Part 1

One of the oldest weather observatories in the United States can be found in the Blue Hills Reservation south of Boston. The Blue Hills observatory has been in operation since 1835. In this project, we'll attempt to analyze a temperature record from the Blue Hills for evidence of climate change. Has it gotten noticeably warmer in the last 170 years?

I downloaded a record of temperature taken at the Blue Hills from http://ingrid.ldeo.columbia.edu.   Feel free to check it out if you want: this site contains huge amounts of climate data, measured by weather stations, ships, weather balloons, and satellites. It's all there: the biggest problem I had was actually *finding* the Blue Hills temperature record.

File Input

You'll find the Blue Hills temperature file on the OnCourse page for this class. Click on the link to download the data file to your computer.

Fire up MATLAB. Use the "edit" command to view the data file. Notice that there's some text at the front describing the data file, which has "%" marks in front: these lines are treated as comments, and ignored.

Use the "load" command to load the data into MATLAB. MATLAB will create a new variable called `blue_hills_temperature`.

Viewing and rearranging the data

Question 1: What is the size and shape of the blue_hills_temperature variable? Describe how the data is laid out, and what the values in each column represent. (I have no idea what Column 2 is for. Just ignore it.)

Create two new vector variables, called `temperature` and `months`: the first should contain the temperature measurements only, and the second should contain the month in which each of these measurements were made.

Calendar and Temperature Math

The months variable is kind of inconvenient: it would be nice to use a date in years to display our data. Create a new variable called `years` which gives the calendar date that the data were taken. This should be a fractional number, so that January 1, 2000 would be 2000.0, and July 1, 1943 would be 1943.5.

All good scientists work using the SI or metric system, but just as an exercise, create a new variable which gives the temperature data in Fahrenheit instead of Celsius.

Plot it up!

Question 2: Create a graph which plots the temperature data as a function of calendar date in years. It should look something like this:

Temperature at Blue Hills, 1836–2006
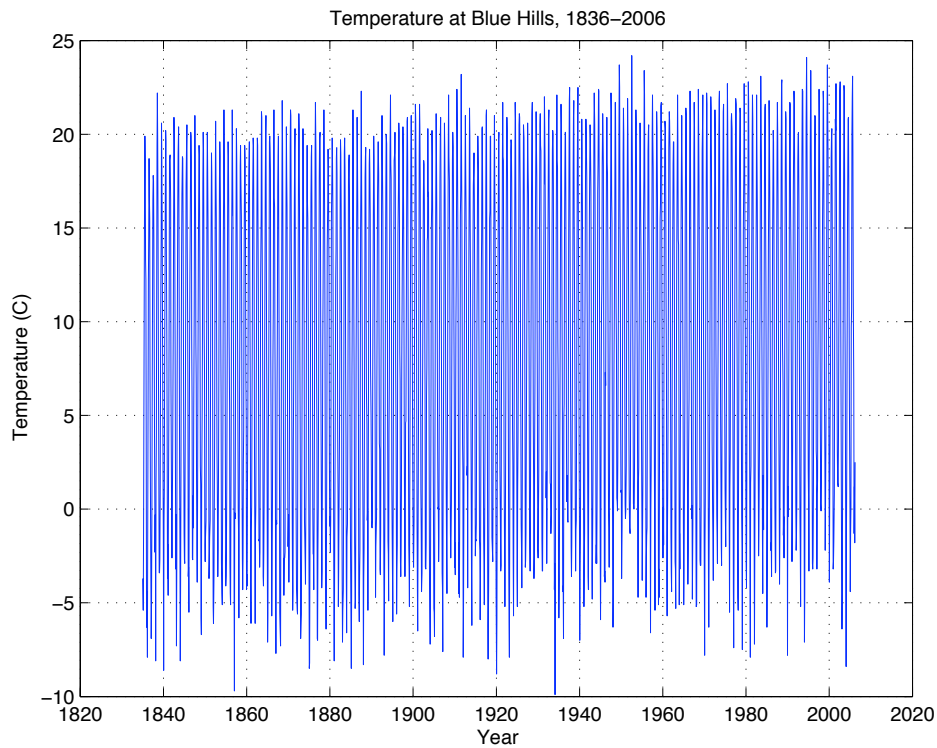
I've used the commands **xlabel**, **ylabel**, **title**, and **grid** to add grid lines, labels, and a title to the graph. You should do the same: use the help feature to learn more about these commands if you need to.

Question 3: It's pretty hard to see what's going on in this graph. Create a new graph which shows only the last 10 years. What do you see?

In the next assignment, we're going to work out a way to remove the seasonal cycle, and show only the departure of each January from the average January, the departure of each February from the average February, and so on.