Analysis Methods in Atmospheric and Oceanic Science

AOSC 652

Getting to know FORTRAN:
Input/Output, Data Sorting, Simple Statistics
Day 2

21 Sep 2016

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Review Mon:

Call to piksrt in our code:

```
call piksrt(iarray_in,iarray_out,npts)
```

Subroutine piksrt as written in Press et al.

```
      subroutine piksrt(n,arr)
      integer n,i,j
      real a,arr(n)
C
C     Input array is "sorted" using PIKSRT method, given on page 321
C     of Press et al., Numerical Recipes in Fortran, 2nd Edition.
C     Sorts an array into ascending numerical order, by straight insertion.
C
      do j=2,n                    ! Pick out each element in turn
        a=arr(j)
        do i=j-1,1,-1             ! Look for the place to insert it
          if(arr(i).le.a) goto 10
          arr(i+1)=arr(i)
        enddo
       i=0
10    arr(i+1)=a                  ! Insert it
      enddo
      return
      end
```

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Review Mon:

Call to piksrt in our code:

```
call piksrt(iarray_in,iarray_out,npts)
```

New subroutine piksrt to comply with our call statement

```
      subroutine piksrt(arr_in,arr_out,n)
      integer n,i,j
      integer a,arr_in(n),arr_out(n)
      do i=1,n
         arr_out(i)=arr_in(i)
      enddo
      do j=2,n                    ! Pick out each element in turn
          a=arr_out(j)
          do i=j-1,1,-1             ! Look for the place to insert it
              if(arr_out(i).le.a) goto 10
              arr_out(i+1)=arr_out(i)
          enddo
          i=0
10        arr_out(i+1)=a                ! Insert it
      enddo
      return
      end
```

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Review Mon:

Call to piksrt in our code:

```
call piksrt(iarray_in,iarray_out,npts)
```

Section of main code:

```
            write(99,790)namein(1:len_namein)
790         format('2,3',/,'Sequence,Integer Value', / ,'Sorted data read from file ', A)

             write(6,708)npts,namein(1:len_namein)
708         format('Read ',I7,' points from file ',A)

            call piksrt(iarray_in,iarray_out,npts)
C***        call heapsort(iarray_in,iarray_out,npts)

            do i=1,npts
               write(99,799)i,iarray_out(i)
            enddo
799         format(I6,3X,I6)
            write(*,*)'Output written to unit 99'
```

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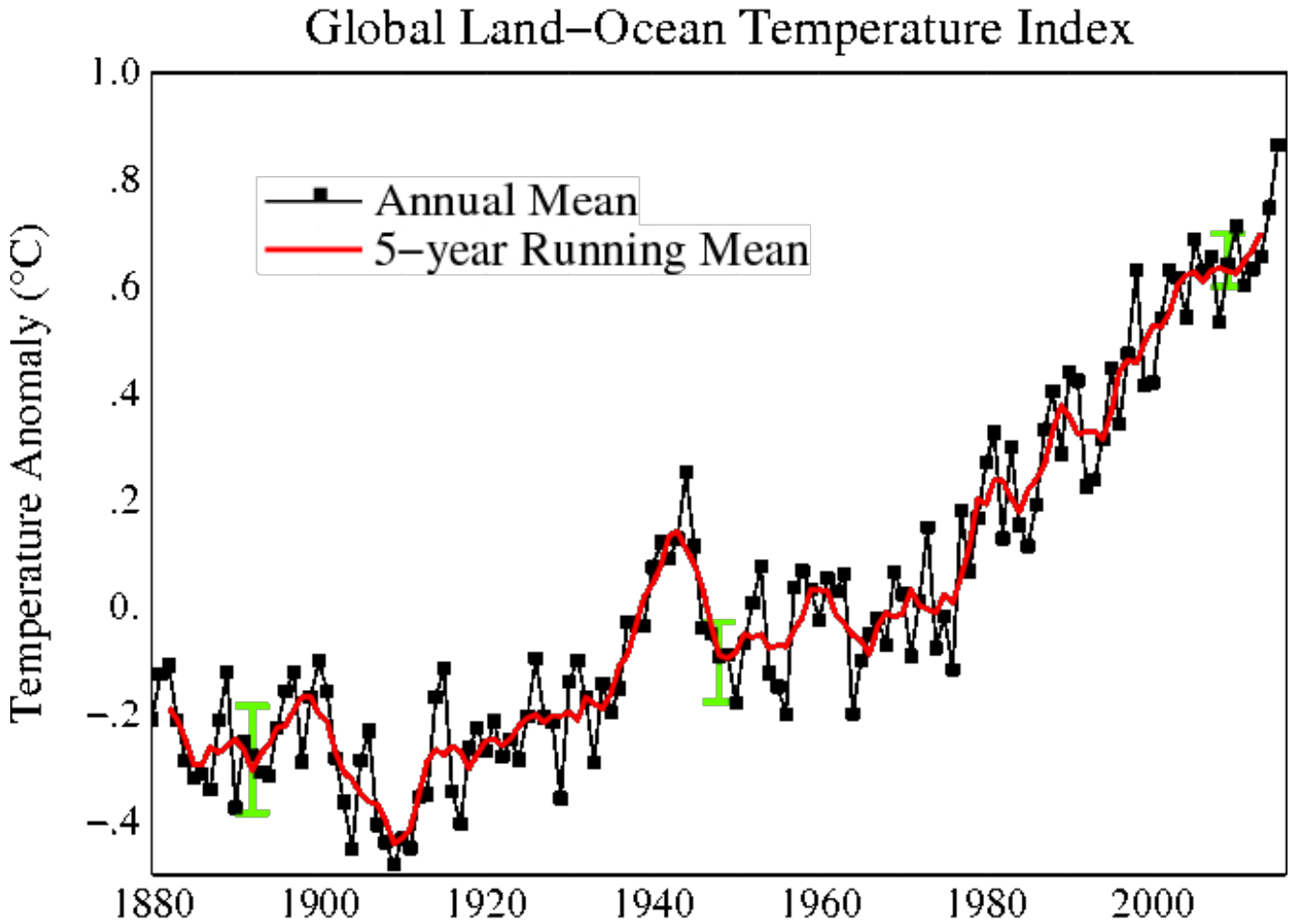
Global mean surface temperature anomaly:



http://data.giss.nasa.gov/gistemp/graphs_v3/Fig.A2.gif
http://data.giss.nasa.gov/gistemp/FAQ.html

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File formatting:

Copy file:

~rjs/aosc652/week_04/global_temperature_record.dat_orig

to your directory.

What changes need to be made to this file for it to be handled properly by our plot routine?

Copy this file to **global_temperature_record.dat** and edit the file

Then, prepare a plot of the global temperature record

You can learn about this temperature record at:

http://data.giss.nasa.gov/gistemp/graphs/

Data from:

http://data.giss.nasa.gov/gistemp/graphs_v3/Fig.A2.txt

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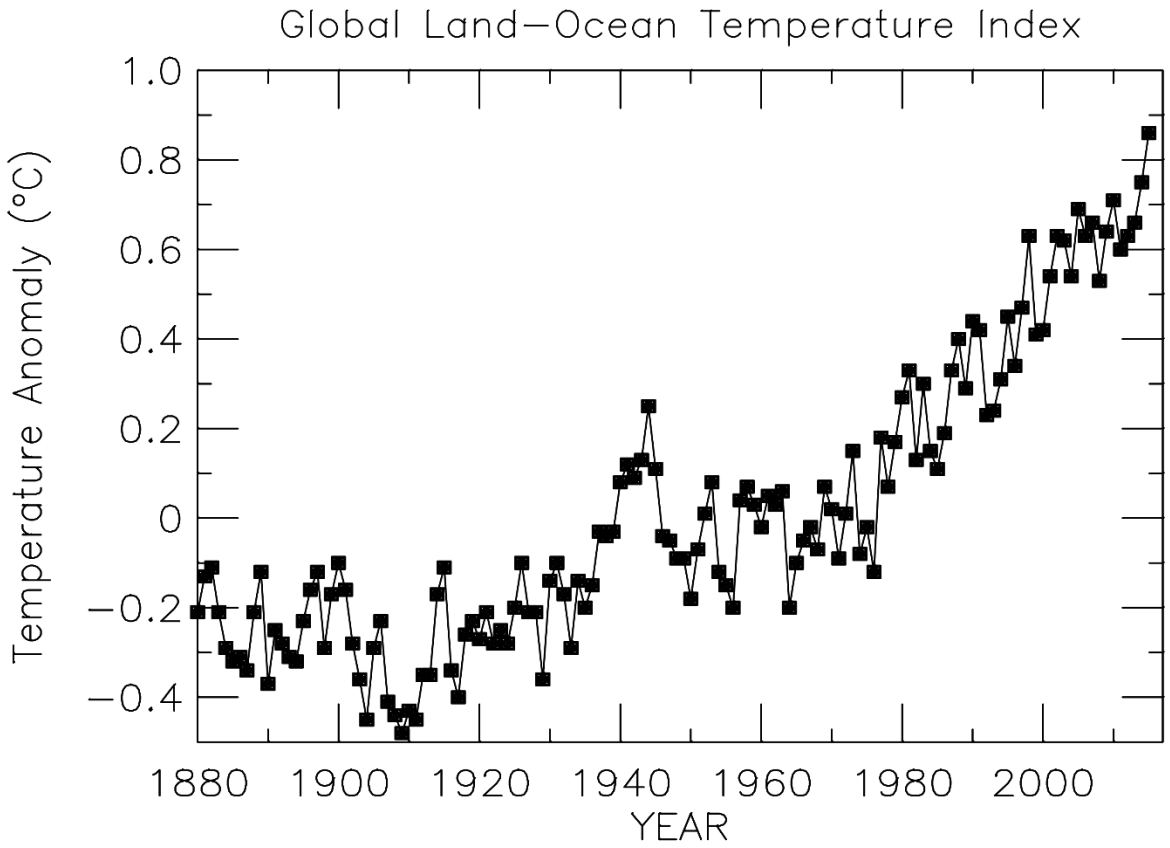
Hopefully your plot looks something like this:



See ~rjs/aosc652/week_04/stncl.500

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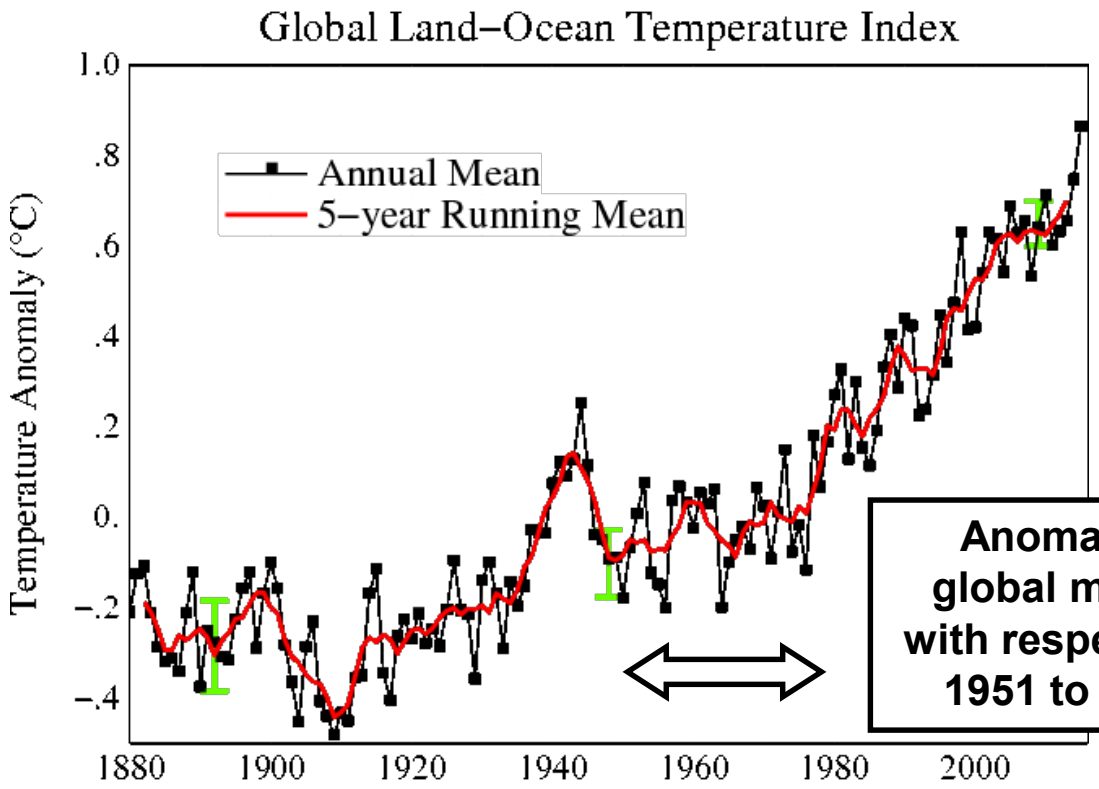
Hopefully your plot looks something like this:



Anomaly: difference of global mean temperature, with respect to average over 1951 to 1980 time period

http://data.giss.nasa.gov/gistemp/graphs_v3/Fig.A2.gif

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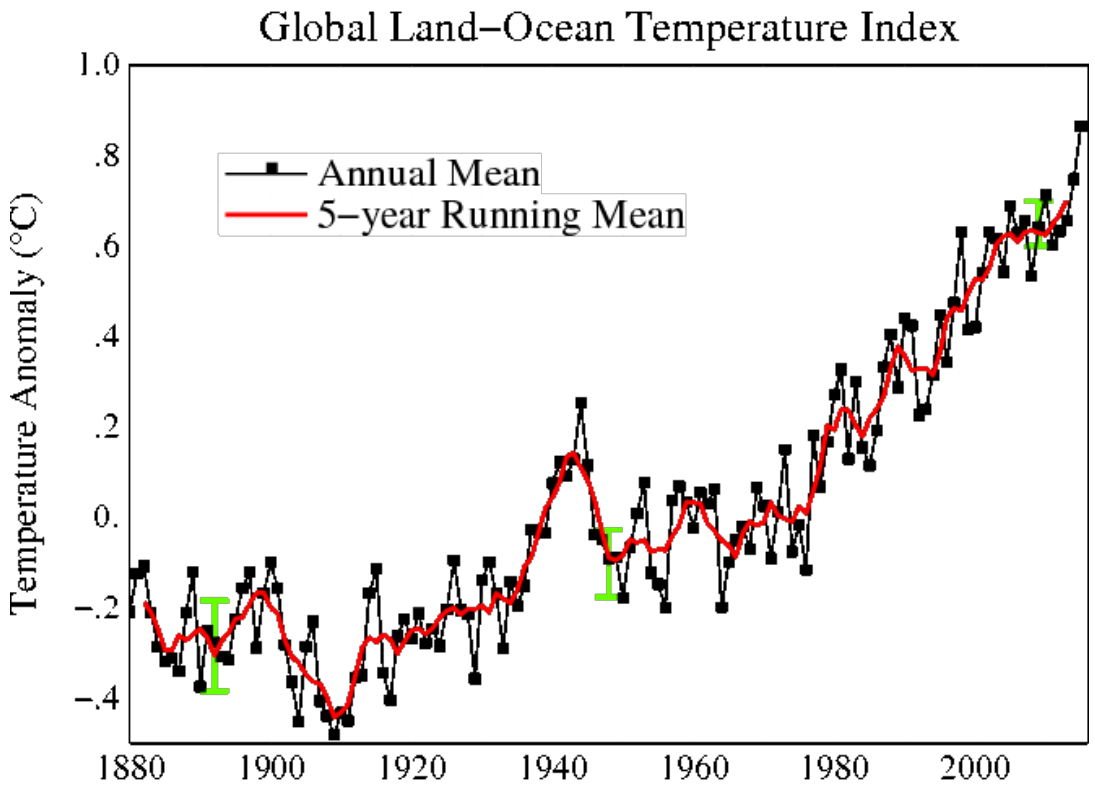
Hopefully your plot looks something like this:



http://data.giss.nasa.gov/gistemp/graphs_v3/Fig.A2.gif

FORTRAN programming:

We are now going to write a code to compute a 5 year, running mean of the global temperature anomaly time series

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FORTRAN programming:

We are now going to write a code to compute a 5 year, running mean of the global temperature anomaly time series

Copy file:

~rjs/aosc652/week_04/global_temperature_5yr_mean.shell.f

to your directory

Then, copy this file to **global_temperature_5yr_mean.f**
which we will edit

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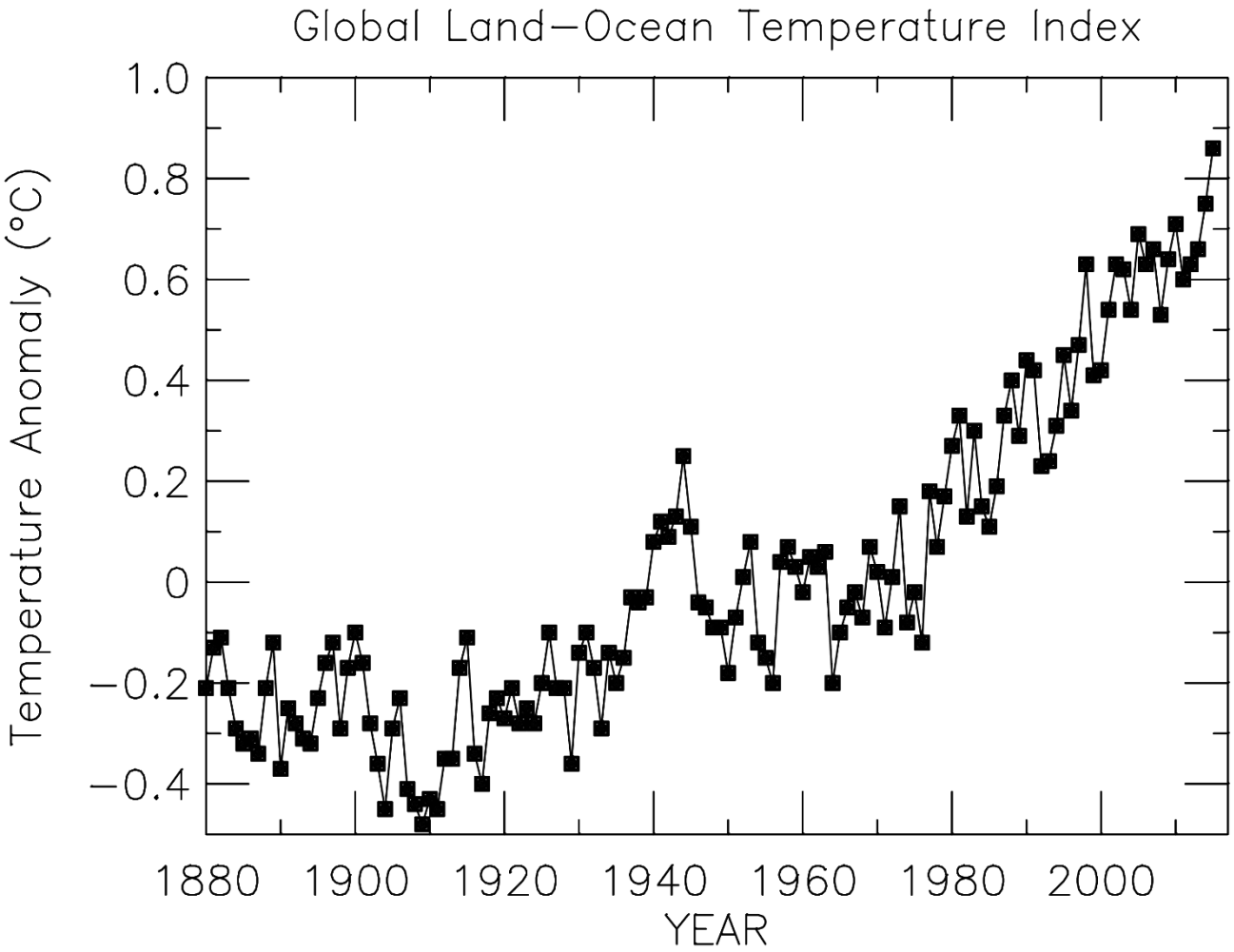
Hopefully your plot looks something like this:



See ~rjs/aosc652/week_04/stncl.500

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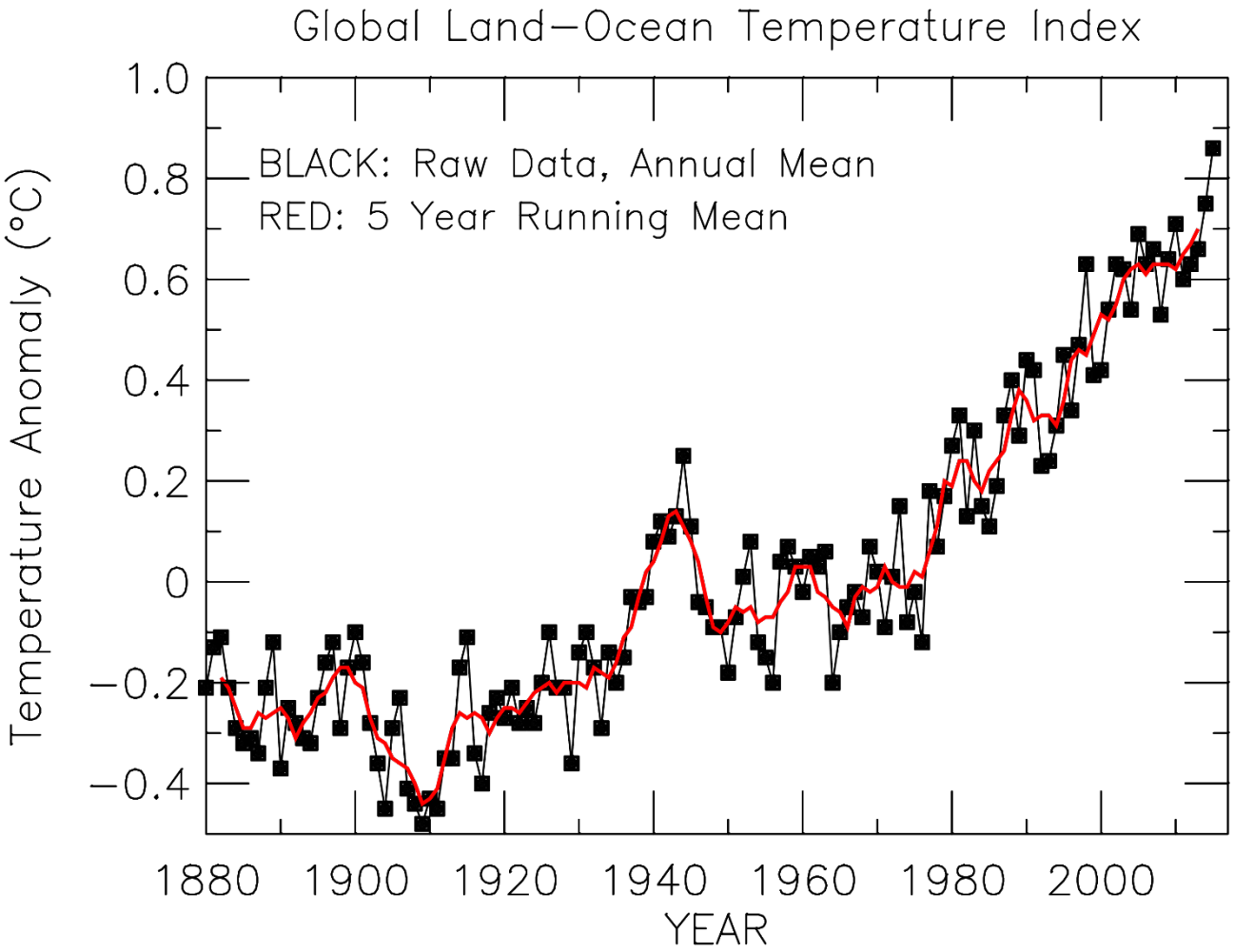
Hopefully your plot looks something like this:



See ~rjs/aosc652/week_04/stncl.500

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Station Data:

Go to: http://cdiac.ornl.gov/epubs/ndp/ushcn/ushcn.html

Click on Data Access

Then, click on Web Interface

Select Colorado from Drop Down Menu and hit Map Sites

Click on Dillon 1 E, CO (052281)

Click on Get Monthly Data

Highlight Mean Temperature (TMEAN) under

"**Select a Temperature variable for plot of Mean Temperature vs year**"

and then click on **"get the plot"**

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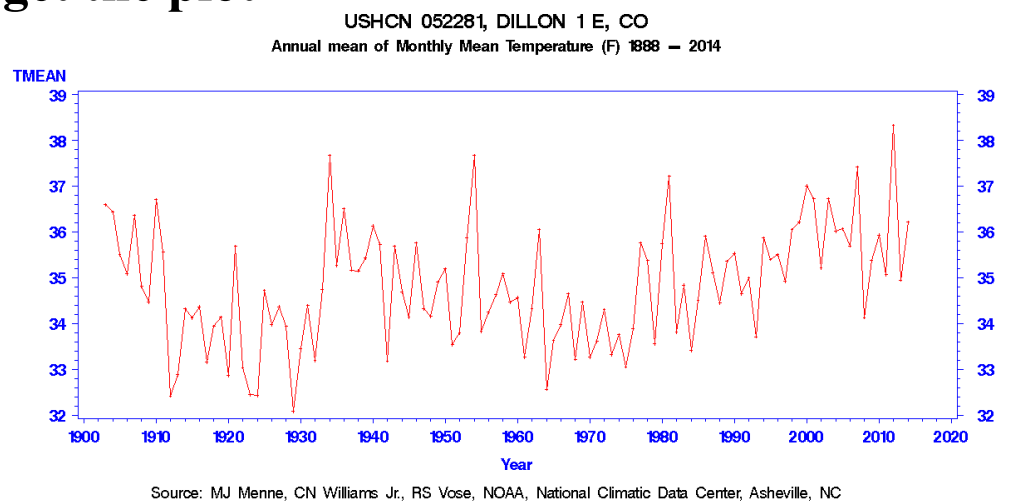
Click on Get Monthly Data

Highlight Mean Temperature (TMEAN) under

"Select a Temperature variable for plot of Mean Temperature vs year"

and then click on **"get the plot"**

Plot should look like:



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Station Data:

To get data, scroll to:

"**Download a comma-separated file of data summarized by year (Jan 1 - Dec 31) to a download area.**"

Select **Annual Average Mean Temperature**, click on submit, and you should see something like:

Your download file name is CO052281_0151.csv

Your download file has 3 columns and 2 header records plus 126 data records.
It is 2,591 bytes.
You can save this file to your computer by clicking on this link in your Web browser:
http://cdiac.esd.ornl.gov/sasserv/CO052281_0677.csv

As the first part of your next assignment, you will need to get data from this *.csv file into a file you are able to plot and analyze.

File can first be saved to disk. Then, can open with an editor and transform into a file that conforms to our format

Commas do not have to be removed but can be removed (using Linux editor) if they seem to be posing a problem. Suggest removing station ID from the first column

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