

## AOSC 652: Analysis Methods in AOSC

### Assignment #4b: FORTRAN Coding, Plotting, Data Analysis

**Due: Monday, 26 September 2016 (at start of class)**

**Late Penalty: 10 points per day**

Name: \_\_\_\_\_

Pathnames of:

*station temperature record* time series: \_\_\_\_\_

Assuming these are in same directory as above, please give filenames of:

*station temperature anomaly* time series: \_\_\_\_\_

5 year running mean of *station temperature anomaly*: \_\_\_\_\_

1. (80 points) This assignment involves writing a FORTRAN code that performs a simple analysis and data input/output of a temperature record.

In class on Wednesday, we wrote code that computes a 5 year running mean of the global temperature record and we produced a plot that showed how global temperature varies from 1880 to present.

Now we would like to compare the global temperature record to the temperature record from another location, *of your choosing*, within the United States (but please, no station in Maryland!).

To obtain the temperature record from this station, go to Monthly Data interface of the U.S. Historical Climatology Network (CONUS, or Continental United States) website run by the Oak Ridge National Laboratory. As we did in class on Wednesday:

First go to [http://cdiac.ornl.gov/epubs/ndp/ushcn/usa\\_monthly.html](http://cdiac.ornl.gov/epubs/ndp/ushcn/usa_monthly.html)

Then, Click on Data Access

Next, click on Web Interface

Then, select a state of your choosing from the Drop Down Menu and hit Map Sites

Select your site and click on Get Monthly Data

A new window should open

In this new window, scroll to:

**“Write a comma-separated file of data summarized by year (Jan 1 - Dec 31) to a download area”**

and then select Annual Average Mean Temperature (under this heading). A check-mark should appear once the selection has been made.

Click on submit and you should see a new page that has text stating

You can save this file to your computer by clicking on this link in your Web browser

Save the \*.csv file to disk.

Your assignment is to:

1. Form an ASCII file written according to our standard format that contains the annual average temperature record at the site you have chosen. Please include, in the header of the file, information identifying the station and any other information you believe will be helpful. Below, this new ASCII file is referred to as *station temperature record*.

2. Copy FORTRAN program `global_temperature_5yr_mean.f` (which we worked on in class on Wednesday) to file `station_temperature_5yr_mean.f`

Modify FORTRAN program `station_temperature_5yr_mean.f` so that it:

a) reads the data in *station temperature record* and writes output (described below) to an appropriately named file

b) computes a single number, the average temperature over the time period 1951 to 1980, which is termed *baseline*

b) subtracts *baseline* temperature from each data point of *station temperature record*. The result of this subtraction is termed the *station temperature anomaly time series*.

**Note:** This subtraction should make the *station temperature record* consistent with the global mean temperature record that we used in class on Wednesday, which was computed, by NASA GISS, as a temperature “anomaly” with respect to a 1951 to 1980 baseline.

c) outputs to a file both the *station temperature anomaly time series* and the **5 year running mean** of the *station temperature anomaly time series*

3. Then, produce a plot showing:

a) The *global mean temperature anomaly* time series and the **5 year running mean** of the *global mean temperature anomaly* (two lines, which we produced in class on Wed)

b) The *station temperature anomaly* time series and the **5 year running mean** of the *station temperature anomaly* (two more lines)

c) Feel free to use your choice of line colors / types to denote these two temperature records.

Please turn:

i) A hardcopy of your FORTRAN program `station_temperature_5yr_mean.f` printed the usual way (enscript, full path name)

ii) the paths to your *station temperature record* time series (input to your FORTRAN code) and the *station temperature anomaly* time series (output of your FORTRAN code) as well as the **5 year, running mean** of this time series

iii) hardcopy of the plot(s) described above (the command `lpr -Pcolor filename.ps` will send plot to the color printer located in CSS 3408; alternatively, can produce a \*.png file using linux convert command, transfer to your laptop, import into Powerpoint, and print using pull down menus within Powerpoint).

**Finally**, please include a *brief statement* (one or two sentences) on the similarity or lack thereof, of the two temperature records: you may write either on the plot or on a separate piece of paper.