

## Problem Set #1

Access, plot, and view time series data. Convert between North, East, Up and X, Y, Z displacements.

### Assignment

**Step 1.** Get setup with MATLAB. Make sure you can:

1) Start MATLAB either on your own system or through the UNR server.

2) Execute commands

3) save files (m-files, .mat files, other datafiles) on your computer.

4) If you are just getting started with MATLAB, try looking at some documentation and learn some of the basic commands, e.g. at the MATLAB prompt type “help plot” or “doc plot”. “doc” usually provides more detailed information, while “help” provides a quicker reference right to the command line.

**Step 2.** Read in the X,Y,Z coordinate file given at  
<http://cheryl.nbmg.unr.edu/billhammond/Courses/GeophysicalGeodesy/>

This file has lines that look like this:

```
2006.5575 -2516711.288606 -4300916.164038 3970585.346371
2006.5603 -2516711.287201 -4300916.162646 3970585.346314
2006.5630 -2516711.287698 -4300916.161902 3970585.345675
2006.5658 -2516711.290159 -4300916.165352 3970585.348849
2006.5685 -2516711.284639 -4300916.160830 3970585.342440
2006.5712 -2516711.287342 -4300916.162096 3970585.344957
2006.5740 -2516711.288200 -4300916.164863 3970585.346668
2006.5767 -2516711.285306 -4300916.160279 3970585.343390
2006.5795 -2516711.284776 -4300916.161162 3970585.343201
:
:
:
```

which are in four columns: decimal year, x, y, z coordinates

### **Step 3. Import this data into Matlab**

You can read a file like this into MATLAB using a command such as:

```
[year, x, y, z]=textread('P130.xyz','%f %f %f %f');
```

Make sure you get no errors. Make sure you are in the same directory as your data file, or specify the entire path name in the filename.

Check to see if your variables read in correctly using “whos”, and/or by typing in the variable names to see the values dumped to the screen.

You can also try using the command 'textscan' which is the more up-to-date MATLAB-ese.

**Step 4.** Plot the X,Y,Z coordinates over time on separate axes in MATLAB. Time on the horizontal axis, coordinate on the vertical axis. Note that the coordinates are in meters, so subtract the median value from each time series (e.g. use MATLAB “median”), multiply by 1000 to get into units of mm. Using “print ” make a file (or files) of the plot output.

**Step 5.** Get the script xyz2latlon.m off of the class web page --> Scripts --> matlab --> xyz2latlon.m. Check out how this works by typing 'help xyz2latlon', or by reading the script.

**Step 6.** Using the script, convert the coordinates to latitude and longitude. I have not provided uncertainties in this example so set them all to some dummy number, e.g. ones.

**Step 7.** Plot latitude, longitude, height as a function of time, similar to Step 3. Since units from xyz2latlon.m are degrees (for latitude and longitude) and meters (for height), convert each to **mm** before plotting. This will illustrate how the north, east and vertical coordinates of the station are changing over time. Use appropriate axes labels.

NOTE: STAY WELL ORGANIZED. KEEP YOUR CODE NEAT. THIS REALLY HELPS WHEN YOU WANT TO GO BACK AND SEE WHAT YOU DID.

**Step 8.**

email the following to *whammond@unr.edu* :

- your plot files. Make sure the files are in some format I can read (.pdf, .ps, .tiff, .jpg, .png, Word, Open Office, etc.)
- your matlab (something.m) script