Homework 7

Table of Contents

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Due: 11/4/2016

Part 1: Volume of Earth's Layers

1.1: A function for the volume of a sphere

```
clc;
clear all;
close all;

% A sample use of sphereVolume.m:

r = 2;
Volume = sphereVolume(r);
```

1.2: Ensuring valid function inputs

We used the following input tests:

if r==0

```
          error('Error. r cannot equal zero.')
```

end

if r<0

```
          error('Error. r cannot be a negative value.')
```

1.3: Another function for the thickness of Earth's layers

```
% earthLayers.m was created as directed and is implemented in Step
 1.4.
```

1.4: Compute the volume of each layer

```
[crust,mantle,core]=earthLayers;

volCore=sphereVolume(core);
volMantle=sphereVolume(core+mantle)-volCore;
volCrust=sphereVolume(crust+core+mantle)-volMantle-volCore;
volPlanet=sphereVolume(crust+core+mantle);
```

1.5: Compute each layer's percentage of Earth's total volume

```
pctVol=@(V)(V/volPlanet)*100;

pctVolCore=pctVol(volCore);
pctVolMantle=pctVol(volMantle);
pctVolCrust=pctVol(volCrust);
```

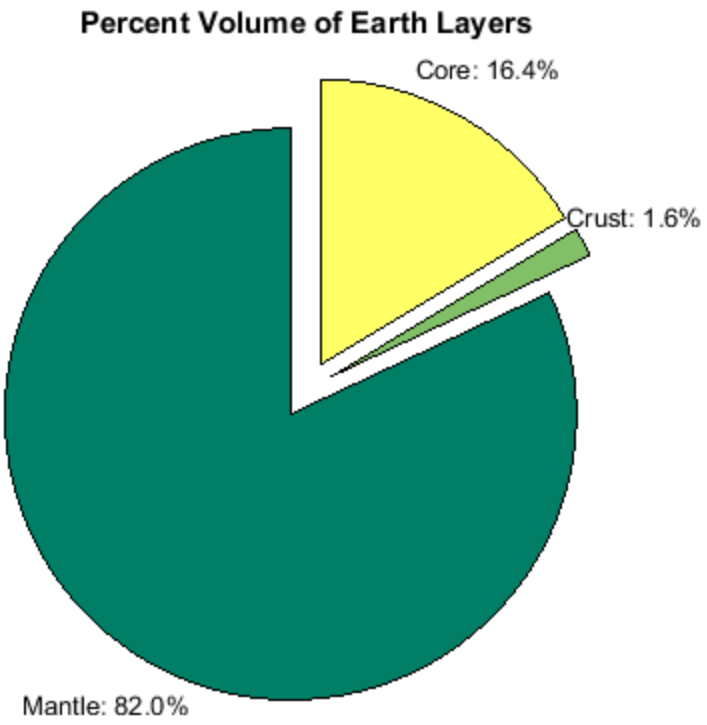
1.6: Formatted output of computation results

```
fprintf('Volume of Core:   %.2e [km^3] \n',volCore)
fprintf('Volume of Mantle: %.2e [km^3] \n',volMantle)
fprintf('Volume of Crust:  %.2e [km^3] \n',volCrust)
fprintf('Core:   %.1f [%%] \n',pctVolCore)
fprintf('Mantle: %.1f [%%] \n',pctVolMantle)
fprintf('Crust:  %.1f  [%%] \n', pctVolCrust)
```

```
Volume of Core:   1.77e+11 [km^3]
Volume of Mantle: 8.88e+11 [km^3]
Volume of Crust:  1.78e+10 [km^3]
Core:   16.4 [%]
Mantle: 82.0 [%]
Crust:  1.6  [%]
```

1.7: Plotting a Pie chart

```
layerPct=[pctVolMantle pctVolCrust pctVolCore];
labels={'Mantle: 82.0%', 'Crust: 1.6%', 'Core: 16.4%'};
explode=[1 1 1];
pie(layerPct,explode,labels)
colormap(summer);
title('Percent Volume of Earth Layers');
```



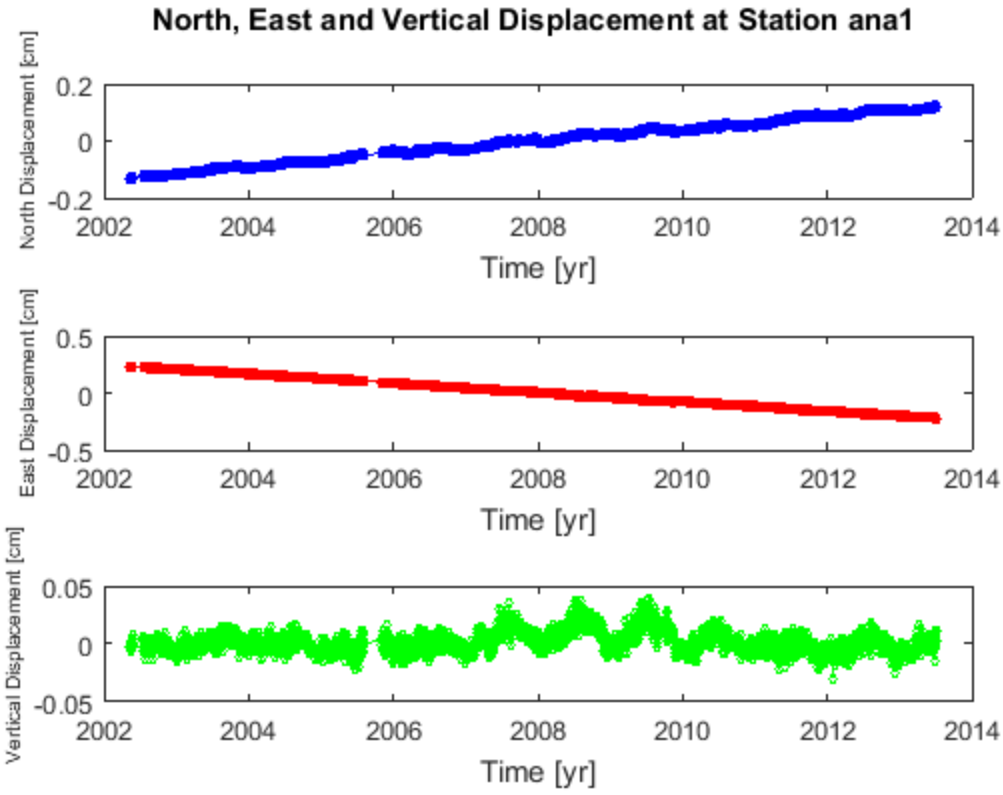
2.5: Process all of the data

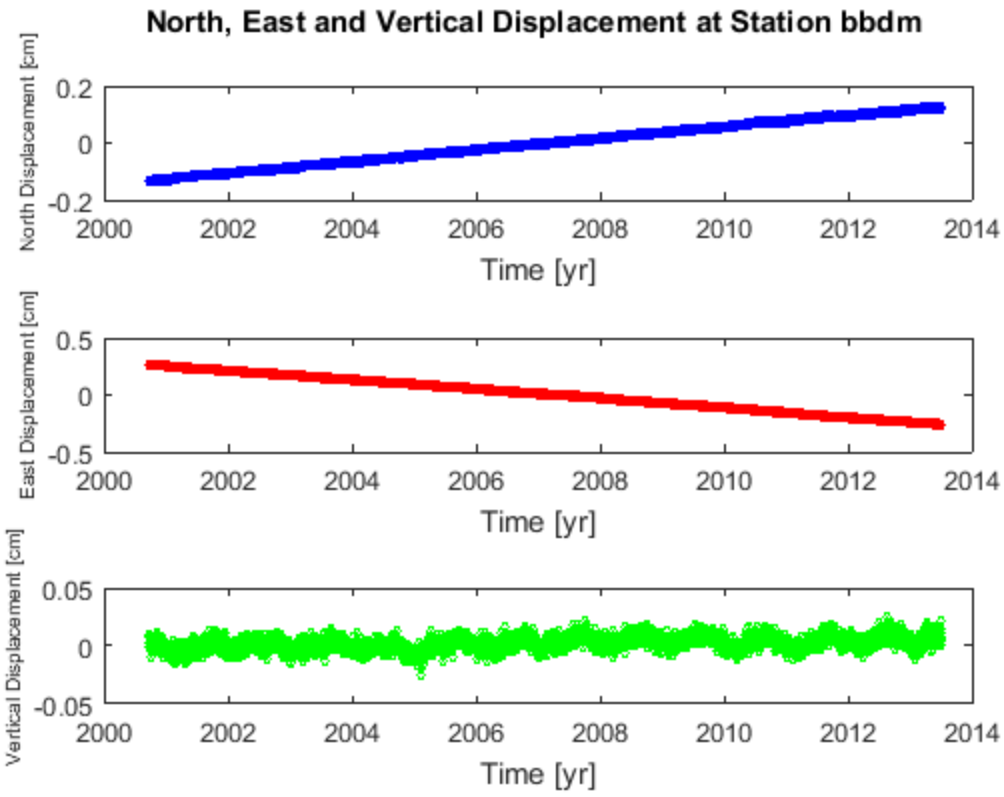
```
allGPS
```

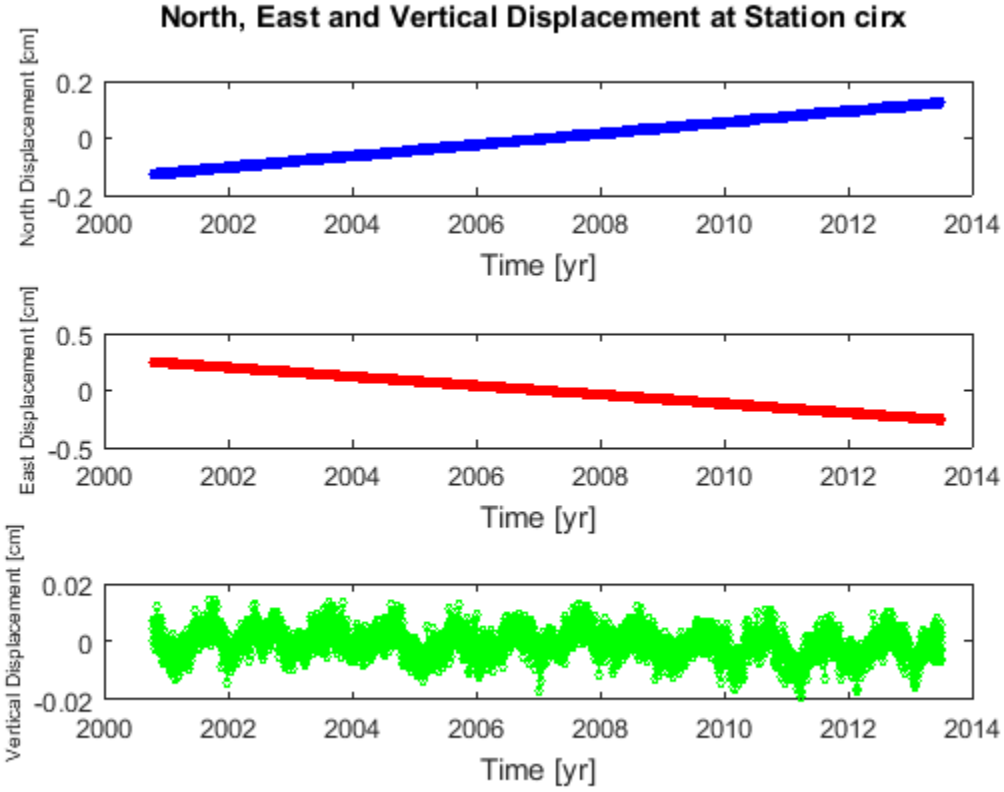
```
.                                cmp9CleanUnf.neu
..                               dam2CleanUnf.neu
GEOS397_HW7_ColtonandSchuler.m   earthLayers.m
GEOS597_HW7_ColtonShuler         getGPSdata.m
GEOS597_HW7_ColtonShuler.zip     html
allGPS.m                         kbrcCleanUnf.neu
ana1CleanUnf.neu                 p729CleanUnf.neu
bbdmCleanUnf.neu                 sphereVolume.m
cirxCleanUnf.neu

Site Name: ana1
Time span: 11.15 [yrs]
Number of days with data: 3862
Total north displacement:     25.00 [cm]
Total east displacement:      -45.48 [cm]
Total vertical displacement:  1.35 [cm]
Avg north velocity:     2.24 [cm/yr]
Avg east velocity:      -4.08 [cm/yr]
Avg vertical velocity:  0.12 [cm/yr]

Site Name: bbdm
```

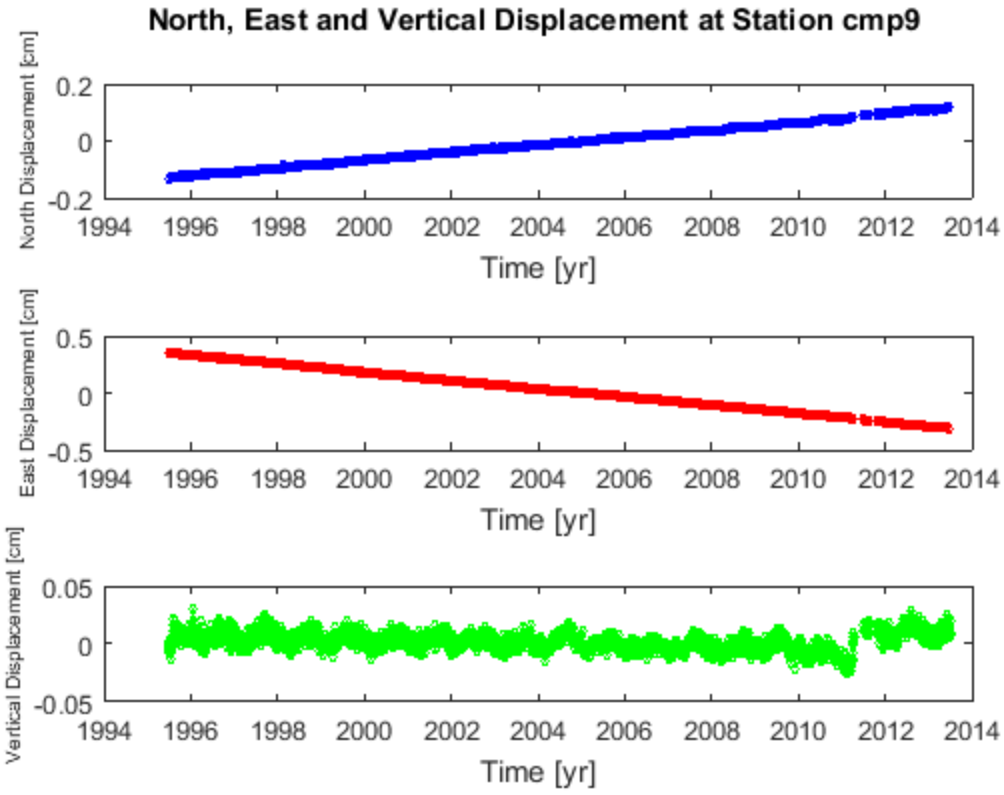
```
Time span: 12.79 [yrs]
Number of days with data: 4543
Total north displacement:     26.15 [cm]
Total east displacement:      -52.17 [cm]
Total vertical displacement:  0.27 [cm]
Avg north velocity:     2.05 [cm/yr]
Avg east velocity:      -4.08 [cm/yr]
Avg vertical velocity:  0.02 [cm/yr]

Site Name: cirx
Time span: 12.71 [yrs]
Number of days with data: 4445
Total north displacement:     25.44 [cm]
Total east displacement:      -50.71 [cm]
Total vertical displacement:  -0.40 [cm]
Avg north velocity:     2.00 [cm/yr]
Avg east velocity:      -3.99 [cm/yr]
Avg vertical velocity:  -0.03 [cm/yr]

Site Name: cmp9
Time span: 18.04 [yrs]
Number of days with data: 6240
Total north displacement:     24.91 [cm]
Total east displacement:      -66.29 [cm]
Total vertical displacement:  1.32 [cm]
Avg north velocity:     1.38 [cm/yr]
Avg east velocity:      -3.68 [cm/yr]
Avg vertical velocity:  0.07 [cm/yr]

Site Name: dam2
Time span: 17.87 [yrs]
Number of days with data: 4702
Total north displacement:     24.38 [cm]
Total east displacement:      -64.41 [cm]
Total vertical displacement:  0.28 [cm]
Avg north velocity:     1.36 [cm/yr]
Avg east velocity:      -3.61 [cm/yr]
Avg vertical velocity:  0.02 [cm/yr]

Site Name: kbrc
Time span: 12.53 [yrs]
Number of days with data: 4325
Total north displacement:     15.70 [cm]
Total east displacement:      -48.26 [cm]
Total vertical displacement:  0.63 [cm]
Avg north velocity:     1.25 [cm/yr]
Avg east velocity:      -3.85 [cm/yr]
Avg vertical velocity:  0.05 [cm/yr]

Site Name: p729
Time span: 6.46 [yrs]
Number of days with data: 2354
Total north displacement:     12.39 [cm]
Total east displacement:      -26.83 [cm]
```

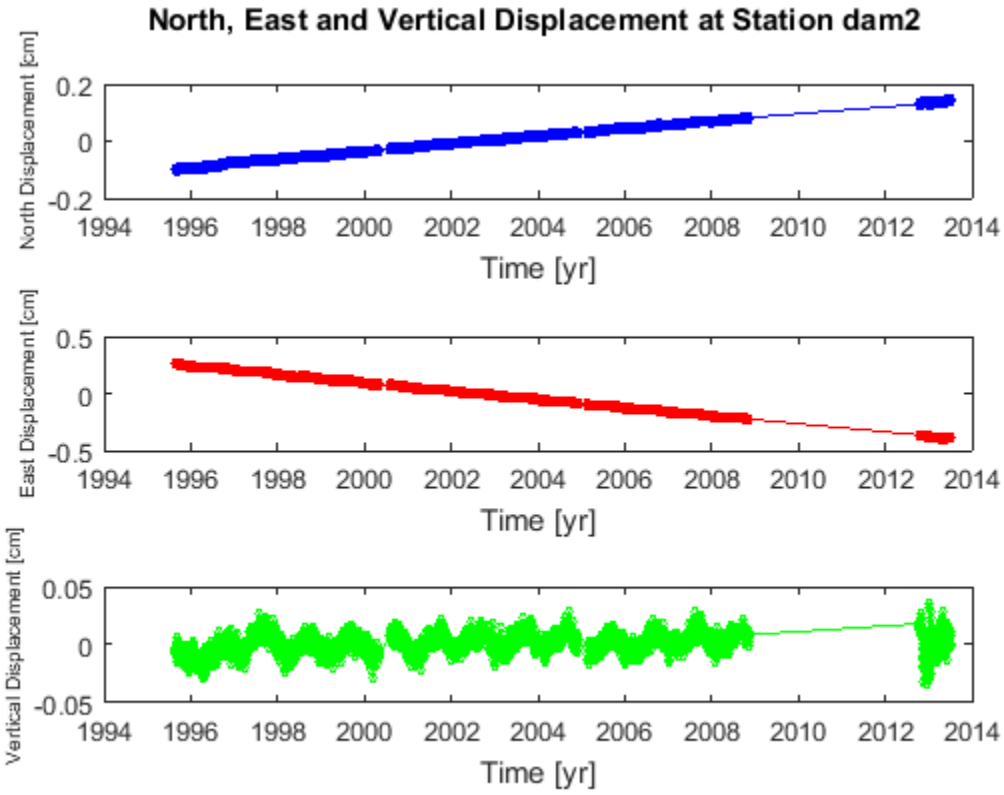
```
Total vertical displacement:  -2.60 [cm]
Avg north velocity:     1.92 [cm/yr]
Avg east velocity:      -4.15 [cm/yr]
Avg vertical velocity:  -0.40 [cm/yr]
```

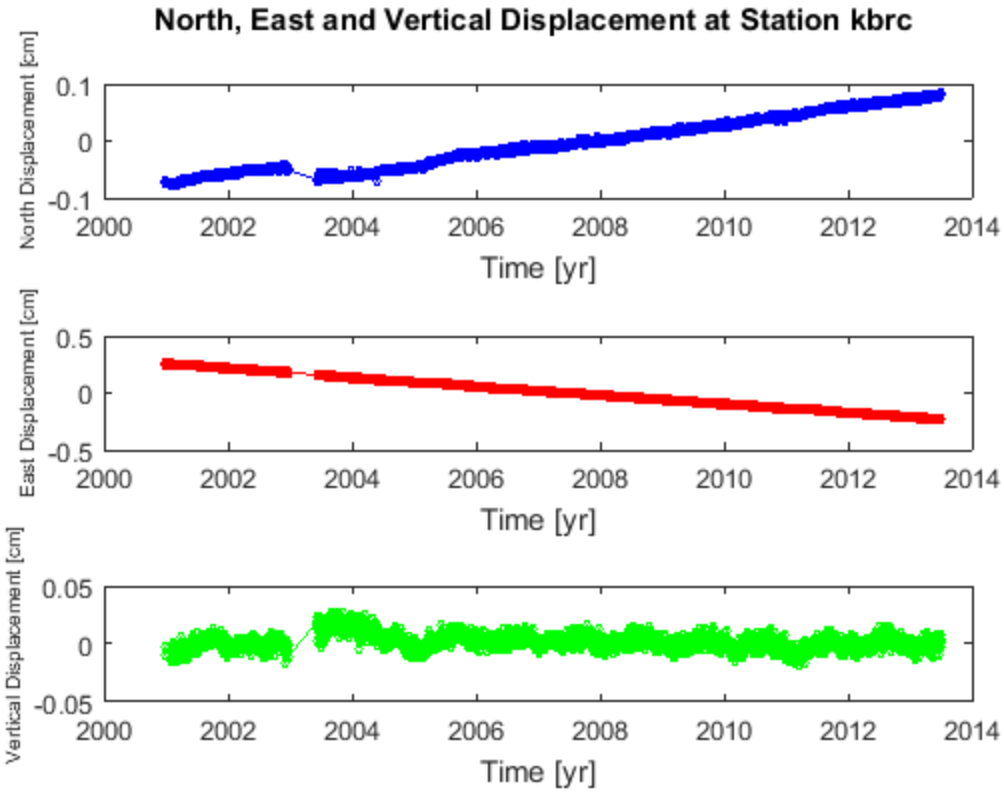


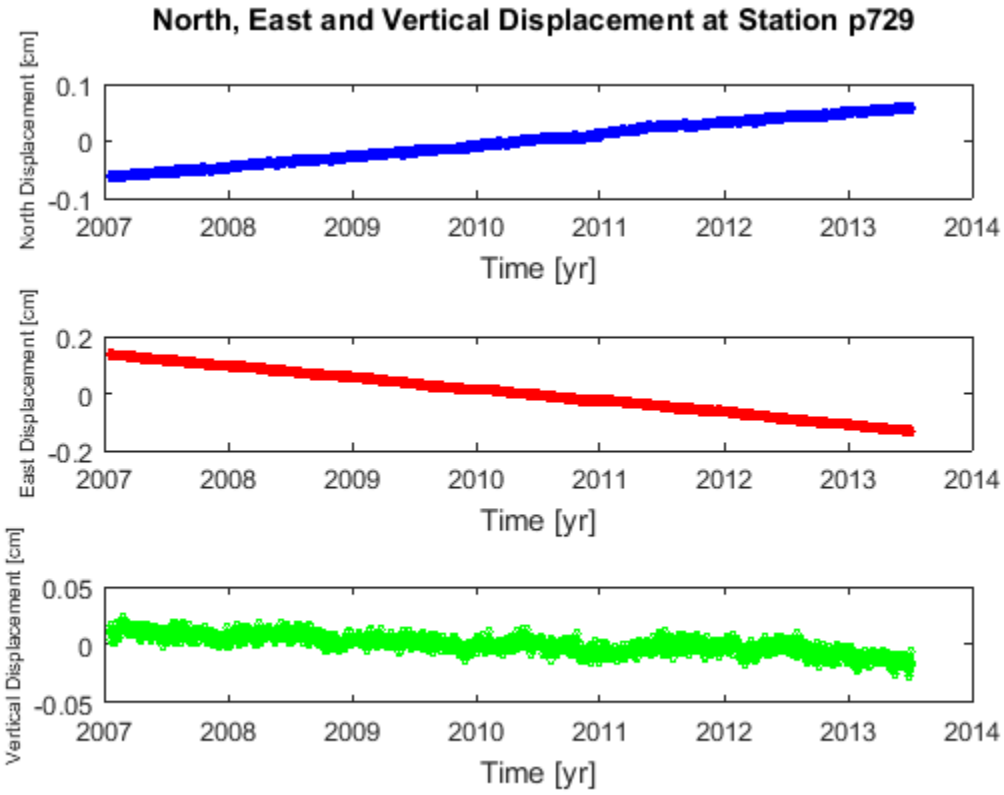

North, East and Vertical Displacement at Station bbdm
North Displacement [cm]
0.2
0
-0.2
2000
2002
2004
2006
2008
2010
2012
2014
Time [yr]
East Displacement [cm]
0.5
0
-0.5
Time [yr]
Vertical Displacement [cm]
0.05
0
-0.05
Time [yr]


North, East and Vertical Displacement at Station cirx
North Displacement [cm]
0.2
0
-0.2
2000
2002
2004
2006
2008
2010
2012
2014
Time [yr]
East Displacement [cm]
0.5
0
-0.5
Time [yr]
Vertical Displacement [cm]
0.02
0
-0.02
Time [yr]


North, East and Vertical Displacement at Station cmp9
North Displacement [cm]
East Displacement [cm]
Vertical Displacement [cm]
Time [yr]
0.2
0
-0.2
0.5
-0.5
0.05
-0.05
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014


North, East and Vertical Displacement at Station dam2
North Displacement [cm]
East Displacement [cm]
Vertical Displacement [cm]
Time [yr]
0.2
0
-0.2
0.5
-0.5
0.05
-0.05
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014


North, East and Vertical Displacement at Station kbrc
North Displacement [cm]
East Displacement [cm]
Vertical Displacement [cm]
Time [yr]
2000
2002
2004
2006
2008
2010
2012
2014


North, East and Vertical Displacement at Station p729
North Displacement [cm]
East Displacement [cm]
Vertical Displacement [cm]
Time [yr]
2007
2008
2009
2010
2011
2012
2013
2014

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