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Homework 8

Taylor Dudunake & John Shuler

GEOS597 Homework #8: GPS, streamflow data and statistics

Due: 11/14/2016

```
clear all;  
close all;  
clc;
```

Part 1: Automated GPS Data Processing

allGPS_HW8

```
.          cirxCleanUnf.neu  
..         cmp9CleanUnf.neu  
GEOS597_HW8_DudunakeShuler.m  dam2CleanUnf.neu  
VelocityTable.xlsx            detrendGPS.m  
VelocityTable_HW8.PNG         detrendGPS.pdf  
allGPS_HW8.m                  kbrccCleanUnf.neu  
ana1CleanUnf.neu              p729CleanUnf.neu  
bbdmCleanUnf.neu  
cavecreek.txt
```

```
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:         2.241 [cm/yr]  
Avg east velocity:         -4.078 [cm/yr]  
Avg vertical velocity:      0.121 [cm/yr]  
Avg north velocity using best-fit polynomial:    2.215 [cm/yr]  
Avg east velocity using best-fit polynomial:    -4.084 [cm/yr]  
Avg vertical velocity best-fit polynomial:    0.001 [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: 2.045 [cm/yr]
Avg east velocity: -4.080 [cm/yr]
Avg vertical velocity: 0.021 [cm/yr]
Avg north velocity using best-fit polynomial: 2.035 [cm/yr]
Avg east velocity using best-fit polynomial: -4.101 [cm/yr]
Avg vertical velocity best-fit polynomial: 0.066 [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: 2.001 [cm/yr]
Avg east velocity: -3.989 [cm/yr]
Avg vertical velocity: -0.031 [cm/yr]
Avg north velocity using best-fit polynomial: 1.972 [cm/yr]
Avg east velocity using best-fit polynomial: -3.971 [cm/yr]
Avg vertical velocity best-fit polynomial: -0.027 [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: 1.381 [cm/yr]
Avg east velocity: -3.675 [cm/yr]
Avg vertical velocity: 0.073 [cm/yr]
Avg north velocity using best-fit polynomial: 1.343 [cm/yr]
Avg east velocity using best-fit polynomial: -3.644 [cm/yr]
Avg vertical velocity best-fit polynomial: -0.028 [cm/yr]

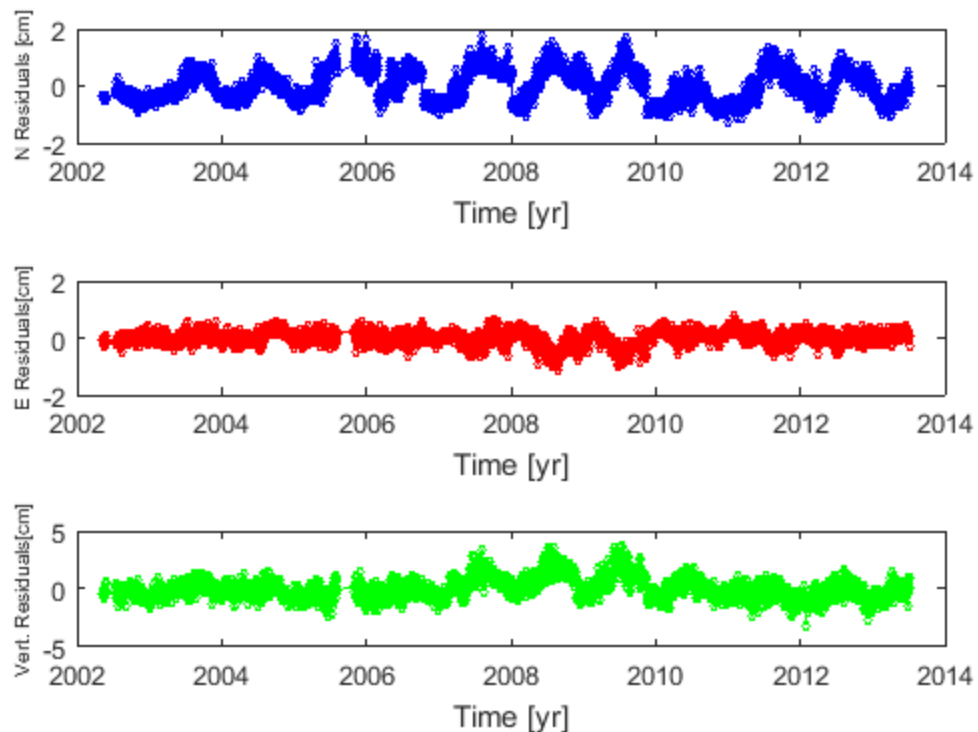
Site Name: dam2
Time span: 17.87 [yrs]
Number of days with data: 4702
Total north displacement: 24.38 [cm]
Total east displacement: -64.41 [cm]
Total vertical displacement: 0.28 [cm]
Avg north velocity: 1.365 [cm/yr]
Avg east velocity: -3.605 [cm/yr]
Avg vertical velocity: 0.016 [cm/yr]
Avg north velocity using best-fit polynomial: 1.337 [cm/yr]
Avg east velocity using best-fit polynomial: -3.649 [cm/yr]
Avg vertical velocity best-fit polynomial: 0.056 [cm/yr]

Site Name: kbrc
Time span: 12.53 [yrs]
Number of days with data: 4325

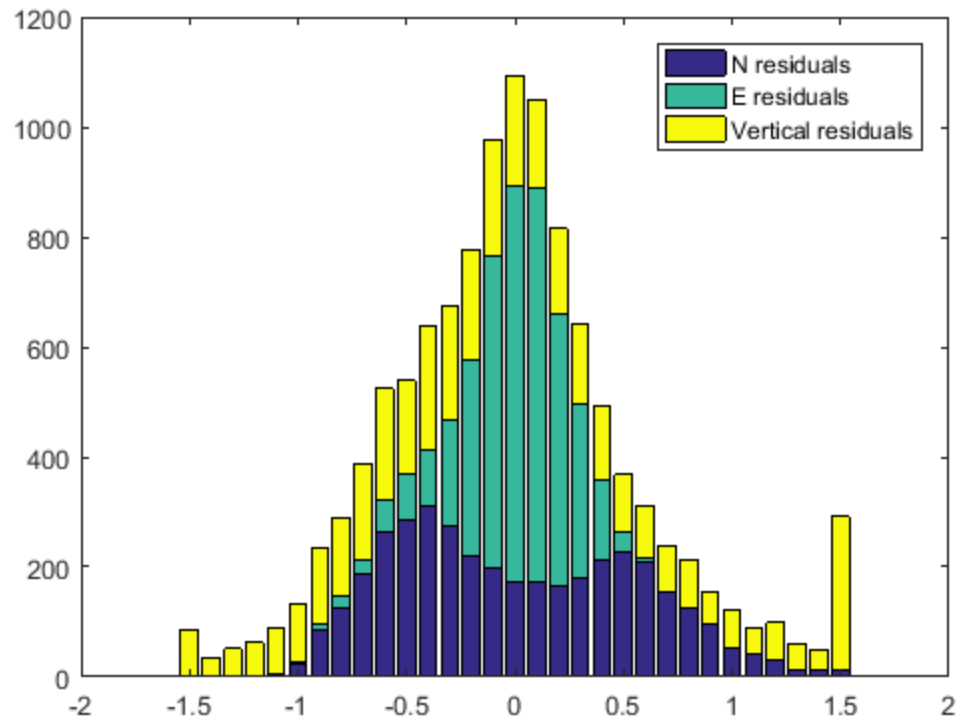
Total north displacement: 15.70 [cm]
Total east displacement: -48.26 [cm]
Total vertical displacement: 0.63 [cm]
Avg north velocity: 1.253 [cm/yr]
Avg east velocity: -3.851 [cm/yr]
Avg vertical velocity: 0.050 [cm/yr]
Avg north velocity using best-fit polynomial: 1.268 [cm/yr]
Avg east velocity using best-fit polynomial: -3.877 [cm/yr]
Avg vertical velocity best-fit polynomial: -0.040 [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: 1.918 [cm/yr]
Avg east velocity: -4.153 [cm/yr]
Avg vertical velocity: -0.402 [cm/yr]
Avg north velocity using best-fit polynomial: 1.927 [cm/yr]
Avg east velocity using best-fit polynomial: -4.108 [cm/yr]
Avg vertical velocity best-fit polynomial: -0.329 [cm/yr]

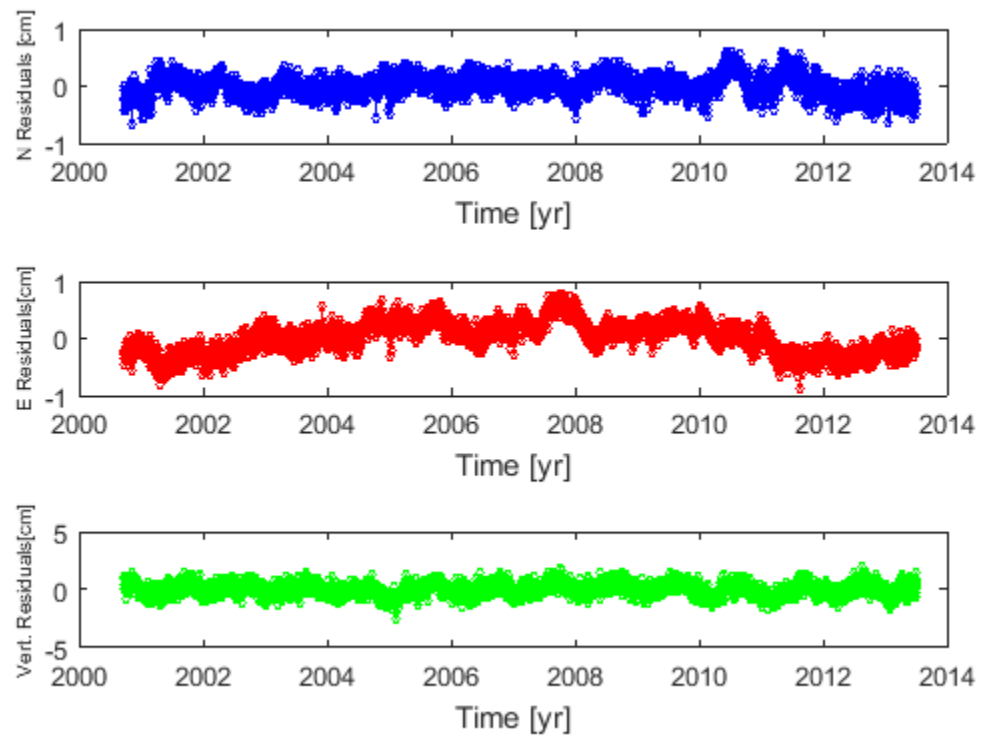
North, East and Vertical Displacement Residuals at Station ana1



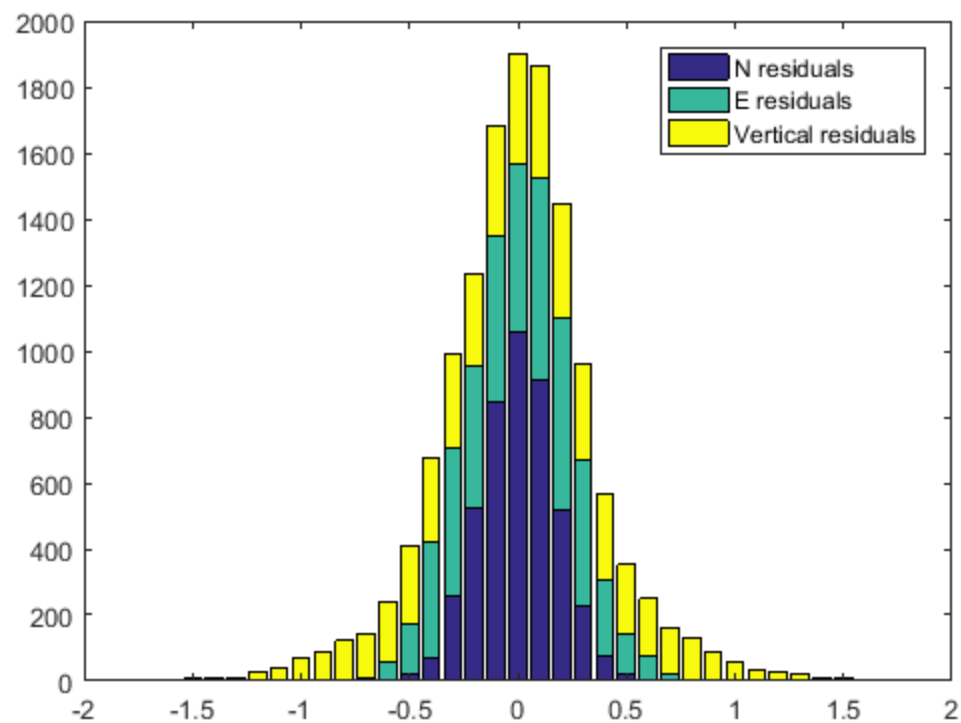
North, East and Vertical Displacement Residuals at Station ana1



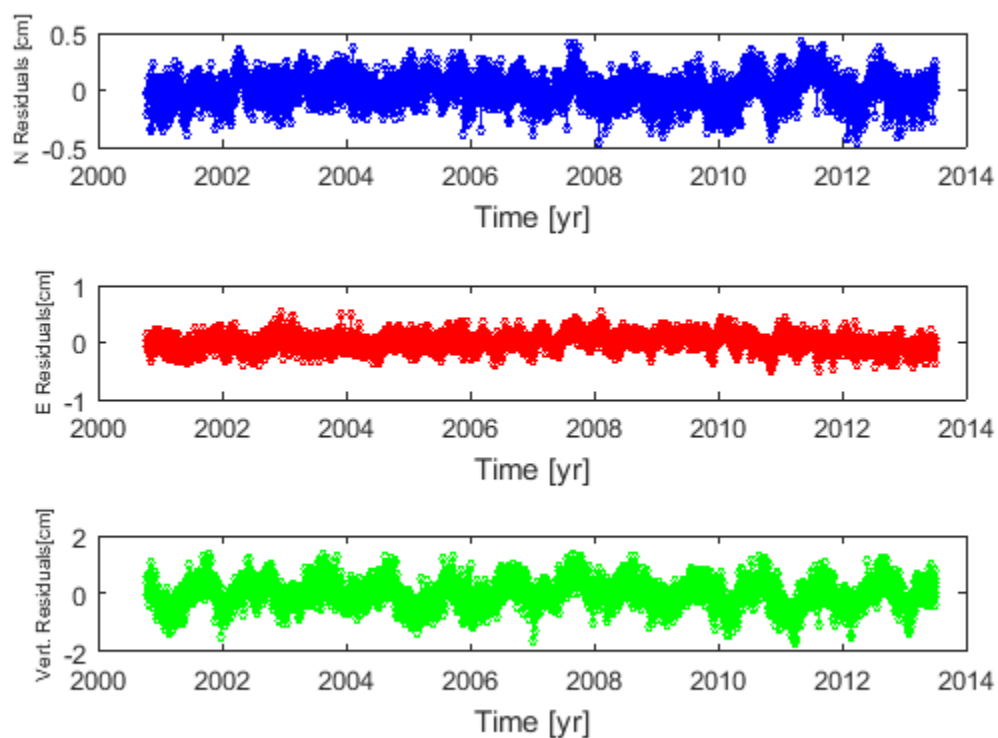
North, East and Vertical Displacement Residuals at Station bbdm



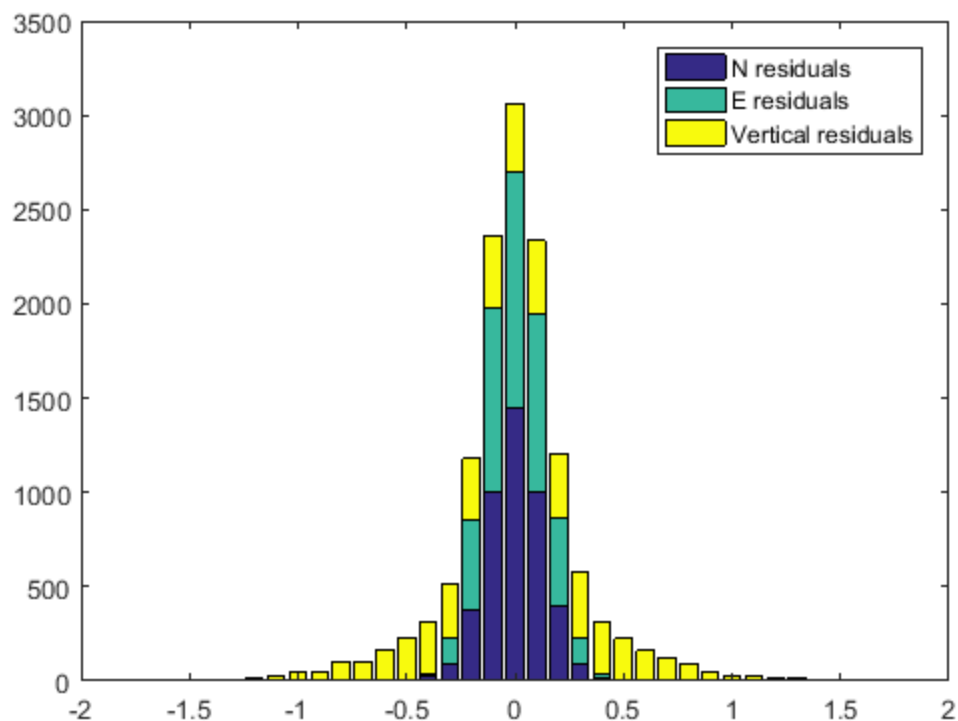
North, East and Vertical Displacement Residuals at Station bbdm



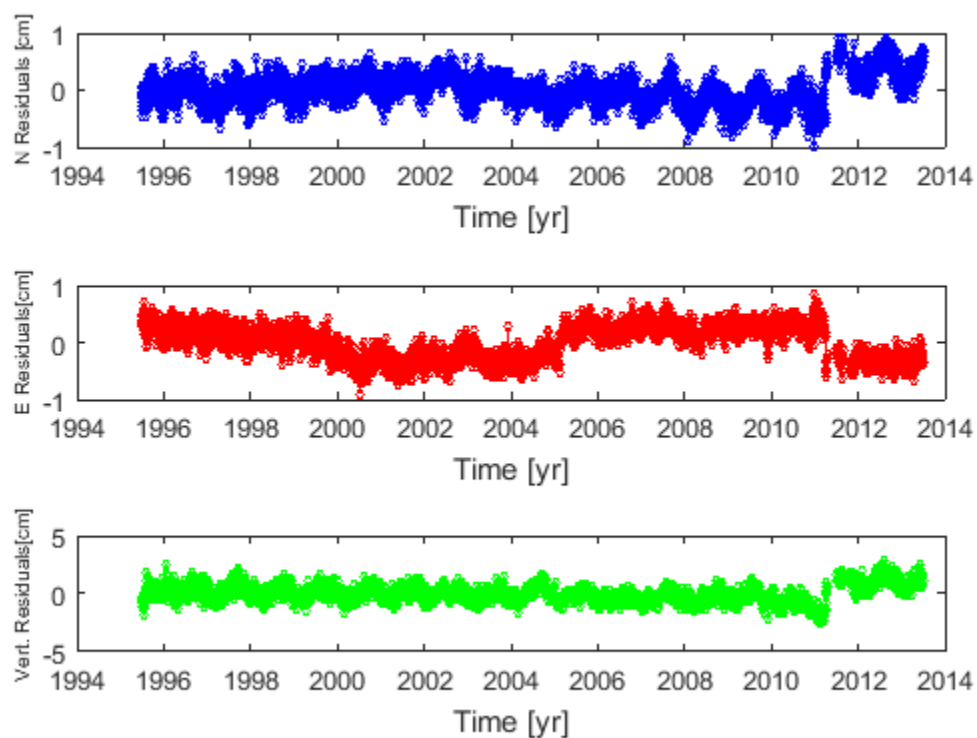
North, East and Vertical Displacement Residuals at Station cirx



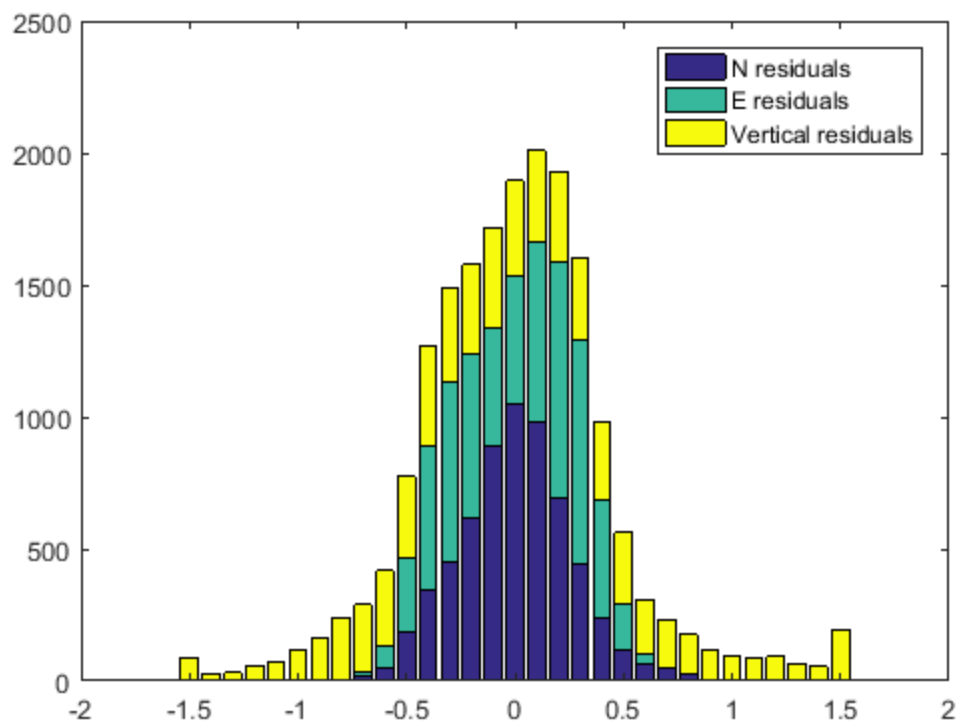
North, East and Vertical Displacement Residuals at Station cirx



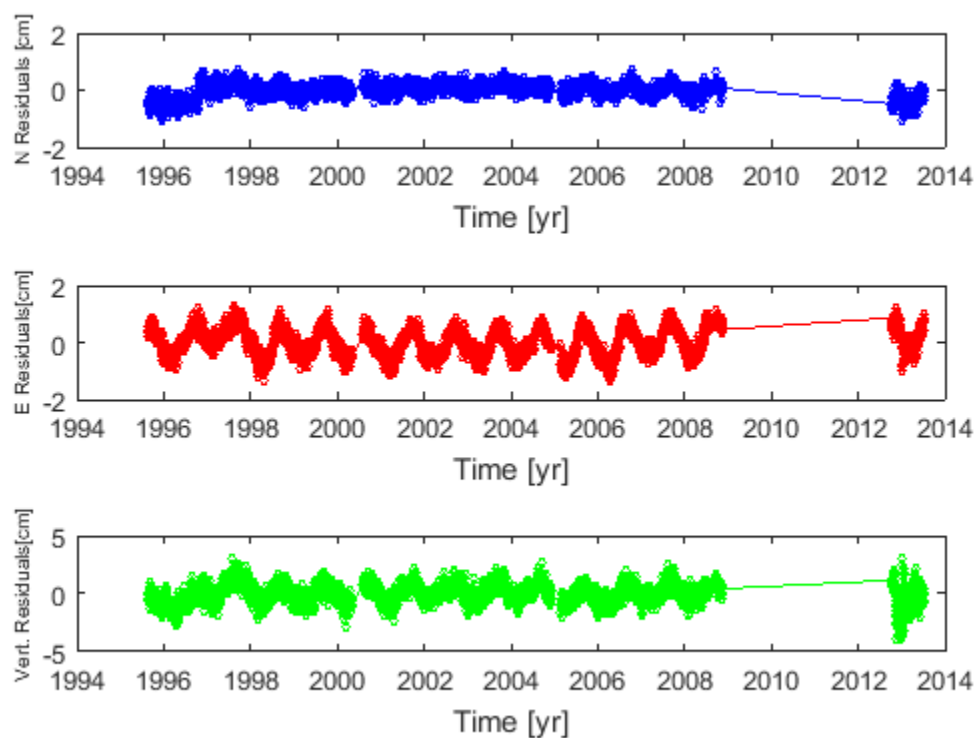
North, East and Vertical Displacement Residuals at Station cmp9



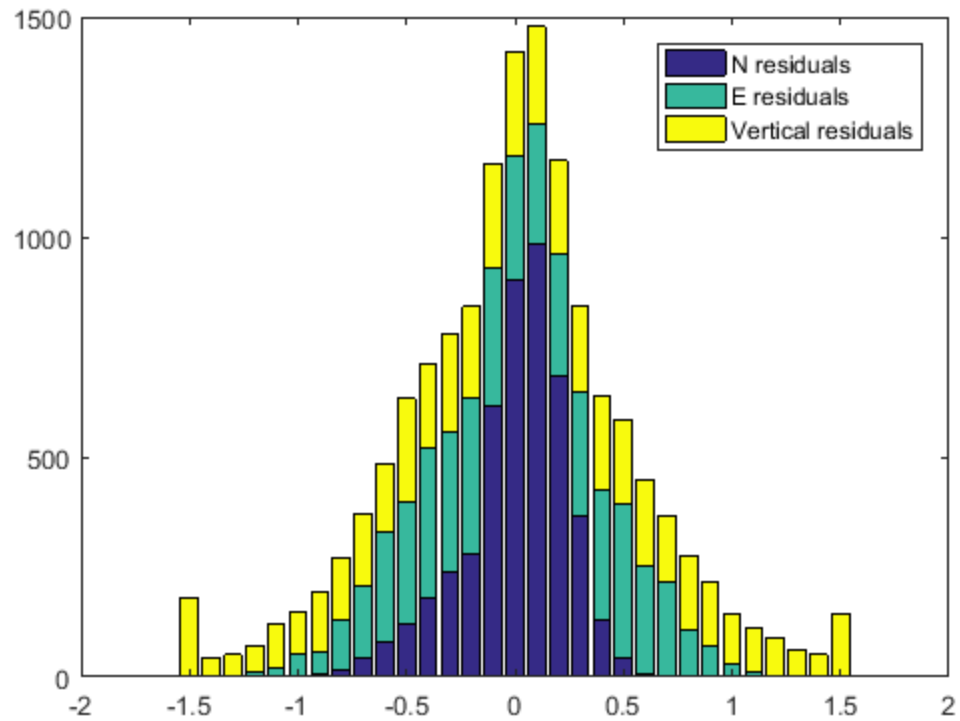
North, East and Vertical Displacement Residuals at Station cmp9



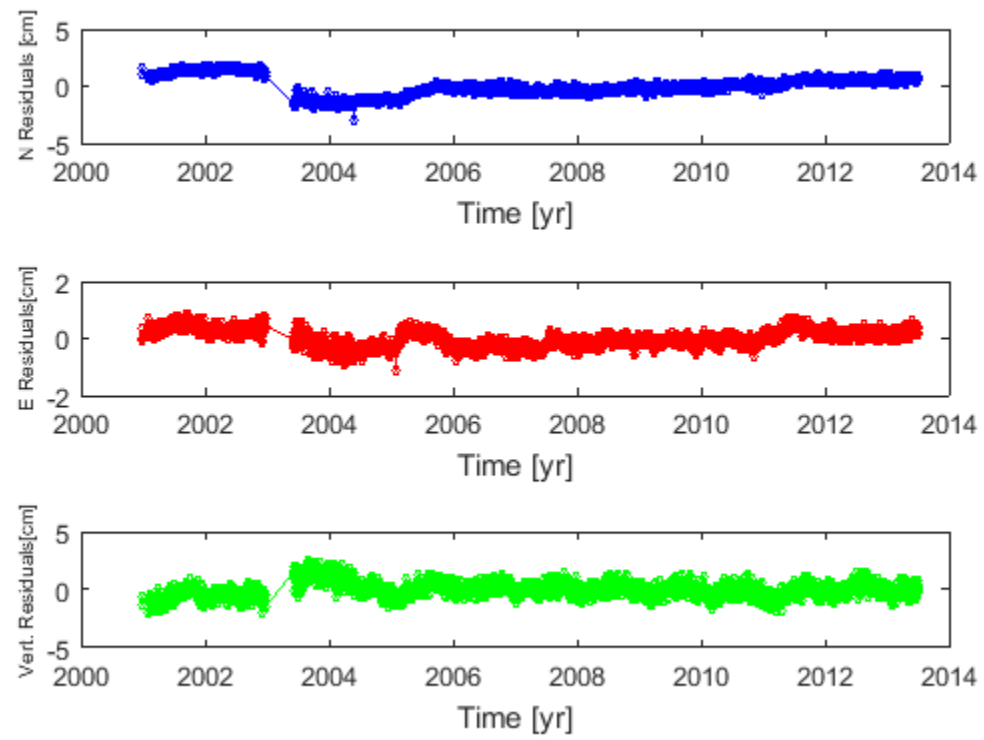
North, East and Vertical Displacement Residuals at Station dam2



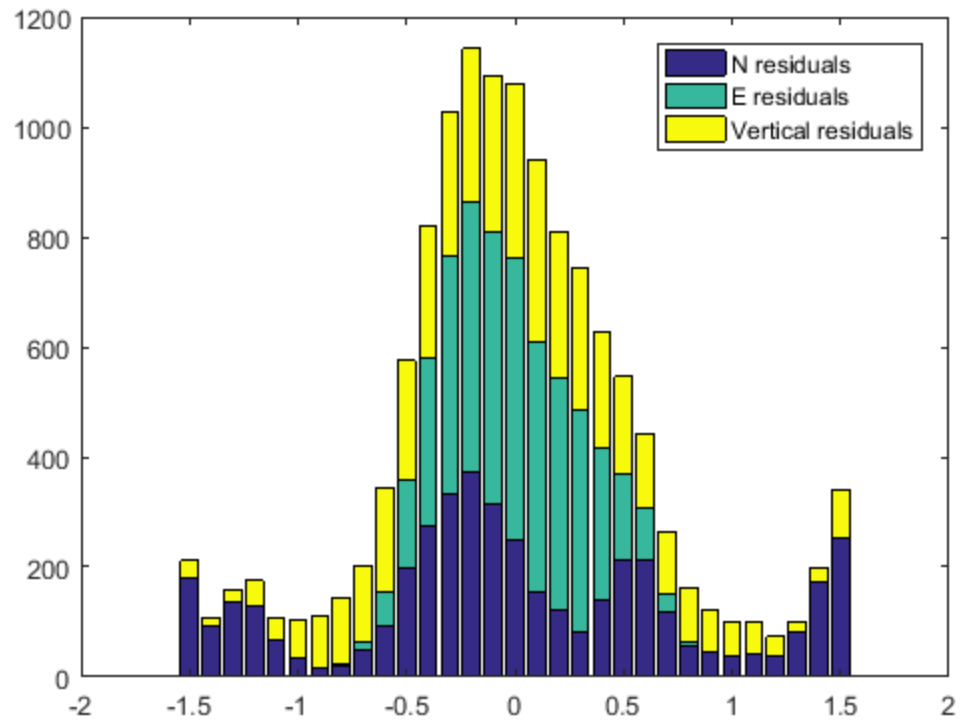
North, East and Vertical Displacement Residuals at Station dam2



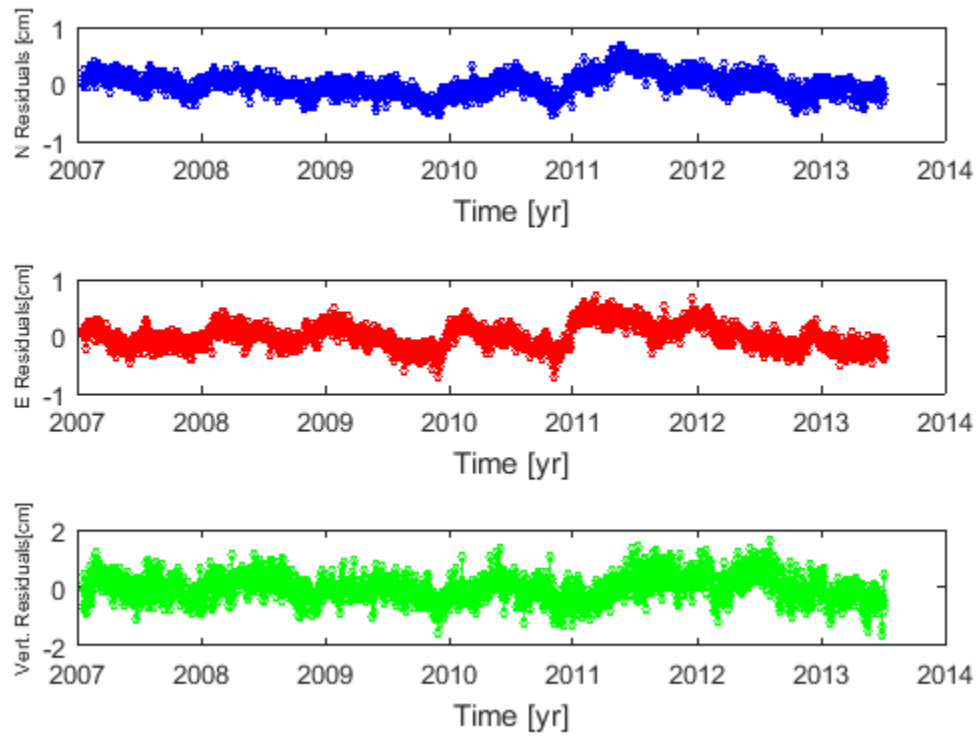
North, East and Vertical Displacement Residuals at Station kbrc



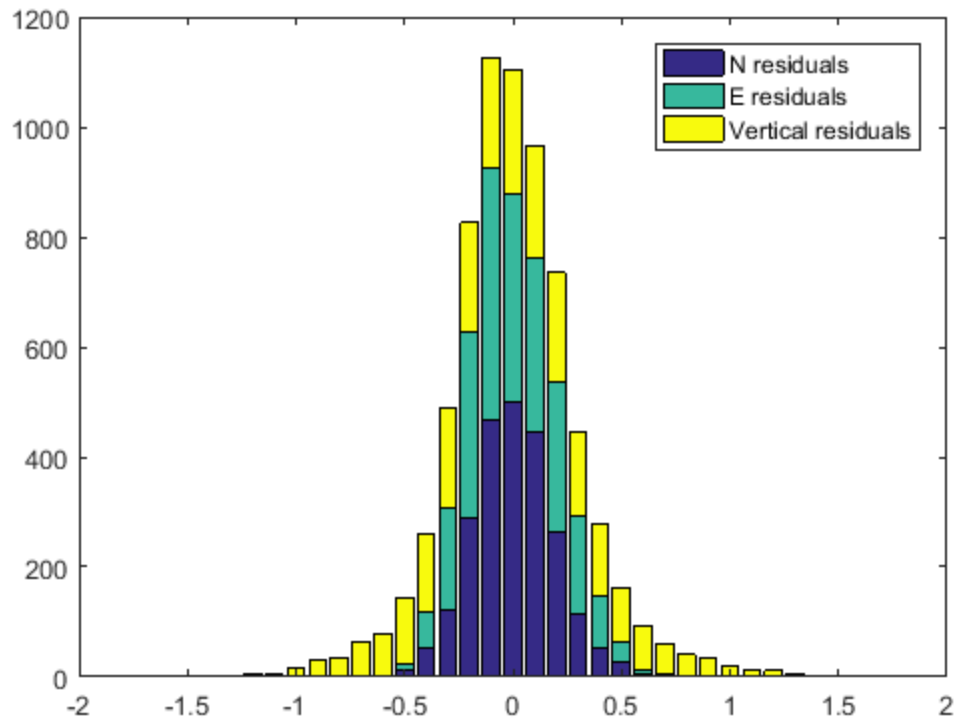
North, East and Vertical Displacement Residuals at Station kbrc



North, East and Vertical Displacement Residuals at Station p729



North, East and Vertical Displacement Residuals at Station p729



1.4 Compare the best-fit polynomial

```
[V,map] = imread('VelocityTable_HW8.PNG', 'png');
imshow(V,map);
```

Station Name	N velocity [cm/y]	N velocity using polyfit	E velocity	E velocity using poly fit	Vertical velocity	Vertical velocity using polyfit
ana1	2.241	2.215	-4.078	-4.084	0.121	0.001
bbdm	2.045	2.035	-4.08	-4.101	0.021	0.066
cirx	2	1.972	-3.99	-3.971	-0.03	-0.027
cmp9	1.381	1.343	-3.675	-3.644	0.073	-0.028
dam2	1.365	1.337	-3.605	-3.649	0.016	0.056
kbrc	1.253	1.268	-3.851	-3.877	0.05	-0.04
p729	1.918	1927	-4.153	-4.108	-0.402	-0.329

Part 2: Water-year data loading & visualization

2.1: Load the data, sort and plot

```
load('cavecreek.txt');
```

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