# OPUS
## Online Positioning User Service

### *Review and new developments*

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**240-678-2167 cell**

# Positions and Elevations from GPS Static Occupations

Different Flavors of OPUS

- *OPUS Rapid Static* (15min to 2 hrs)
- *OPUS Static* (2 hours +)
  - Database (Publishing Option)
  - OPUS Projects (Network Least Squares solution)
- *OPUS Net* (Under development)
- *GNSS* (Under development)

# Changes

-New Web page and interface
-Absolute Antenna Calibrations
-MYCS coordinates available

# OPUS: Online Positioning User Service

National Geodetic Survey



OPUS Menu

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## Choose a fram[illegible]o upload your data:

**for current frames, click below:**

NAD 83(2011,MA11,PA11)
Mexico(IGS08)
epoch 2010.00

International
IGS08
epoch of observation

**for previous frames,**

**access expires soon***

NAD 83(CORS96,MARP00,PACP00)
epoch 2002.00

ITRF00

- ***Why two frames? What's the difference?***
  - NGS has revised the CORS coordinates and absolute antenna calibrations. For a limited time, OPUS will provide access to both the current and previous frames. **See FAQ & difference maps**.
- ***Which frame is best for me?***
  - **Most users should choose the current frames**, using the previous only for NAVD 88 orthometric heights, or positions consistent with existing NGS datasheets.

    * note these will be superseded soon, when NGS completes the **adjustment of the passive control network** and release of GEOID12.
- ***Why is there no NAVD 88 orthometric height for the current frame?***
  - This is a temporary situation that will be resolved soon with the release of GEOID12 (see question above.) The current GEOID09 model was built from CORS96-derived ellipsoid heights, and therefore works best with the previous frame.
- ***Will published solutions use the current or previous frames?***
  - Either, for now, but soon all published solutions will be updated to the current frames, with previous coordinates retained as superseded.

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National Geodetic Survey



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Contact OPUS

## Upload your data file.

Tie your GPS observation to the National Spatial Reference System.

What is OPUS? FAQs

You selected 96 frame for processing your observation.

Scott.Lokken@noaa.gov

* **Email address** - your solution will be sent here.

C:\aa\opusProjects\DOTbridge\Hobucken\c Browse...

* **Data file** of dual-frequency GPS observations. **sample**

TRM57971.00 NONE Zephyr GNSS Geodetic II - RoHS compliant

**Antenna type** - choosing wrong may degrade your accuracy.

2.0 meters above your mark.

**Antenna height** of your antenna's reference point.

Options to **customize** your solution.

Upload to Rapid-Static | Upload to Static

for data > 15 min. < 2 hrs. for data > 2 hrs. < 48 hrs.

* required fields

We may use your data for internal evaluations of OPUS use, accuracy, or related research.

Sample Solutions

**OPUS Menu**

- Upload
- About OPUS
- Published Solutions
- Contact OPUS

Scott.Lokken@noaa.gov

* **Email address** - your solution will be sent here.

Sample Solutions

C:\aa\opusProjects\DOTbridge\Hobucken\c Browse...

* **Data file** of dual-frequency GPS observations. **sample**

TRM57971.00 NONE Zephyr GNSS Geodetic II - RoHS compliant

**Antenna type** - choosing wrong may degrade your accuracy.

2.0 meters above your mark.

**Antenna height** of your antenna's reference point.

Options to **customize** your solution.

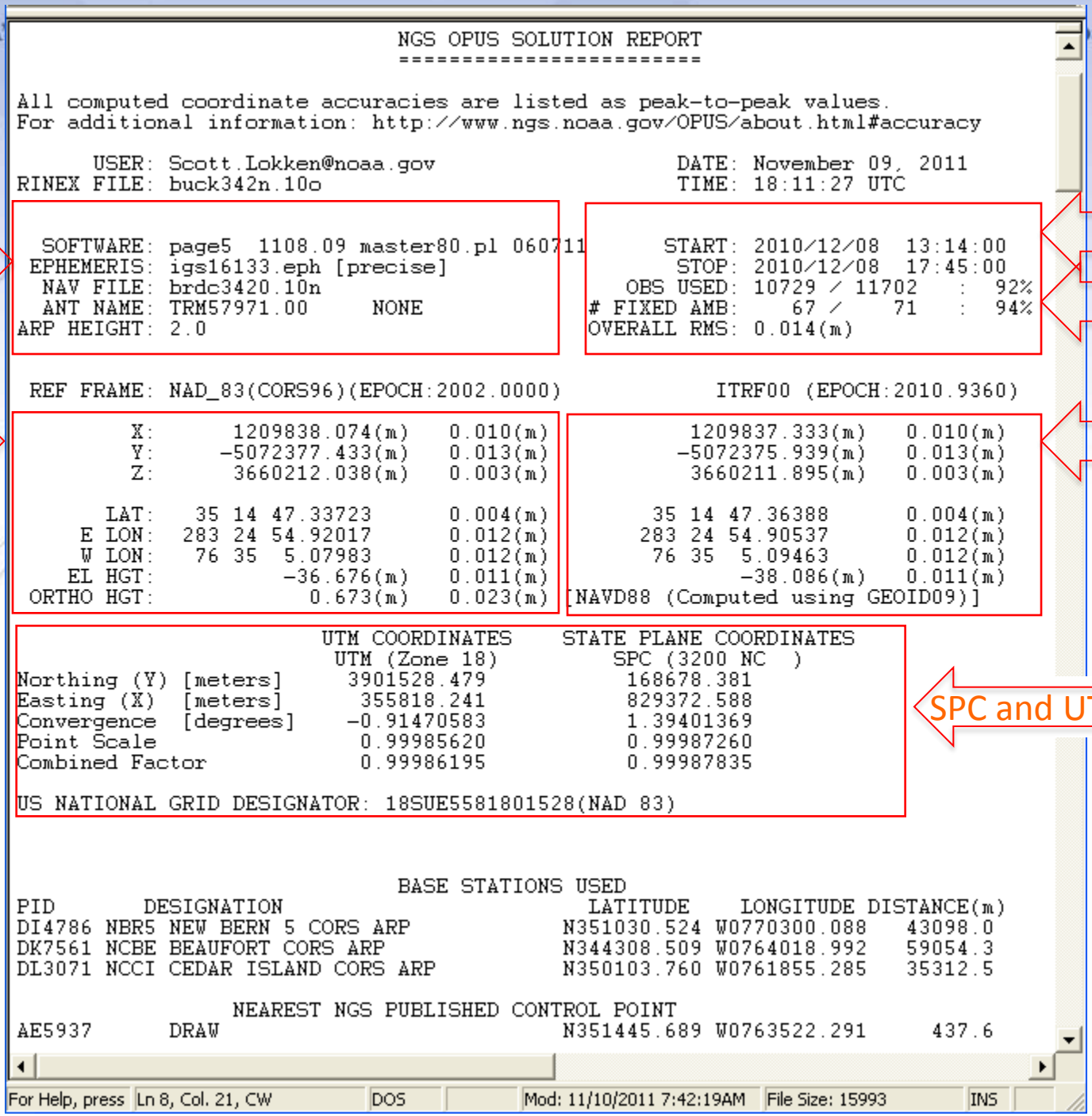
| | | |
|---|---|---|
| **Solution formats** | Add details to your report | standard solution |
| **Base stations** | Type in 4-char site IDs, or select from map, any CORS you wish to explicitly include or exclude from your solution **Sample** | **Use:** **Exclude:** **Look up site IDs**  **browse map** |
| **State plane coordinates** | Overrule your native SPCS zone | let OPUS choose |
| **Geoid Model** | Customize your orthometric height model | GEOID09 |
| **Contribute to a project** | Enter the project identifier provided by your project manager. | |
| **My profile** | Customize OPUS defaults for future solutions | |
| **Publish my solution** | Share your solutions | No, don't publish |

Upload to Rapid-Static Upload to Static

for data > 15 min. < 2 hrs. for data > 2 hrs. < 48 hrs.

* required fields

We may use your data for internal evaluations of OPUS use, accuracy, or related research.



NGS OPUS SOLUTION REPORT
==========

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.html#accuracy

USER: Scott.Lokken@noaa.gov
RINEX FILE: buck342n.10o

DATE: November 09, 2011
TIME: 18:11:27 UTC

SOFTWARE: page5 1108.09 master80.pl 060711
EPHEMERIS: igs16133.eph [precise]
NAV FILE: brdc3420.10n
ANT NAME: TRM57971.00 NONE
ARP HEIGHT: 2.0

START: 2010/12/08 13:14:00
STOP: 2010/12/08 17:45:00
OBS USED: 10729 / 11702 : 92%
# FIXED AMB: 67 / 71 : 94%
OVERALL RMS: 0.014(m)

REF FRAME: NAD_83(CORS96)(EPOCH:2002.0000)

| | | |
|---|---|---|
| X: | 1209838.074(m) | 0.010(m) |
| Y: | -5072377.433(m) | 0.013(m) |
| Z: | 3660212.038(m) | 0.003(m) |
| LAT: | 35 14 47.33723 | 0.004(m) |
| E LON: | 283 24 54.92017 | 0.012(m) |
| W LON: | 76 35 5.07983 | 0.012(m) |
| EL HGT: | -36.676(m) | 0.011(m) |
| ORTHO HGT: | 0.673(m) | 0.023(m) |

ITRF00 (EPOCH:2010.9360)

| | |
|---|---|
| 1209837.333(m) | 0.010(m) |
| -5072375.939(m) | 0.013(m) |
| 3660211.895(m) | 0.003(m) |
| 35 14 47.36388 | 0.004(m) |
| 283 24 54.90537 | 0.012(m) |
| 76 35 5.09463 | 0.012(m) |
| -38.086(m) | 0.011(m) |

[NAVD88 (Computed using GEOID09)]

| | UTM COORDINATES UTM (Zone 18) | STATE PLANE COORDINATES SPC (3200 NC ) |
|---|---|---|
| Northing (Y) [meters] | 3901528.479 | 168678.381 |
| Easting (X) [meters] | 355818.241 | 829372.588 |
| Convergence [degrees] | -0.91470583 | 1.39401369 |
| Point Scale | 0.99985620 | 0.99987260 |
| Combined Factor | 0.99986195 | 0.99987835 |

US NATIONAL GRID DESIGNATOR: 18SUE5581801528(NAD 83)

BASE STATIONS USED

| PID | DESIGNATION | LATITUDE | LONGITUDE | DISTANCE(m) |
|---|---|---|---|---|
| DI4786 | NBR5 NEW BERN 5 CORS ARP | N351030.524 | W0770300.088 | 43098.0 |
| DK7561 | NCBE BEAUFORT CORS ARP | N344308.509 | W0764018.992 | 59054.3 |
| DL3071 | NCCI CEDAR ISLAND CORS ARP | N350103.760 | W0761855.285 | 35312.5 |

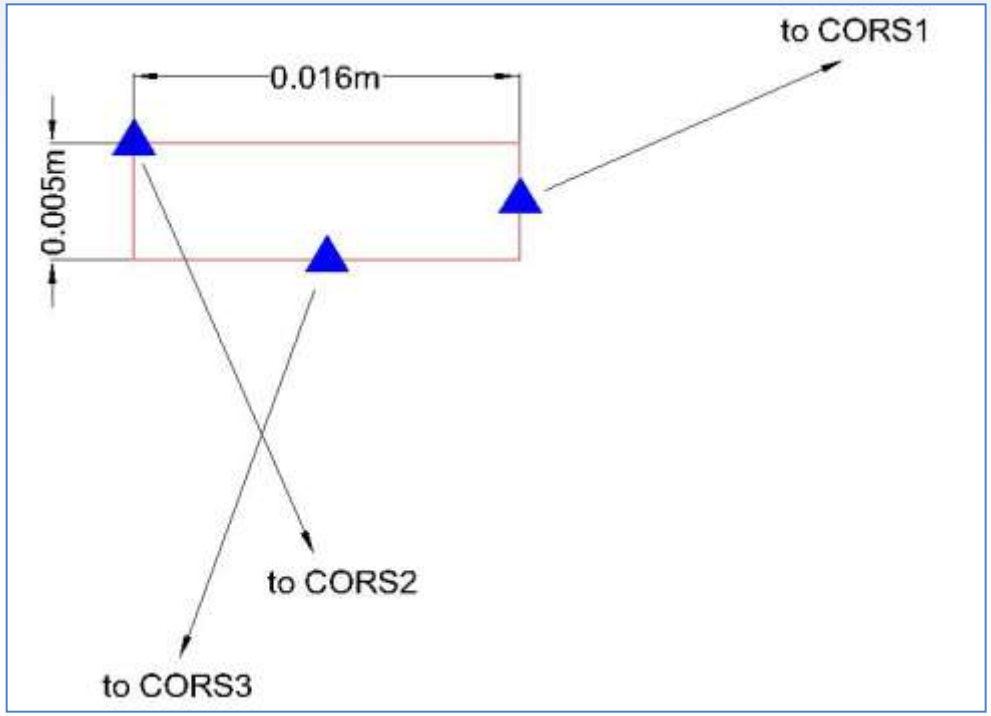
NEAREST NGS PUBLISHED CONTROL POINT

| | | | | |
|---|---|---|---|---|
| AE5937 | DRAW | N351445.689 | W0763522.291 | 437.6 |

For Help, press | Ln 8, Col. 21, CW | DOS | Mod: 11/10/2011 7:42:19AM | File Size: 15993 | INS

# Peak to Peak

OPUS Peak to Peak Errors are the separation of the max/min component values from the 3 separate CORS solutions.



OPUS2.txt - WordPad

File Edit View Insert Format Help

```
      USER: gary.thompson@ncmail.net                DATE: May 24, 2005
RINEX FILE: 0007068s.05o                            TIME: 16:15:31 UTC

  SOFTWARE: page5  0411.19 master16.pl       START: 2005/03/09 18:00:00
 EPHEMERIS: igs13133.eph [precise]            STOP: 2005/03/09 19:05:00
   NAV FILE: brdc0680.05n                  OBS USED:  1535 /  1799   :85%
   ANT NAME: TRM33429.00+GP             # FIXED AMB:    18 /    23   :78%
ARP HEIGHT: 2.0                         OVERALL RMS: 0.027(m)

 REF FRAME: NAD_83(CORS96)(EPOCH:2002.0000)              ITRF00
(EPOCH:2005.1857)

         X:      1003875.380(m)    0.062(m)          1003874.713(m)0.062(m)
         Y:     -5075187.524(m)    0.276(m)         -5075186.044(m)0.276(m)
         Z:      3717944.760(m)    0.112(m)          3717944.614(m)0.112(m)

       LAT:   35 53  7.63395       0.091(m)        35 53  7.66019   0.091(m)
     E LON:  281 11 19.37207       0.035(m)       281 11 19.35743   0.035(m)
     W LON:   78 48 40.62793       0.035(m)        78 48 40.64257   0.035(m)
    EL HGT:           73.342(m)    0.283(m)                 71.976(m)0.283(m)
 ORTHO HGT:          105.286(m)    0.284(m) [Geoid03 NAVD88]

                      UTM COORDINATES     STATE PLANE COORDINATES
                       UTM (Zone 17)          SPC (3200 NC  )
Northing (Y) [meters]     3973456.259          236907.801
Easting (X)  [meters]      697563.667          626639.843
Convergence  [degrees]     1.28336671          0.10892038
Point Scale                1.00008097          0.99993364
Combined Factor            1.00006946          0.99992213
```

Short session

Trouble fixing ambiguities

Result: High peak to peak errors (poor solution)

For Help, press F1

FILE: 40822081.DAT 000435875

NGS OPUS SOLUTION REPORT
========================

USER: scott.lokken@noaa.gov
RINEX FILE: 4082208r.05o

DATE: February 22, 2006
TIME: 16:32:16 UTC

SOFTWARE: page5 0601.10 master29.pl
EPHEMERIS: igs13333.eph [precise]
NAV FILE: brdc2080.05n
ANT NAME: TRM33429.00+GP NONE
ARP HEIGHT: 2.0

START: 2005/07/27 17:05:00
STOP: 2005/07/27 19:19:00
OBS USED: 3603 / 3646 : 99%
# FIXED AMB: 18 / 27 : 67%
OVERALL RMS: 0.026(m)

| REF FRAME: | NAD_83(CORS96)(EPOCH:2002.0000) | | ITRF00 (EPOCH:2005.5692) | |
|---|---|---|---|---|
| X: | 1089872.681(m) | 0.090(m) | 1089872.009(m) | 0.090(m) |
| Y: | -5125746.179(m) | 0.239(m) | -5125744.683(m) | 0.239(m) |
| Z: | 3623660.943(m) | 0.084(m) | 3623660.790(m) | 0.084(m) |
| LAT: | 34 50 37.98863 | 0.075(m) | 34 50 38.01428 | 0.075(m) |
| E LON: | 282 0 13.92566 | 0.138(m) | 282 0 13.91203 | 0.138(m) |
| W LON: | 77 59 46.07434 | 0.138(m) | 77 59 46.08797 | 0.138(m) |
| EL HGT: | -9.461(m) | 0.231(m) | -10.865(m) | 0.231(m) |
| ORTHO HGT: | 26.467(m) | 0.233(m) | [Geoid03 NAVD88] | |

| | UTM COORDINATES UTM (Zone 18) | STATE PLANE COORDINATES SPC (3200 NC |
|---|---|---|
| Northing (Y) [meters] | 3859825.607 | 121809.557 |
| Easting (X) [meters] | 226036.083 | 701405.274 |
| Convergence [degrees] | -1.71288291 | 0.57940289 |
| Point Scale | 1.00052518 | 0.99989777 |
| Combined Factor | 1.00052666 | 0.99989926 |

US NATIONAL GRID DESIGNATOR: 18STD2603659826(NAD 83)

**Note:**
**Peak to peaks are fairly large;**
**hoz @ 15 cm**
**Vrt @ 23 cm**

BASE STATIONS USED

| PID | DESIGNATION | LATITUDE | LONGITUDE | DISTANCE(m) |
|---|---|---|---|---|
| DG5759 | NCLI LILLINGTON 2004 CORS ARP | N352512.546 | W0784840.339 | 98008.3 |
| DG4687 | NCRD RALEIGH DOT CORS ARP | N354549.508 | W0783444.395 | 115000.6 |
| AM7011 | CASL CASTLE HAYNE CORS ARP | N342040.707 | W0775231.382 | 56479.3 |

NEAREST NGS PUBLISHED CONTROL POINT

| | | | | |
|---|---|---|---|---|
| EB1945 | ROSE HILL FIRE TOWER | N344949.143 | W0780104.093 | 2490.4 |

BASE STATION INFORMATION

```
STATION NAME: ncli  a    2 (LILLINGTON 2004; Lillington, North Carolina, U.S.A
 ANTENNA: TRM33429.00+GP  NONE                                 S/N=0220150495
XYZ   1009713.4986  -5104666.4802   3675966.8245  MON @ 1997.0000 (M)
XYZ        -0.0153        -0.0017         0.0023  VEL (M/YR)
NEU         0.0000         0.0000         0.0000  MON TO ARP (M)
NEU        -0.0000        -0.0000         0.0740  ARP TO L1 PHASE CENTER (M)
NEU        -0.0000         0.0000         0.0703  ARP TO L2 PHASE CENTER (M)
XYZ        -0.1311        -0.0146         0.0197  VEL TIMES 8.5690 YRS
XYZ         0.0000         0.0000         0.0000  MON TO ARP
XYZ         0.0117        -0.0592         0.0429  ARP TO L1 PHASE CENTER
XYZ   1009713.3792  -5104666.5539   3675966.8871  L1 PHS CEN @ 2005.5692
XYZ        -0.0000         0.0001         0.0001  + XYZ ADJUSTMENTS
XYZ   1009713.3792  -5104666.5539   3675966.8872  NEW L1 PHS CEN @ 2005.5692
XYZ   1009713.3675  -5104666.4947   3675966.8443  NEW ARP @ 2005.5692
XYZ   1009713.3675  -5104666.4947   3675966.8443  NEW MON @ 2005.5692
LLH  35 25 12.57272  281 11 19.64536     24.4088  NEW L1 PHS CEN @ 2005.5692
LLH  35 25 12.57272  281 11 19.64536     24.3348  NEW ARP @ 2005.5692
LLH  35 25 12.57272  281 11 19.64536     24.3348  NEW MON @ 2005.5692

STATION NAME: ncrd  a    3 (RALEIGH DOT; Raleigh, North Carolina, U.S.A.)
 ANTENNA: TRM22020.00+GP  NONE                                 S/N=0220085899
XYZ   1026003.8242  -5078804.5860   3706983.0859  MON @ 1997.0000 (M)
XYZ        -0.0154        -0.0017         0.0023  VEL (M/YR)
NEU         0.0000         0.0000         0.0000  MON TO ARP (M)
NEU        -0.0000         0.0000         0.0742  ARP TO L1 PHASE CENTER (M)
NEU        -0.0000         0.0000         0.0705  ARP TO L2 PHASE CENTER (M)
XYZ        -0.1320        -0.0146         0.0197  VEL TIMES 8.5690 YRS
XYZ         0.0000         0.0000         0.0000  MON TO ARP
XYZ         0.0119        -0.0590         0.0434  ARP TO L1 PHASE CENTER
XYZ   1026003.7042  -5078804.6596   3706983.1490  L1 PHS CEN @ 2005.5692
XYZ        -0.0001        -0.0001         0.0000  + XYZ ADJUSTMENTS
XYZ   1026003.7040  -5078804.6596   3706983.1490  NEW L1 PHS CEN @ 2005.5692
XYZ   1026003.6921  -5078804.6006   3706983.1056  NEW ARP @ 2005.5692
XYZ   1026003.6921  -5078804.6006   3706983.1056  NEW MON @ 2005.5692
LLH  35 45 49.53437  281 25 15.59010     50.5173  NEW L1 PHS CEN @ 2005.5692
LLH  35 45 49.53437  281 25 15.59010     50.4431  NEW ARP @ 2005.5692
LLH  35 45 49.53437  281 25 15.59010     50.4431  NEW MON @ 2005.5692

STATION NAME: casl  a    3 (Castle Hayne; Castle Hayne, North Carolina  USA)
 ANTENNA: TRM33429.00+GP  NONE                                 S/N=0220145916
XYZ   1107275.2852  -5154173.8764   3578066.5984  MON @ 1997.0000 (M)
XYZ        -0.0149        -0.0017         0.0026  VEL (M/YR)
NEU         0.0000         0.0000         0.0000  MON TO ARP (M)
NEU        -0.0000         0.0000         0.0740  ARP TO L1 PHASE CENTER (M)
NEU        -0.0000         0.0000         0.0703  ARP TO L2 PHASE CENTER (M)
XYZ        -0.1277        -0.0146         0.0223  VEL TIMES 8.5690 YRS
XYZ         0.0000         0.0000         0.0000  MON TO ARP
XYZ         0.0128        -0.0597         0.0417  ARP TO L1 PHASE CENTER
XYZ   1107275.1704  -5154173.9507   3578066.6624  L1 PHS CEN @ 2005.5692
XYZ         0.0000         0.0000        -0.0000  + XYZ ADJUSTMENTS
XYZ   1107275.1704  -5154173.9507   3578066.6624  NEW L1 PHS CEN @ 2005.5692
XYZ   1107275.1575  -5154173.8910   3578066.6206  NEW ARP @ 2005.5692
XYZ   1107275.1575  -5154173.8910   3578066.6206  NEW MON @ 2005.5692
```

```
NEU        -0.0000          0.0000          0.0740  ARP TO L1 PHASE CENTER (M)
NEU        -0.0000          0.0000          0.0703  ARP TO L2 PHASE CENTER (M)
XYZ        -0.1277         -0.0146          0.0223  VEL TIMES 8.5690 YRS
XYZ         0.0000          0.0000          0.0000  MON TO ARP
XYZ         0.0128         -0.0597          0.0417  ARP TO L1 PHASE CENTER
XYZ   1107275.1704  -5154173.9507    3578066.6624  L1 PHS CEN @ 2005.5692
XYZ         0.0000          0.0000         -0.0000  + XYZ ADJUSTMENTS
XYZ   1107275.1704  -5154173.9507    3578066.6624  NEW L1 PHS CEN @ 2005.5692
XYZ   1107275.1575  -5154173.8910    3578066.6206  NEW ARP @ 2005.5692
XYZ   1107275.1575  -5154173.8910    3578066.6206  NEW MON @ 2005.5692
LLH  34 20 40.73299  282  7 28.60396     -17.2527  NEW L1 PHS CEN @ 2005.5692
LLH  34 20 40.73299  282  7 28.60396     -17.3267  NEW ARP @ 2005.5692
LLH  34 20 40.73299  282  7 28.60396     -17.3267  NEW MON @ 2005.5692

                    REMOTE STATION INFORMATION

STATION NAME: 4082        1
 ANTENNA: TRM33429.00+GP  NONE                              S/N=UNKNOWN
XYZ   1089872.2054  -5125745.9126    3623661.8800  MON @ 2005.5691 (M)
NEU        -0.0000         -0.0000          2.0000  MON TO ARP (M)
NEU        -0.0000         -0.0000          0.0740  ARP TO L1 PHASE CENTER (M)
NEU        -0.0000         -0.0000          0.0703  ARP TO L2 PHASE CENTER (M)
XYZ         0.3414         -1.6055          1.1427  MON TO ARP
XYZ         0.0126         -0.0594          0.0423  ARP TO L1 PHASE CENTER
XYZ   1089872.5594  -5125747.5775    3623663.0650  L1 PHS CEN @ 2005.5692

BASELINE NAME:   ncli  4082
XYZ        -0.2041          1.3072         -1.1264  + XYZ ADJUSTMENTS
XYZ   1089872.3553  -5125746.2703    3623661.9386  NEW L1 PHS CEN @ 2005.5692
XYZ   1089872.3427  -5125746.2109    3623661.8963  NEW ARP @ 2005.5692
XYZ   1089872.0013  -5125744.6054    3623660.7536  NEW MON @ 2005.5692
LLH  34 50 38.01475  282  0 13.91237     -8.8749  NEW L1 PHS CEN @ 2005.5692
LLH  34 50 38.01475  282  0 13.91237     -8.9489  NEW ARP @ 2005.5692
LLH  34 50 38.01475  282  0 13.91237    -10.9489  NEW MON @ 2005.5692

BASELINE NAME:   ncrd  4082
XYZ        -0.1470          1.3106         -1.1005  + XYZ ADJUSTMENTS
XYZ   1089872.4124  -5125746.2670    3623661.9644  NEW L1 PHS CEN @ 2005.5692
XYZ   1089872.3998  -5125746.2076    3623661.9222  NEW ARP @ 2005.5692
XYZ   1089872.0584  -5125744.6020    3623660.7795  NEW MON @ 2005.5692
LLH  34 50 38.01528  282  0 13.91460     -8.8531  NEW L1 PHS CEN @ 2005.5692
LLH  34 50 38.01528  282  0 13.91460     -8.9271  NEW ARP @ 2005.5692
LLH  34 50 38.01528  282  0 13.91460    -10.9271  NEW MON @ 2005.5692

BASELINE NAME:   casl  4082
XYZ        -0.2374          1.0718         -1.0424  + XYZ ADJUSTMENTS
XYZ   1089872.3220  -5125746.5058    3623662.0226  NEW L1 PHS CEN @ 2005.5692
XYZ   1089872.3094  -5125746.4464    3623661.9803  NEW ARP @ 2005.5692
XYZ   1089871.9680  -5125744.8408    3623660.8376  NEW MON @ 2005.5692
LLH  34 50 38.01284  282  0 13.90916     -8.6436  NEW L1 PHS CEN @ 2005.5692
LLH  34 50 38.01284  282  0 13.90916     -8.7176  NEW ARP @ 2005.5692
LLH  34 50 38.01284  282  0 13.90916    -10.7176  NEW MON @ 2005.5692
```

NOAA's

G-FILES

```
Axx2005 727   5 727
B2005 72717 5   5 7271919 1 page5 v0601.10IGS     222 1 2 27NGS   2006 222IFDDFX
Iant_info.003         NGS   20060126
C00090001 -801586338   32  210781107   87  523060907   56 X2085A4082X2085ANCLI
D  1  2 -8562701  1  3  7298122  2  3 -9374319

Axx2005 727   5 727
B2005 72717 5   5 7271919 1 page5 v0601.10IGS     222 1 2 27NGS   2006 222IFDDFX
Iant_info.003         NGS   20060126
C00090002 -638683663   48  469400014  111  833223262   71 X2085A4082X2085ANCRD
D  1  2 -8603388  1  3  7627535  2  3 -9223071

Axx2005 727   5 727
B2005 72717 5   5 7271919 1 page5 v0601.10IGS     222 1 2 27NGS   2006 222IFDDFX
Iant_info.003         NGS   20060126
C00090003  174031896   30 -284290501   80 -455942170   49 X2085A4082X2085ACASL
D  1  2 -7933161  1  3  7073419  2  3 -9099661
```

POST-FIT RMS BY SATELLITE VS. BASELINE

| | OVERALL | 05 | 14 | 15 | 16 | 18 | 20 | 22 | 25 |
|---|---|---|---|---|---|---|---|---|---|
| ncli-4082\| | 0.029 | 0.029 | ... | 0.023 | 0.039 | 0.033 | 0.028 | 0.033 | 0.026 |
| | 30 | | | | | | | | |
| ncli-4082\| | 0.022 | | | | | | | | |

| | OVERALL | 05 | 14 | 15 | 16 | 18 | 20 | 22 | 25 |
|---|---|---|---|---|---|---|---|---|---|
| ncrd-4082\| | 0.028 | 0.030 | ... | 0.039 | 0.022 | 0.024 | 0.040 | 0.030 | 0.020 |
| | 30 | | | | | | | | |
| ncrd-4082\| | 0.031 | | | | | | | | |

| | OVERALL | 05 | 14 | 15 | 16 | 18 | 20 | 22 | 25 |
|---|---|---|---|---|---|---|---|---|---|
| casl-4082\| | 0.021 | 0.023 | ... | 0.014 | 0.024 | 0.015 | 0.052 | 0.022 | 0.017 |
| | 30 | | | | | | | | |
| casl-4082\| | 0.019 | | | | | | | | |

OBS BY SATELLITE VS. BASELINE

| | OVERALL | 05 | 14 | 15 | 16 | 18 | 20 | 22 | 25 |
|---|---|---|---|---|---|---|---|---|---|
| ncli-4082\| | 1196 | 164 | ... | 38 | 40 | 115 | 41 | 266 | 266 |
| | 30 | | | | | | | | |
| ncli-4082\| | 266 | | | | | | | | |

| | OVERALL | 05 | 14 | 15 | 16 | 18 | 20 | 22 | 25 |
|---|---|---|---|---|---|---|---|---|---|
| ncrd-4082\| | 1200 | 158 | ... | 36 | 57 | 114 | 41 | 262 | 266 |
| | 30 | | | | | | | | |
| ncrd-4082\| | 266 | | | | | | | | |

| | OVERALL | 05 | 14 | 15 | 16 | 18 | 20 | 22 | 25 |
|---|---|---|---|---|---|---|---|---|---|
| casl-4082\| | 1207 | 162 | ... | 41 | 60 | 119 | 39 | 254 | 266 |
| | 30 | | | | | | | | |
| casl-4082\| | 266 | | | | | | | | |

Covariance Matrix for the xyz OPUS Position (meters2).

| | | |
|---|---|---|
| 0.0000093956 | -0.0000019715 | 0.0000010994 |
| -0.0000019715 | 0.0000584222 | -0.0000034229 |
| 0.0000010994 | -0.0000034229 | 0.0000235067 |

Covariance Matrix for the enu OPUS Position (meters2).

| | | |
|---|---|---|
| 0.0000107141 | 0.0000049471 | -0.0000065153 |
| 0.0000049471 | 0.0000310284 | -0.0000144542 |
| -0.0000065153 | -0.0000144542 | 0.0000495819 |

Horizontal network accuracy = 0.01167 meters.
Vertical network accuracy = 0.01381 meters.

Derivation of NAD 83 vector components

Position of reference station ARP in NAD_83(CORS96)(EPOCH:2002.0000).

| | Xa(m) | Ya(m) | Za(m) | |
|---|---|---|---|---|
| NCLI | 1009714.03980 | -5104667.97969 | 3675966.99299 | 2002.00 |
| NCRD | 1026004.36535 | -5078806.08244 | 3706983.25157 | 2002.00 |
| CASL | 1107275.82827 | -5154175.39371 | 3578066.77751 | 2002.00 |

Position of reference station monument in NAD_83(CORS96)(EPOCH:2002.0000).

| | Xr(m) | Yr(m) | Zr(m) | |
|---|---|---|---|---|
| NCLI | 1009714.03980 | -5104667.97969 | 3675966.99299 | 2002.00 |
| NCRD | 1026004.36535 | -5078806.08244 | 3706983.25157 | 2002.00 |
| CASL | 1107275.82827 | -5154175.39371 | 3578066.77751 | 2002.00 |

Velocity of reference station monument in NAD_83(CORS96)(EPOCH:2002.0000).

| | Vx (m/yr) | Vy (m/yr) | Vz (m/yr) |
|---|---|---|---|
| NCLI | -0.00000 | -0.00000 | 0.00000 |
| NCRD | -0.00000 | -0.00000 | -0.00000 |
| CASL | 0.00000 | -0.00000 | 0.00000 |

Vectors from unknown station monument to reference station monument in NAD_83(CORS96)(EPOCH:2002.0000).

| | Xr-X= DX(m) | Yr-Y= DY(m) | Zr-Z= DZ(m) | |
|---|---|---|---|---|
| NCLI | -80158.64120 | 21078.19931 | 52306.04999 | 2002.00 |
| NCRD | -63868.31565 | 46940.09656 | 83322.30857 | 2002.00 |
| CASL | 17403.14727 | -28429.21471 | -45594.16549 | 2002.00 |

STATE PLANE COORDINATES - U.S. Survey Foot
SPC (3200 NC )

| | |
|---|---|
| Northing (Y) [feet] | 399636.855 |
| Easting (X) [feet] | 2301193.803 |
| Convergence [degrees] | 0.57940289 |
| Point Scale | 0.99989777 |
| Combined Factor | 0.99989926 |

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 40822081.DAT 000436739

USER: scott.lokken@noaa.gov DATE: February 23, 2006
RINEX FILE: 4082208r.05o TIME: 16:49:06 UTC

SOFTWARE: page5 0601.10 master22.pl START: 2005/07/27 17:05:00
EPHEMERIS: igs13333.eph [precise] STOP: 2005/07/27 19:19:00
NAV FILE: brdc2080.05n OBS USED: 3566 / 3644 : 98%
ANT NAME: TRM33429.00+GP NONE # FIXED AMB: 19 / 26 : 73%
ARP HEIGHT: 2.0 OVERALL RMS: 0.026(m)

| REF FRAME: | NAD_83(CORS96)(EPOCH:2002.0000) | | ITRF00 (EPOCH:2005.5692) | |
|---|---|---|---|---|
| LAT: | 34 50 37.98922 | 0.021(m) | 34 50 38.01487 | 0.021(m) |
| E LON: | 282 0 13.92654 | 0.073(m) | 282 0 13.91292 | 0.073(m) |
| W LON: | 77 59 46.07346 | 0.073(m) | 77 59 46.08708 | 0.073(m) |
| EL HGT: | -9.519(m) | 0.060(m) | -10.922(m) | 0.060(m) |
| ORTHO HGT: | 26.409(m) | 0.065(m) | [Geoid03 NAVD88] | |

BASE STATIONS USED

| PID | DESIGNATION | LATITUDE | LONGITUDE | DISTANCE(m) |
|---|---|---|---|---|
| DG5759 | NCLI LILLINGTON 2004 CORS ARP | N352512.546 | W0784840.339 | 98008.3 |
| DG4687 | NCRD RALEIGH DOT CORS ARP | N354549.508 | W0783444.395 | 115000.6 |
| AJ2915 | WASR WASHINGTON CORS ARP | N353334.802 | W0770331.543 | 116584.1 |

REMOTE STATION INFORMATION

BASELINE NAME: ncli 4082

| | | | | |
|---|---|---|---|---|
| XYZ | -0.3852 | 1.3854 | -0.7755 | + XYZ ADJUSTMENTS |
| XYZ | 1089872.3553 | -5125746.2703 | 3623661.9385 | NEW L1 PHS CEN @ 2005.5692 |
| XYZ | 1089872.3427 | -5125746.2109 | 3623661.8963 | NEW ARP @ 2005.5692 |
| XYZ | 1089872.0013 | -5125744.6054 | 3623660.7536 | NEW MON @ 2005.5692 |
| LLH | 34 50 38.01475 | 282 0 13.91237 | -8.8749 | NEW L1 PHS CEN @ 2005.5692 |
| LLH | 34 50 38.01475 | 282 0 13.91237 | -8.9489 | NEW ARP @ 2005.5692 |
| LLH | 34 50 38.01475 | 282 0 13.91237 | -10.9489 | NEW MON @ 2005.5692 |

BASELINE NAME: ncrd 4082

| | | | | |
|---|---|---|---|---|
| XYZ | -0.3281 | 1.3888 | -0.7496 | + XYZ ADJUSTMENTS |
| XYZ | 1089872.4124 | -5125746.2670 | 3623661.9644 | NEW L1 PHS CEN @ 2005.5692 |
| XYZ | 1089872.3998 | -5125746.2076 | 3623661.9222 | NEW ARP @ 2005.5692 |
| XYZ | 1089872.0584 | -5125744.6020 | 3623660.7795 | NEW MON @ 2005.5692 |
| LLH | 34 50 38.01528 | 282 0 13.91460 | -8.8531 | NEW L1 PHS CEN @ 2005.5692 |
| LLH | 34 50 38.01528 | 282 0 13.91460 | -8.9271 | NEW ARP @ 2005.5692 |
| LLH | 34 50 38.01528 | 282 0 13.91460 | -10.9271 | NEW MON @ 2005.5692 |

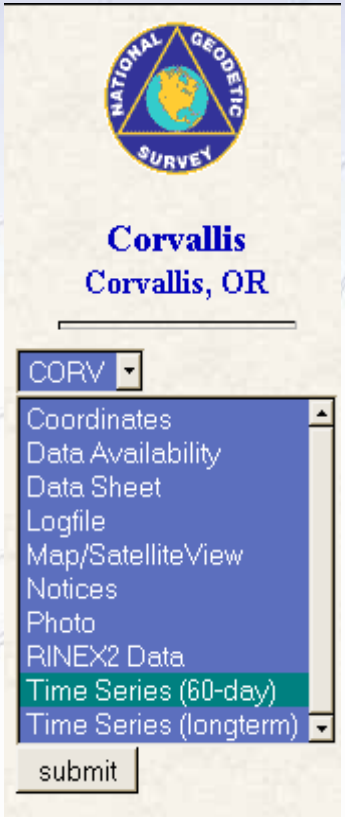
BASELINE NAME: wasr 4082

| | | | | |
|---|---|---|---|---|
| XYZ | -0.3907 | 1.3317 | -0.7450 | + XYZ ADJUSTMENTS |
| XYZ | 1089872.3498 | -5125746.3240 | 3623661.9691 | NEW L1 PHS CEN @ 2005.5692 |
| XYZ | 1089872.3372 | -5125746.2646 | 3623661.9268 | NEW ARP @ 2005.5692 |
| XYZ | 1089871.9958 | -5125744.6591 | 3623660.7841 | NEW MON @ 2005.5692 |
| LLH | 34 50 38.01461 | 282 0 13.91172 | -8.8153 | NEW L1 PHS CEN @ 2005.5692 |
| LLH | 34 50 38.01461 | 282 0 13.91172 | -8.8893 | NEW ARP @ 2005.5692 |

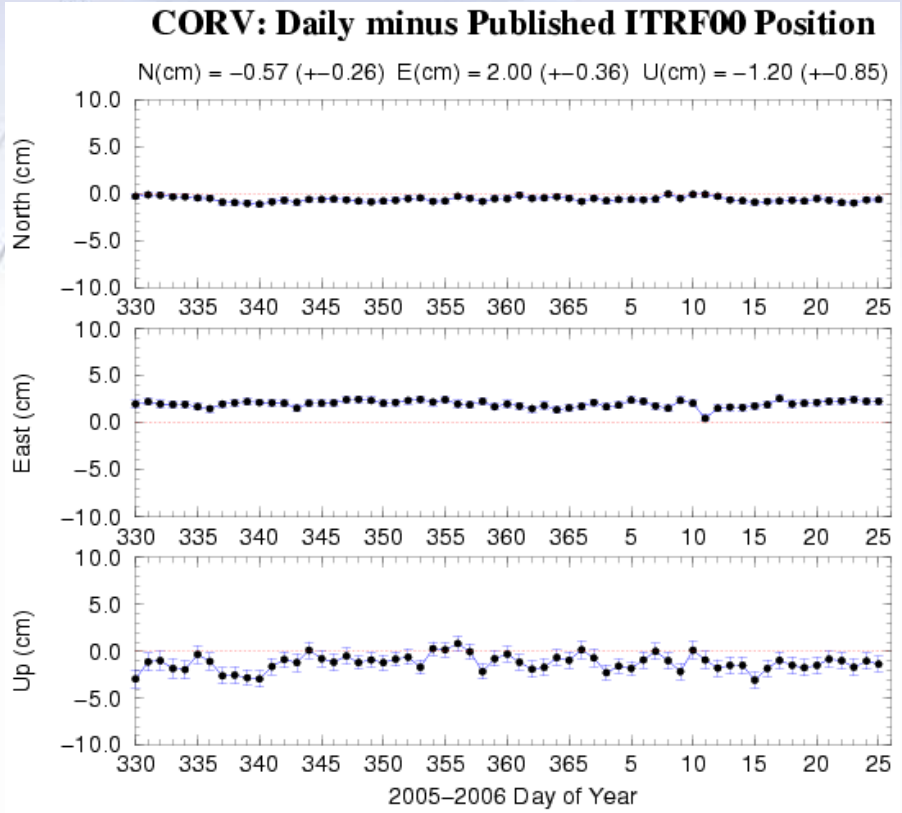
```
 FILE: 40822081.DAT 000436739

      USER: scott.lokken@noaa.gov                DATE: February 23, 2006
RINEX FILE: 4082208r.05o                         TIME: 16:49:06 UTC


  SOFTWARE: page5  0601.10 master22.pl           START: 2005/07/27  17:05:00
 EPHEMERIS: igs13333.eph [precise]               STOP: 2005/07/27  19:19:00
  NAV FILE: brdc2080.05n                      OBS USED:  3566 /  3644    :  98%
  ANT NAME: TRM33429.00+GP  NONE           # FIXED AMB:    19 /    26    :  73%
ARP HEIGHT: 2.0                            OVERALL RMS: 0.026(m)


 REF FRAME: NAD_83(CORS96)(EPOCH:2002.0000)

       LAT:   34 50 37.98922      0.021(m)     34 50 37.98863      0.075(m)
     E LON:  282  0 13.92654      0.073(m)    282  0 13.92566      0.138(m)
     W LON:   77 59 46.07346      0.073(m)     77 59 46.07434      0.138(m)
    EL HGT:           -9.519(m)   0.060(m)           -9.461(m)   0.231(m)
 ORTHO HGT:           26.409(m)   0.065(m) [G        26.467(m)   0.233(m) [Geoid03 NAVD88]

                        BASE STATIONS USED
PID       DESIGNATION                       LATITUDE    LONGITUDE DISTANCE(m)
DG5759 NCLI LILLINGTON 2004 CORS ARP      N352512.546 W0784840.339   98008.3
DG4687 NCRD RALEIGH DOT CORS ARP          N354549.508 W0783444.395  115000.6
AJ2915 WASR WASHINGTON CORS ARP           N353334.802 W0770331.543  116584.1

                     REMOTE STATION INFORMATION
 BASELINE NAME:    ncli  4082
 XYZ         -0.3852         1.3854        -0.7755  + XYZ ADJUSTMENTS
 XYZ    1089872.3553  -5125746.2703   3623661.9385  NEW L1 PHS CEN @ 2005.5692
 XYZ    1089872.3427  -5125746.2109   3623661.8963  NEW ARP @ 2005.5692
 XYZ    1089872.0013  -5125744.6054   3623660.7536  NEW MON @ 2005.5692
 LLH   34 50 38.01475  282  0 13.91237     -8.8749  NEW L1 PHS CEN @ 2005.5692
 LLH   34 50 38.01475  282  0 13.91237     -8.9489  NEW ARP @ 2005.5692
 LLH   34 50 38.01475  282  0 13.91237    -10.9489  NEW MON @ 2005.5692

 BASELINE NAME:    ncrd  4082
 XYZ         -0.3281         1.3888        -0.7496  + XYZ ADJUSTMENTS
 XYZ    1089872.4124  -5125746.2670   3623661.9644  NEW L1 PHS CEN @ 2005.5692
 XYZ    1089872.3998  -5125746.2076   3623661.9222  NEW ARP @ 2005.5692
 XYZ    1089872.0584  -5125744.6020   3623660.7795  NEW MON @ 2005.5692
 LLH   34 50 38.01528  282  0 13.91460     -8.8531  NEW L1 PHS CEN @ 2005.5692
 LLH   34 50 38.01528  282  0 13.91460     -8.9271  NEW ARP @ 2005.5692
 LLH   34 50 38.01528  282  0 13.91460    -10.9271  NEW MON @ 2005.5692

 BASELINE NAME:    wasr  4082
 XYZ         -0.3907         1.3317        -0.7450  + XYZ ADJUSTMENTS
 XYZ    1089872.3498  -5125746.3240   3623661.9691  NEW L1 PHS CEN @ 2005.5692
 XYZ    1089872.3372  -5125746.2646   3623661.9268  NEW ARP @ 2005.5692
 XYZ    1089871.9958  -5125744.6591   3623660.7841  NEW MON @ 2005.5692
 LLH   34 50 38.01461  282  0 13.91172     -8.8153  NEW L1 PHS CEN @ 2005.5692
 LLH   34 50 38.01461  282  0 13.91172     -8.8893  NEW ARP @ 2005.5692
```

# Time-series plots, 60-day and long-term

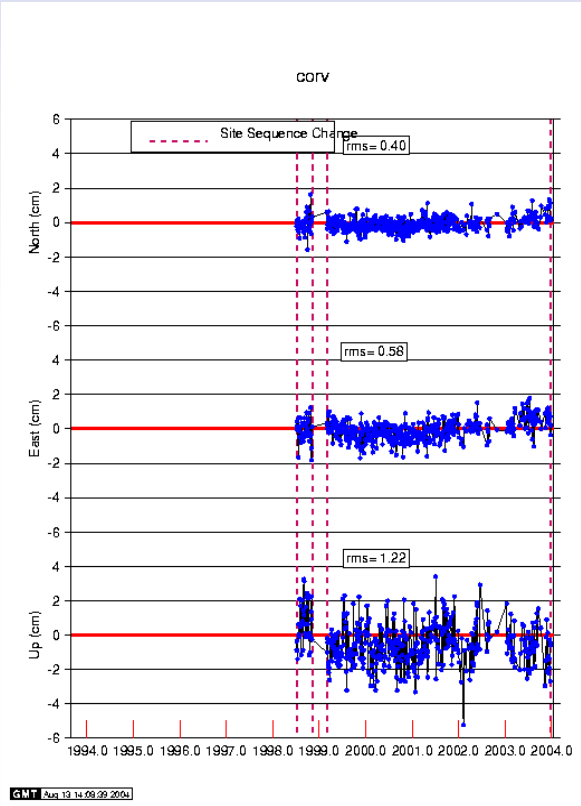
web page




60-day time series




Long-term time series




The time series plots provide a means of evaluating the small changes in position of a CORS.

# How Can I Improve My Results?

-Observe longer sessions.

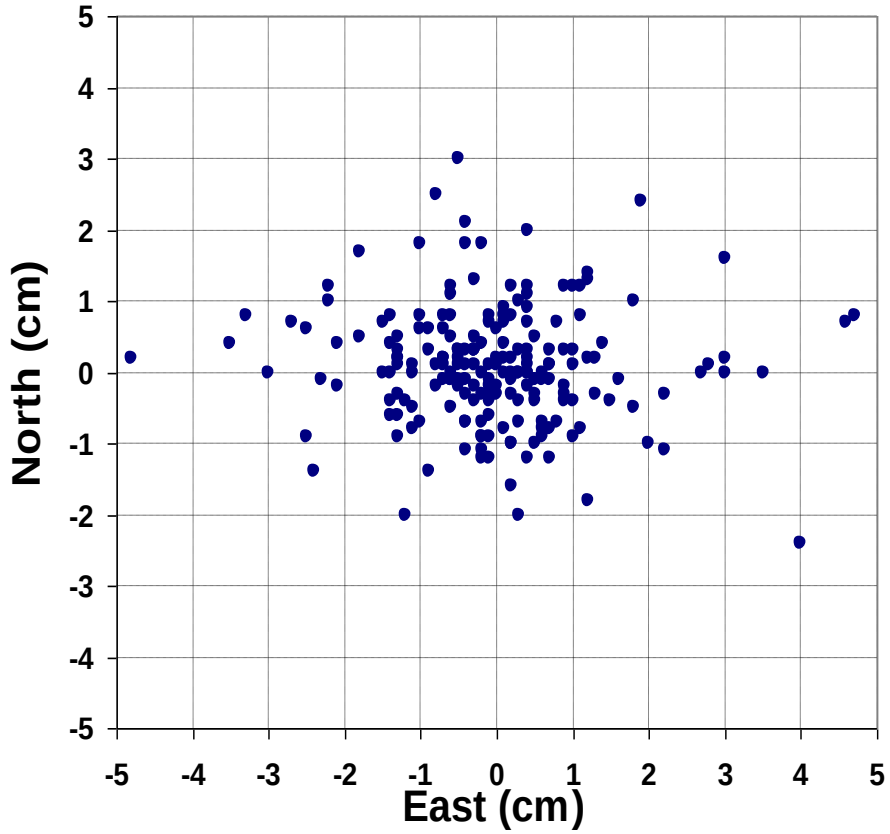
  -4+ hours result in more reliable results.

-Pre-plan your survey. PDOP < 6

-NO obstructions (preferably use a fixed height pole)

-Antenna with a ground plane

# Distribution of Horizontal Offset from Accepted Values

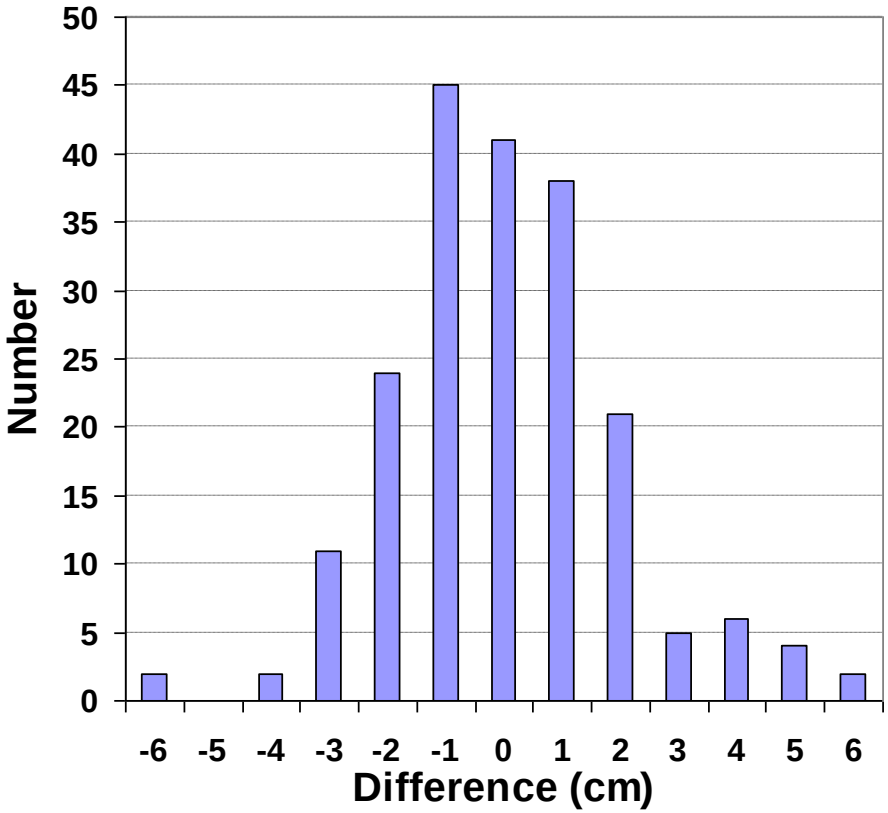



> 200 CORS
2 hours of data

0.8 cm N-S RMS

1.4 cm E-W RMS

# Distribution of Vertical Offset from Accepted Values



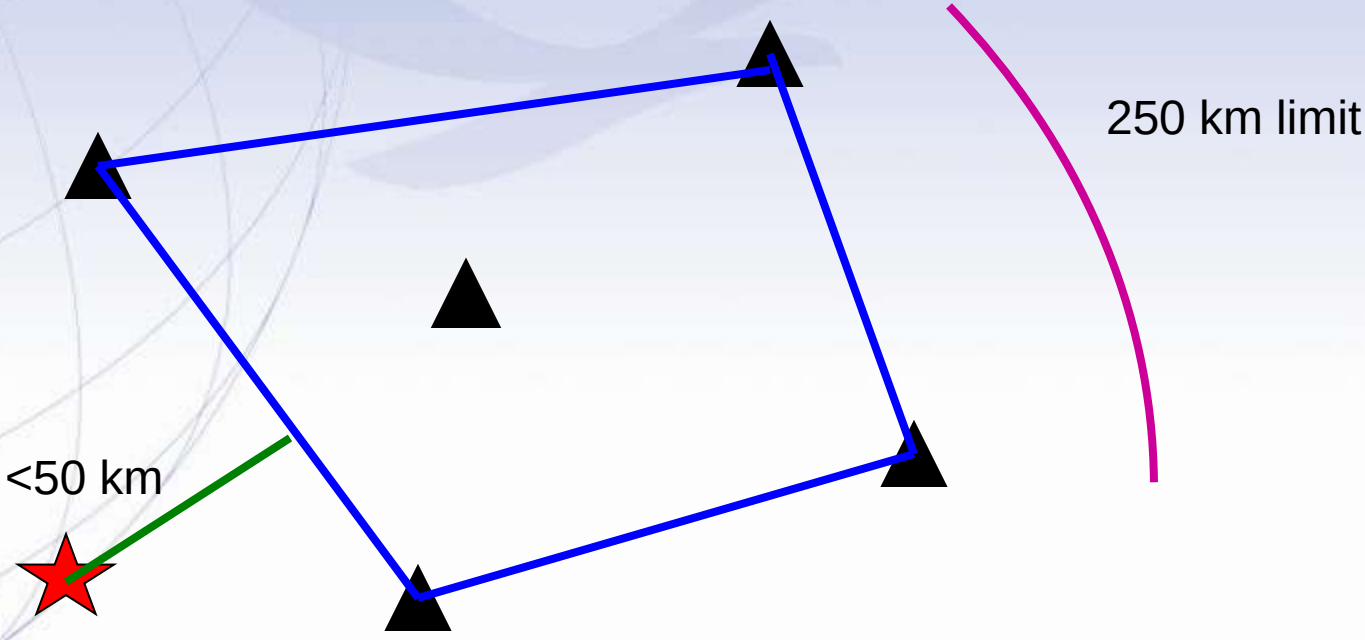

> 200 CORS
2 hours of data

1.9 cm RMS

The mean of all offsets < 1 mm !!

# OPUS RS

# OPUS-RS




- Sort stations in CORS network by distance from rover. Select up to nine CORS that are less than 250 km from rover and that have suitable data.
- No solution is attempted if fewer than three CORS selected.
- No solution attempted if distance from rover to polygon enclosing selected CORS is greater than 50 km.

- Obs used >60
- quality ind. < 1
  - might have problem
- Normalize residual<1 is desirable

```
FILE: GPS20722.DAT 000816027
                        NGS OPUS-RS SOLUTION REPORT
                        ===========================
      USER: gary.thompson@ncmail.net                DATE: March 13, 2008
RINEX FILE: gps2072t.08o                            TIME: 01:22:35 UTC

  SOFTWARE: rsgps  1.19 RS30.prl 1.23a           START: 2008/03/12 19:43:15
EPHEMERIS: igu14703.eph [ultra-rapid]            STOP: 2008/03/12 20:28:30
  NAV FILE: brdc0720.08n                      OBS USED:  5040 /  5670   :  89%
  ANT NAME: TRM22020.00+GP                 QUALITY IND.  23.41/ 38.54
ARP HEIGHT: 2.0                          NORMALIZED RMS:       0.275

REF FRAME: NAD_83(CORS96)(EPOCH:2002.0000)          ITRF00 (EPOCH:2008.19628)

        X:      1175881.439(m)   0.008(m)          1175880.727(m)   0.008(m)
        Y:     -5116235.353(m)   0.024(m)         -5116233.855(m)   0.024(m)
        Z:      3610239.640(m)   0.019(m)          3610239.495(m)   0.019(m)

      LAT:   34 41 48.27049      0.004(m)       34 41 48.29654      0.004(m)
    E LON:  282 56 37.30132      0.009(m)      282 56 37.28724      0.009(m)
    W LON:   77  3 22.69868      0.009(m)       77  3 22.71276      0.009(m)
   EL HGT:          -31.208(m)   0.030(m)              -32.622(m)   0.030(m)
ORTHO HGT:            5.979(m)   0.039(m) [Geoid03 NAVD88]

                          UTM COORDINATES     STATE PLANE COORDINATES
                           UTM (Zone 18)          SPC (3200 NC  )
Northing (Y) [meters]       3841338.101           106766.534
Easting (X)  [meters]        311654.751           787663.934
Convergence  [degrees]       -1.17086076          1.12184283
Point Scale                   1.00003725          0.99991919
Combined Factor               1.00004215          0.99992409

US NATIONAL GRID DESIGNATOR: 18SUD1165541338(NAD 83)

                              BASE STATIONS USED
PID       DESIGNATION                        LATITUDE     LONGITUDE DISTANCE(m)
DI4788 NBR6 NEW BERN 6 CORS ARP          N351029.898 W0770259.335   53057.5
AM7011 CASL CASTLE HAYNE CORS ARP        N342040.707 W0775231.382   84742.4
DI1071 NCKN KENANSVILLE CORS ARP         N345630.497 W0775849.945   88818.6
AJ2915 WASR WASHINGTON CORS ARP          N353334.802 W0770331.543   95734.4
DI1680 NCET ELIZABETHTOWN CORS ARP       N343913.601 W0783111.734  134217.6
DJ8943 NCWH WHITEVILLE CORS ARP          N341649.590 W0784259.331  159323.7
DH9594 NCFA FAYETTEVILLE 2006 CORS ARP   N350202.489 W0785214.731  170068.0
DG5759 NCLI LILLINGTON 2004 CORS ARP     N352512.546 W0784840.339  179068.4
DG5313 NCPI PEA ISLAND CORS ARP          N354102.040 W0752856.350  180389.4

                     NEAREST NGS PUBLISHED CONTROL POINT
EA1381      SIMKINS RM 1                  N344151.    W0770325.       102.7
```

# NGS OPUS-RS SOLUTION REPORT

```
      USER: scott.lokken@noaa.gov                    DATE: November 22, 2008
RINEX FILE: test308a.08o                             TIME: 15:32:20 UTC

  SOFTWARE: rsgps  1.32 RS42.prl 1.5a              START: 2008/11/03 00:00:00
 EPHEMERIS: igs15040.eph [precise]                  STOP: 2008/11/03 01:57:30
  NAV FILE: brdc3070.08n                       OBS USED:  8019 /  8964    :  89%
  ANT NAME: TRM55971.00     TZGD             QUALITY IND.  55.09/ 89.75
ARP HEIGHT: 0.0                          NORMALIZED RMS:        0.272

 REF FRAME: NAD_83(CORS96)(EPOCH:2002.0000)          ITRF00 (EPOCH:2008.83891)

         X:       876525.906(m)   0.008(m)           876525.193(m)   0.008(m)
         Y:     -5066580.350(m)   0.011(m)         -5066578.885(m)   0.011(m)
         Z:      3761683.308(m)   0.007(m)          3761683.164(m)   0.007(m)

       LAT:   36 22 19.68821      0.005(m)       36 22 19.71455      0.005(m)
     E LON:  279 48 54.37372      0.009(m)      279 48 54.35555      0.009(m)
     W LON:   80 11  5.62628      0.009(m)       80 11  5.64445      0.009(m)
    EL HGT:           276.353(m)   0.012(m)                275.007(m)   0.012(m)
 ORTHO HGT:           309.571(m)   0.028(m) [NAVD88 (Computed using GEOID03)]

                        UTM COORDINATES    STATE PLANE COORDINATES
                         UTM (Zone 17)         SPC (3200 NC  )
Northing (Y) [meters]     4025533.459          291528.711
Easting (X)  [meters]      573117.413          503266.530
Convergence  [degrees]     0.48340029         -0.68388684
Point Scale                0.99966587          1.00006383
Combined Factor            0.99962251          1.00002046

US NATIONAL GRID DESIGNATOR: 17SNA7311725533(NAD 83)

                                BASE STATIONS USED
PID       DESIGNATION                        LATITUDE    LONGITUDE DISTANCE(m)
DH5853 NCWS WINSTON SALEM CORS ARP       N360415.678 W0801337.750   33629.2
AI4198 HIPT HIGH POINT CORS ARP          N355756.487 W0800048.938   47662.6
DF5767 DOBS DOBSON CORS ARP              N362531.514 W0804311.711   48360.7
DJ6107 NCG5 GREENSBORO 5 CORS ARP        N360403.612 W0794441.845   52021.7
DG5757 NCLE LEXINGTON CORS ARP           N354853.143 W0801346.202   61979.0
DF9213 NCBU BURLINGTON CORS ARP          N360529.586 W0792612.176   74119.2
DK4047 NCNW NORTH WILKESBORO CORS ARP    N360959.275 W0810757.224   88161.5
DG7016 NCAS ASHEBORO CORS ARP            N353749.456 W0794553.601   90598.3
AI1571 BLKV BLACKSBURG CORS ARP          N371221.637 W0802452.276   94786.9

                    NEAREST NGS PUBLISHED CONTROL POINT
FZ0192      E 94                         N362209.    W0801055.        423.4
```

# What to look for?

- your antenna type and antenna height are correct
- orbit used = precise or rapid

## OPUS-static

- 90% data used
- 50% Ambiguities solved
- RMS< 3cm
- Peak to Peak < 5cm
  - 3cm horz
  - 5cm vert

## OPUS-rs

- Abs used >60
- quality ind. < 1 might have problem
- Normalize residual<1 is desirable

Rapid Static:

-No warning messages.

-Quality indicators that are suspiciously low

-Normalized RMS that is suspiciously high.

-Coordinate standard deviations that are suspiciously high.

# Calculating horz/vert accuracies OPUS Static solution report

- Horizontal positional accuracy calculation at 95% confidence

$$\text{HzAccuracy} = \sqrt[2]{(\text{latitude peak to peak})^2 + (\text{longitude peak to peak})^2}$$

- Vertical positional accuracy calculation at 95% confidence

$$\text{VertAccuracy} = \text{height peak to peak value}$$

# OPUS Rapid Static

OPUSrs reports Root Mean Square Error (RMSE) results at 1 sigma (68% confidence interval).

- **Horizontal positional accuracy at 95% confidence:**

*2 methods-dependent on the RMSE values*

**#1 if**: $RMSE_{lat} = RMSE_{long}$

*Horizontal accuracy = 1.7308 x RMSE*

**#2. if:** $0.2 < RMSE_{smaller}/RMSE_{larger} < 1.0$

$$Horizontal\ accuracy = 2.4477 \times 0.5(RMSE_{lat} + RMSE_{long})$$

# OPUS Rapid Static (cont)

OPUS reports Root Mean Square Error (RMSE) results at 1 sigma (68%).

- **Vertical accuracy at 95% confidence:**

$$\text{Vertical accuracy} = 1.96 \times (\text{RMSE}_{\text{orthometric height}})$$

# OPUS: Online Positioning User Service

National Geodetic Survey



OPUS Menu

Upload
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Published Solutions
Contact OPUS

On September 6, 2011 NGS's CORS group released **revised coordinates** for all CORS sites. The new coordinates update both the global frame and the National Spatial Reference Frame as follows.

| New Frames | | Previous Frames | |
|---|---|---|---|
| IGS08 | Epoch 2005.00 | ITRF00 | Epoch 1997.00 |
| NAD 83(2011) | Epoch 2010.00 | NAD 83(CORS96) | Epoch 2002.00 |
| NAD 83(MA11) | Epoch 2010.00 | NAD 83(MARP00) | Epoch 2002.00 |
| NAD 83(PA11) | Epoch 2010.00 | NAD 83(PACP00) | Epoch 2002.00 |

NGS is in the process of completing an **adjustment of the passive control network**. Until the adjustment is complete, OPUS will allow users to choose getting coordinates in either the new or previous reference frames. Once the passive network is adjusted to NAD 83(2011, MA11, PA11) then the OPUS support for ITRF00 and NAD 83(CORS96, MARP00, PACP00) will end.

ose one of the following buttons to upload your data.

NAD 83(2011,MA11,PA11)
Mexico(IGS08)
epoch 2010.00

International
IGS08
epoch of observation

NAD 83(CORS96,MARP00,PACP00)
epoch 2002.00

ITRF00

- **Q**: Which button/reference frame should I choose to get my solution?
  - **A**: Most users should start using the new reference frame, especially for users who are only interested in the global reference frame i.e. IGS08. Users who are in the middle of a project, will probably want to continue using their original reference frame.

- **Q**: How much will OPUS coordinates change if I use the new reference frame?
  - **A**: The biggest changes in the coordinates are caused by the change from relative to absolute antenna calibrations and the change in reference epoch as defined at the top of this page. OPUS coordinate changes should mimic those of the CORS namely: Difference of NAD 83(2011) epoch 2010.00 minus NAD 83(CORS96) epoch 2002.00: mean East 0.05±5.25 cm; North 2.12±6.08 cm; Up -0.66±2.24cm and median values of: East -0.12 cm; North 0.00 cm; Vertical -0.80 cm. For maps showing differences in CORS coordinates see this **FAQ**.

- **Q**: Has the OPUS processor changed?
  - **A**: No. The OPUS processor simply points to the new set of CORS coordinates and absolute antenna calibrations.

# OPUS: Online Positioning User Service

National Geodetic Survey

NGS Home | About NGS | Data & Imagery | Tools | Surveys | Science & Education | Search

## View published solutions.

Results from survey observations on passive marks are accessible below.

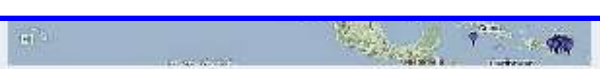
### OPUS Published Solution Report

*Click on PID to view a Published Solution*

| PID | Designation | County, State | Submitter | Load Date |
|---|---|---|---|---|
| BBBB54 | FAIR | Hyde County,NC | scott.lokken@noaa.gov | 032008 |
| BBBF93 | DENNIS | Johnston County,NC | scott.lokken@noaa.gov | 121208 |
| BBBG02 | LEE | Johnston County,NC | scott.lokken@noaa.gov | 122308 |
| BBBX84 | MARLE | Pasquotank County,NC | scott.lokken@noaa.gov | 061010 |
| BBBX87 | ALBE | Pasquotank County,NC | scott.lokken@noaa.gov | 061110 |
| BBCD93 | HOB | Pamlico County,NC | scott.lokken@noaa.gov | 010511 |
| BBCF12 | BUCKY | Pamlico County,NC | scott.lokken@noaa.gov | 011111 |
| BBCF24 | ALBE | Chowan County,NC | scott.lokken@noaa.gov | 011211 |
| BBCF27 | MARLE | Washington County,NC | scott.lokken@noaa.gov | 011211 |

OPUS Menu

- Upload
- About OPUS
- Published Solutio
- Contact OPUS



**Retrieve Solutions via Email Address:**

scott.lokken

* Email ( *Hint: enter a few characters from the beginning, middle, or end of the publisher's email address.*)

Select a **Solution Format:** ○Datasheet ○XML ○Shapefile

List Marks

These search pages retrieve OPUS Solutions only. See also **NGS Datasheets**
Want to add more? Explain **publishing.**

Website Owner: National Geodetic Survey / Last modified by NGS.OPUS Monday, 19-Sep-2011 14:45:34 EDT

# SURVEY DATASHEET (Version 1.0)



**PID:** BBBX87
**Designation:** ALBE
**Stamping:** ALBE 1998
**Stability:** May hold, commonly subject to ground movement
**Setting:** Set in top of concrete monument
**Description:** To reach from the intersection of US 158east and US 17 Bypass in Elizabeth City, go N on bypass for 1.8 mi to the the College of the Albemarle and the station set in the grass yard in front of buildings B and C and on extended centerline of sidewalk between the buildings. Located 45.63m WNW of a fire hydrant, 39.01m WSW of the NW corner of building B, 39.01m SW of the SW corner of building C, 34.23m S of a flag pole, 27.25m WNW of a magnolia tree, and 26.03m SW of the road curb.
**Observed:** 2009-05-07T14:09:00Z
**Source:** OPUS - page5 0909.08


**Close-up View**

| REF_FRAME: | EPOCH: | SOURCE: | UNITS: | SET PROFILE | DETAILS |
|---|---|---|---|---|---|
| NAD_83(CORS96) | 2002.0000 | NAVD88 (Computed using GEOID09) | m | | |

| | | |
|---|---|---|
| **LAT:** | 36° 19' 29.59469" ± 0.008 m | |
| **LON:** | -76° 13' 15.24573" ± 0.025 m | |
| **ELL HT:** | -35.496 ± 0.037 m | |
| **X:** | 1225359.866 ± 0.024 m | |
| **Y:** | -4996639.788 ± 0.039 m | |
| **Z:** | 3757275.610 ± 0.017 m | |
| **ORTHO HT:** | 1.972 ± 0.040 m | |

| | | |
|---|---|---|
| | **UTM** 18 | **SPC** 3200(NC ) |
| **NORTHING:** | 4020675.884m | 289143.824m |
| **EASTING:** | 390413.652m | 859122.562m |
| **CONVERGENCE:** | -0.72328916° | 1.60401294° |
| **POINT SCALE:** | 0.99974796 | 1.00004800 |
| **COMBINED FACTOR:** | 0.99975353 | 1.00005357 |

**CONTRIBUTED BY**

scott.lokken
National Geodetic Survey

**Horizon View**

## Publish Your OPUS Solutions

Publishing helps maintain local ties to the National Spatial Reference System, and, by linking observations, strengthens the models used to translate between modern and legacy mapping products.

### Step 1. Follow These Requirements

**Field Procedures**

- GPS **data file** ≥ 4 hour duration
- quality **mark setting**
- experienced observer
- fixed height tripod recommended
- brace tripod legs with sandbags or chain
- verify **antenna height** and plumb
- see **HARN guidelines**

**High-Quality OPUS Solution**

- ≥ 70% observations used
- ≥ 70% ambiguities fixed
- ≤ 3 cm RMS
- ≤ 4 cm peak-to-peaks, lat. & lon.
- ≤ 8 cm peak-to-peak, el. hgt.
- properly identify **antenna type**
- precise or rapid orbits (avail. next day)

**Mark Attributes**

- photos of mark & equipment
- details (name, type, stability, etc.)
- description to aid mark recovery
- preview **mark description form** & **help file**


**Step 3 of 4: Describe new mark.**

for data file: buck342n.10o

1. upload √ | 2. identify | **3. describe your mark** | 4. publish

*** Stamping** BUCKY 2010

*** Designation** BUCKY 2010

*** Type** D = Disk | DD = Survey disk (other agency)

*** Setting** 7 = Set in top of concrete monument

**Specific setting** *(optional)*:

*** Description** (describe the mark, witness ties, etc., to enable future recoveries. Max. characters=500) 426

Located about 6.2 mi. southeast of Vandemere at the Hobucken Intracoastal Waterway bridge. From the east end of bridge go approximately 0.15 mi. east on NC304 to the mark on the right set 1 ft lower than the road and flush with the ground. Located 145.5 ft East of a power pole, 52.7 ft NW of a fiber optic cable marker, 41.3 ft WNW of the western corner of concrete headwall, and 26.5 ft SSW of the center line of nc33/nc304.

*** Close-up photo** C:\aa\opusProjects\DOTbridge\photos\buck-1.JF Browse...

*** Horizon photo** C:\aa\opusProjects\DOTbridge\photos\buck-3nw Browse...

**Stability** B = Monument will probably hold position well

**Magnetic** I = Marker is a steel rod

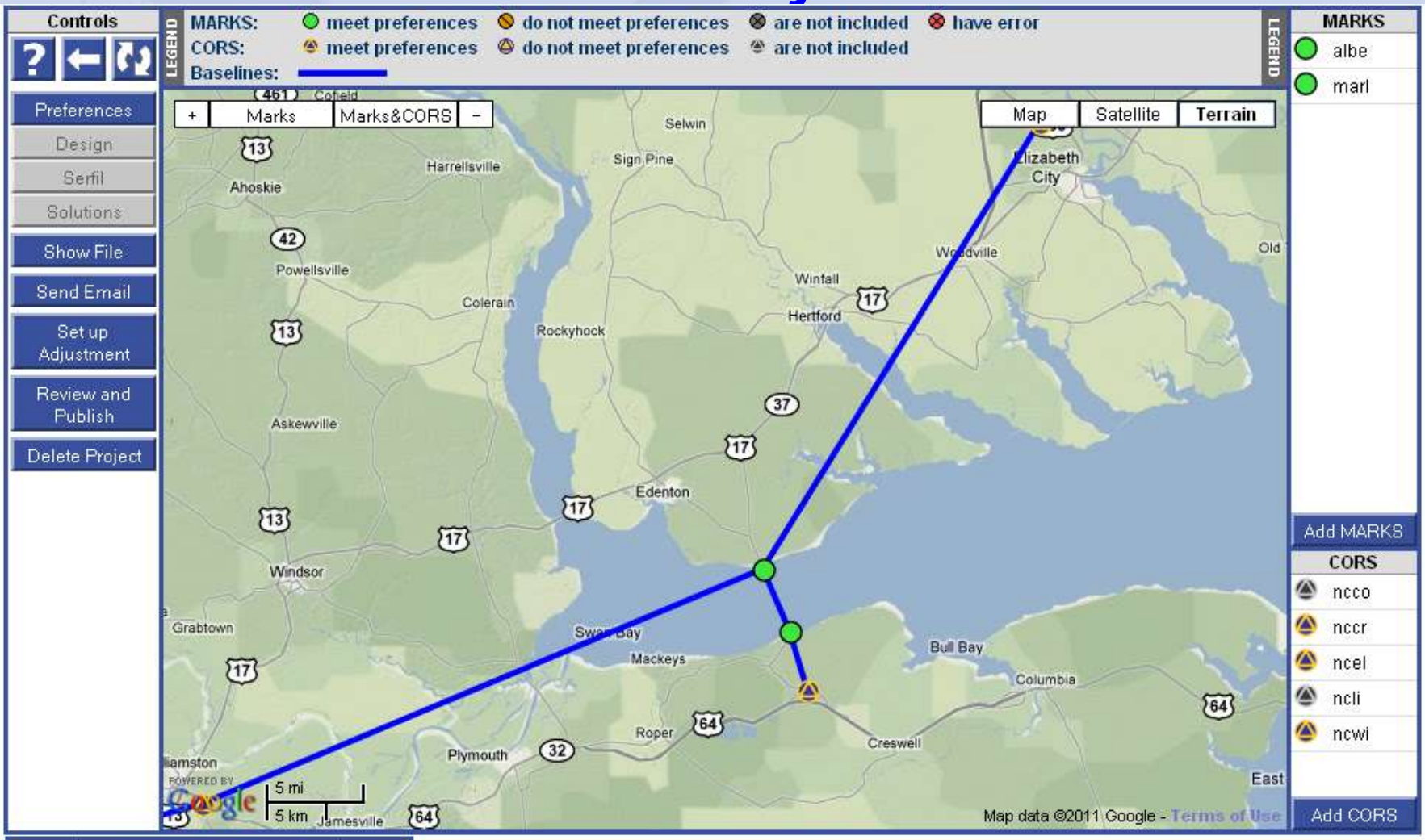
**Application** Choose Special Application

**Antenna S/N** 123456 **Receiver S/N:** 654321

**Model** 57971.00 **Firmware** 4.0

Upload Description | Abort

# OPUS Projects




| MARKS | Sessions & Solutions | | | MARKS |
|---|---|---|---|---|
| | 2010-347 A | 2010-354 A | network 1stFCAdj | |
| albe | ⊗ | ⊗ | ● | albe |
| marl | ⊗ | ⊗ | ● | marl |

# OPUS Projects

1. Submit Data to OPUS static
   - Include recovery info, description and photographs
2. Combine multiple observations into a session
3. Perform a least squares adjustment of all sessions

OpusProjects.prl.htm

# Future developments

- **OPUS NET**
- Will Replace OPUS static
- Use new algorithm for processing
  - Least Squares instead of mean
- Different style output
  - Includes usFt in SPC!
- In testing for over a year, and rumored to go live soon.
- GNSS
  - Working on adding to both NET and RS

# Questions?