OPUS
Online Positioning User Service

Review and new developments

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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
Choose a frame to 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

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**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.

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**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 datasets.

*note these will be superseded soon, when NGS completes the adjustment of the passive control network and release of GEOID12.

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**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.

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**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for now, but soon all published solutions will be updated to the current frames, with previous coordinates retained as superseded.
**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.

* Email address - your solution will be sent here.

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

*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

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

State plane coordinates  Override your native NPCS zone

Geoid model  Customize your orthometric height model

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

Upload to Rapid-Static  for data > 15 min. < 2 hrs.

Upload to Static  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](http://www.ngs.noaa.gov/OPUS/about.html#accuracy)

**USER:** Scott.Lokken@noaa.gov  
RINEX FILE: buck342n.10n  
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  
**ARP HEIGHT:** 2.0

**REF FRAME:** NAD_83(CORS96)(EPOCH:2002.0000)  
**ITRF00** (EPOCH:2010.9360)

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**UTM COORDINATES**  
**STATE PLANE COORDINATES**  
**SPC (3200 NC)**

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**US NATIONAL GRID DESIGNATOR:** 18SUE5581801528(NAD 83)

**BASE STATIONS USED**

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For Help, press Ln 8, Col. 21, CW
OPUS Peak to Peak Errors are the separation of the max/min component values from the 3 separate CORS solutions.
Short session

Trouble fixing ambiguities

Result: High peak to peak errors (poor solution)
Note:
Peak to peaks are fairly large;
hoz @ 15 cm
Vrt @ 23 cm
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**REMOTE STATION INFORMATION**

**STATION NAME:** 4082

**ANTENNA:** TRM33429.00+GP

**BASELINE NAME:** ncli 4082

**BASELINE NAME:** ncrd 4082

**BASELINE NAME:** casl 4082

**S/N=UNKNOWN**
### POST-FIT RMS BY SATELLITE VS. BASELINE

<table>
<thead>
<tr>
<th>Satellite</th>
<th>OVERALL</th>
<th>05</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>18</th>
<th>20</th>
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<tbody>
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### OBS BY SATELLITE VS. BASELINE

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<th>15</th>
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<td>119</td>
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Covariance Matrix for the xyz OPUS Position (meters^2).
0.0000093956 -0.0000019715 0.00000010994
-0.0000019715 0.00000584222 -0.0000034229
0.00000010994 -0.0000034229 0.0000235067

Covariance Matrix for the enu OPUS Position (meters^2).
0.00000107141 0.00000049471 -0.00000065153
0.00000049471 0.0000310284 -0.0000144542
-0.00000065153 -0.0000144542 0.0000495819

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

Derivation of NAD 83 vector components


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<tr>
<th>Station</th>
<th>Xa(m)</th>
<th>Ya(m)</th>
<th>Za(m)</th>
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<tbody>
<tr>
<td>NCLI</td>
<td>1009714.03980</td>
<td>-5104667.97969</td>
<td>3675966.99299</td>
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<tr>
<td>NCRD</td>
<td>1026004.36535</td>
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<td>3706983.25157</td>
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<tr>
<td>CASL</td>
<td>1107275.82827</td>
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<td>3578066.77751</td>
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</tbody>
</table>


<table>
<thead>
<tr>
<th>Station</th>
<th>Xr(m)</th>
<th>Yr(m)</th>
<th>Zr(m)</th>
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<tbody>
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<td>3675966.99299</td>
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<td>NCRD</td>
<td>1026004.36535</td>
<td>-5078806.08244</td>
<td>3706983.25157</td>
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<td>CASL</td>
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<td>3578066.77751</td>
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<table>
<thead>
<tr>
<th>Station</th>
<th>Vx (m/yr)</th>
<th>Vy (m/yr)</th>
<th>Vz (m/yr)</th>
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</thead>
<tbody>
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<td>-0.000000</td>
<td>0.000000</td>
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<tr>
<td>NCRD</td>
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<tr>
<td>CASL</td>
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<td>0.000000</td>
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</table>

Vectors from unknown station monument to reference station monument

<table>
<thead>
<tr>
<th>Station</th>
<th>Xr-X= DX(m)</th>
<th>Yr-Y= DY(m)</th>
<th>Zr-Z= DZ(m)</th>
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<tbody>
<tr>
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<td>NCRD</td>
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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.loken@noaa.gov  
**DATE:** February 23, 2006

**RINEX FILE:** 4082208r.05c  
**TIME:** 16:49:06 UTC

**SOFTWARE:** page5 0601.10 master22.pl

**EPHEMERIS:** igs13333.eph [precise]

**NAV FILE:** brdc2008.05n  
**OBS USED:** 3566 / 3644 : 98%

**ANT NAME:** TRN33429.00+GP  
**FIXED AHB:** 19 / 26 : 73%

**ARP HEIGHT:** 2.0  
**OVERALL RNS:** 0.026(m)

**REF FRAME:** NAD_83(CORS96)(EPOCH:2002.0000)  
**ITRF00 (EPOCH:2005.5692)**

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<tr>
<td>E LON</td>
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<td>0.073(m)</td>
<td>282 0 13.91292</td>
<td>0.073(m)</td>
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<td>W LON</td>
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<td>0.073(m)</td>
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<tr>
<td>EL HGT</td>
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<td>0.060(m)</td>
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<tr>
<td>ORTHO HGT</td>
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<td>0.065(m)</td>
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**BASE STATIONS USED**

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<th>LONGITUDE</th>
<th>DISTANCE(m)</th>
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<td>W0784840.339</td>
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<td>WASR WASHINGTON CORS ARP</td>
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**REMOTE STATION INFORMATION**

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**BASELINE NAME:** ncrd 4082

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**BASELINE NAME:** wasr 4082

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REMOTE STATION INFORMATION

BASELINE NAME: ncll 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 -8.9531 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 -8.8315 NEW L1 PHS CEN @ 2005.5692
LLH 34 50 38.01461 282 0 13.91172 -8.8893 NEW ARP @ 2005.5692
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 !!
• 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
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
NORMIALIZED 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

<table>
<thead>
<tr>
<th>PID</th>
<th>DESIGNATION</th>
<th>LATITUDE</th>
<th>LONGITUDE</th>
<th>DISTANCE(m)</th>
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<tbody>
<tr>
<td>DH5853</td>
<td>NCUS WINSTON SALEM CORS ARP</td>
<td>N360415.678</td>
<td>W0801337.750</td>
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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

\[ H_{z\text{Accuracy}} = \sqrt{(\text{latitude peak to peak})^2 + (\text{longitude peak to peak})^2} \]

• Vertical positional accuracy calculation at 95% confidence

\[ V_{\text{ert\text{Accuracy}}} = \text{height peak to peak value} \]
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: \[ \text{RMSE}_{\text{lat}} = \text{RMSE}_{\text{long}} \]  
  \[
  \text{Horizontal accuracy} = 1.7308 \times \text{RMSE}
  \]

  #2. if: \[ 0.2 < \frac{\text{RMSE}_{\text{smaller}}}{\text{RMSE}_{\text{larger}}} < 1.0 \]  
  \[
  \text{Horizontal accuracy} = 2.4477 \times 0.5(\text{RMSE}_{\text{lat}} + \text{RMSE}_{\text{long}})
  \]
OPUS reports Root Mean Square Error (RMSE) results at 1 sigma (68%).

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

  \[
  \text{Vertical accuracy} = 1.96 \times (\text{RMSE}_{\text{orthometric height}})
  \]
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.

<table>
<thead>
<tr>
<th>New Frames</th>
<th>Previous Frames</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGS08</td>
<td>ITRF00</td>
</tr>
<tr>
<td>Epoch 2005.00</td>
<td>Epoch 1997.00</td>
</tr>
<tr>
<td>NAD 83(2011)</td>
<td>NAD 83(CORS96)</td>
</tr>
<tr>
<td>Epoch 2010.00</td>
<td>Epoch 2002.00</td>
</tr>
<tr>
<td>NAD 83(MA11)</td>
<td>NAD 83(MARP00)</td>
</tr>
<tr>
<td>Epoch 2010.00</td>
<td>Epoch 2002.00</td>
</tr>
<tr>
<td>NAD 83(PA11)</td>
<td>NAD 83(PACP00)</td>
</tr>
<tr>
<td>Epoch 2010.00</td>
<td>Epoch 2002.00</td>
</tr>
</tbody>
</table>

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.

Choose 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±2.24 cm 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.
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

<table>
<thead>
<tr>
<th>PID</th>
<th>Designation</th>
<th>County, State</th>
<th>Submitter</th>
<th>Load Date</th>
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</thead>
<tbody>
<tr>
<td>BBBB54</td>
<td>FAIR</td>
<td>Hyde County,NC</td>
<td><a href="mailto:scott.lokken@noaa.gov">scott.lokken@noaa.gov</a></td>
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<tr>
<td>BBBF93</td>
<td>DENNIS</td>
<td>Johnston County,NC</td>
<td><a href="mailto:scott.lokken@noaa.gov">scott.lokken@noaa.gov</a></td>
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<tr>
<td>BBBG02</td>
<td>LEE</td>
<td>Johnston County,NC</td>
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<tr>
<td>BBBX84</td>
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<td><a href="mailto:scott.lokken@noaa.gov">scott.lokken@noaa.gov</a></td>
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</table>

Retrieve Solutions via Email Address:

* 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.
**SURVEY DATASHEET (Version 1.0)**

**PID:** BBBX37  
**Designation:** ALBE  
**Stamping:** ALBE 1998  
**Stability:** May be subject to ground movement  
**Setting:** Set in top of concrete monument  
**Description:** To reach from the intersection of US 17 East and US 17 Bypass in Elizabeth City, go N on bypass for 1.8 mi to the intersection with the College of the Albemarle and the station is in the grass yard in front of buildings B and C and on an extended sidewalk between the buildings. Located 45.65 m WNW of a fire hydrant, 39.01 m WSW of the NW corner of building B, 39.01 m SW of the SW corner of building C, 34.25 m S of a flag pole, 27.25 m WNW of a magnolia tree, and 26.00 m SW of the road curb.  
**Observed:** 2009-05-07T14:05:00Z  
**Source:** OPUS - page 3 05/10/03

**REF_FRAME:**  
**NAD_83(COES96)**  
**SOURCE:**  
**NAVD88 (Computed using:**  
**GEOD09)**  
**EPOCH:**  
**2002.0000**  
**UNITS:**  
**m**  
**SET PROFILE DETAILS**  
**UTM 18**  
**SPC:** 3200(NC)  
**NORTHING:** 400675.33 ft 2891.43 ft 2891.82 ft  
**EASTING:** 390413.62 ft 3912.22 ft 3912.50 ft  
**CONVERGENCE:** 0.7232 ft 4.60 ft 0.00 ft  
**POINT SCALE:** 0.5997 ft 1.00 ft 0.00 ft  
**COMBINED FACTOR:** 0.5997 ft 1.00 ft 0.00 ft

**LAT:** 36° 19' 29.59469' ± 0.006 m  
**LON:** 76° 13' 15.24573' ± 0.025 m  
**ELL HT:** -35.49 ft ± 0.037 m  
**X:** 122539.886 ± 0.034 m  
**Y:** -296639.733 ± 0.039 m  
**Z:** 3157275.610 ± 0.017 m  
**ORTHO HT:** 1.972 ± 0.040 m

**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

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

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

for data file: bsk342n.100

* Stamping: BUCKY 2010
* Designation: BUCKY 2010
* Type: D - Disk
* Setting: 7 = Set in top of concrete monument

Specific setting (optional): [426]

* Description: 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 NC303/NC304.

* Close-up photo: C:\a\opusProjects\DOTbridge\photos\buck-1.JF
* Horizon photo: C:\a\opusProjects\DOTbridge\photos\buck-3rnw.JF

Stability: B = Monument will probably hold position well
Magnetic: I = Marker is a steel rod
Application: Choose Special Application
Antenna SN: 123456
Model: 57971.00
Receiver SN: 654321
Firmware: 4.0

Upload Description  Abort
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?