Angela Boyea

From: opus [opus@NGS.NOAA.GOV]
Sent: Tuesday, April 05, 2011 11:29 AM
To: Angela Boyea
Subject: OPUS solution : 15630890.DAT 000195173

FILE: 15630890.DAT 000195173

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: angela.boyea@towill.com DATE: April 05, 2011
RINEX FILE: 1563089p.11o TIME: 18:29:08 UTC

SOFTWARE: page5 1009.28 master40.pl 121510 START: 2011/03/30 15:05:00
EPHEMERIS: igr16293.eph [rapid] STOP: 2011/03/30 19:10:00
NAV FILE: brdc0890.11n OBS USED: 11147 / 11442 : 97%
ANT NAME: TRM14532.10 NONE # FIXED AMB: 50 / 56 : 89%
ARP HEIGHT: 2 OVERALL RMS: 0.010(m)

REF FRAME:	NAD_83(CORS96)(EPOCH:2002.0000)		ITRF00 (EPOCH:2011.2430)	
X:	-2715621.411(m)	0.019(m)	-2715622.123(m)	0.019(m)
Y:	-3998850.716(m)	0.014(m)	-3998849.410(m)	0.014(m)
Z:	4147163.038(m)	0.026(m)	4147163.159(m)	0.026(m)
LAT:	40 49 6.19872	0.024(m)	40 49 6.21610	0.024(m)
E LON:	235 49 10.39961	0.023(m)	235 49 10.34317	0.023(m)
W LON:	124 10 49.60039	0.023(m)	124 10 49.65683	0.023(m)
EL HGT:	-27.499(m)	0.013(m)	-27.935(m)	0.013(m)
ORTHO HGT:	3.194(m)	0.031(m)	[NAVD88 (Computed using GEOID09)]	

	UTM COORDINATES UTM (Zone 10)	STATE PLANE COORDINATES SPC (0401 CA 1)
Northing (Y) [meters]	4519267.167	667184.701
Easting (X) [meters]	400449.766	1816083.627
Convergence [degrees]	-0.77167680	-1.42575847
Point Scale	0.99972198	0.99989468
Combined Factor	0.99972629	0.99989899

US NATIONAL GRID DESIGNATOR: 10TDL0044919267(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DH3867	P162 TABLEBLUFFCN2004 CORS ARP	N404127.922	W1241413.276	14921.9
AJ6965	TRND TRINIDAD HEAD CORS ARP	N410313.972	W1240903.065	26270.9
DG8511	P169 FICKLEHILLCN2004 CORS ARP	N404728.104	W1235803.494	18225.5

NEAREST NGS PUBLISHED CONTROL POINT

LV0786	SAMOA HAMMOND REDWOOD CO STACK	N404907.167	W1241051.267	49.2

BASE STATION INFORMATION

```
STATION NAME: p162  a    3 (RedwoodsCCCN2004; Loleta, CA  United States)
 MONUMENT: NO DOMES NUMBER
XYZ  -2724770.6993  -4003808.8804   4136468.6269  MON @ 1997.0000 (M)
XYZ        -0.0040         0.0082         0.0053  VEL (M/YR)
NEU        -0.0000         0.0000         0.0083  MON TO ARP (M)
NEU         0.0015         0.0004         0.0880  ARP TO L1 PHASE CENTER (M)
NEU         0.0001         0.0011         0.1172  ARP TO L2 PHASE CENTER (M)
XYZ        -0.0570         0.1168         0.0755  VEL TIMES 14.2418 YRS
XYZ        -0.0035        -0.0052         0.0054  MON TO ARP
XYZ        -0.0366        -0.0546         0.0585  ARP TO L1 PHASE CENTER
XYZ  -2724770.7964  -4003808.8234   4136468.7663  L1 PHS CEN @ 2011.2430
XYZ        -0.0000         0.0000         0.0000  + XYZ ADJUSTMENTS
XYZ  -2724770.7964  -4003808.8234   4136468.7663  NEW L1 PHS CEN @ 2011.2430
XYZ  -2724770.7598  -4003808.7688   4136468.7078  NEW ARP @ 2011.2430
XYZ  -2724770.7562  -4003808.7636   4136468.7024  NEW MON @ 2011.2430
LLH  40 41 27.94038  235 45 46.66710     -6.3751  NEW L1 PHS CEN @ 2011.2430
LLH  40 41 27.94033  235 45 46.66708     -6.4632  NEW ARP @ 2011.2430
LLH  40 41 27.94033  235 45 46.66708     -6.4715  NEW MON @ 2011.2430

STATION NAME: trnd  a    5 (TRND_PNGA_CN1999; Trinidad Head, CA  USA)
          WARNING: ORIGINALLY "TRM29659.00     UNAV"
XYZ  -2703981.9441  -3986137.3182   4166989.0528  MON @ 1997.0000 (M)
XYZ        -0.0050         0.0050         0.0015  VEL (M/YR)
NEU        -0.0000         0.0000         0.0796  MON TO ARP (M)
NEU        -0.0001        -0.0009         0.0920  ARP TO L1 PHASE CENTER (M)
NEU        -0.0002         0.0002         0.1205  ARP TO L2 PHASE CENTER (M)
XYZ        -0.0712         0.0712         0.0214  VEL TIMES 14.2418 YRS
XYZ        -0.0337        -0.0497         0.0523  MON TO ARP
XYZ        -0.0397        -0.0569         0.0603  ARP TO L1 PHASE CENTER
XYZ  -2703982.0887  -3986137.3536   4166989.1868  L1 PHS CEN @ 2011.2430
XYZ        -0.0000         0.0000         0.0000  + XYZ ADJUSTMENTS
XYZ  -2703982.0887  -3986137.3536   4166989.1868  NEW L1 PHS CEN @ 2011.2430
XYZ  -2703982.0490  -3986137.2967   4166989.1265  NEW ARP @ 2011.2430
XYZ  -2703982.0153  -3986137.2470   4166989.0742  NEW MON @ 2011.2430
LLH  41  3 13.98932  235 50 56.87854     78.3336  NEW L1 PHS CEN @ 2011.2430
LLH  41  3 13.98932  235 50 56.87858     78.2416  NEW ARP @ 2011.2430
LLH  41  3 13.98932  235 50 56.87858     78.1620  NEW MON @ 2011.2430

STATION NAME: p169  a    3 (FickleHillCN2004; Arcata, CA  United States)
 MONUMENT: NO DOMES NUMBER
XYZ  -2702159.0996  -4010998.5993   4145341.2697  MON @ 1997.0000 (M)
XYZ        -0.0077         0.0066         0.0014  VEL (M/YR)
NEU        -0.0000         0.0000         0.0083  MON TO ARP (M)
NEU         0.0015         0.0004         0.0880  ARP TO L1 PHASE CENTER (M)
NEU         0.0001         0.0011         0.1172  ARP TO L2 PHASE CENTER (M)
XYZ        -0.1097         0.0940         0.0199  VEL TIMES 14.2418 YRS
XYZ        -0.0035        -0.0052         0.0054  MON TO ARP
XYZ        -0.0363        -0.0547         0.0587  ARP TO L1 PHASE CENTER
XYZ  -2702159.2491  -4010998.5652   4145341.3537  L1 PHS CEN @ 2011.2430
XYZ        -0.0000        -0.0000        -0.0000  + XYZ ADJUSTMENTS
XYZ  -2702159.2491  -4010998.5652   4145341.3537  NEW L1 PHS CEN @ 2011.2430
XYZ  -2702159.2128  -4010998.5105   4145341.2950  NEW ARP @ 2011.2430
XYZ  -2702159.2093  -4010998.5053   4145341.2896  NEW MON @ 2011.2430
LLH  40 47 28.12038  236  1 56.44924    689.4578  NEW L1 PHS CEN @ 2011.2430
LLH  40 47 28.12033  236  1 56.44922    689.3697  NEW ARP @ 2011.2430
LLH  40 47 28.12033  236  1 56.44922    689.3614  NEW MON @ 2011.2430

                        REMOTE STATION INFORMATION

STATION NAME: 1563       1
 MONUMENT: NO DOMES NUMBER
XYZ  -2715622.9611  -3998850.6089   4147164.4382  MON @ 2011.2428 (M)
NEU         0.0010        -0.0004         2.0000  MON TO ARP (M)
NEU        -0.0010         0.0004         0.0772  ARP TO L1 PHASE CENTER (M)
NEU         0.0015         0.0035         0.0865  ARP TO L2 PHASE CENTER (M)
```

```
 XYZ        -0.8503        -1.2513         1.3081  MON TO ARP
 XYZ        -0.0328        -0.0491         0.0497  ARP TO L1 PHASE CENTER
 XYZ  -2715623.8442  -3998851.9094   4147165.7960  L1 PHS CEN @ 2011.2430

 BASELINE NAME:   p162  1563
 XYZ         0.8259         1.2057        -1.2936  + XYZ ADJUSTMENTS
 XYZ  -2715623.0183  -3998850.7036   4147164.5024  NEW L1 PHS CEN @ 2011.2430
 XYZ  -2715622.9855  -3998850.6545   4147164.4526  NEW ARP @ 2011.2430
 XYZ  -2715622.1352  -3998849.4032   4147163.1446  NEW MON @ 2011.2430
 LLH  40 49  6.21572  235 49 10.34257    -25.8661  NEW L1 PHS CEN @ 2011.2430
 LLH  40 49  6.21575  235 49 10.34256    -25.9434  NEW ARP @ 2011.2430
 LLH  40 49  6.21572  235 49 10.34257    -27.9433  NEW MON @ 2011.2430

 BASELINE NAME:   trnd  1563
 XYZ         0.8439         1.1921        -1.2776  + XYZ ADJUSTMENTS
 XYZ  -2715623.0003  -3998850.7173   4147164.5184  NEW L1 PHS CEN @ 2011.2430
 XYZ  -2715622.9675  -3998850.6681   4147164.4687  NEW ARP @ 2011.2430
 XYZ  -2715622.1172  -3998849.4168   4147163.1606  NEW MON @ 2011.2430
 LLH  40 49  6.21609  235 49 10.34354    -25.8548  NEW L1 PHS CEN @ 2011.2430
 LLH  40 49  6.21612  235 49 10.34352    -25.9320  NEW ARP @ 2011.2430
 LLH  40 49  6.21609  235 49 10.34354    -27.9320  NEW MON @ 2011.2430

 BASELINE NAME:   p169  1563
 XYZ         0.8453         1.1997        -1.2671  + XYZ ADJUSTMENTS
 XYZ  -2715622.9989  -3998850.7096   4147164.5289  NEW L1 PHS CEN @ 2011.2430
 XYZ  -2715622.9661  -3998850.6605   4147164.4791  NEW ARP @ 2011.2430
 XYZ  -2715622.1158  -3998849.4092   4147163.1711  NEW MON @ 2011.2430
 LLH  40 49  6.21650  235 49 10.34340    -25.8533  NEW L1 PHS CEN @ 2011.2430
 LLH  40 49  6.21653  235 49 10.34338    -25.9305  NEW ARP @ 2011.2430
 LLH  40 49  6.21650  235 49 10.34340    -27.9305  NEW MON @ 2011.2430
```

G-FILES

```
Axx2011 330  11 330
B2011 33015 4  11 3301910 1 page5 v1009.28IGS     126 1 2 27NGS   2011 4 5IFDDPX
IIGS05_1627          IGS   20110313
C00090001  -91486211   19  -49593605   17 -106944422   21 X0891A1563X0891AP162
D  1  2  8644232  1  3  1451257  2  3 -1587015

Axx2011 330  11 330
B2011 33015 4  11 3301910 1 page5 v1009.28IGS     126 1 2 27NGS   2011 4 5IFDDPX
IIGS05_1627          IGS   20110313
C00090002  116401019   19  127121698   23  198259136   25 X0891A1563X0891ATRND
D  1  2  9483200  1  3   743159  2  3   546990

Axx2011 330  11 330
B2011 33015 4  11 3301910 1 page5 v1009.28IGS     126 1 2 27NGS   2011 4 5IFDDPX
IIGS05_1627          IGS   20110313
C00090003  134629065   24 -121490961   20  -18218815   18 X0891A1563X0891AP169
D  1  2  -512402  1  3 -7423598  2  3 -4320012
```

POST-FIT RMS BY SATELLITE VS. BASELINE

```
            OVERALL     03     06     09     11     14     15     16     18
 p162-1563|  0.009  0.008  0.007  0.013  0.010  0.008  0.009  0.014  0.008
                19     21     22     24     26     27     29     30     31
 p162-1563|  0.006  0.009    ...  0.010    ...  0.016  0.021  0.017  0.012
                32
 p162-1563|  0.014

            OVERALL     03     06     09     11     14     15     16     18
 trnd-1563|  0.011  0.009  0.007  0.014  0.013  0.008  0.009  0.017  0.009
                19     21     22     24     26     27     29     30     31
 trnd-1563|  0.009  0.009    ...  0.016    ...  0.021  0.023  0.016  0.013
                32
 trnd-1563|  0.020
```

```
           OVERALL     03     06     09     11     14     15     16     18
p169-1563|  0.010  0.008  0.009  0.015  0.011  0.008  0.009  0.013  0.008
              19     21     22     24     26     27     29     30     31
p169-1563|  0.007  0.009    ...  0.014    ...  0.022  0.017  0.014  0.018
              32
p169-1563|  0.021
```

OBS BY SATELLITE VS. BASELINE

```
           OVERALL     03     06     09     11     14     15     16     18
p162-1563|   3733    464    423    207    151    389    223    155    489
              19     21     22     24     26     27     29     30     31
p162-1563|    386    340    ...    110    ...     85     86     88     58
              32
p162-1563|     79
           OVERALL     03     06     09     11     14     15     16     18
trnd-1563|   3705    463    423    207    150    378    223    148    488
              19     21     22     24     26     27     29     30     31
trnd-1563|    386    327    ...    110    ...     91     86     88     58
              32
trnd-1563|     79
           OVERALL     03     06     09     11     14     15     16     18
p169-1563|   3709    464    423    207    152    382    223    149    480
              19     21     22     24     26     27     29     30     31
p169-1563|    386    337    ...    110    ...     82     82     95     58
              32
p169-1563|     79
```

Covariance Matrix for the xyz OPUS Position (meters^2).

```
   0.0000028844     0.0000001487    -0.0000000506
   0.0000001487     0.0000027067    -0.0000000402
  -0.0000000506    -0.0000000402     0.0000030889
```

Covariance Matrix for the enu OPUS Position (meters^2).

```
   0.0000026901     0.0000000749    -0.0000001169
   0.0000000749     0.0000029483     0.0000001022
  -0.0000001169     0.0000001022     0.0000030416
```

Horizontal network accuracy = 0.00411 meters.
Vertical network accuracy = 0.00342 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)	
P162	-2724770.05621	-4003810.07201	4136468.57338	2002.00
TRND	-2703981.33594	-3986138.56768	4166989.02549	2002.00
P169	-2702158.47909	-4010999.79700	4145341.19940	2002.00

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

	Xr(m)	Yr(m)	Zr(m)	
P162	-2724770.05271	-4003810.06681	4136468.56798	2002.00
TRND	-2703981.30224	-3986138.51798	4166988.97319	2002.00
P169	-2702158.47559	-4010999.79180	4145341.19400	2002.00

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

	Vx (m/yr)	Vy (m/yr)	Vz (m/yr)
P162	0.01340	0.00890	0.01630
TRND	0.01250	0.00570	0.01240
P169	0.00600	0.00810	0.01160

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)	
P162	-9148.64171	-4959.35081	-10694.47002	2002.00
TRND	11640.10876	12712.19802	19825.93519	2002.00
P169	13462.93541	-12149.07580	-1821.84400	2002.00

STATE PLANE COORDINATES - U.S. Survey Foot
SPC (0401 CA 1)

Northing (Y)	[feet]	2188921.805
Easting (X)	[feet]	5958267.701
Convergence	[degrees]	-1.42575847
Point Scale		0.99989468
Combined Factor		0.99989899

** Orthometric Heights Above Future Geopotential Datum.

Prototype orthometric heights are now being made available as a precursor to the completion of GRAV-D and the replacement of NAVD 88 with a new geopotential reference system. The following height reflects the current best estimate of the true orthometric height, based on the existing gravimetric geoid model. This height is subject to change as data and modeling for the gravimetric geoid change throughout the lifetime of the GRAV-D project, or as new realizations of the ITRF are adopted. However, at the completion of GRAV-D, these heights will supersede the NAVD 88 heights

APPROX ORTHO HGT: 2.143 (m) [PROTOTYPE (Computed using USGG2009,GRS80,ITRF2000)]

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.