



Oregon Real-time GNSS Network Update



**OGUG
Annual Meeting
15 June, 2018**



The Geodetic Group



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GNSS and Coordinate System Support

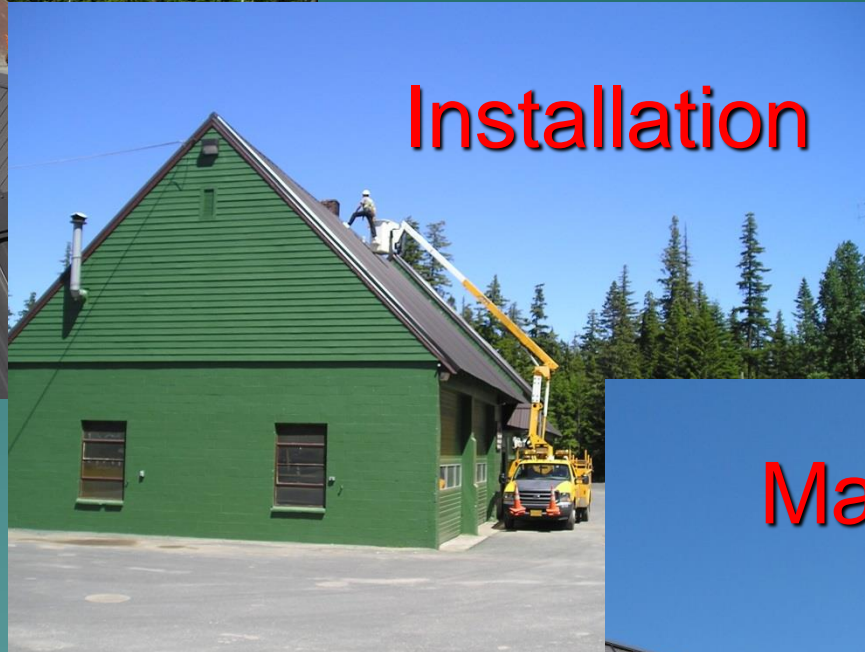


Recon



Support

Installation

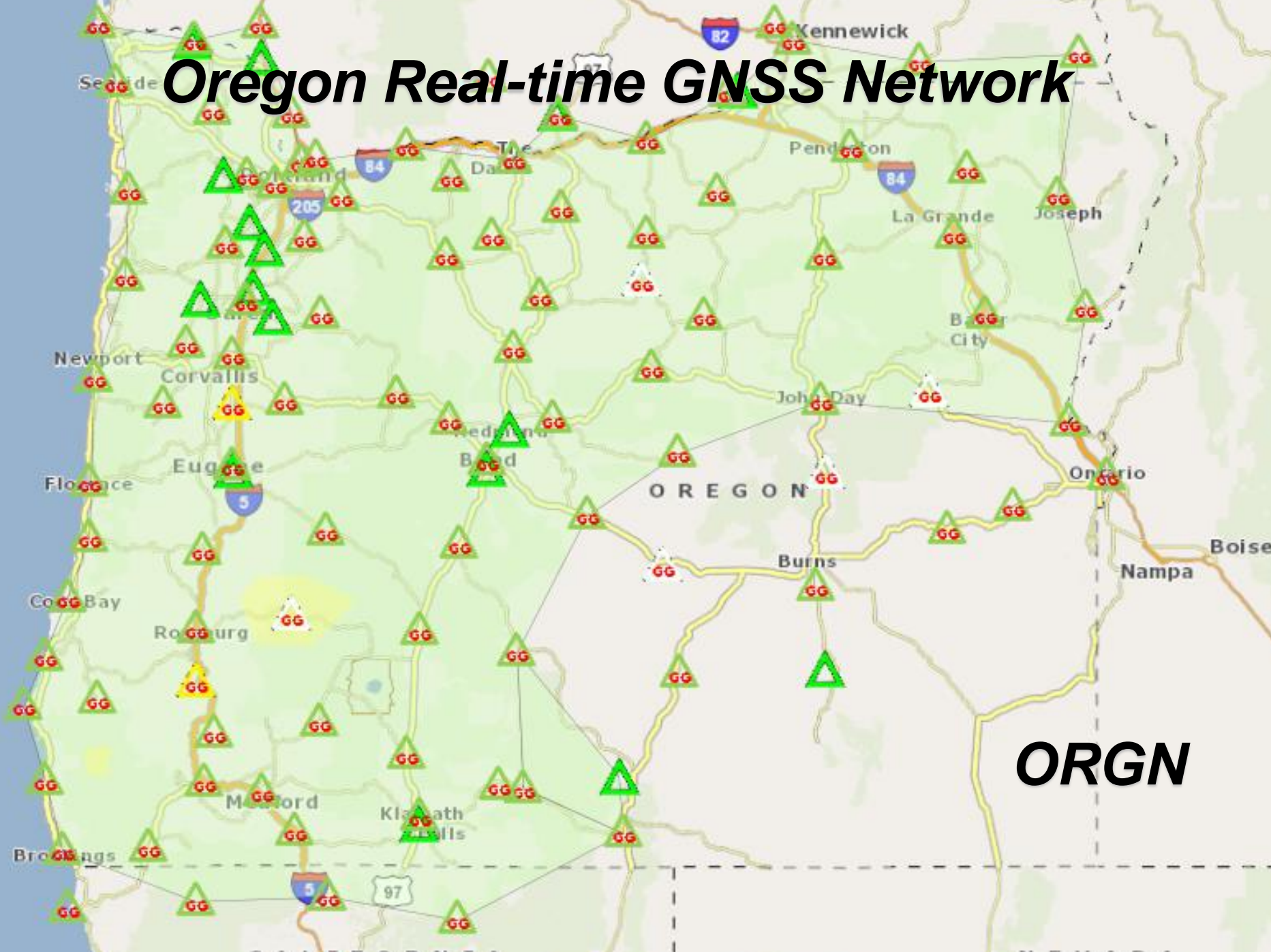


Maintenance

Monitoring



Oregon Real-time GNSS Network





ORGN Facts

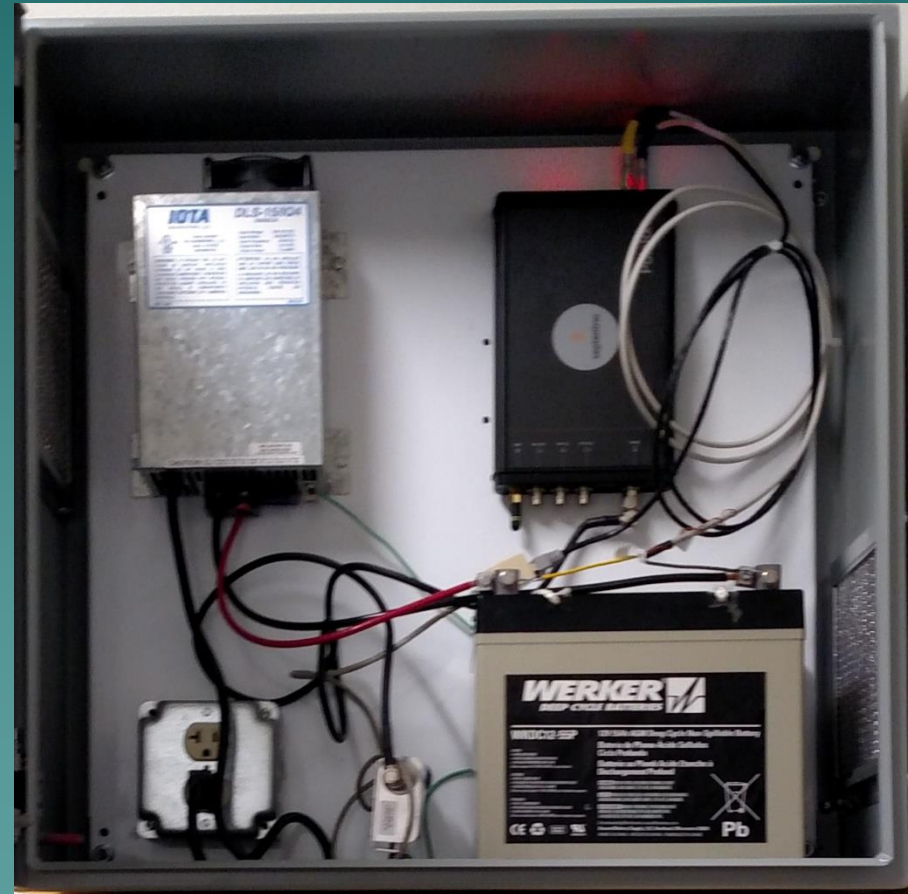
- ◆ How many Stations in the ORGN network?
 - 110 Stations (39 ODOT Owned)
 - 96 In the Network
 - 14 Redundant
 - 6 Planned
- ◆ How many ORGN stations are NGS CORS?
 - 22 CORs
 - 16 in the Network
 - 6 Redundant
- ◆ How many ORGN stations are GLONASS?
 - 93 Total
 - 88 in network



SEPTENTRIO

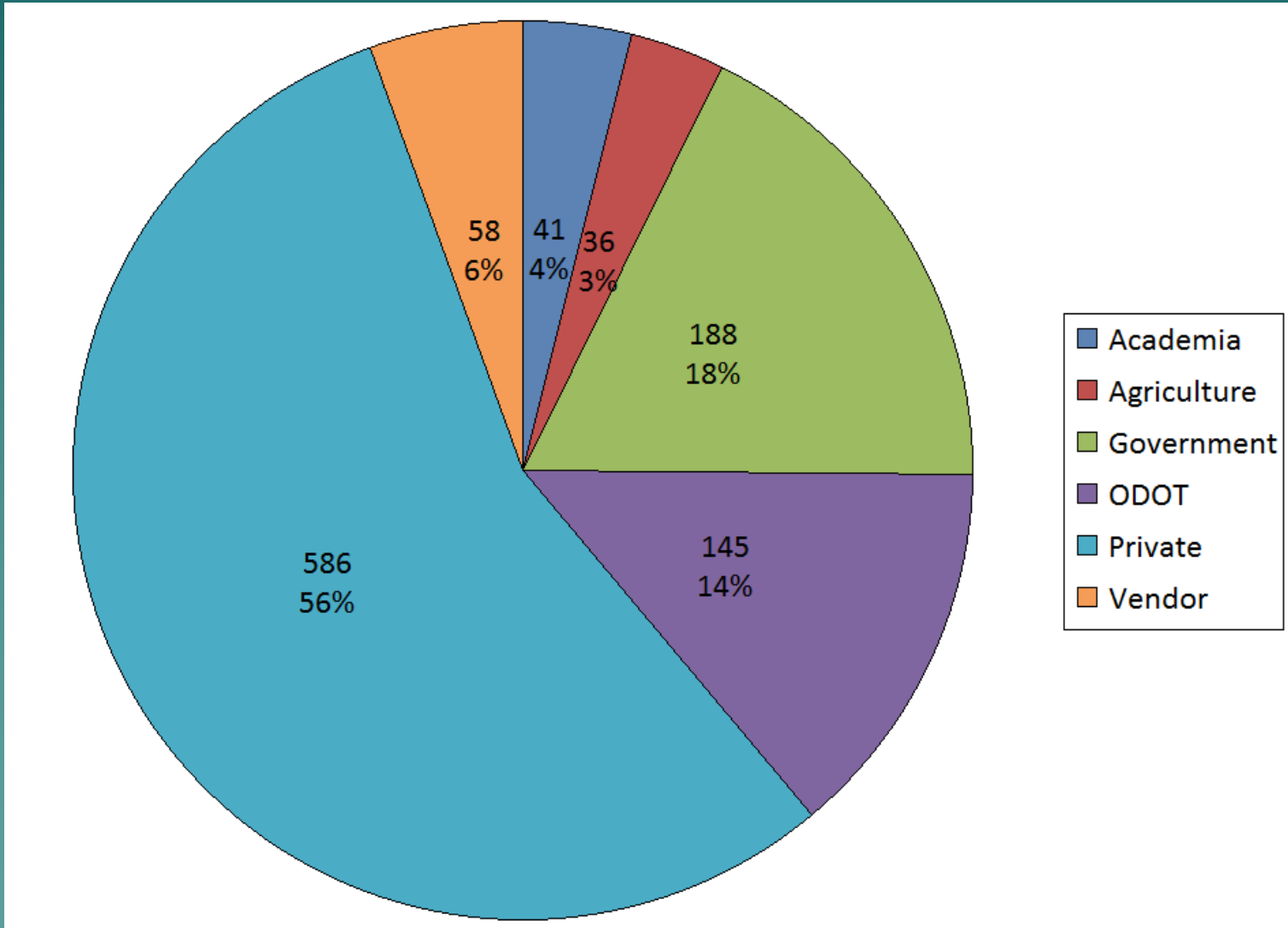
- 32 ODOT owned 19 provided to PBO (2017 MOU)
- Recent installs
 - Juntura
 - Ashland
 - Central Point
 - The Dalles
- 13 PBO owned
- 45 Total in the ORGN
- Plans for 5 additional each year







Over 1000 Rover Accounts





NTRIP Products

167.131.109.57

- ◆ Port 9879
 - All single-base correctors by name: both GPS-only and GG.
- ◆ Port 9881
 - Network (multi-base) & nearest-single-base correctors: all are GPS-only
- ◆ Port 9882
 - Network (multi-base) & nearest-single-base correctors: all are GG

Let the Geodetic Group know if we are missing any you need



The ORGN move to NATRF 2022

- ◆ The ORGN will change Realization from NAD83 2011 epoch 2010.00 within 6 months of NGS releasing NATRF2022
- ◆ The ORGN will be in line with the current National Spatial Reference System (NSRS)
- ◆ The ODOT will re-compute coordinates on all ORGN stations using OPUS Projects.
- ◆ Notifications will be made in advance concerning the date of the move to NATRF2022.



Geometronics Toolkit

- ◆ ORGN stations and coverage
- ◆ 39 OCRS zones distortion maps
- ◆ State Plane North and South distortion maps
- ◆ Oregon Lambert distortion map
- ◆ Coming Soon GPS on Benchmarks



GPS on BM

http://glistel.intranet.odot.state.or.us/geometronicsonline toolkit/

File Edit View Favorites Tools Help

Find: p018 Previous Next Options

Oregon Department of Transportation ODOT TransGIS

Navigation Analysis Benchmark Tools Hide Benchmark Benchmark Id Tool Show Benchmarks List Admin PLACE NAME SEARCH: <enter search text here>

Station ID: RA0889
 Designation: F 84
 Latitude: 45 34 12.0
 County: WALLOWA
 Priority: A
 Obs_Req: 2
 Datasheet: http://www.ngs.noaa.gov/cgi-bin/ds_mark.pri?PidBox=RA0889
 Status: A-None

0 117,407 feet Oregon Department of Transportation © 2009-2018 -117.3475° E, 45.5355° N 100%



Priority Marks

National Geodetic Survey
Positioning America for the Future

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

GPS on BM Links
Home
Recover
Observe
Report
2018 Web Map
Prioritized Marks
Training Resources
GPS on BM FAQ
GPS on BM One Pager

Related Links
GEOID18
NGS Data Explorer
DSWorld
OPUS Upload
Mark Recovery Form
Photo Submission

For geocachers:
Hunt for marks!
Bench Mark Hunting




Prioritized Marks

Currently there are over 400,000 bench marks across the Conterminous United States (CONUS), Alaska, Hawaii and U.S. territories. Tidal marks and bench marks are used for determining heights and when possible providing GPS on these marks can help to relate the GPS derived ellipsoid height with the leveling derived orthometric height associated with these marks.

NGS will create models and tools that cover the nation using the data we have. The information provided on this page will enable local users to collect and submit data that will improve the accuracy of those products in their local regions.

Over the past year NGS has analyzed the leveling and GPS data we have on bench marks to determine where additional data would be most helpful in creating the next hybrid geoid model, GEOID18 and the transformation tools that will be produced with NAPGD2022. This rigorous analysis examined the ellipsoid-orthometric-geoid relationship at over 30,000 individual bench mark as well as the patterns in that relationship over broad regions. A prioritized list of bench marks where additional GPS data would be most helpful has been generated from that analysis and is available to download below.

Download Prioritized Marks
A listing of prioritized marks has been generated and is downloadable in various formats (.xls; .kmz; and .shp). There are approximately 6100 benchmarks in this listing. Click the icons to the right to download the files.

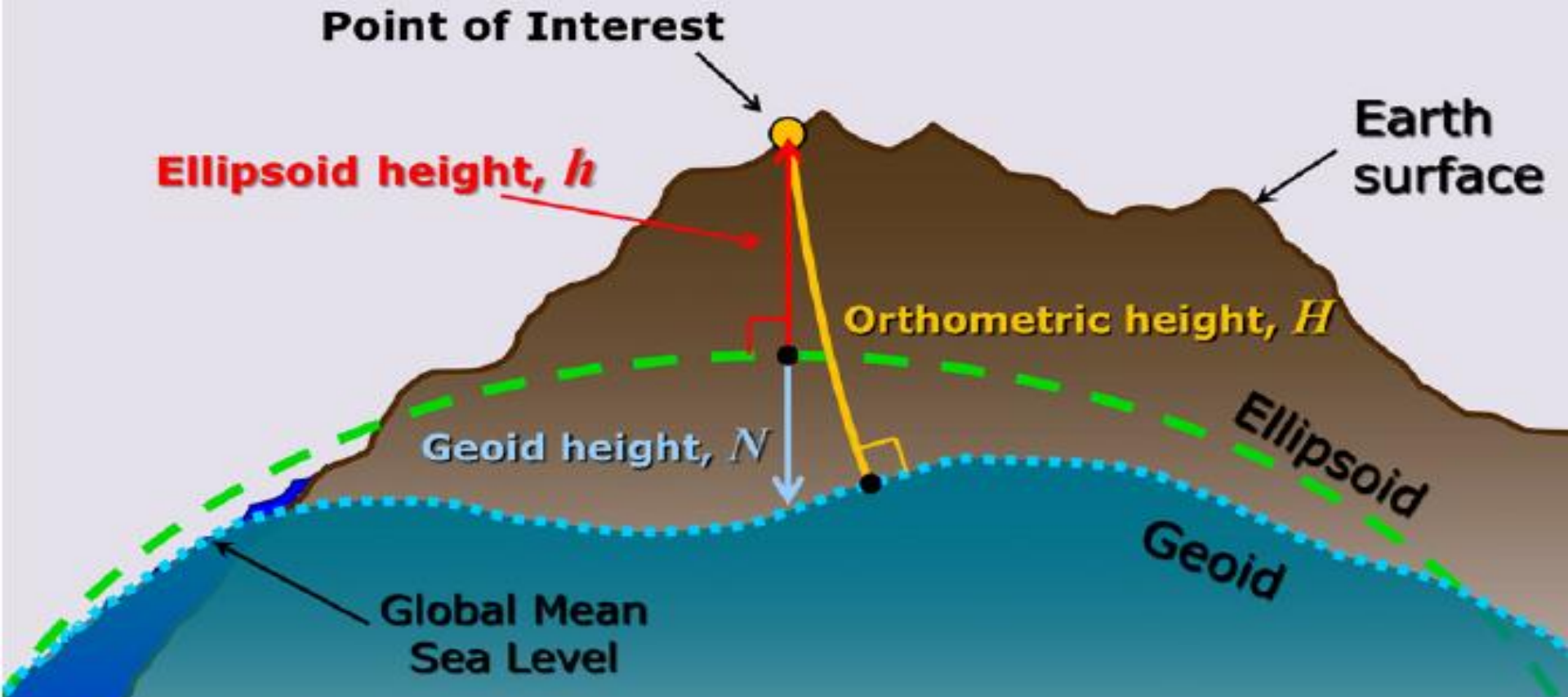
  

Priorities A and B
The marks in the list are coded as either Priority A or B and both A and B priority marks will help improve the development of GEOID18 as well as support development of the transformation tool for NAPGD2022. Here is more information about the differentiation between the two priorities.

- <https://geodesy.noaa.gov/GPSonBM/prioritize.shtml>



$$H \approx h - N$$



Note: Geoid height is **negative** everywhere in the coterminous US (but it is **positive** in most of Alaska)



Current Geoid 12A Accuracy Estimate



GEOID12A accuracy estimate (95% confidence)



GPS on BM

- Data submitted to NGS by August 31st, 2018 will be used to support the GEOID18 model
- Data will be used to support the development of the 2022 Transformation tool
- Includes data collected before and after August 31st, 2018





The NGS Data Sheet

See file [dsdata.pdf](#) for more information about the datasheet.

PROGRAM = datasheet95, VERSION = 8.12.4
 1 National Geodetic Survey, Retrieval Date = MARCH 8, 2018
 PA0587 *****
 PA0587 DESIGNATION - E 699
 PA0587 PID - PA0587
 PA0587 STATE/COUNTY- OR/HARNEY
 PA0587 COUNTRY - US
 PA0587 USGS QUAD - NEW PRINCETON (1990)
 PA0587
 PA0587 *CURRENT SURVEY CONTROL
 PA0587
 PA0587* NAD 83(1986) POSITION- 43 15 45.54 (N) 118 33 17.12 (W) HD_HELDD1
 PA0587* NAVD 88 ORTHO HEIGHT - 1255.946 (meters) 4120.55 (feet) ADJUSTED
 PA0587
 PA0587 GEOID HEIGHT - -18.844 (meters) GEOID12B
 PA0587 DYNAMIC HEIGHT - 1255.314 (meters) 4118.48 (feet) COMP
 PA0587 MODELED GRAVITY - 980,073.3 (mgal) NAVD 88
 PA0587
 PA0587 VERT ORDER - FIRST CLASS II
 PA0587
 PA0587.The horizontal coordinates were determined by differentially corrected
 PA0587.hand held GPS observations or other comparable positioning techniques
 PA0587.and have an estimated accuracy of +/- 3 meters.
 PA0587.
 PA0587.The orthometric height was determined by differential leveling and
 PA0587.adjusted by the NATIONAL GEODETIC SURVEY
 PA0587.in June 1991.
 PA0587
 PA0587.Significant digits in the geoid height do not necessarily reflect accuracy.
 PA0587.GEOID12B height accuracy estimate available [here](#).
 PA0587
 PA0587.The dynamic height is computed by dividing the NAVD 88
 PA0587.geopotential number by the normal gravity value computed on the
 PA0587.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 PA0587.degrees latitude (g = 980.6199 gals.).
 PA0587
 PA0587.The modeled gravity was interpolated from observed gravity values.
 PA0587
 PA0587:

	North	East	Units	Estimated Accuracy
PA0587:SPC OR S	- 179,119.8	1,657,909.2	MT	(+/- 3 meters HH1 GPS)

 PA0587
 PA0587 U.S. NATIONAL GRID SPATIAL ADDRESS: 11TLH7381491155(NAD 83)
 PA0587
 PA0587 SUPERSEDED SURVEY CONTROL
 PA0587
 PA0587.No superseded survey control is available for this station.
 PA0587
 PA0587 MARKER: DB = BENCH MARK DISK
 PA0587_SETTING: 66 = SET IN ROCK OUTCROP

Shared Solution

PID: PA0587
 Designation: E 699
 Stamping: E 699 1984
 Stability: Most reliable; expected to hold position well
 Setting: In rock outcrop or ledge
 Mark G
 Condition:
 Description: Mark found in good condition as described in the IDB datasheet and suitable for GNSS. A short part of a Carsonite post is concreted into the same boulder as the mark.
 Observed: 2015-08-24T18:57:00Z [See Also 1984](#)
 Source: OPUS - page5 1209.04



Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12B)	UNITS: m	SET PROFILE	DETAILS
LAT: 43° 15' 45.54475" ± 0.006 m		UTM 11 SPC 3602(OR S)			
LON: -118° 33' 17.12400" ± 0.006 m		NORTHING: 4791155.950m 179119.914m			
ELL HT: 1237.133 ± 0.024 m		EASTING: 373814.496m 1657909.101m			
X: -2224081.266 ± 0.015 m		CONVERGENCE: -1.06568304° 1.33083309°			
Y: -4086928.989 ± 0.015 m		POINT SCALE: 0.99979587 0.99989595			
Z: 4349644.341 ± 0.013 m		COMBINED FACTOR: 0.99960194 0.99970200			
ORTHO HT: 1255.977 ± 0.043 m					

CONTRIBUTED BY

[mark.l.armstrong](#)
 National Geodetic Survey

Horizon View

Map Satellite

E 699

Get directions: [To here](#) (nearest road)

Princeton Spur Rd

Google

Map data ©2018 Google Terms of Use Report a map error

The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified the



Observation

- 1 close up photo
- 1 horizon photo while observing, facing south
- Fixed height tripod is recommended
- Update description as needed
- 4 hour sessions
- Field log forms are available





The OCRS move to NATRF 2022

ODOT's recommendations for all legislated coordinate systems.

OAR 734-005-0015

Coordinate System Parameters

(b) South Zone

North American Datum of 1927

Reference Ellipsoid: **Clarke Spheroid of 1866**

Projection: Lambert Conformal Conic (Two Standard Parallel - Secant)

Central Meridian: 120° 30' West

Latitude of Origin: 41° 40' North

Standard Parallel (South): 42° 20' North

Standard Parallel (North): 44° 00' North

False Northing: 0 US Survey Feet

False Easting: **2 000 000 US Survey Feet**

One U.S. Survey foot = 1200/3937 meters exactly

County Coverage of South Zone:

The area included in the following counties on June 16, 1945, constitutes the south zone: Coos, Crook, Curry, Deschutes, Douglas, Harney, Jackson, Josephine, Klamath, Lake, Lane and Malheur.



NAD 83

OAR 734-005-0015

Coordinate System Parameters

(b) South Zone

North American Datum of 1983

Reference Ellipsoid: **Geodetic Reference System of 1980**

Projection: Lambert Conformal Conic (Two Standard Parallel - Secant)

Central Meridian: 120° 30' West

Latitude of Origin: 41° 40' North

Standard Parallel (South): 42° 20' North

Standard Parallel (North): 44° 00' North

False Northing: 0.000 meters

False Easting: **1 500 000.000 meters**

One International Foot = 0.3048 meters exactly

County Coverage of South Zone:

The area included in the following counties on June 16, 1945, constitutes the south zone: Coos, Crook, Curry, Deschutes, Douglas, Harney, Jackson, Josephine, Klamath, Lake, Lane and Malheur.



NATRF 2022

OAR 734-005-0015

Coordinate System Parameters

(b) South Zone

North American Terrestrial Reference Frame 2022

Reference Ellipsoid: **Geodetic Reference System of 1980**

Projection: Lambert Conformal Conic (Two Standard Parallel - Secant)

Central Meridian: 120° 30' West

Latitude of Origin: 41° 40' North

Standard Parallel (South): 42° 20' North

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Legal Status of OCRS

- ◆ The Oregon Transportation Commission adopted new Oregon Administrative Rules (OARs) defining the Oregon Coordinate Systems (734-005-0005, 734-005-0010, 734-005-0015) on December 21, 2011, and the rule was filed with the Secretary of State on December 22, 2011. **The rule became effective January 1, 2012.**
- ◆ These rules implemented **Senate Bill 877**, passed in 2011, by moving all definitions of the existing Oregon State Plane Coordinate System from ORS Chapter 93 to ODOT's administrative rules and placing all definitions for the new Oregon Coordinate Reference System in the new OAR.
- ◆ **Senate Bill 877** also required that ODOT form an OAR Advisory Committee to approve the Administrative Rule.



- ◆ **SB877, Section 7 (3), required the Oregon DOT to appoint the following advisory committee members:**
 - ◆ Two members representing the Oregon Department of Transportation
 - ◆ Two members who are county surveyors in Oregon and members of the Oregon Association of County Engineers and Surveyors;
 - ◆ Two members representing professional surveyors in private practice in Oregon; and
 - ◆ One member representing the entity reorganized and renamed as the Oregon Geographic Information Council by Executive Order 94-16.
- ◆ **SB 877, Section 7 (4), requires that Administrative rules adopted or amended pursuant to Section 7 must be approved by a majority of the members of the advisory committee.**



OCRS Committee Members

- Joseph Thomas – Chairman (ODOT)
- Randy Oberg (ODOT)
- Bradley Cross, Hood River County Surveyor (OACES)
- Kevin Samuel, Deschutes Deputy County Surveyor (OACES)
- Tim Fassbender (PLSO)
- John Putnam (PLSO)
- Brady Callahan (OGIC)



Questions?

Oregon Real-time GNSS Network
www.theorgn.net



Oregon Department of Transportation





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