

# 2022 is Coming – Will You Be Ready? (or NAD83 and NAVD88 Are Going Away)

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NOAA's National Geodetic Survey

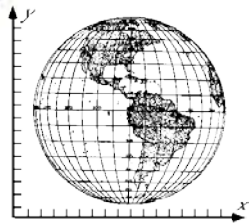


**UGIC • 2015**  
snowbird

# U.S. Department of Commerce National Oceanic & Atmospheric Administration National Geodetic Survey

**Mission:** To define, maintain & provide access to the  
National Spatial Reference System (NSRS)  
to meet our Nation's economic, social & environmental needs

## National Spatial Reference System



- Latitude
- Longitude
- Height
- Scale
- Gravity
- Orientation

& their time variations

- North American Datum 1983 (NAD83)
- North American Vertical Datum 1988 (NAVD88)

(& National Shoreline, etc.)

DESIGNATION - HENNA  
 PID - AI5806  
 STATE/COUNTY- UT/SALT LAKE  
 COUNTRY - US  
 USGS QUAD - DRAPER (1975)



# NAD 83(2011) epoch 2010.00

## \*CURRENT SURVEY CONTROL

NAD 83(2011) POSITION- 40 37 21.14423(N) 111 47 57.20194(W) ADJUSTED  
 NAD 83(2011) ELLIP HT- 1464.588 (meters) (06/27/12) ADJUSTED  
 NAD 83(2011) EPOCH - 2010.00  
 NAVD 88 ORTHO HEIGHT - 1481.1 (meters) 4859. (feet) GPS OBS

NAVD 88 orthometric height was determined with geoid model GEOID09  
 GEOID HEIGHT - -16.46 (meters) GEOID09  
 GEOID HEIGHT - -16.49 (meters) GEOID12B  
 NAD 83(2011) X - -1,800,738.064 (meters) COMP  
 NAD 83(2011) Y - -4,502,343.473 (meters) COMP  
 NAD 83(2011) Z - 4,131,651.220 (meters) COMP  
 LAPLACE CORR - 20.32 (seconds) DEFLEC12B

Network accuracy estimates per FGDC Geospatial Positioning Accuracy Standards:

	FGDC (95% conf, cm)		Standard deviation (cm)			CorrNE (unitless)
	Horiz	Ellip	SD_N	SD_E	SD_h	
NETWORK	0.62	1.37	0.28	0.22	0.70	-0.08326909

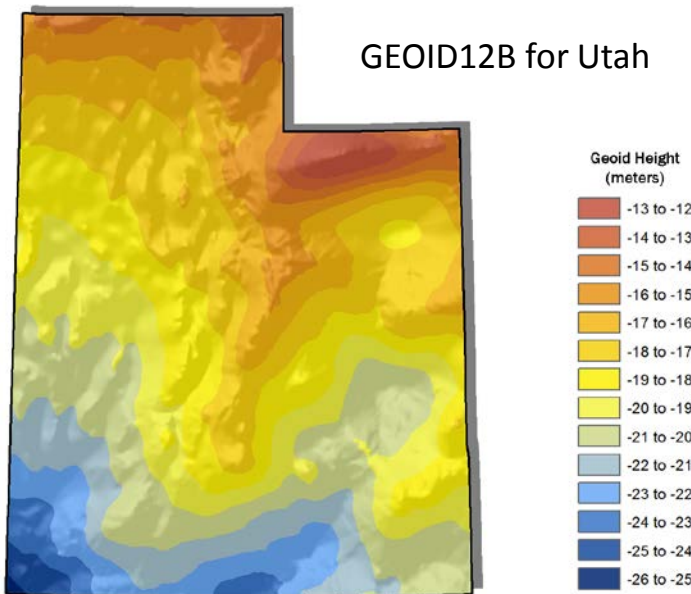
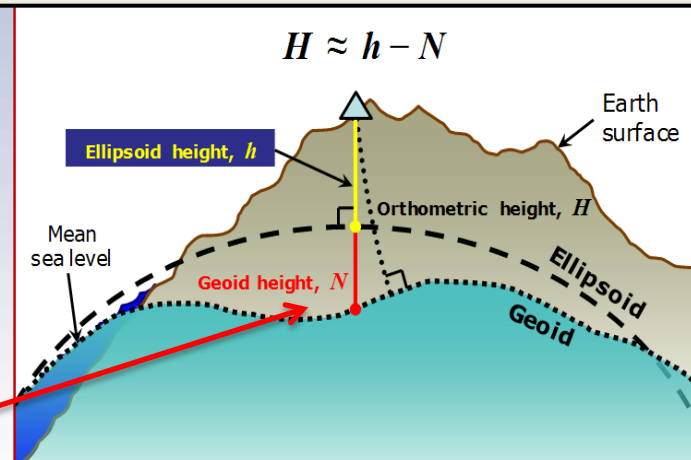
Click [here](#) for local accuracies and other accuracy information.

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in June 2012.

NAD 83(2011) refers to NAD 83 coordinates where the reference frame has been affixed to the stable North American tectonic plate. See [NA2011](#) for more information.

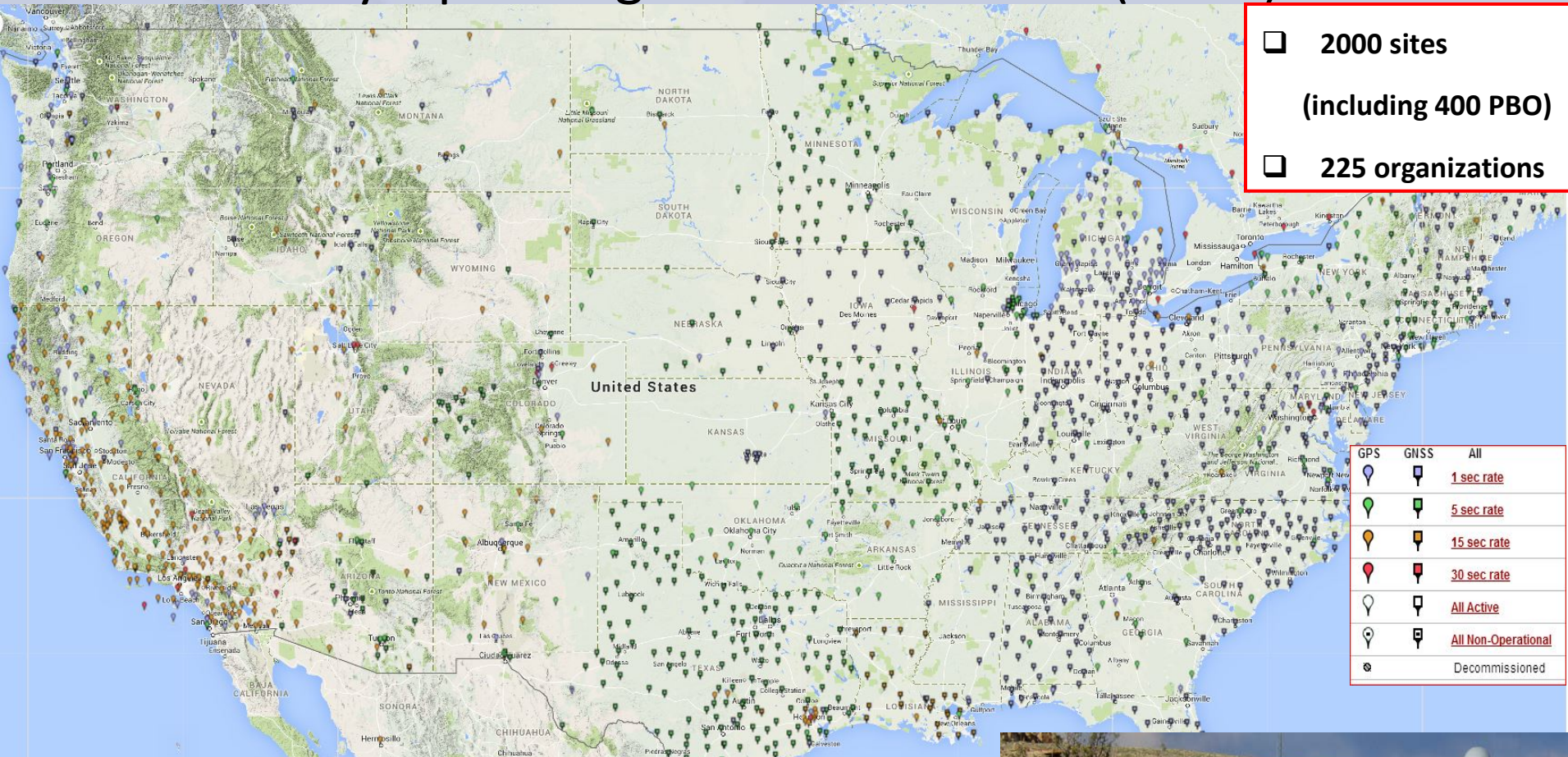
The horizontal coordinates are valid at the epoch date displayed above which is a decimal equivalence of Year/Month/Day.

The orthometric height was determined by GPS observations and a high-resolution geoid model.



# Continuously Operating Reference Station (CORS) Network

- 2000 sites (including 400 PBO)
- 225 organizations



# CORS Coordinates

```

Antenna Reference Point (ARP): SCOTTSDALE CORS ARP
-----
                                PID = AH3759

IGS08 POSITION (EPOCH 2005.0)
Computed in Aug 2011 using data through gpswk 1631.
  X = -1982826.934 m    latitude   = 33 34 07.39597 N
  Y = -4936878.021 m    longitude  = 111 52 55.77821 W
  Z =  3506904.128 m    ellipsoid height = 391.322 m

IGS08 VELOCITY
Computed in Aug 2011 using data through gpswk 1631.
  VX = -0.0128 m/yr    northward = -0.0060 m/yr
  VY =  0.0023 m/yr    eastward  = -0.0127 m/yr
  VZ = -0.0055 m/yr    upward    = -0.0008 m/yr

NAD_83 (2011) POSITION (EPOCH 2010.0)
Transformed from IGS08 (epoch 2005.0) position in Aug 2011.
  X = -1982826.249 m    latitude   = 33 34 07.38024 N
  Y = -4936879.362 m    longitude  = 111 52 55.73421 W
  Z =  3506904.203 m    ellipsoid height = 392.188 m

NAD_83 (2011) VELOCITY
Transformed from IGS08 velocity in Aug 2011.
  VX =  0.0023 m/yr    northward =  0.0033 m/yr
  VY =  0.0028 m/yr    eastward  =  0.0011 m/yr
  VZ =  0.0017 m/yr    upward    = -0.0019 m/yr

L1 Phase Center of the current GPS antenna: SCOTTSDALE CORS L1 PC C
    
```

IGS08 Position >>>

IGS08 Velocity >>>

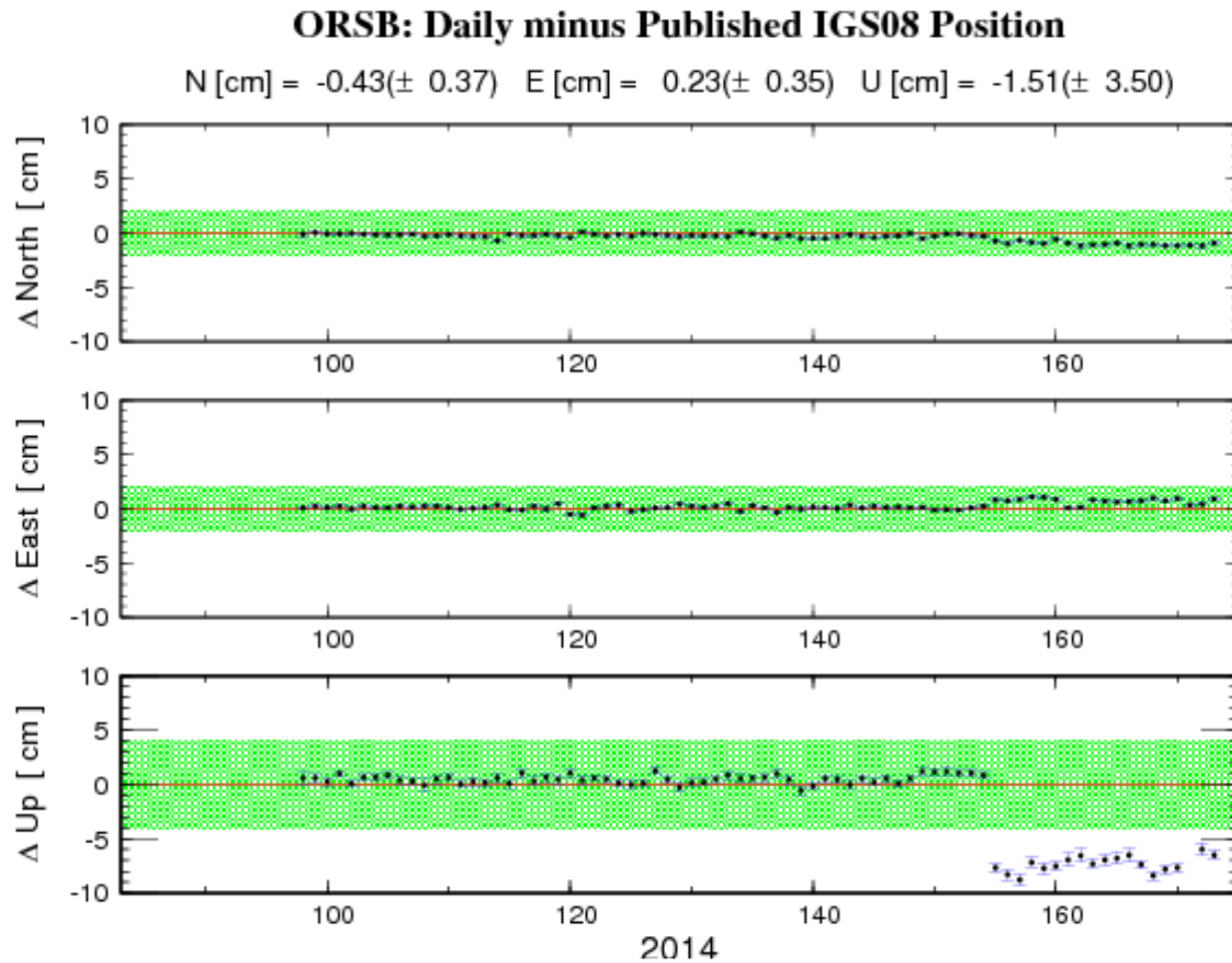
NAD83 Position >>>

NAD83 Velocity >>>

IGS08 = International GNSS Service 2008  
(GPS-only realization of ITRF2008)  
  
[replaces ITRF00 (epoch 1997.0)]

NAD83 (2011) epoch 2010.00 = North American Datum 1983  
(2011 realization @ January 1, 2010)  
  
[replaces NAD83(CORS96) (epoch 2002.0)]

# CORS 90-day Coordinate Plots



# National Geodetic Survey *Ten-Year Strategic Plan*

- ❖ By 2022, reduce all definitional & access-related errors in geometric reference frame to 1 cm when using min of GNSS data

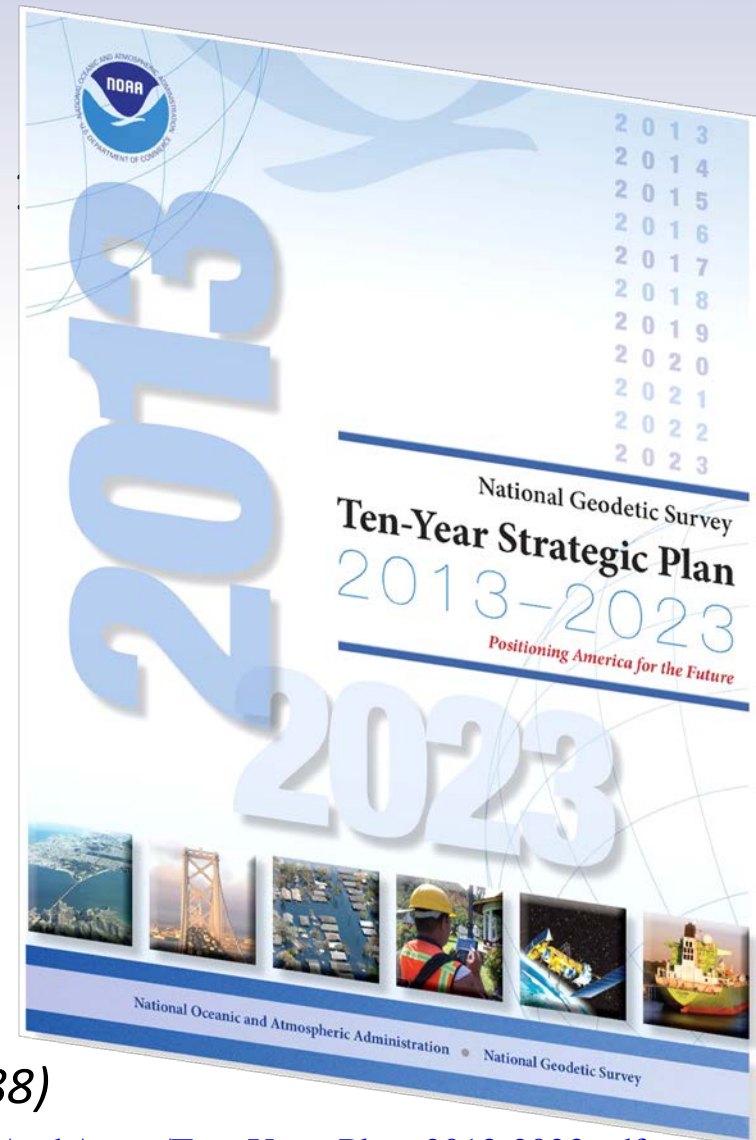
## **“Replace NAD83”**

*(NAD83 = North American Datum 1983)*

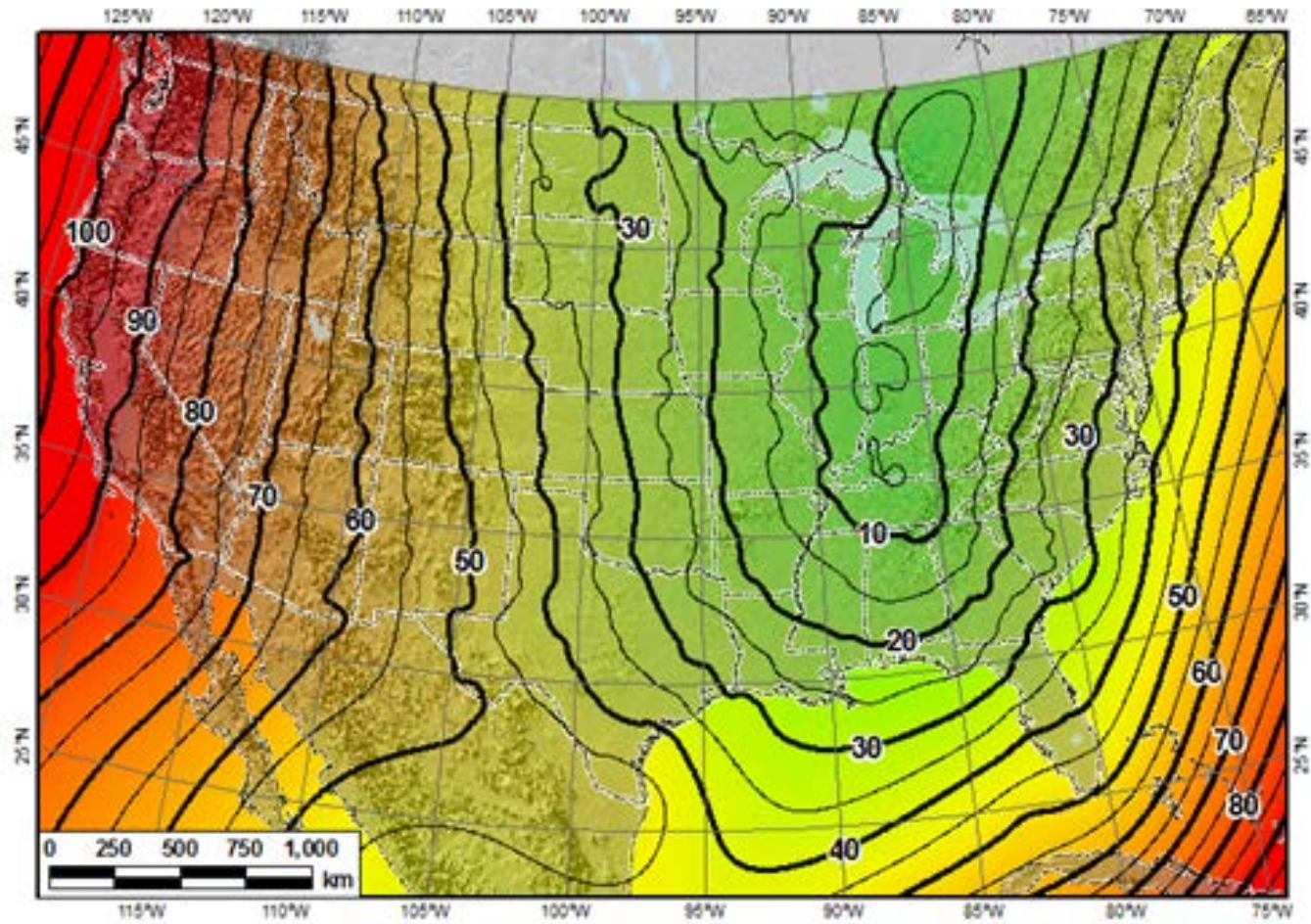
- ❖ By 2022, reduce all definitional & access-related errors in orthometric heights in geopotential reference frame to 2 cm when using 15 min of GNSS data

## **“Replace NAVD88”**

*(NAVD88 = North American Vertical Datum 1988)*



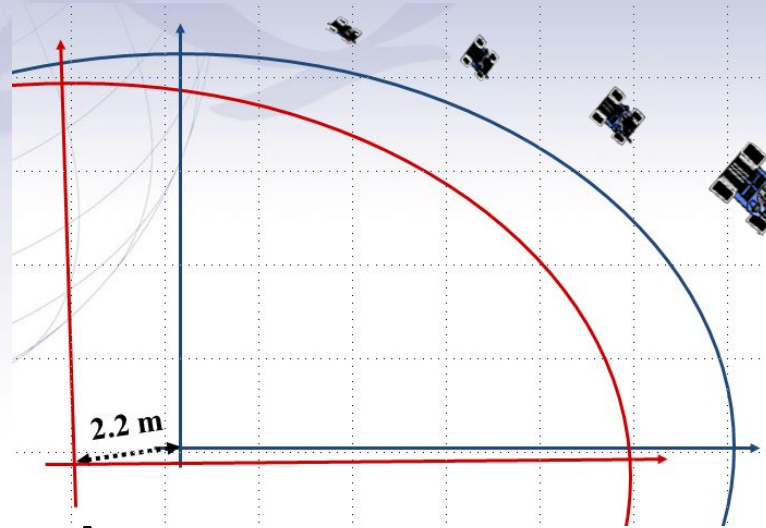
# Magnitude of Positional Change: NAD27 to NAD83 (meters)



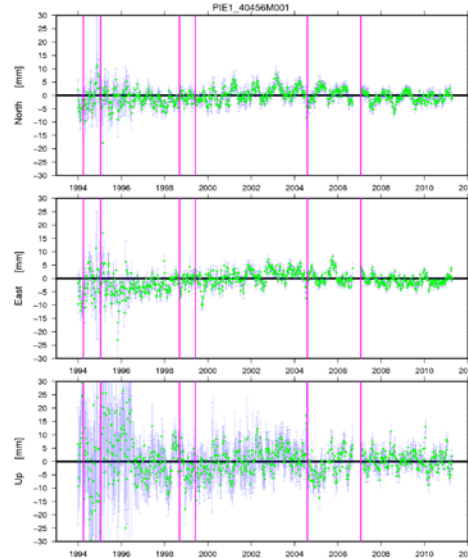
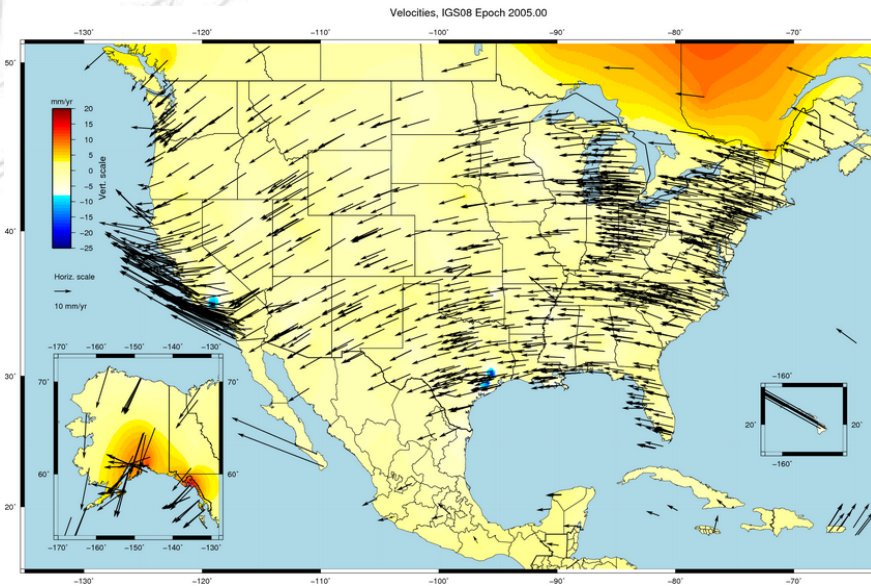


# North American Datum 1983 (NAD83) Shortcomings

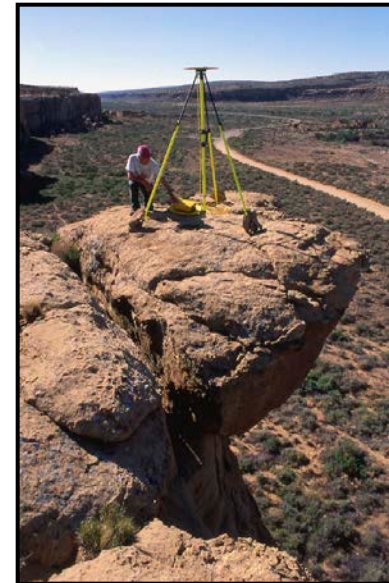
- 2.2 m offset –  
NAD83 vs.  
International Terrestrial  
Reference Frame (ITRF)



- CORS & passive network inconsistency

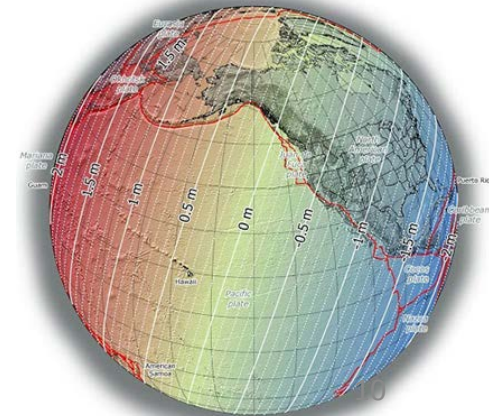


VS.

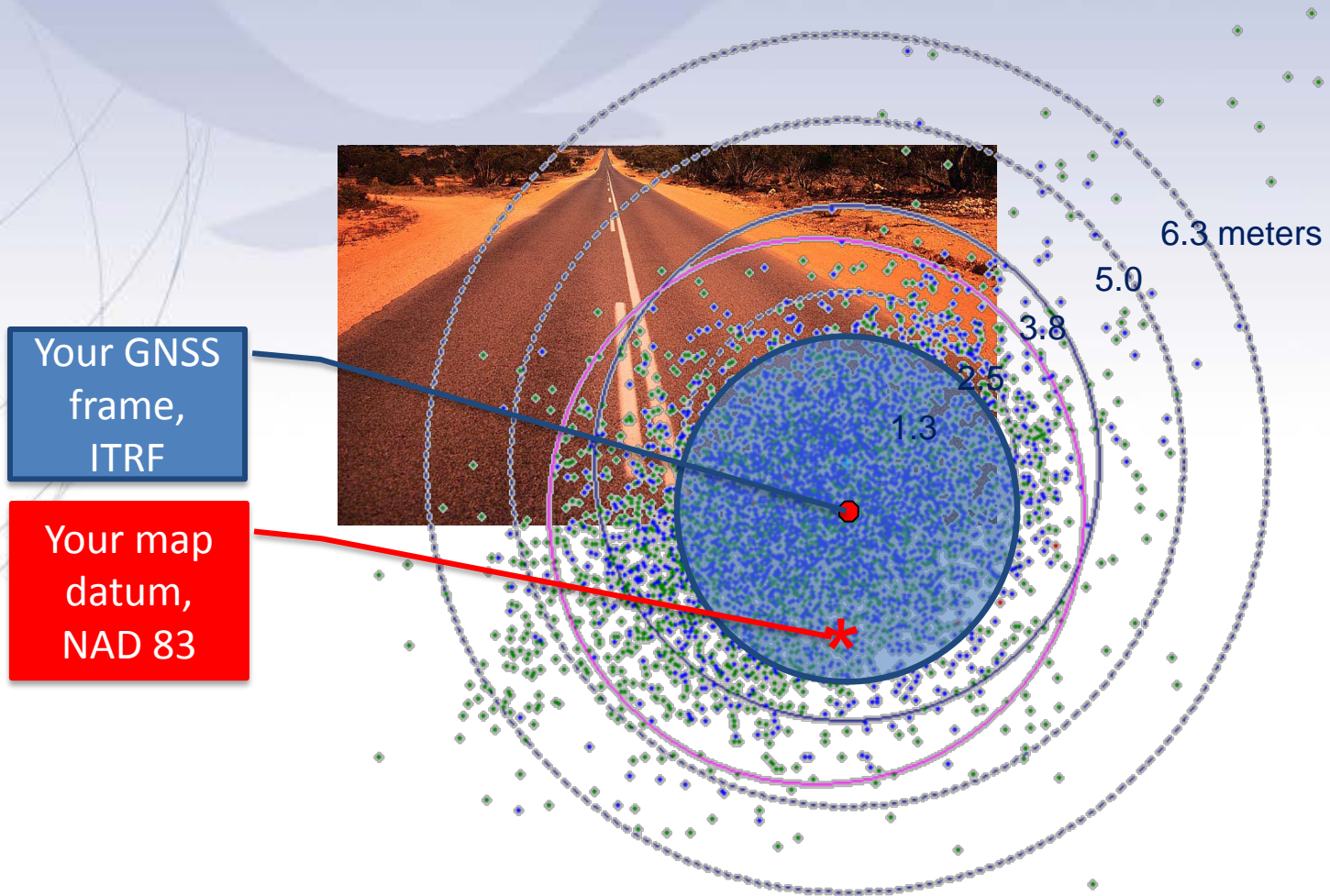


# Needed Repairs: NAD 83

- NAD83 frame  $\neq$  GPS navigation frame
- NAD83 frame  $\neq$  WAAS navigation frame
- NAD83 frame  $\neq$  satellite orbits frame
- NAD83 frame  $\neq$  satellite product frame
- NAD83 frame  $\neq$  international geodetic frame
  - International flights take off & land on different datums
  - Many geodetic tools assume ITRF as default



# Map how you navigate



As GNSS un-augmented user range error improves over time ...

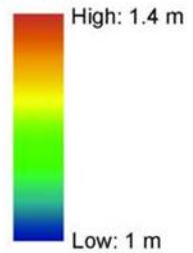
# Future Geometric (3-D) Reference Frame

- **replace NAD83 with new geometric reference frame – by 2022**
- **CORS-based, accessed via GNSS observations**
- **coordinates & velocities in ITRF & new US reference frame**  
**(NAD83 replacement: plate-fixed or “ITRF-like”?)**
- **passive control tied to new reference frame (not a component of)**
- **transformation tools will relate NAD83 to new US reference frame**

# Approximate Horizontal Change

# Approximate Horizontal Change North American Plate

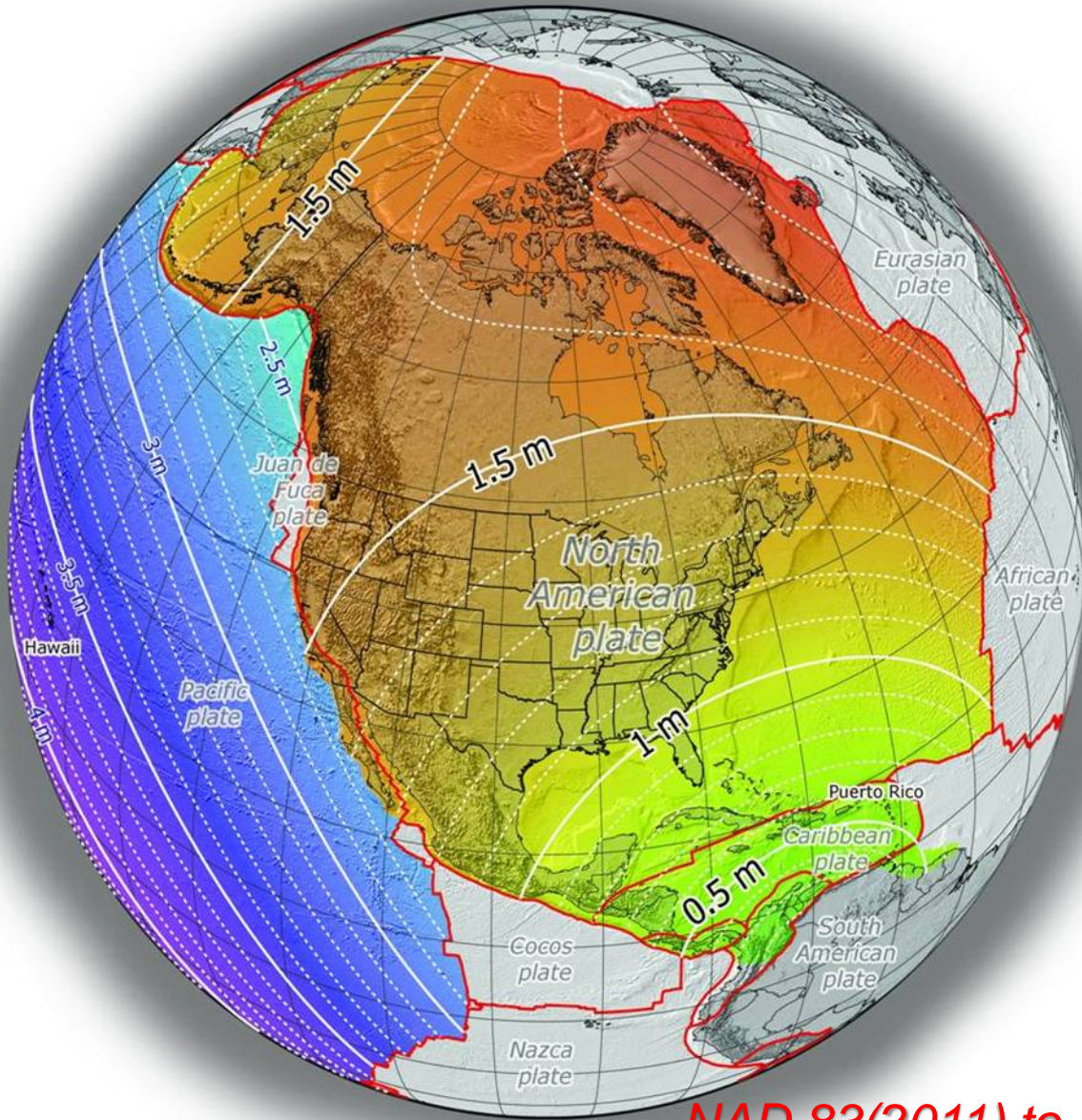
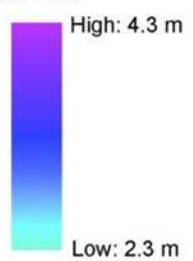
Mariana Plate (Meters)



North American Plate (Meters)



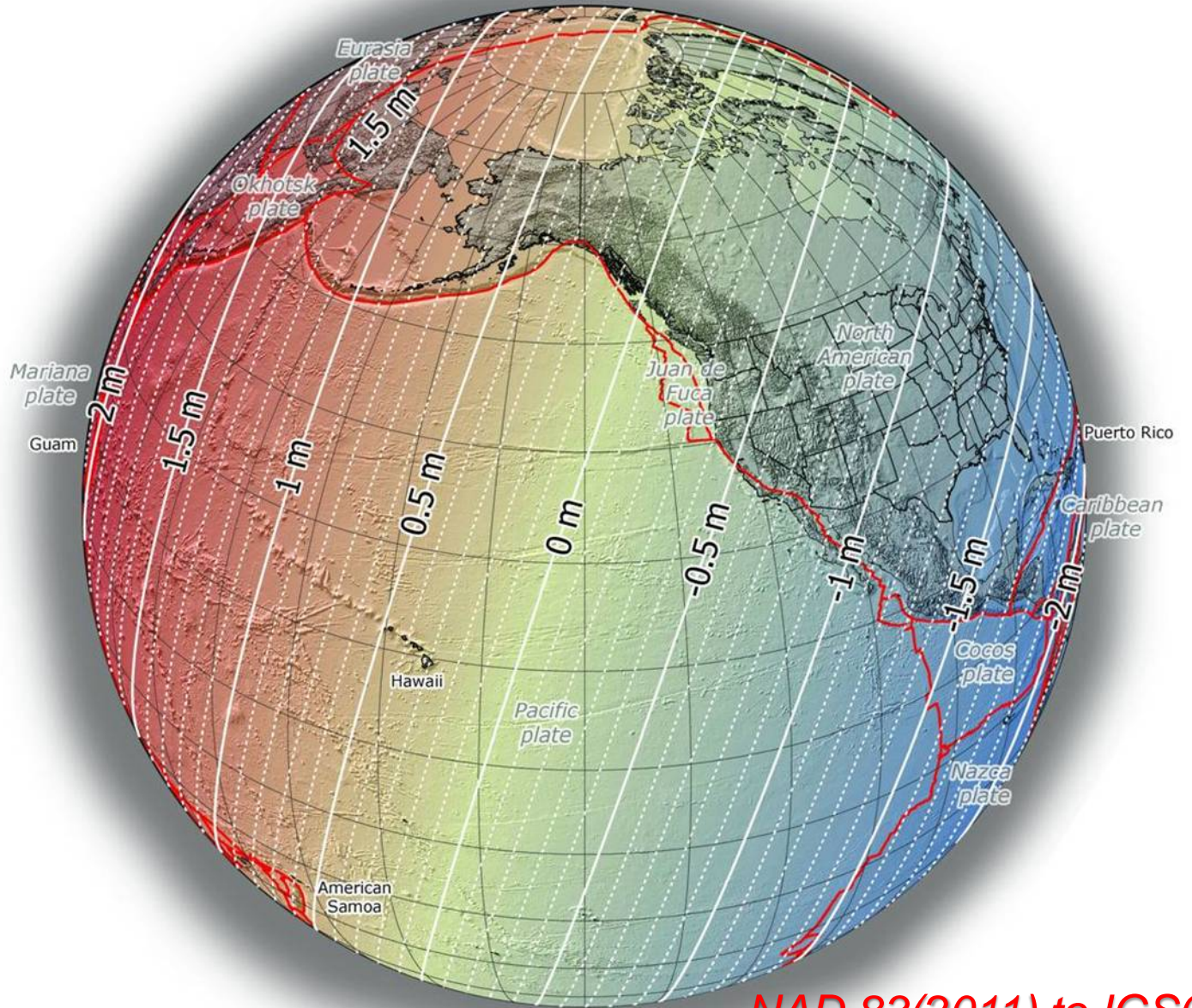
Pacific Plate (Meters)



Tectonic Plate Boundaries

**NAD 83(2011) to IGS08  
at epoch 2022.0**

# Approximate Ellipsoid Height Change



Ellipsoid Height  
(Meters)

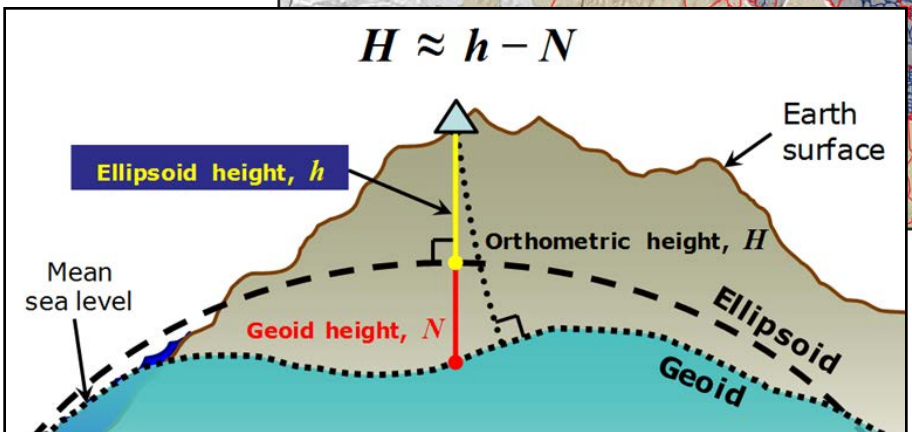
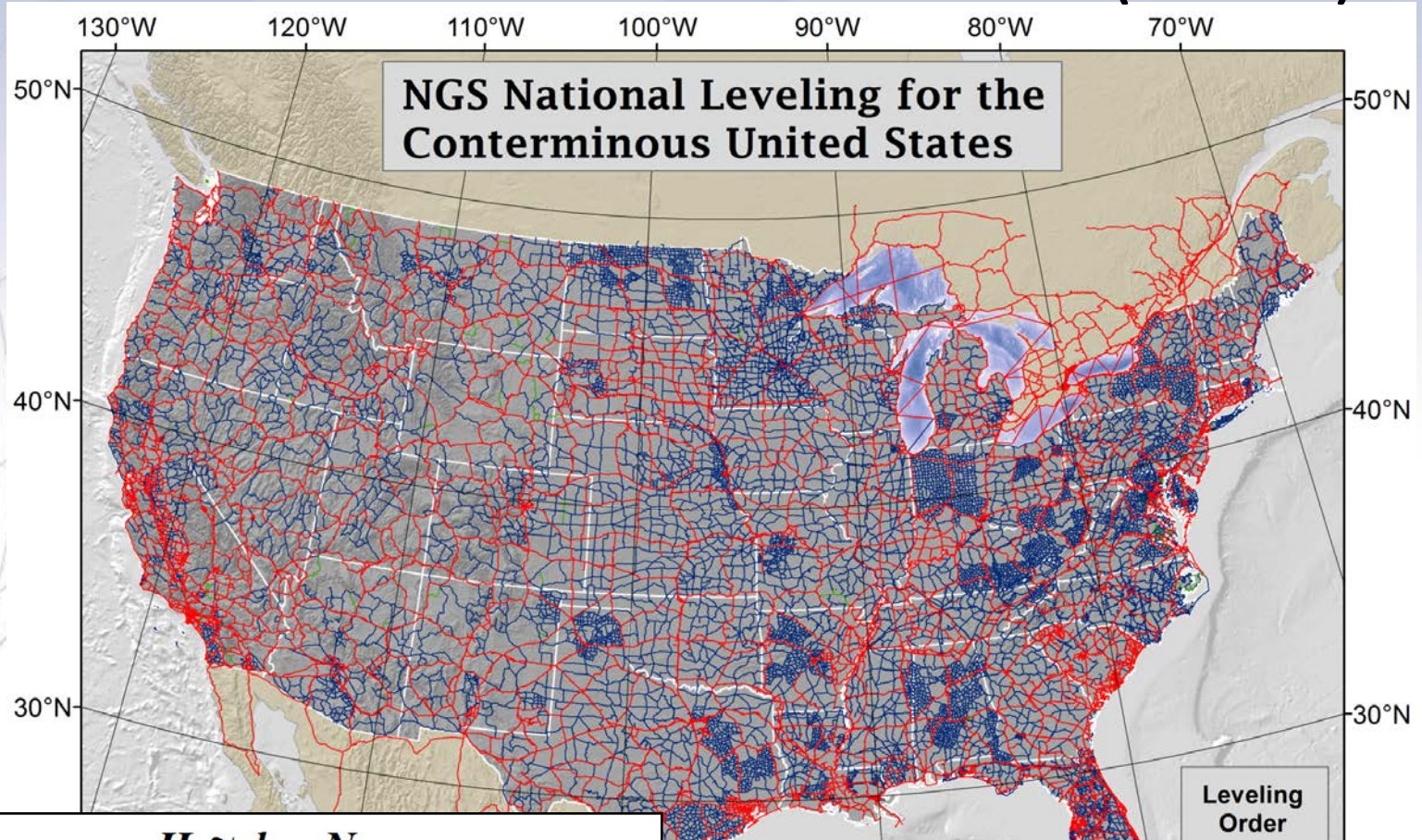


High: 2 m

Low: -2 m

*NAD 83(2011) to IGS08  
at epoch 2022.0*

# NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88)



# Vertical change from NGVD 29 to NAVD 88 (meters)

125°W 120°W 115°W 110°W 105°W 100°W 95°W 90°W 85°W 80°W 75°W 70°W 65°W

45°N

40°N

35°N

30°N

25°N

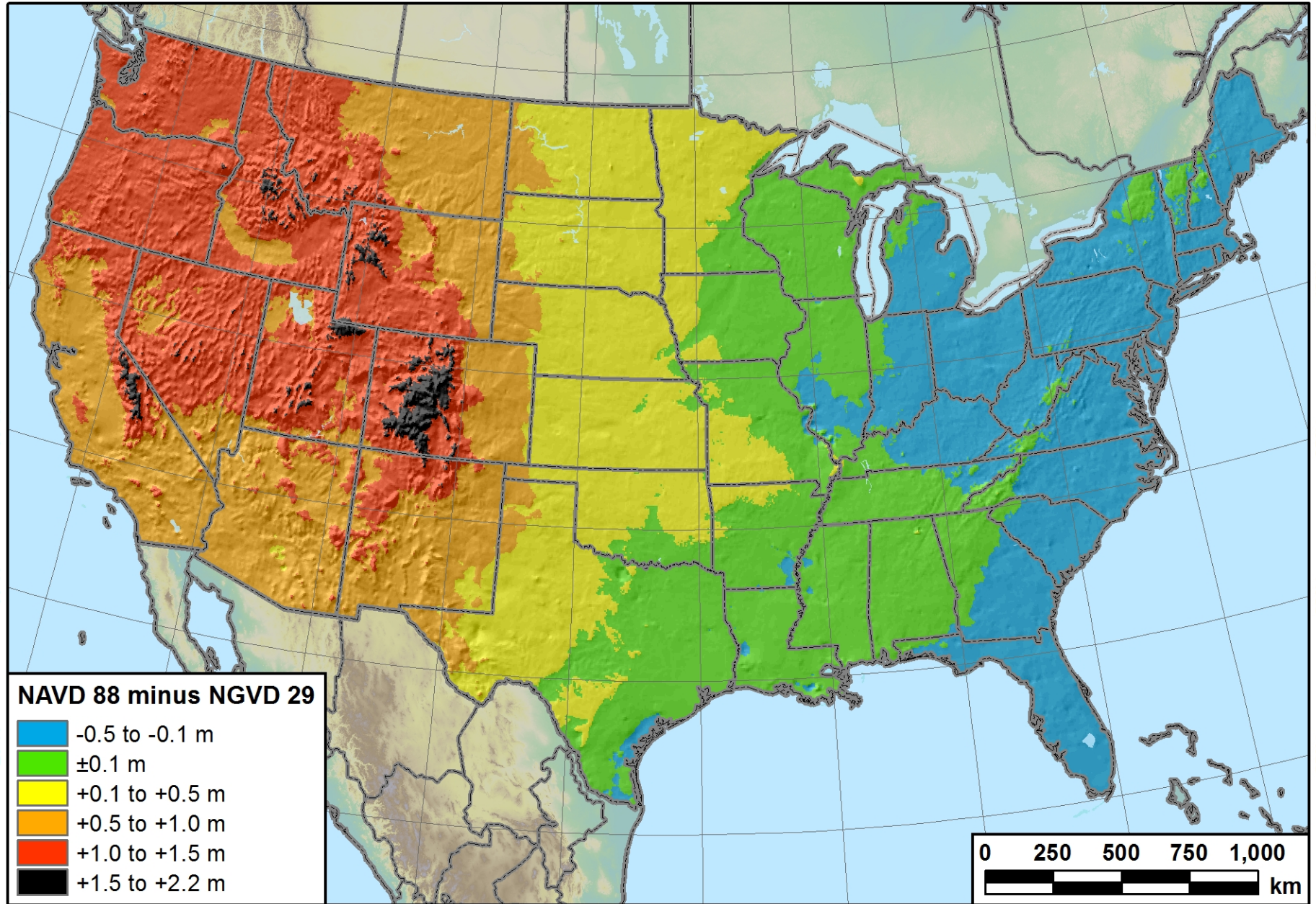
45°N

40°N

35°N

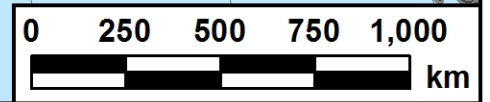
30°N

25°N



## NAVD 88 minus NGVD 29

- -0.5 to -0.1 m
- ±0.1 m
- +0.1 to +0.5 m
- +0.5 to +1.0 m
- +1.0 to +1.5 m
- +1.5 to +2.2 m

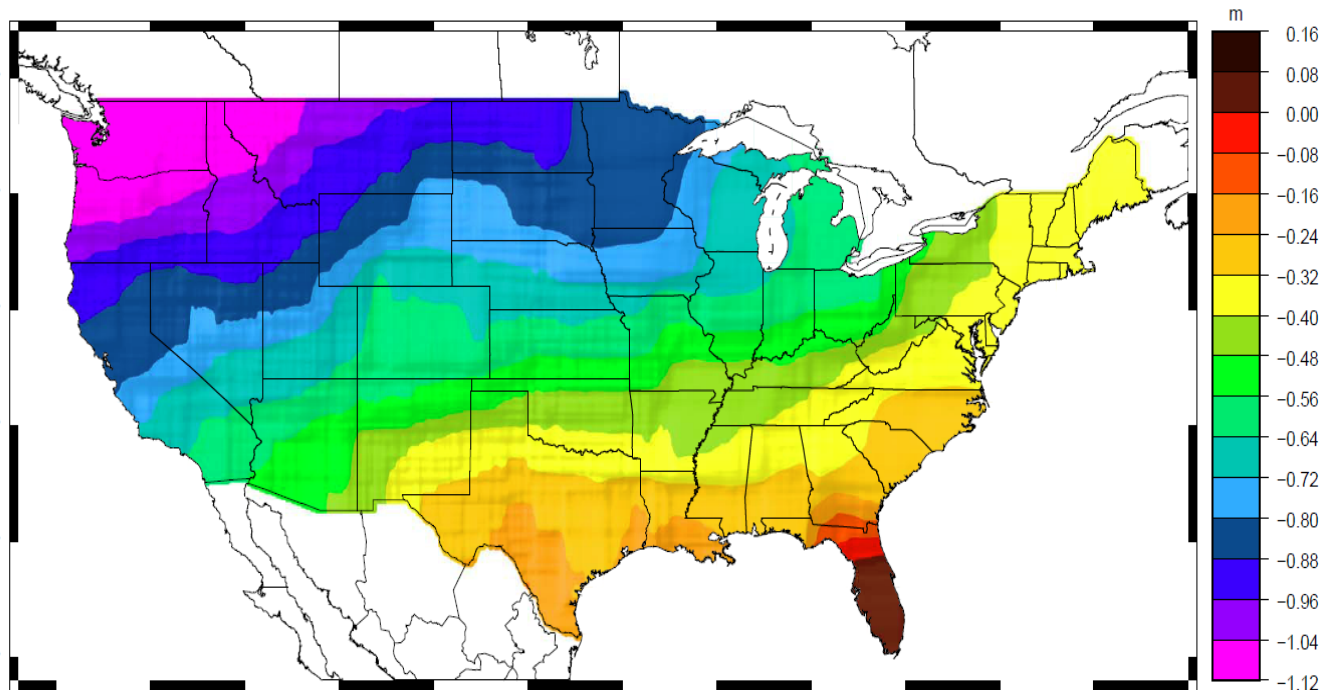


115°W 110°W 105°W 100°W 95°W 90°W 85°W 80°W 75°W



# North American Vertical Datum 1988 (NAVD88) Shortcomings

- **Cross-country errors (1-m tilt)**
- **0.5 m bias in reference surface vs. global mean sea level geoid**
- **Subsidence, uplift, freeze/thaw invalidate BM elevations**
- **LIMITED AVAILABILITY / ACCESS**

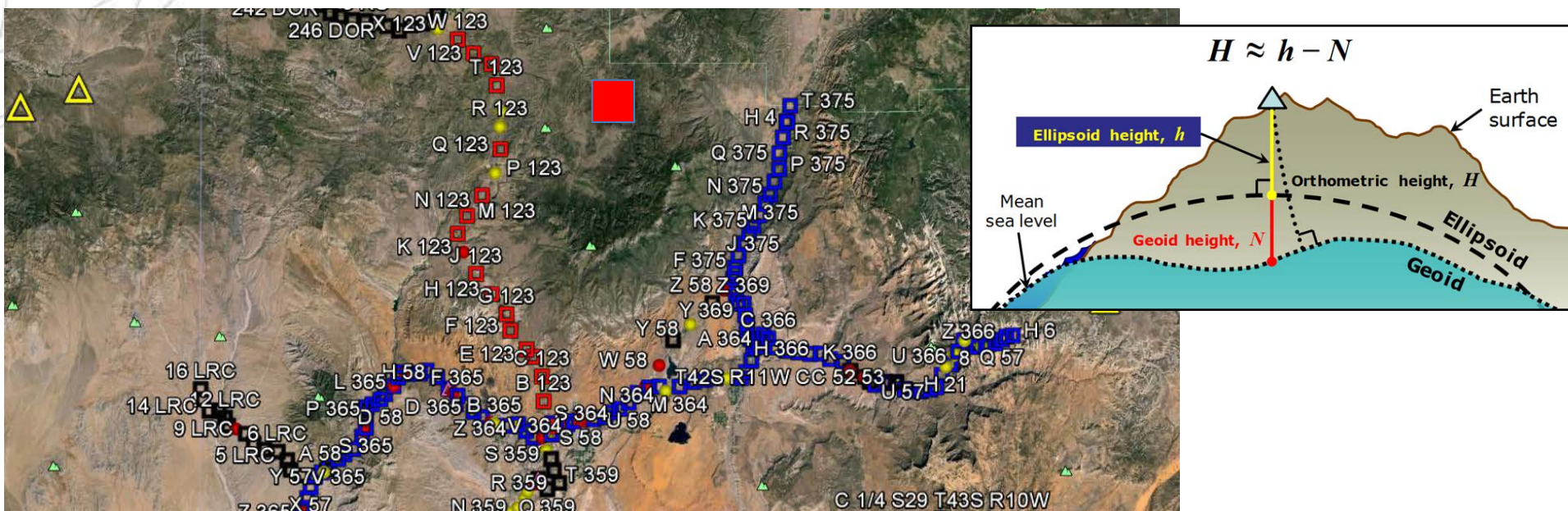


Approximate Geoid Mismatch in the NAVD88 H=0 surface



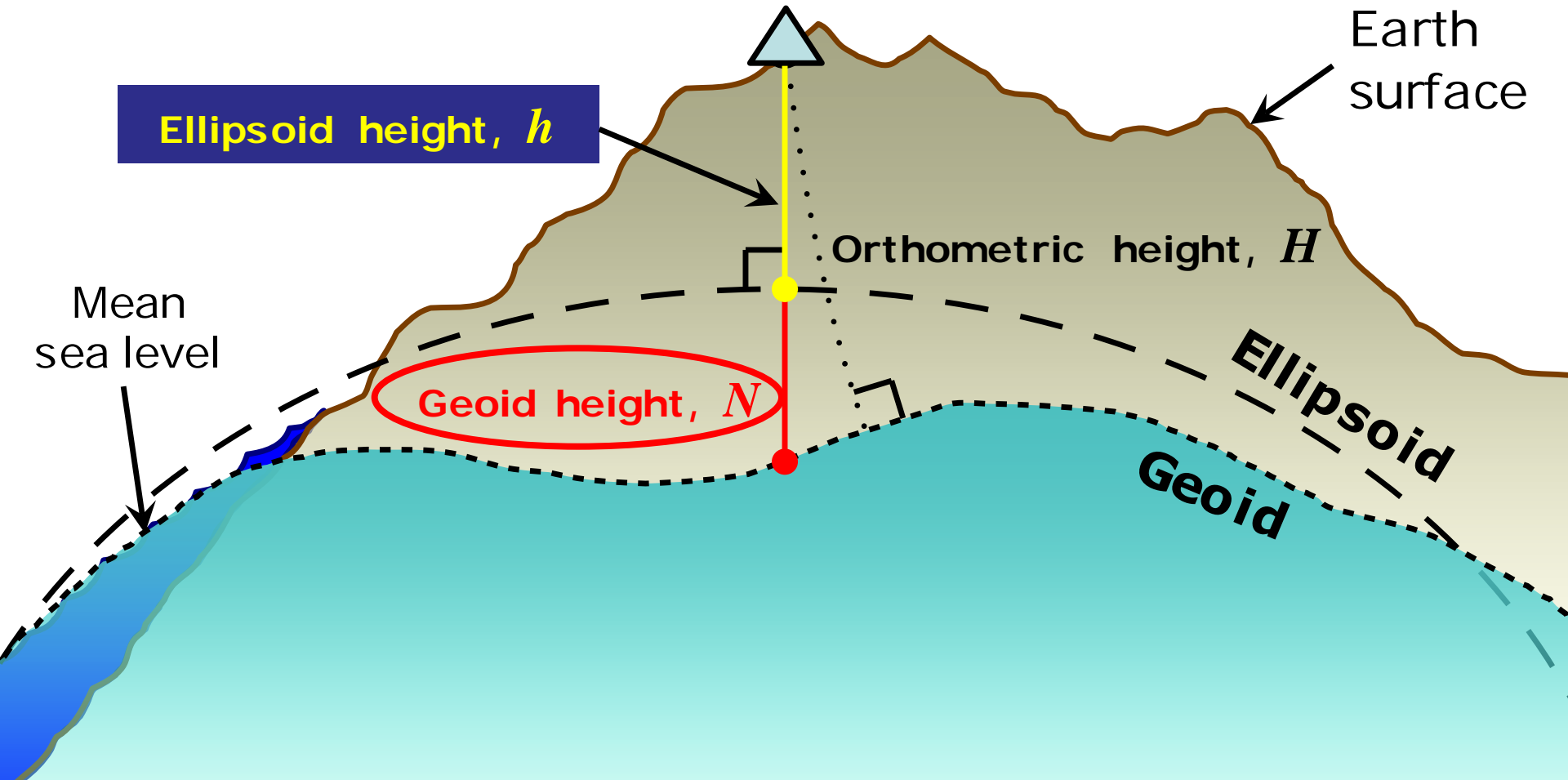
# Future Geopotential (Vertical) Reference Frame

- replace NAVD88 – by 2022
- accessed by GNSS & gravimetric geoid
- monitor time-varying nature of gravity field
- most accurate continental gravimetric geoid model, ever

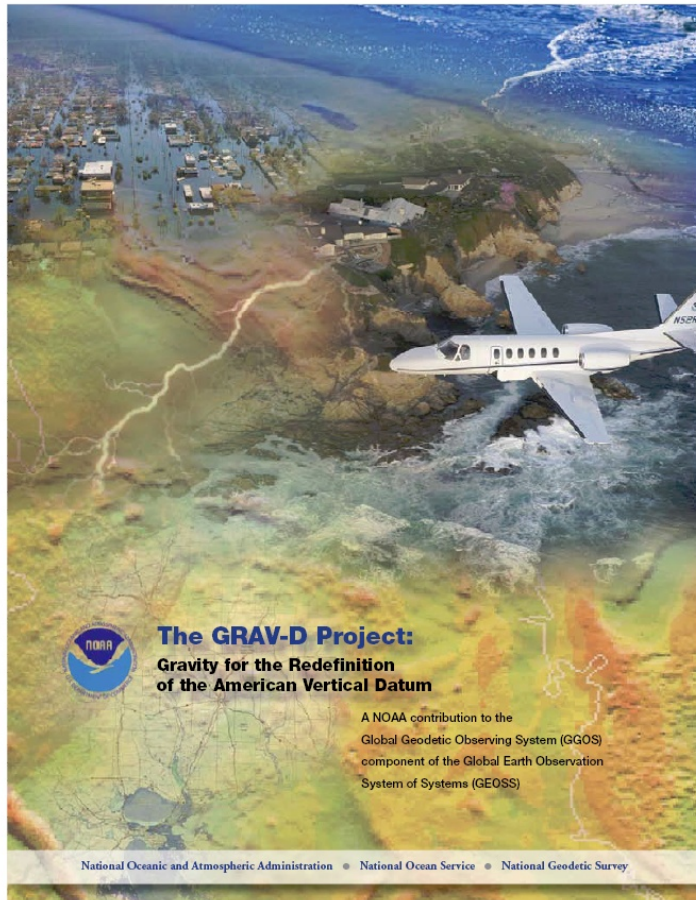


# The Relationship of Heights

$$H \approx h - N$$



# Gravity for the Redefinition of the American Vertical Datum (GRAV-D)



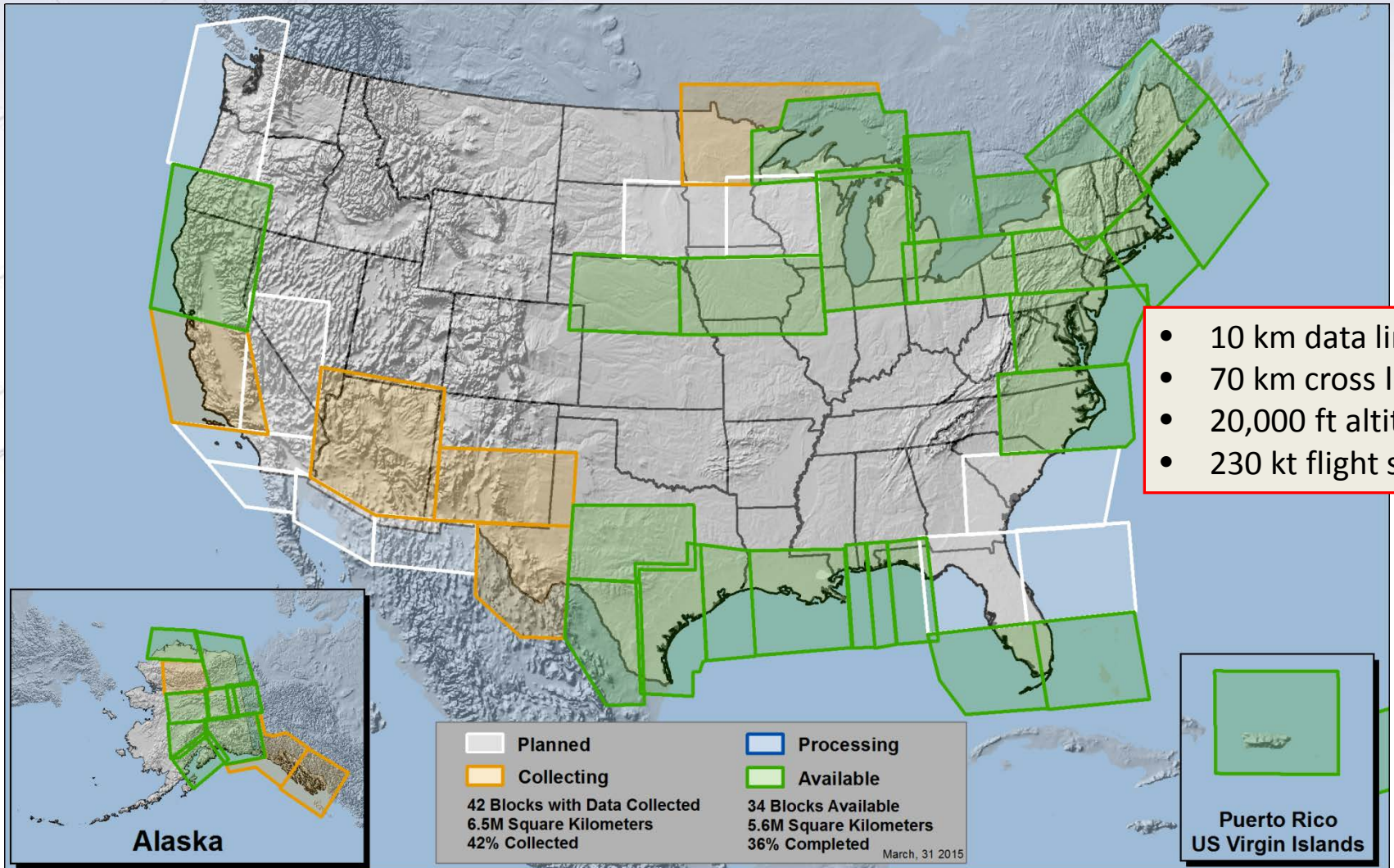
- Replace the national vertical datum (NAVD88) by 2022 with a **1 cm accurate gravimetric geoid**
- Orthometric heights accessed via GNSS **accurate to 2 cm**
- Thrusts of project:
  - Airborne gravity survey of entire country and its holdings
  - Long-term geoid change monitoring
  - Partnership surveys

**Gravity and Heights are  
inseparably connected**

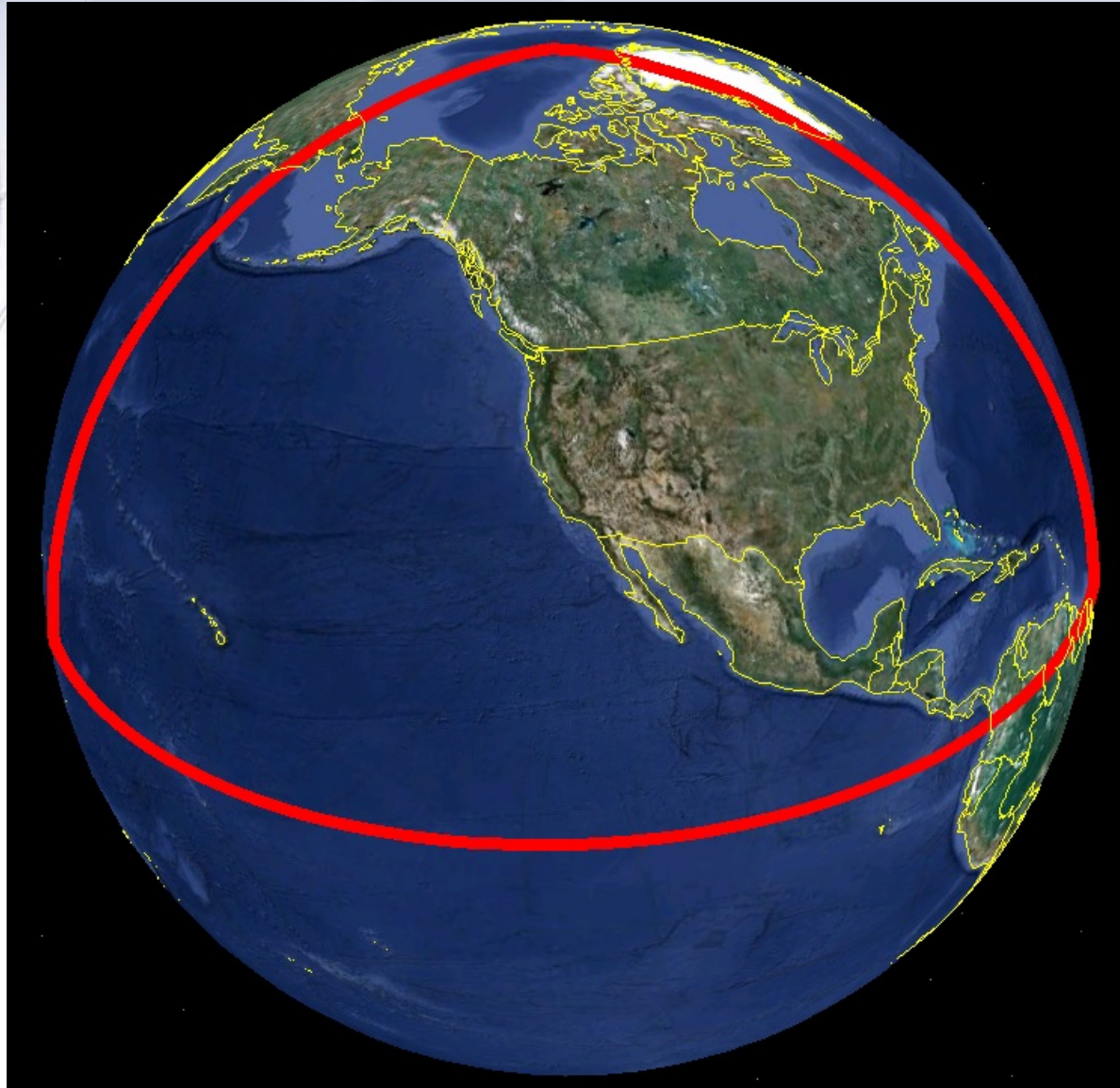


# Gravity for the Redefinition of the American Vertical Datum (GRAV-D)

<http://www.geodesy.noaa.gov/GRAV-D/>

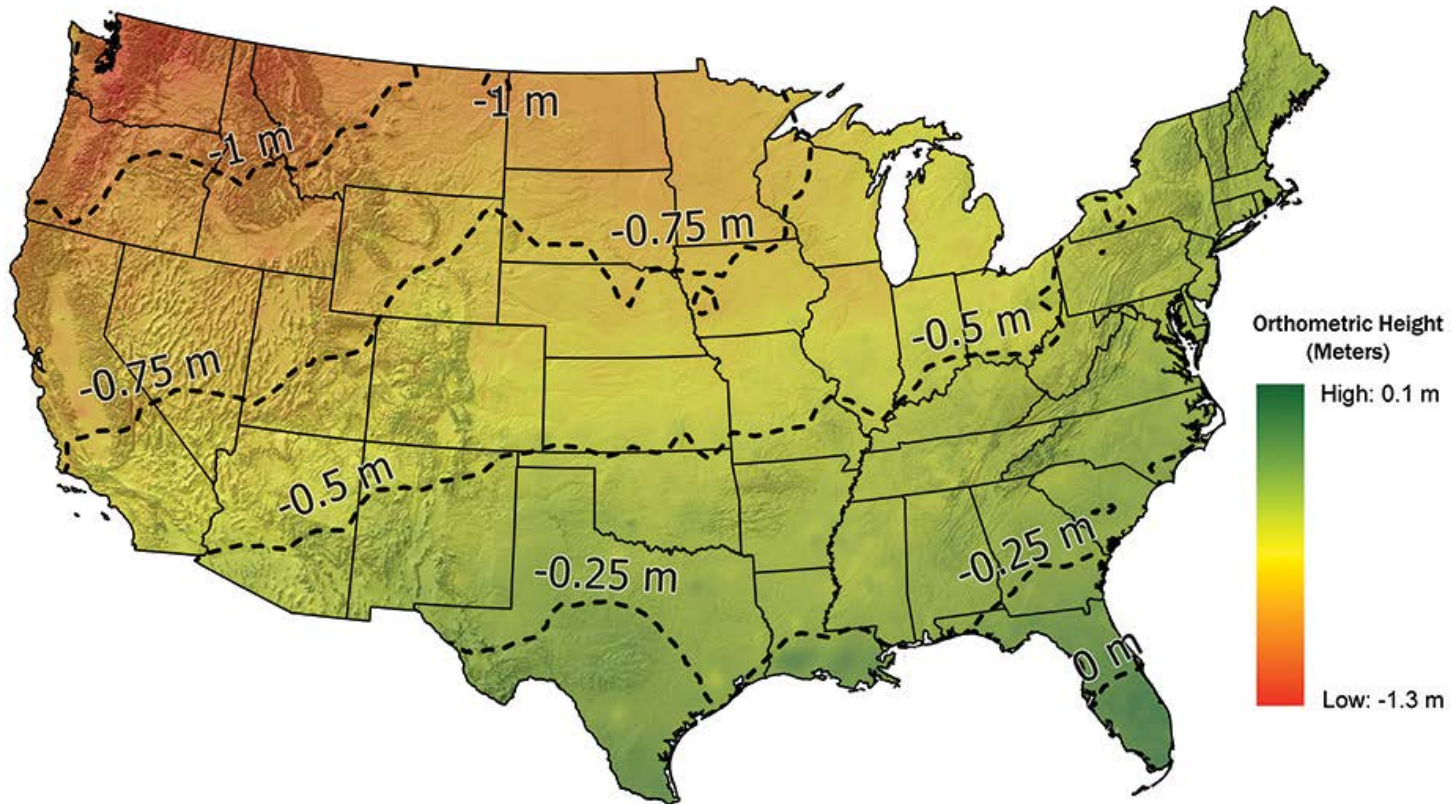


# Extent of 2022 gravimetric geoid model used for new geopotential reference frame



# How will the new datums affect you?

## Approximate Orthometric Height Change



The new vertical (geopotential) datum will change heights on average 50 cm with a 1m tilt towards the Pacific Northwest.

# Agreement on $W_0$ Value – between Canada & United States




## Agreement: The U.S. National Geodetic Survey and The Canadian Geodetic Survey

March 14, 2012

The U.S. National Geodetic Survey and Natural Resources Canada's Geodetic Survey Division, via conference call held 2012/02/17, agree:

- To **define** the common (a unique) vertical datum for the United States of America (USA) and Canada (CA) through use of an equipotential surface, realized through one commonly (jointly) computed geoid model, corresponding to the mean coastal sea level for North America by 2022. Adoption is subject to National decisions;
- To **compute** the potential  $W_0$  of this equipotential surface using Global Positioning System (GPS) data on tidal benchmarks, by April 1, 2012 and to **use** this value, for the realization of geoid models in the USA and CA until 2022;
- To **maintain** this equipotential surface as one option to adopt as the vertical datum even if this surface diverges (departs) from the true mean coastal sea level for (around) North America over time;
- To **monitor** differences between the above-mentioned equipotential surface and the mean sea level via Global Navigation Satellite Systems (GNSS) on tidal benchmarks, altimetry or other means as required;
- To **provide** to the public, deformational velocities ( $N\text{-dot}$ ) of the equipotential surface  $W_0$ ;
- To **collaborate** in the realization of geoid models, through the sharing of data and related information;
- To **compute** updated geoid models and geoid deformation models with improved realizations as needed;
- To **inform** each other when large discrepancies (outside 95% confidence region) are found in overlapping regions; and
- To **choose** a threshold value (in alignment with both stakeholder needs and scientific integrity) in 2022, between predicted (modeled) geoid change and true geoid change (including deformation and sea level change) which will warrant new realization of the vertical datum.

  
Denis Hains  
Director  
Geodetic Survey Division  
Canada Centre for Remote Sensing  
Natural Resources Canada Resources naturelles Canada  
    
Canada

  
Juliana P. Blackwell  
Director  
National Geodetic Survey  
 




## Entente: National Geodetic Survey des États-Unis et les Levés géodésiques du Canada

14 mars, 2012

Le National Geodetic Survey des États-Unis et la Division des levés géodésiques du ministère des Ressources naturelles du Canada, par un appel conférence tenu le 2012/02/17, se sont entendus :

- À **définir** un datum vertical commun (unique) pour les États-Unis d'Amérique (USA) et le Canada (CA) par l'entremise d'une surface équipotentielle réalisée par un modèle de géoïde calculé en commun (ensemble), correspondant au niveau moyen des mers le long des côtes de l'Amérique du Nord par 2022. L'adoption est sujette aux décisions nationales;
- À **calculer** le potentiel  $W_0$  de cette surface équipotentielle par mesures du Système de positionnement mondial (GPS) à des marégraphes avant le 1<sup>er</sup> avril 2012 et à **utiliser** cette valeur pour la réalisation des modèles du géoïde des USA et du CA jusqu'en 2022;
- À **maintenir** cette surface équipotentielle comme une option pour l'adoption d'un datum vertical même si cette surface diverge (s'écarte), avec le temps, du véritable niveau moyen des mers de (entourant) l'Amérique du Nord.
- À **surveiller** la différence entre la surface équipotentielle mentionnée ci-haut et le niveau moyen des mers par mesures des Systèmes mondiaux de navigation par satellites (GNSS) à des marégraphes, par altimétrie et par autres moyens requis;
- À **fournir** au public des vitesses ( $N\text{-dot}$ ) de déformation de la surface équipotentielle  $W_0$ ;
- À **collaborer** à la réalisation des modèles du géoïde en partageant des données et l'information reliée;
- À **calculer** des mises-à-jour des modèles du géoïde et de déformation au besoin;
- À **s'informer** mutuellement des écarts importants (à l'extérieur d'une marge de confiance de 95%) retrouvés en régions chevauchantes;
- À **choisir** une valeur seuil (cadrant avec les besoins des utilisateurs et scientifiquement rigoureuse) en 2022 entre les changements prédits et réels du géoïde (incluant sa déformation et le changement du niveau moyen des mers) qui justifieront une nouvelle réalisation du datum vertical.

  
Denis Hains  
Directeur  
Division des levés géodésiques  
Centre canadien de télédétection  
    
Canada

  
Juliana P. Blackwell  
Directrice  
National Geodetic Survey  
 



# Monitoring Sea-Level Change

## Observing Systems

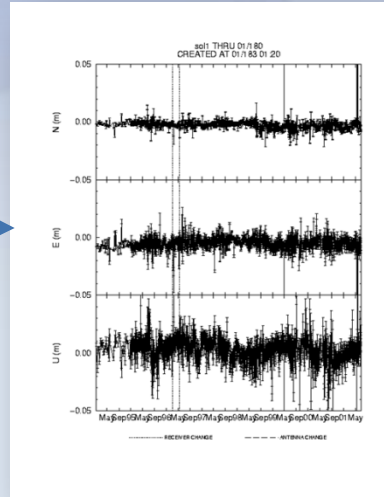


CORS

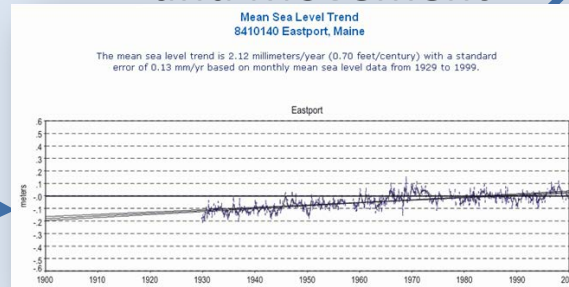


NWLON

## Local Predictions

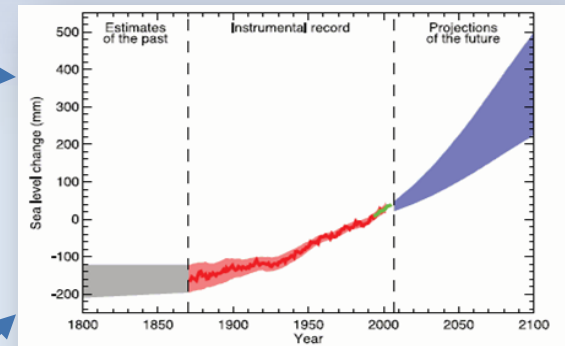


## Vertical & Horizontal Land Movement



## Local Relative Sea Level Trends

## Global Predictions



**FAQ 5.1, Figure 1.** Time series of global mean sea level (deviation from the 1980-1999 mean) in the past and as projected for the future. For the period before 1870, global measurements of sea level are not available. The grey shading shows the uncertainty in the estimated long-term rate of sea level change (Section 6.4.3). The red line is a reconstruction of global mean sea level from tide gauges (Section 5.5.2.1), and the red shading denotes the range of variations from a smooth curve. The green line shows global mean sea level observed from satellite altimetry. The blue shading represents the range of model projections for the SRES A1B scenario for the 21st century, relative to the 1980 to 1999 mean, and has been calculated independently from the observations. Beyond 2100, the projections are increasingly dependent on the emissions scenario (see Chapter 10 for a discussion of sea level rise projections for other scenarios considered in this report). Over many centuries or millennia, sea level could rise by several metres (Section 10.7.4).

## Global Mean Sea Level Trend

# OPUS Extended Output -

## Estimate of New Datum (2022) Orthometric Height

\*\* 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: 1659.685 (m)**

**[PROTOTYPE (Computed using  
USGG2012, GRS80, IGS08)]**

# New Datums: How to Prepare

- Move to newest realizations.  
NAD 83(2011) epoch 2010.00  
USGG12 (gravimetric geoid) / GEOID12B (hybrid geoid)
- Obtain precise ellipsoid heights on NAVD 88 bench marks.  
(OPUS-DB, contact NGS Geodetic Advisor)  
Improves hybrid geoid models and provides “hard points” in new vertical datum.  
Follow new NGS Guidelines when released.
- Move from NGVD 29 to NAVD 88.  
Understand the accuracy of VERTCON in your area.
- Move away from passive marks to GNSS.  
Utilize CORS, OPUS, Real-time Networks.
- Require/provide complete metadata for all mapping contracts.  
How were the positions/heights derived? Document it!



# National Geodetic Survey

Positioning America for the Future

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- Storm Imagery
- Survey Mark Datasheets
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**Upcoming Events**

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**Notices**

May 5, 2015

**Announcing New Geoid Model (GEOID12B) for Better Determination of Heights with Respect to Mean Sea Level**  
04.23.2015

**NOAA's National Geodetic Survey Hosts 2015 Geospatial Summit on Improvements to the National Spatial Reference System, April 13 - 14** 04.03.2015

**Input Formats and Specifications of the National Geodetic Survey Data Base** 04.10.2015

**NGS Announces Joint Release of GEOCON v1.0 and GEOCON11 v1.0** 08.12.2014

**June 30, 2014: The National Geodetic Survey (NGS) Releases new Beta experimental geoid height model "xGEOID14B," spanning one-quarter of Earth's surface** 06.27.2014

**Popular GPS Positioning Service Is Enhanced: OPUS Projects** 01.28.2014

**In The News**

**04/30/2015 - NGS Collects Damage Assessment Images of Illinois Tornado Strikes**

Earlier this month, NGS collected **damage assessment imagery** to support Illinois's tornado emergency response. More than 2,800 images, collected in areas impacted by multiple tornado strikes in northern Illinois, are now publicly available. The imagery will be used to help determine the extent of the damage inflicted by the storms and to compare the storm's forecast models to the actual damage...[more](#)

**04/23/2015 - New Geoid Model (GEOID12B) for Better Determination of Heights with Respect to Mean Sea Level**

NGS produced a new geoid model, **GEOID12B**, to replace the previous GEOID12A model. **GEOID12B** is a height transformation model for surveyors, engineers, and others involved in water flow and the determination of heights with respect to mean sea level...[more](#)

**04/16/2015 - Geospatial Summit Prepares Users for 2022**

NGS hosted a 2015 Geospatial Summit April 13-14 in Arlington, Virginia, to share updates on the 2022 release of new geodetic datums. NGS discussed the tools available to transition to the new datums and also shared strategies to enable the mapping and surveying communities to prepare for the **2022 release**. Huge benefits are associated with the adoption of the new datums...[more](#)

**Looking for Bench Marks?**

Coming in 2022:  
**New Datums!**  
Learn more...

**GPS on Bench Marks**

**Geodetic Datums**

See our videos!

Federal Geodetic Control Subcommittee

# NGS homepage: [geodesy.noaa.gov](http://geodesy.noaa.gov)

- Data access
- Geodetic Toolkit
- Publications
- Height Modernization
- Training opps
- Education resources
- Presentations

## NGS Training/Online Learning Email Notifications

If you would like to receive an email informing you of upcoming training/learning opportunities presented by NOAA's National Geodetic Survey, please fill in the information below.  
\* Required

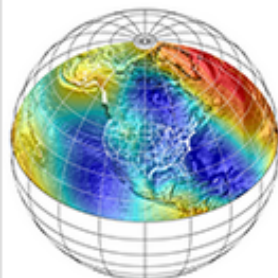
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# New Datums

National Geodetic Survey

<a href="#">NGS Home</a>	<a href="#">About NGS</a>	<a href="#">Data &amp; Imagery</a>	<a href="#">Tools</a>	<a href="#">Surveys</a>	<a href="#">Science &amp; Education</a>	<input type="text"/>	<a href="#">Search</a>
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### New Datums Quick Links

- [Home](#)
- [What to expect](#)
- [Get prepared](#)
- [Track our progress](#)
- [Related projects](#)
- [Watch videos](#)
- [Learn more](#)
- [New Datums FAQ](#)
- [Contact Us](#)
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### Events

- [2015 Summit](#)
- [2010 Summit](#)

May 6, 2015

## Replacing NAVD 88 and NAD 83

NAD 83 and NAVD 88 will be replaced in 2022, and there are many related projects to make sure the transition goes smoothly. Read the **NGS Ten-Year Plan** to learn more and continue to visit this web-page for more information.

<a href="#">What to Expect</a>	<a href="#">Get Prepared</a>
<a href="#">Related Projects</a>	<a href="#">Track Our Progress</a>
<a href="#">Watch Our Videos</a>	<a href="#">Learn More</a>

### Why is NGS replacing NAD 83 and NAVD 88?

NAD 83 and NAVD 88, although still the official horizontal and vertical datums of the National Spatial Reference System (NSRS), have been identified as having shortcomings that are best addressed through defining new horizontal and vertical datums.

Specifically, NAD 83 is non-geocentric by about 1.5 meters. Secondly, NAVD 88 is both biased (by about one-half meter) and tilted (about 1 meter coast to coast) relative to the best global geoid models available today. Both of these issues derive from the fact that both datums were defined primarily using terrestrial surveying techniques at passive geodetic survey marks. This network of survey marks deteriorate over time (both through unchecked physical movement and simple removal), and resources are not available to



# NGS Workshop, Conference, and Training Opportunities

- Training Classes
- Workshops and Conferences
- NGS Online Learning Resources

[http://www.geodesy.noaa.gov/web/science\\_edu/training/](http://www.geodesy.noaa.gov/web/science_edu/training/)

NOS Online Learning Resources  
cover NGS programs and more.

<http://oceanservice.noaa.gov/multimedia/>



# NGS Presentations Library

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National Geodetic Survey

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Search

Below is a collection of NGS publicly-given presentations that have been collected for viewing by the public. For more information contact [ngs.presentations@noaa.gov](mailto:ngs.presentations@noaa.gov).

Show 10 entries      Search:

Title	Presenter	Author	Co-Author(s)	Date Presented	Location	Group/Forum/Meeting	Keywords/Topics	Abstract	File Information
GRAV-D and the New Datums: Coming Your Way in 2022!	Vicki Childers	Vicki Childers	Theresa Damiani	2014/03/22	Tony Cheng Restaurant, Washington, DC	DC Association of Land Surveyors Spring Banquet	GRAV-D, New Datums	<a href="#">Show Abstract</a>	<a href="#">Download</a> (pptx) (32.68 MB)
NGS Update - Focus on Height Modernization	William Stone	William Stone		2014/03/14	Albuquerque, NM	New Mexico Professional Surveyors 2014 Conference	Height Modernization, geoid model, bench marks, GPSBM, datums, CORS, OPUS, GEOID12A	<a href="#">Show Abstract</a>	<a href="#">Download</a> (ppt) (69.98 MB)
NGS Products and Services Update	Brian Shaw	Brian Shaw		2014/02/25	Penn State Wilkes-Barre campus	Lambda Sigma Honor Society	NGS, Products, Services		<a href="#">Download</a> (ppt) (63.64 MB)
NGS Updates	David Zenk	David Zenk		2014/02/21	Bloomington, MN	Minnesota Society of Professional Surveyors	OPUS, GRAV-D, Leveling, GEOID Slope Validation	<a href="#">Show Abstract</a>	<a href="#">Download</a> (pdf) (3.34 MB)
National Geodetic Survey - Height Modernization Program	William Stone	William Stone		2014/02/21	St. George, UT	Utah Council of Land Surveyors 2014 Conference	geodesy, geoid models, GEOID12A, heights, GPSBMs, new datums, DSWorld, CORS, OPUS, Height Modernization	<a href="#">Show Abstract</a>	<a href="#">Download</a> (ppt) (68.03 MB)
NGS UPDATE	Dave Rigney	Dave Rigney		2014/02/21	Manistee, MI	Michigan Society of Professional Surveyors	Datums Product and Services	<a href="#">Show Abstract</a>	<a href="#">Download</a> (ppt) (17.62 MB)
Vertical Datums, Geoids: What you need to know	Pamela Fromhertz	Pamela Fromhertz		2014/02/20	Denver, CO	DRCOG	GIS, State Capitol Mile HI Marks, datums, geoids, new datums, National Surveyor Week		<a href="#">Download</a> (ppt) (15.86 MB)
Usage of GOCE Data with GRAV-D	Daniel Roman	Daniel Roman	Xiaopeng Li and Simon Holmes	2014/02/20	ESTEC, Noordwijk, The Netherlands	STSE-GOCE+ Height System Unification Final Meeting	ESA, GOCE, World Height System, GRAV-D	<a href="#">Show Abstract</a>	<a href="#">Download</a> (ppt) (4.62 MB)
Datums and Projections	Pamela Fromhertz	Pamela Fromhertz		2014/02/19	Golden, CO	Graduate Student of Geosciences Colorado School of Mines: Reservoir Characterization Project	NGS, NSRS, datums, geoids, new datums, projections, SPCS, UTM, National Surveyor Week		<a href="#">Download</a> (ppt) (17.88 MB)

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National Geodetic Survey

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[Upcoming Classes](#)  
[Past Classes](#)  
[Directions](#)  
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**NGS Workshop, Conference and Training Opportunities**  
There are several ways to learn more about or receive training on NGS products and tools.

**Workshops/Conferences**  
If you would like to attend a conference or workshop, [click here](#) to see if there is one scheduled for your area. If you would like to inquire about scheduling a workshop, [click here](#) to see if there is a State Advisor in your state. If so, he or she can assist you. If there is not a State Advisor in your state, or if you would like more information about the NGS Workshop program, please contact Erika Little, [erika.little@noaa.gov](mailto:erika.little@noaa.gov), or 540-373-1243.

**Training Classes**  
If you would like to learn about upcoming classes offered at NGS' Corbin Training Center located just south of Fredericksburg, VA, [click here](#) to see the upcoming schedule of classes. This page also lists web-based classes. All classes are free of charge.

**Online Learning Resources**  
To see a list of online learning resources, [click here](#).

**Contact Us**  
 Phone: (540) 373-1243  
 Fax: (540) 373-4327  
[Email Us](#)

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\* Required

Your email address \*

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 State government  
 Local government  
 Private company  
 Academia  
 Nonprofit organization  
 other

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Positioning America for the Future

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Announcements: New Version of the NOAA Shoreline Data Explorer Is No...

**Notices** June 23, 2014

**June 26, 2014: NGS Webinar Presentation "A Conversation with the National Geodetic Survey"** 06.06.2014

**NGS Hosts the North American Comparison of Absolute Gravimeters(NACA614), September 13-21, 2014** 05.15.2014

**Heartbleed Vulnerability Notice** 05.02.2014

**Popular GPS Positioning Service Is Enhanced: OPUS Projects** 01.28.2014

**In The News**

**06/19/2014 - National Geodetic Survey Officiates at Dedication of Historic Bilby Tower in Osgood, Indiana**  
In 1928, an inventive surveyor named Jasper S. Bilby, chief signalman of the U.S. Coast and Geodetic Survey (an NGS predecessor agency), designed the nation's first galvanized steel surveying towers...more

**06/12/2014 - Swiss Astrometric Camera Training Sets Stage for Summer Geoid Slope Validation Study**  
Visitors from the Geodesy and Geodynamics Lab of the Institute of Geodesy and Photogrammetry in Zurich, Switzerland, are providing training on the theory, software, and operation of a Compact Digital Astrometric Camera (CODIAC) May 27 to June 13 at NGS' Corbin Training Center. The Swiss scientists will also present talks to NGS and NOAA's National Ocean Service...more

**05/29/2014 - NGS Collaborates with Swiss Colleagues on Important Geodetic Survey**  
This week, the National Geodetic Survey (NGS) began hosting scientists from the Swiss Federal Institute of Technology as they train their NOAA counterparts to use a Compact Digital Astrometric Camera. The camera will be used in a NOAA survey project to validate the latest gravity surface model (called "the geoid")...more

**Previous NGS News Stories**

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subscribe NGS.news

Shortly after sending your "subscribe NGS.news" message, you will receive an automated reply from the mailing list service with a subject line similar to: Subscribe NGS.news Confirm 111111 {where 111111 is a random number assigned to your request}. The email will instruct you to confirm your request by replying to the confirmation message.

You will receive one final message welcoming you to the NGS News mailing list. The email will include a help message explaining how to get help and how to unsubscribe from the list.

# What's Next for Geodetic Datums?



[https://www.youtube.com/playlist?list=PLsyDI\\_aqUTdFY6eKURmiCBBk-mP4R10Dx](https://www.youtube.com/playlist?list=PLsyDI_aqUTdFY6eKURmiCBBk-mP4R10Dx)

# Attend a Monthly Webinar



## NGS Webinar Series

National Geodetic Survey

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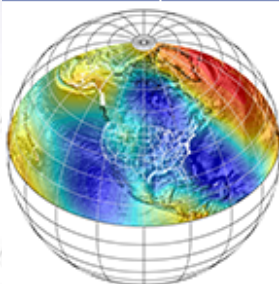
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### Webinar Series Quick Links

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[Recorded Webinars](#)

[Frequently Asked Questions \(FAQ\)](#)

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**Geodetic  
Datums**

### Overview

Each month, a speaker will give a presentation on various topics related to NGS programs, projects, products and services to educate constituents about NGS activities.

Webinars are held on the second Thursday of every month, from 2:00-3:00 p.m. East Coast time. You can register for any presentation on the **"Upcoming Webinars" page**, and you can **sign-up to receive a monthly notice** describing the upcoming presentation.

This webinar series is a continuation of **monthly presentations sponsored by the National Height Modernization Program**, and you can download previous presentations from the Program's online meeting archive.

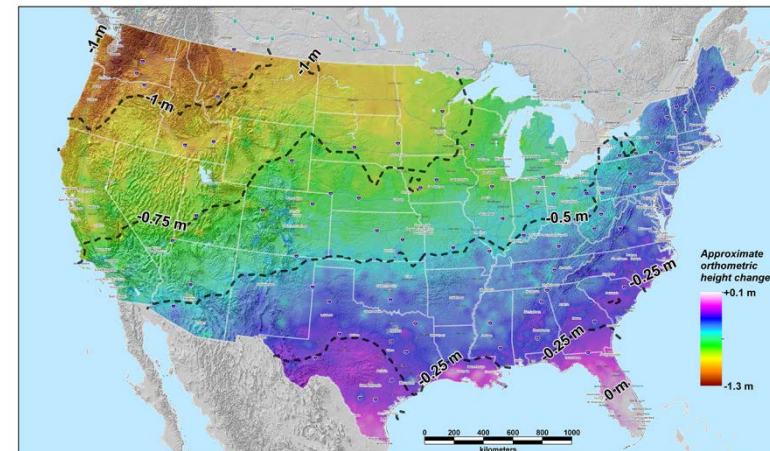
Many additional NGS resources are available online, including:

- **Continuously Operating Reference Station (CORS) weekly newsletter archive**
- **Ecosystem and Climate Operations newsletter archive**
- **Educational videos**
- **Height Modernization monthly meeting archive**
- **Online Learning Resources** (e.g. recorded webinars and online training modules)
- **Presentation library**

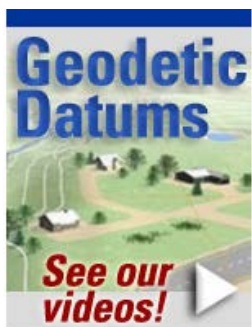
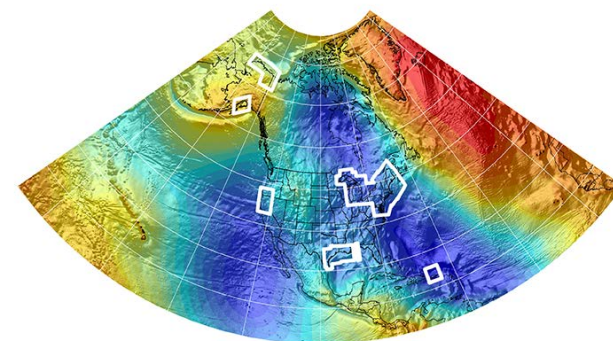
# New Datums Are Coming in 2022!

- NOAA's National Geodetic Survey will release new geometric (horizontal) and geopotential (vertical) datums in 2022
- The realization of the new datums will be through GPS/GNSS receivers and will replace the current datums:
  - NAD 83 (geometric) and NAVD 88 (geopotential)
- Target: 2-centimeter accuracy relative to sea level (orthometric heights) using GPS/GNSS and a geoid (gravity) model from NGS' GRAV-D project.
- NGS will provide the tools to easily transform between the new and old datums.

Approximate predicted change from NAVD88 to new vertical (geopotential) datum



Predicted change estimated as NAVD88 "zero" (datum) surface minus NGS gravimetric geoid



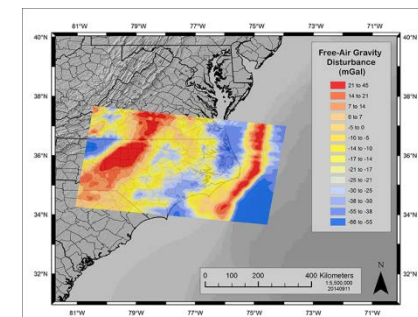
## MORE INFO:

April 13-14 DC Area Geospatial Summit:

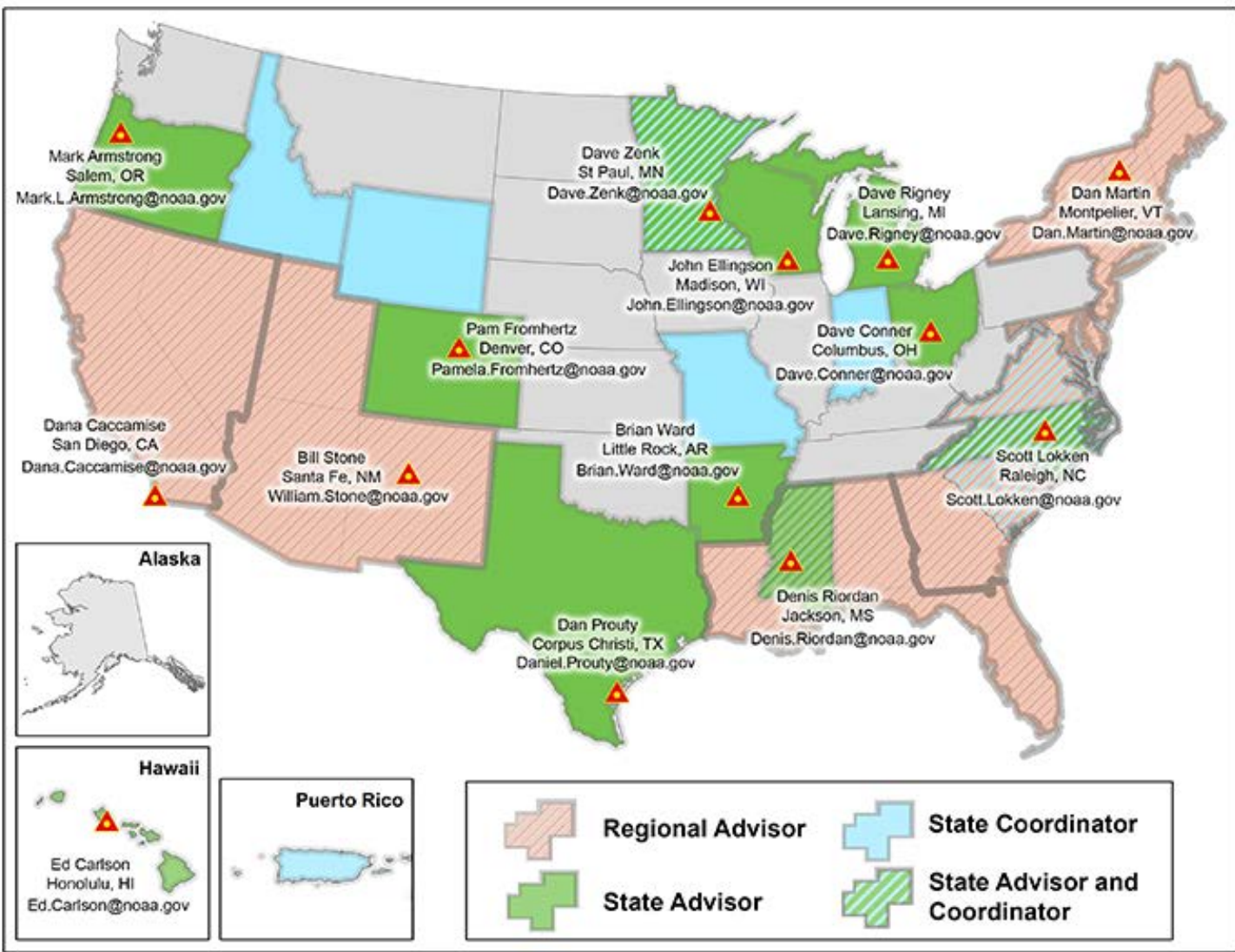
<http://www.geodesy.noaa.gov/2015GeospatialSummit/>

New Datums Webpage and Videos:

<http://www.geodesy.noaa.gov/datums/newdatums/NewDatums.shtml>



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in the West...

AZ, NM, UT

**Bill Stone**

CO

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OR

**Mark Armstrong**

CA, NV

**Dana Caccamise**

WY

**Mike Londe**

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