



NSRS Modernization New Datums are Coming in 2022

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What's Being Replaced?

Horizontal

- NAD 83(2011)
- NAD 83(PA11)
- NAD 83(MA11)

Latitude
Longitude
Ellipsoid Height
State Plane Coordinates

Vertical

- NAVD 88
- PRVD 02
- VIVD09
- ASVD02
- NMVD03
- GUV D04
- IGLD 85

Heights

Nomenclature

- A chance to increase accuracy in **naming!**
 - “North American”?
 - Ignores Guam, Hawaii, American Samoa, Northern Mariana Islands
 - Datum vs. Reference Frame?
 - Plate-specific?
 - Vertical vs. Geopotential?
- 6/8/2016: NGS and the Canadian Geodetic Survey (CGS) negotiated a naming proposal
 - Approved by the NGS Executive Steering Committee
 - Approved by the CGS leadership (with minor reservations)
- Early 2017:
 - Approved by the Mexico's INEGI

(DRUM ROLL Please)

New Reference Frame Names

NAD 83 becomes:

- North American Terrestrial Reference Frame (NATR2022)
- Caribbean Terrestrial Reference Frame (CTRF2022)
- Mariana Terrestrial Reference Frame (MTRF2022)
- Pacific Terrestrial Reference Frame (PTRF2022)

NAVD88 becomes:

- North American-Pacific Geopotential Datum of 2022 (NAPGD2022)

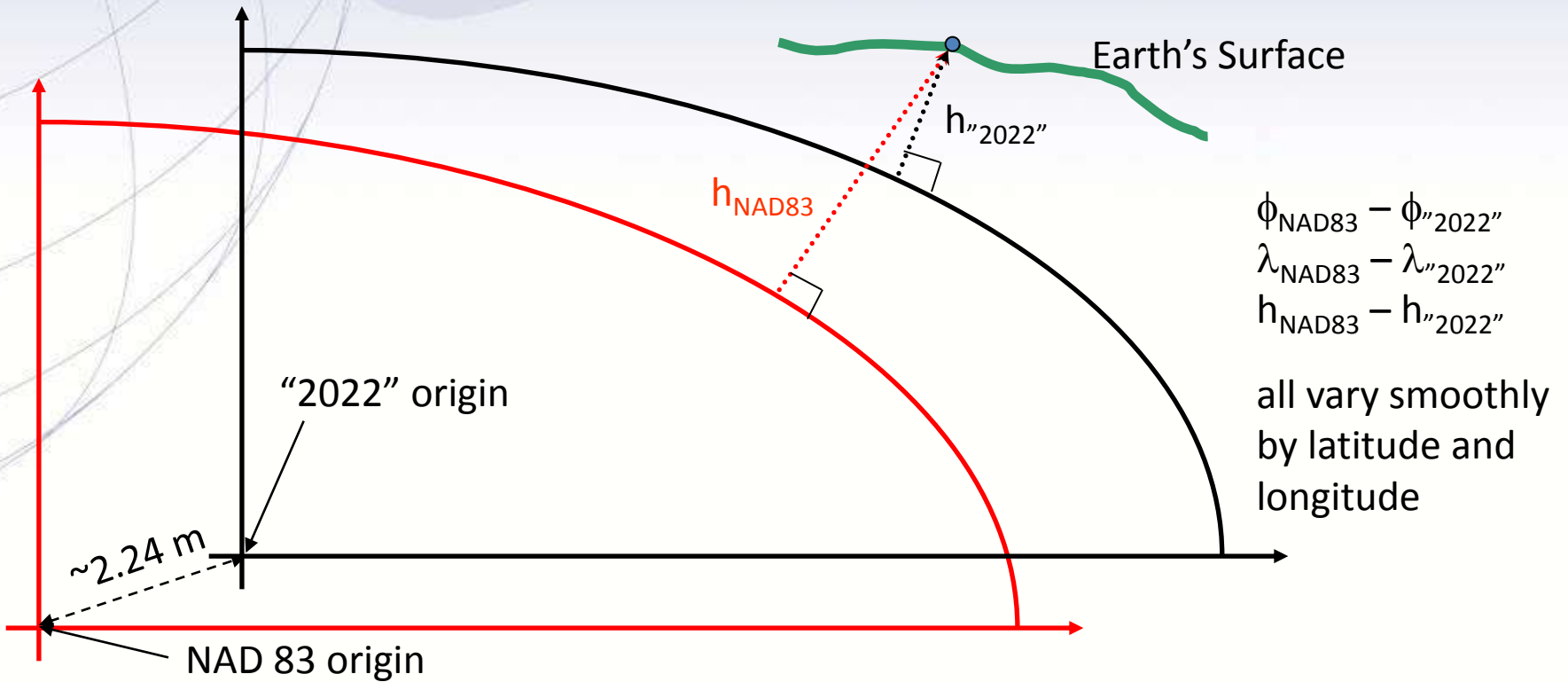
(Realized by GEOID2022)

Legislation

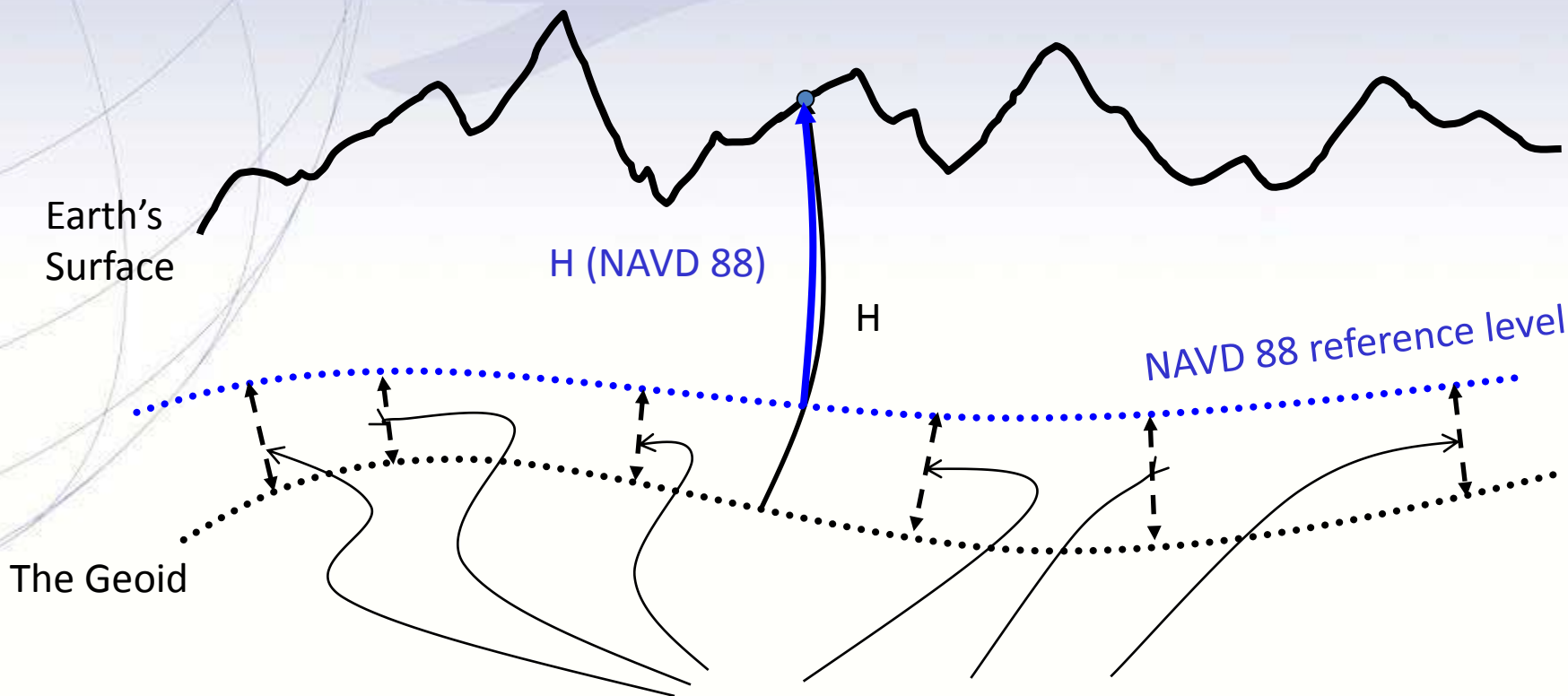
- When NAD 83 replaced NAD 27, the Federal NSRS users were required to switch to NAD 83
- Through the 1980s and 1990s NGS worked with the *states* to update their laws
 - To encourage use of the new system beyond the feds
- 48 states now have laws that refer to NAD 83 *by name*
 - A name which will be *retired* in 2022

Replace NAD 83

Simplified concept of NAD 83 vs. "2022"



Replace NAVD 88



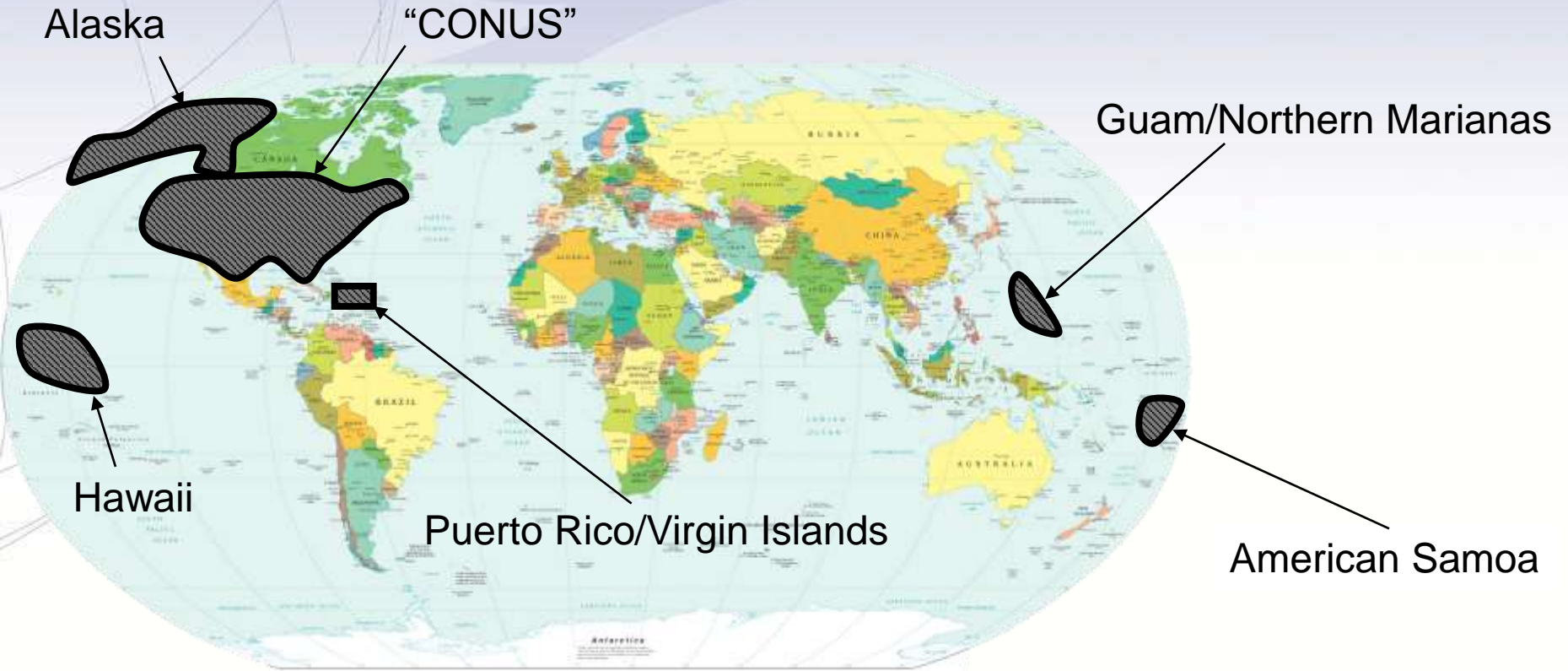
Errors in NAVD 88: ~50 cm average, 100 cm CONUS tilt, 1-2 meters average in Alaska, NO tracking

Replace NAVD 88

- Changing from a leveling-based to a geoid/GNSS-based vertical datum
- Biggest requirement: An updated, accurate, nationwide gravity survey
 - Airborne
 - GRAV-D!
 - **G**ravity for the **R**edefinition of the **A**merican **V**ertical **D**atum



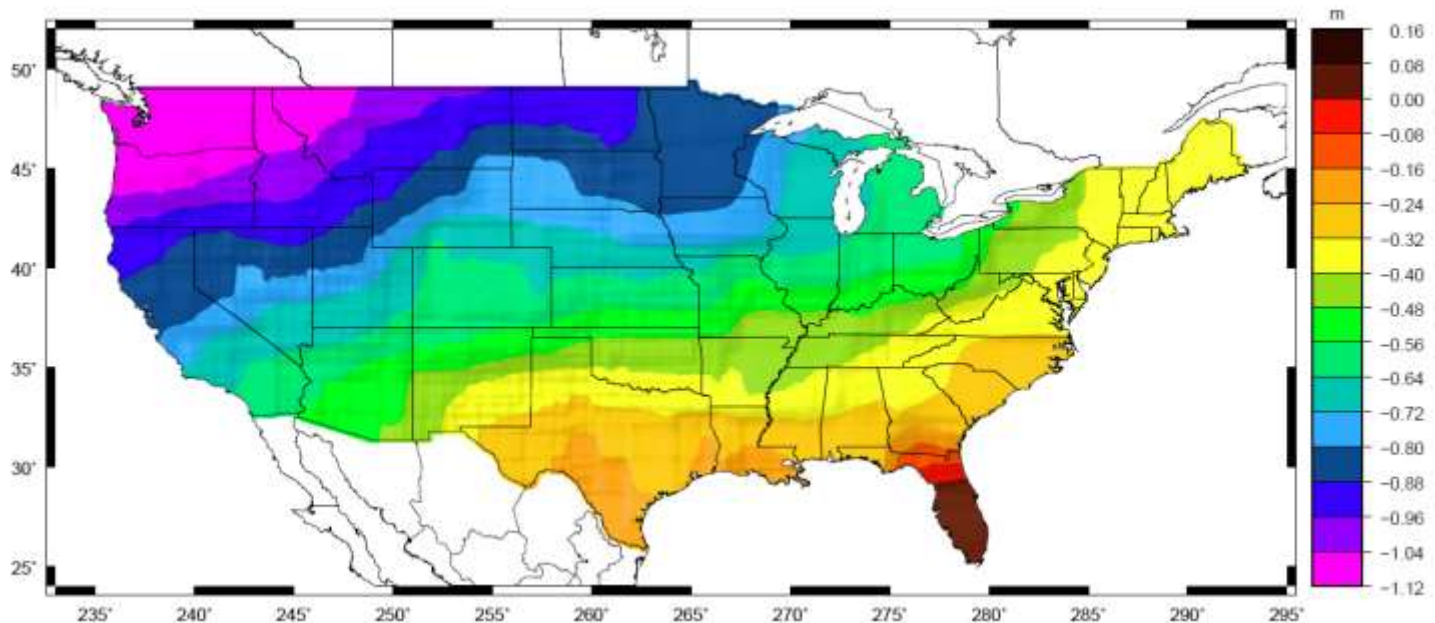
GRAV-D Coverage



Orthometric Heights

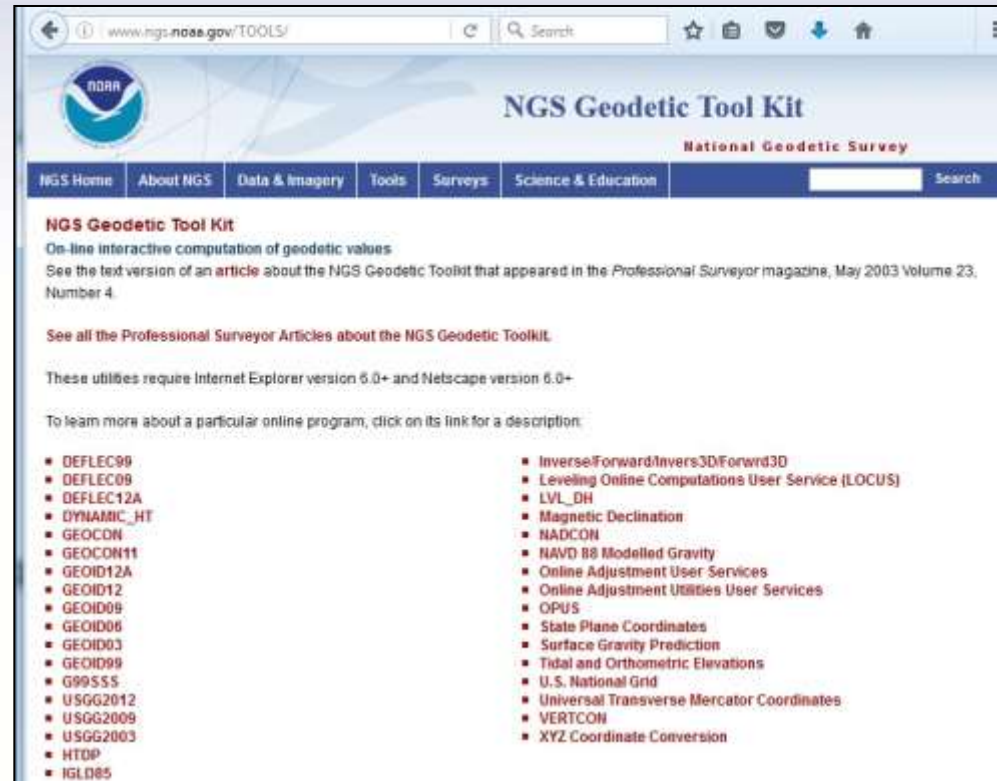
Approximate EXPECTED SHIFTS

- Approximate level of geoid mismatch known to exist in the NAVD 88 zero surface
- Does not include local subsidence issues



NGS Toolkit

- A set of (mostly FORTRAN-based) geodetic tools
- Little integration
- Many with no online capability
- No web services



The screenshot shows the NGS Geodetic Tool Kit website. The browser address bar displays "www.ngs.noaa.gov/TOOLS/". The page features the NOAA logo and the title "NGS Geodetic Tool Kit" with the subtitle "National Geodetic Survey". A navigation menu includes links for "NGS Home", "About NGS", "Data & Imagery", "Tools", "Surveys", and "Science & Education". The main content area is titled "NGS Geodetic Tool Kit" and describes it as an "On-line interactive computation of geodetic values". It includes a link to an article from the Professional Surveyor magazine and a note about browser requirements (Internet Explorer 6.0+ and Netscape 6.0+). A list of tools is provided, including DEFLEC99, DEFLEC09, DEFLEC12A, DYNAMIC_HT, GEOCON, GEOCON11, GEOID12A, GEOID12, GEOID09, GEOID06, GEOID03, GEOID99, G99555, USGG2012, USGG2009, USGG2003, HTDP, IGLD85, Inverse/Forward/Invers3D/Forwrd3D, Leveling Online Computations User Service (LOCUS), LVL_DH, Magnetic Declination, NADCON, NAVD 88 Modelled Gravity, Online Adjustment User Services, Online Adjustment Utilities User Services, OPUS, State Plane Coordinates, Surface Gravity Prediction, Tidal and Orthometric Elevations, U.S. National Grid, Universal Transverse Mercator Coordinates, VERTCON, and XYZ Coordinate Conversion.

New Toolkit

<http://beta.ngs.noaa.gov/gtkweb/>

The screenshot shows the NOAA BETA Coordinate Conversion web application. The page title is "BETA Coordinate Conversion" and it is part of the National Geodetic Survey. The navigation menu includes "NGS Home", "About NGS", "Data & Imagery", "Tools", "Surveys", and "Science & Education". The "Tools" menu is expanded, showing options: "Conversion from lat-long", "Conversion to lat-long", "Conversion of multiple coordinates", "Web services", and "Downloads". The "Conversion from lat-long" option is selected. The main content area is titled "Choose a location to generate projected coordinates" and offers two methods: "Enter decimal degrees" and "or drag map marker". Under "Enter decimal degrees", there are input fields for "Lat" (37.393300000) and "Lon" (-82.459040000). Under "or degrees-minutes-seconds", there are input fields for "Lat" (N, 37-23-35.880000) and "Lon" (W, 092-27-32.544000). A map of the region around Springfield, MA, is displayed on the right, with a red pin marker indicating the location.

- Convert to/from latitude and longitude
 - State Plane Coordinates
 - UTM
 - US National Grid
- Upload file of points
- Web service
- Download and run offline

NADCON 5

- Replacing NADCON 4.2 and GEOCON 2.0
- Support for nearly all horizontal datums since 1897
 - Exceptions: Regional Alaska
- No “state by state” grids
- Fixing all existing bugs
- Web service
- Consistent
- Documented
- Rigorous location-dependent error estimates
- **Ready to support 2022**

Toolkit Future

The entire NGS Toolkit will be integrated eventually

- VERTCON 3.0
- HTDP
- VDatum
- All other tools

Summary

NSRS Modernization

- More than just replacing NAD 83 and NAVD 88
- Affects most tools, products and services of NGS
- Dozens of interdependent, multi-year projects ongoing
- Expect rollouts and announcements throughout the next 6 years!

To Learn More

Visit the New Datums web page

New Datums
National Geodetic Survey

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

September 28, 2016

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.

What to Expect **Get Prepared**
Related Projects **Track Our Progress**
Watch Our Videos **Learn More**

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 2.2 meters. Secondly, NAVD 88 is both biased (by about one-half meter) and tilted (about 1 meter coast

New Datums Quick Links
Home
What to expect
Get prepared
Track our progress
Related projects
Watch videos
Learn more
New Datums FAQ
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Sign up for list-serve

Events
2017 Summit
2015 Summit

FAQs
Frequently asked questions

NGS 2017 Geospatial Summit
April 24-25

Geodetic Datums
See our videos!

geodesy.noaa.gov/datums/newdatums/index.shtml

To Learn More Attend the Geospatial Summit



The screenshot shows the NOAA National Geodetic Survey website for the 2017 Geospatial Summit. The page features the NOAA logo, a navigation menu with links to NGS Home, About NGS, Data & Imagery, Tools, Surveys, and Science & Education, and a search bar. The main content area is titled "2017 Geospatial Summit" and includes a "Save the Date" section. A circular graphic on the left shows a globe with the text "2017 GEOSPATIAL SUMMIT" and "APRIL 24th & 25th". The "Save the Date" section states that the summit will be held in Silver Spring, Maryland, on April 24-25, 2017. It also provides information about the summit's focus on the modernization of the National Spatial Reference System (NSRS) and the replacement of the North American Datum of 1983 (NAD 83) and the North American Vertical Datum of 1988 (NAVD 88) in 2022. A sidebar on the left contains links to the 2017 Summit Home, Logistics, FAQs, and Related Links, including the NGS 10-year plan, 2015 and 2010 Summit Proceedings, and the New Datums Web page.

2017 Geospatial Summit

Save the Date

On April 24-25, 2017 we will host the 2017 Geospatial Summit in Silver Spring, Maryland.

The 2017 Geospatial Summit will provide updated information about the planned modernization of the National Spatial Reference System (NSRS). Specifically, NGS plans to replace the North American Datum of 1983 (NAD 83) and the North American Vertical Datum of 1988 (NAVD 88) in 2022.

The Summit will provide an opportunity for NGS to share updates and discuss the progress of projects related to NSRS Modernization. NGS also looks forward to hearing feedback and collecting requirements from its stakeholders across the federal, public and private sectors. This event will also help continue discussions from previous Geospatial Summits held in 2010 and 2015.

Additional information about the 2017 Geospatial Summit will be posted online. In the coming months, NGS will update the web-page with information about the agenda, registration options, **logistics** and **frequently asked questions**. If you have questions or comments, **contact us**.

2017 Summit Home
[Logistics](#)
[FAQs](#)

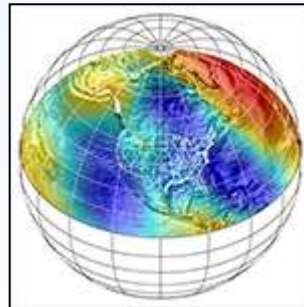
Related Links
[NGS 10-year plan](#)
[2015 Summit Proceedings](#)
[2010 Summit Proceedings](#)
[New Datums Web page](#)

- Silver Spring, MD
- April 24-25, 2017
- FREE

geodesy.noaa.gov/geospatial-summit/index.shtml

What are we doing to prepare for the new datums (reference frames) in 2022

- Created a 2022 Datum Working Group to develop implementation recommendations
- Partnering with UNCC on a grant proposal (National Science Foundation) to purchase an absolute and relative gravity meter (**grant proposal has been submitted**)
- Working with SC Geodetic Survey to develop common implementation plans

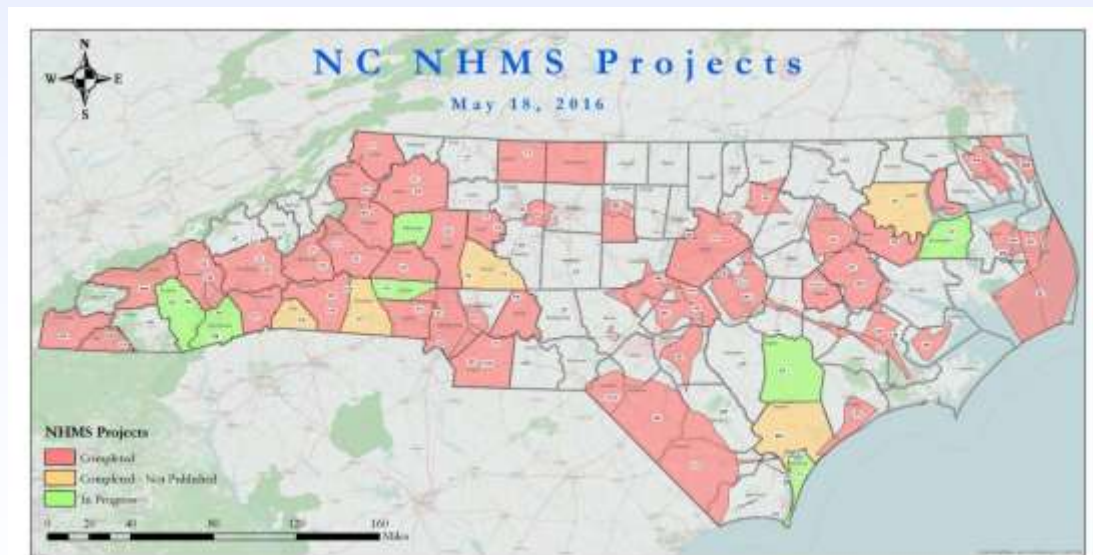


North Carolina Emergency Management



What are we doing to prepare for the new datums (reference frames) in 2022

- Potential future grant proposal would involve obtaining gravity data from airborne IMU's (during imagery or LiDAR data collection)
- Obtaining precise ellipsoidal heights on NAVD88 bench marks (Height Modernization surveys)



Benchmarks with GNSS Observations in and near NC



Legend

- NC
- SC or VA
- Rejected Benchmark



North Carolina Emergency Management





QUESTIONS?