Geodetic Control/2022 Reference Frame

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)

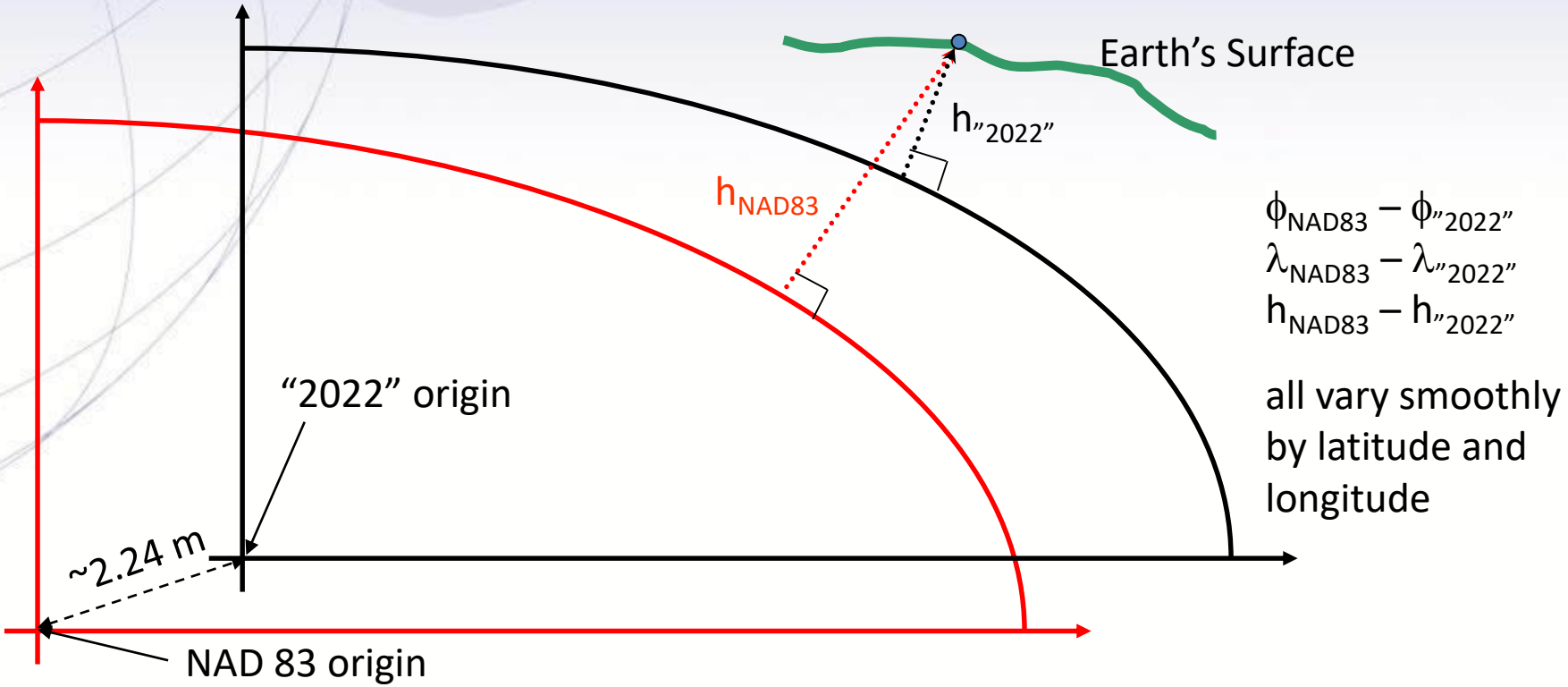
NAVD88 becomes:

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

(Realized by GEOID2022)

Replace NAD 83

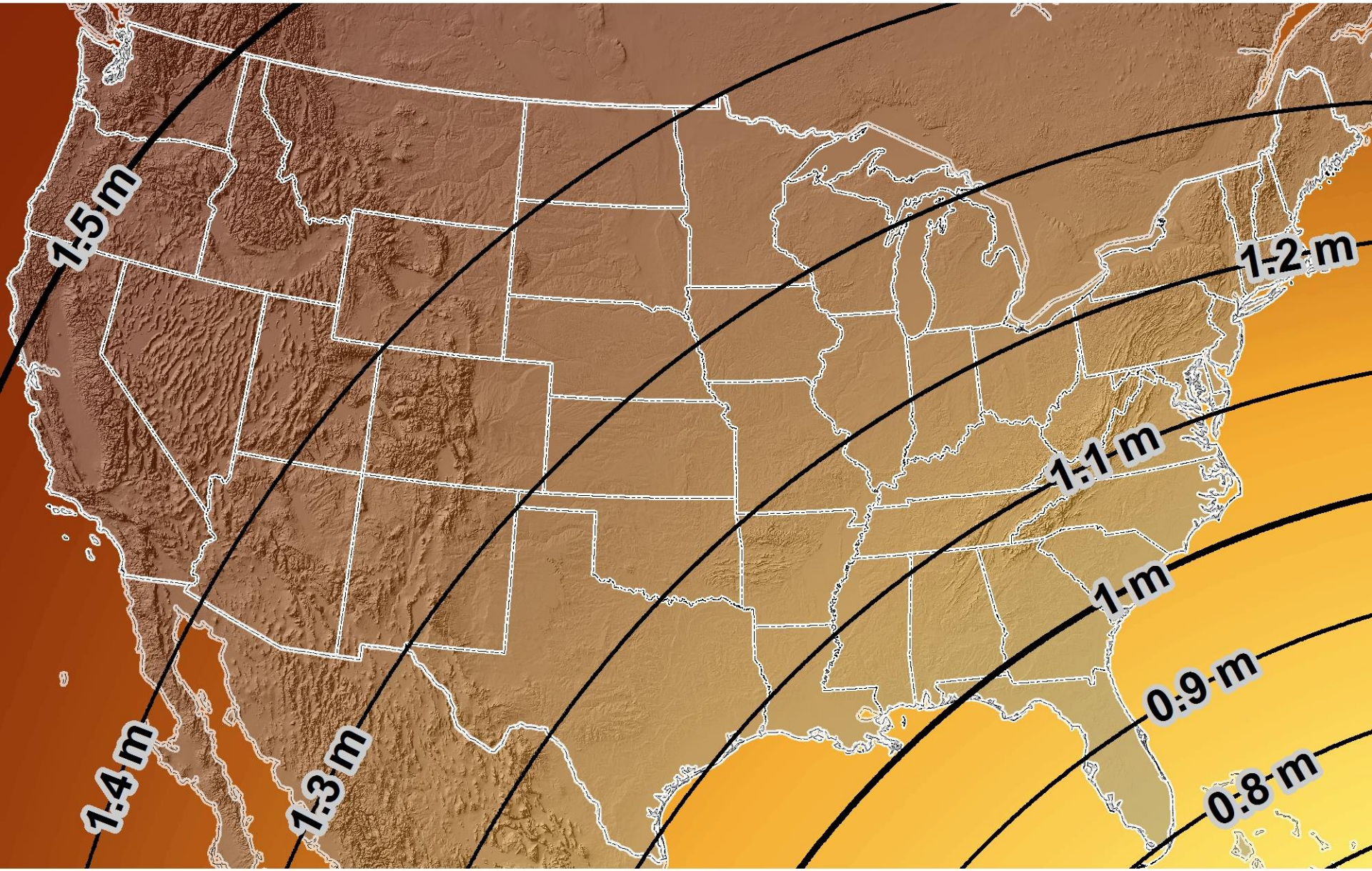
Simplified concept of NAD 83 vs. "2022"



$\phi_{NAD83} - \phi_{"2022"}$
$\lambda_{NAD83} - \lambda_{"2022"}$
$h_{NAD83} - h_{"2022"}$

all vary smoothly by latitude and longitude

Estimated horizontal change from NAD 83 to new geometric datum



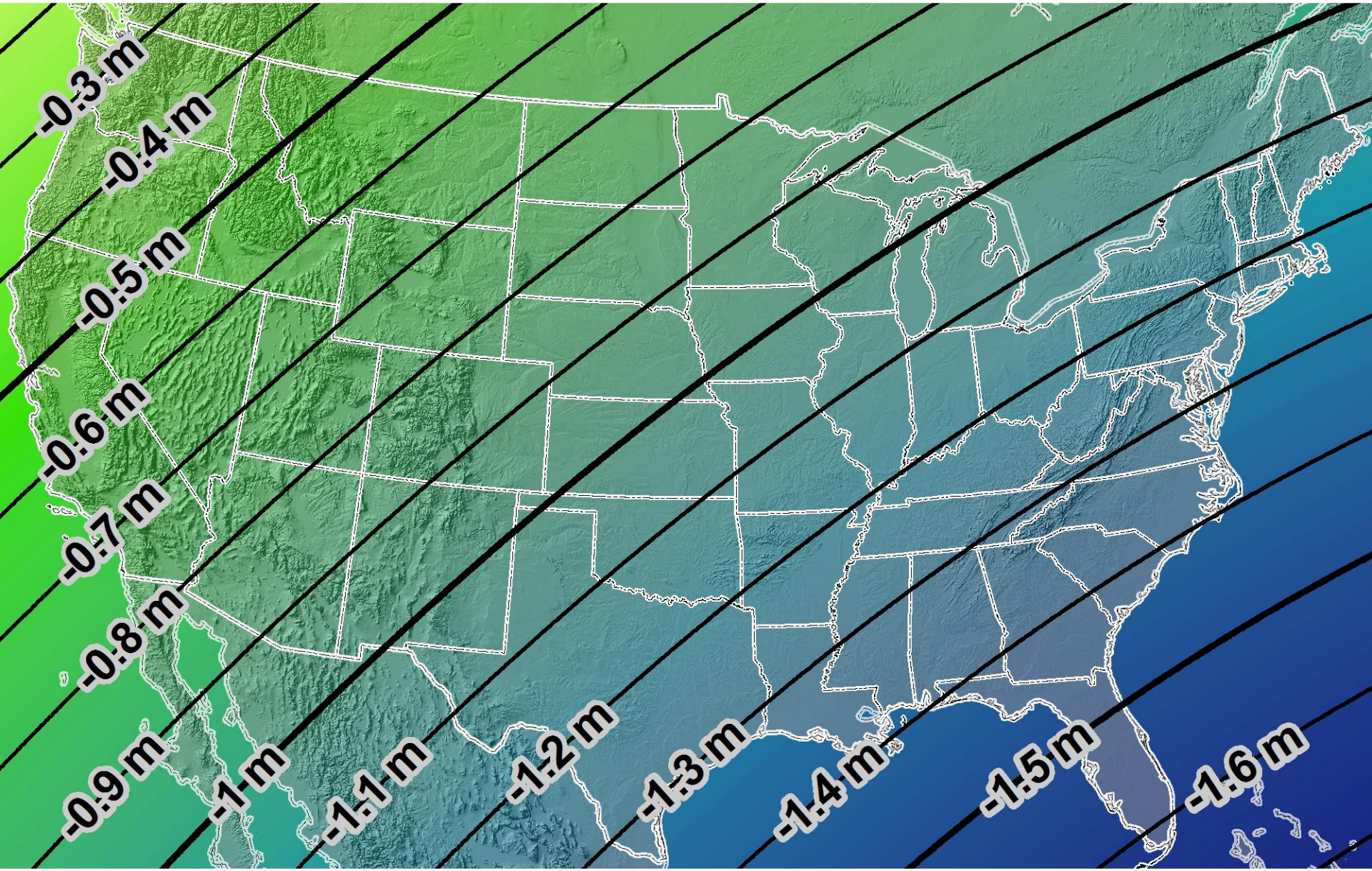
0 500 1000 km

April 5, 2017

Northern Chester PLSC

Delta Horizontal = (ITRF 05) minus (NAD 83) at 2020.0

Estimated ellipsoid height change from NAD 83 to new geometric datum

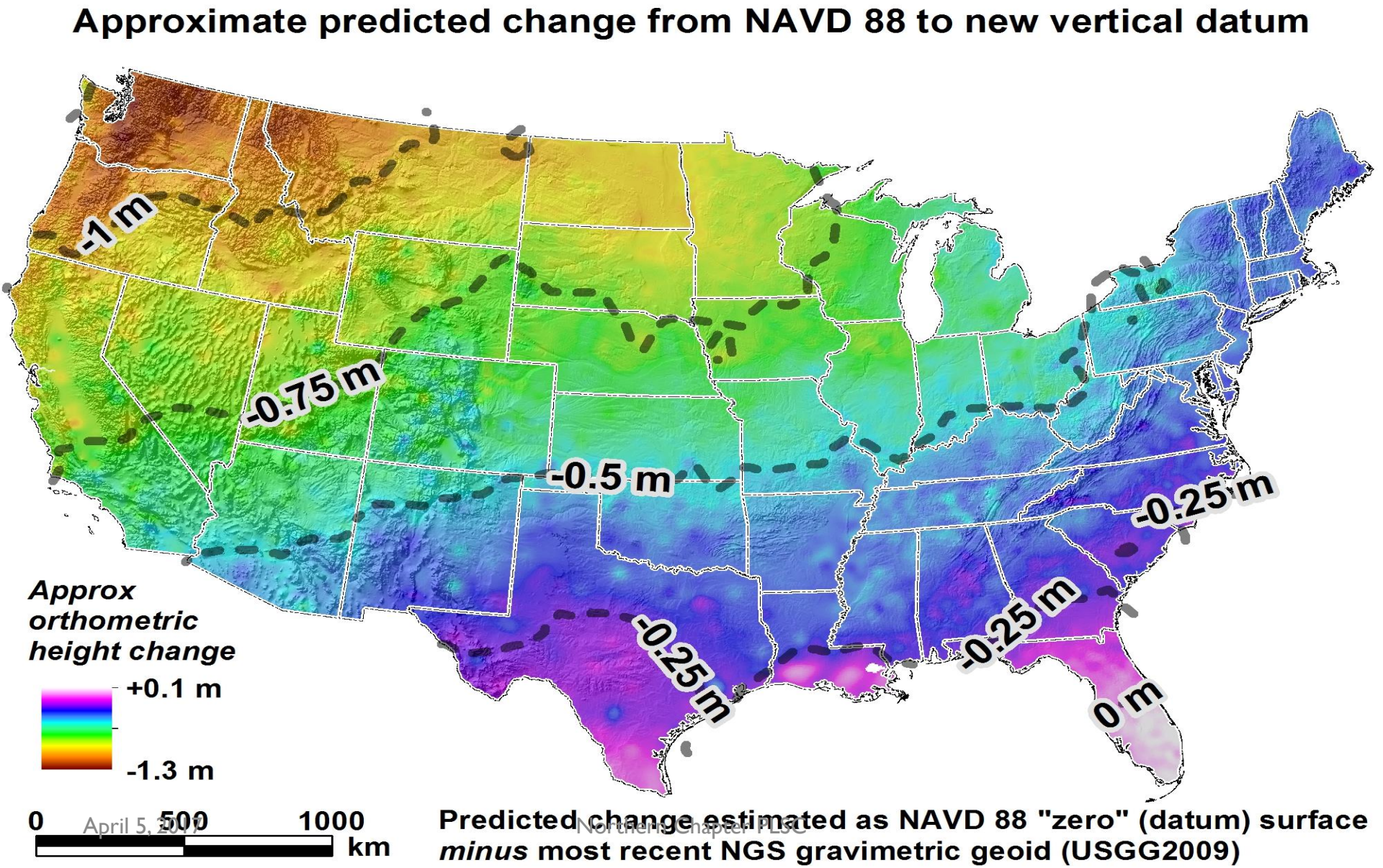


April 5, 2017

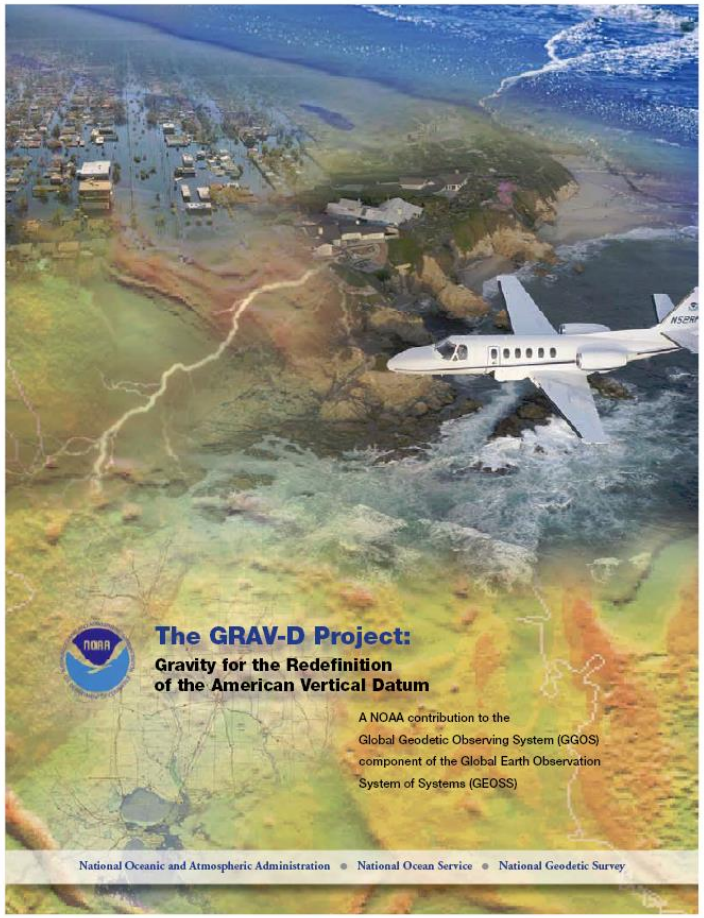
Northern Chapter PLSC

Delta h = h(ITRF 05) minus h(NAD 83) at 2020.0

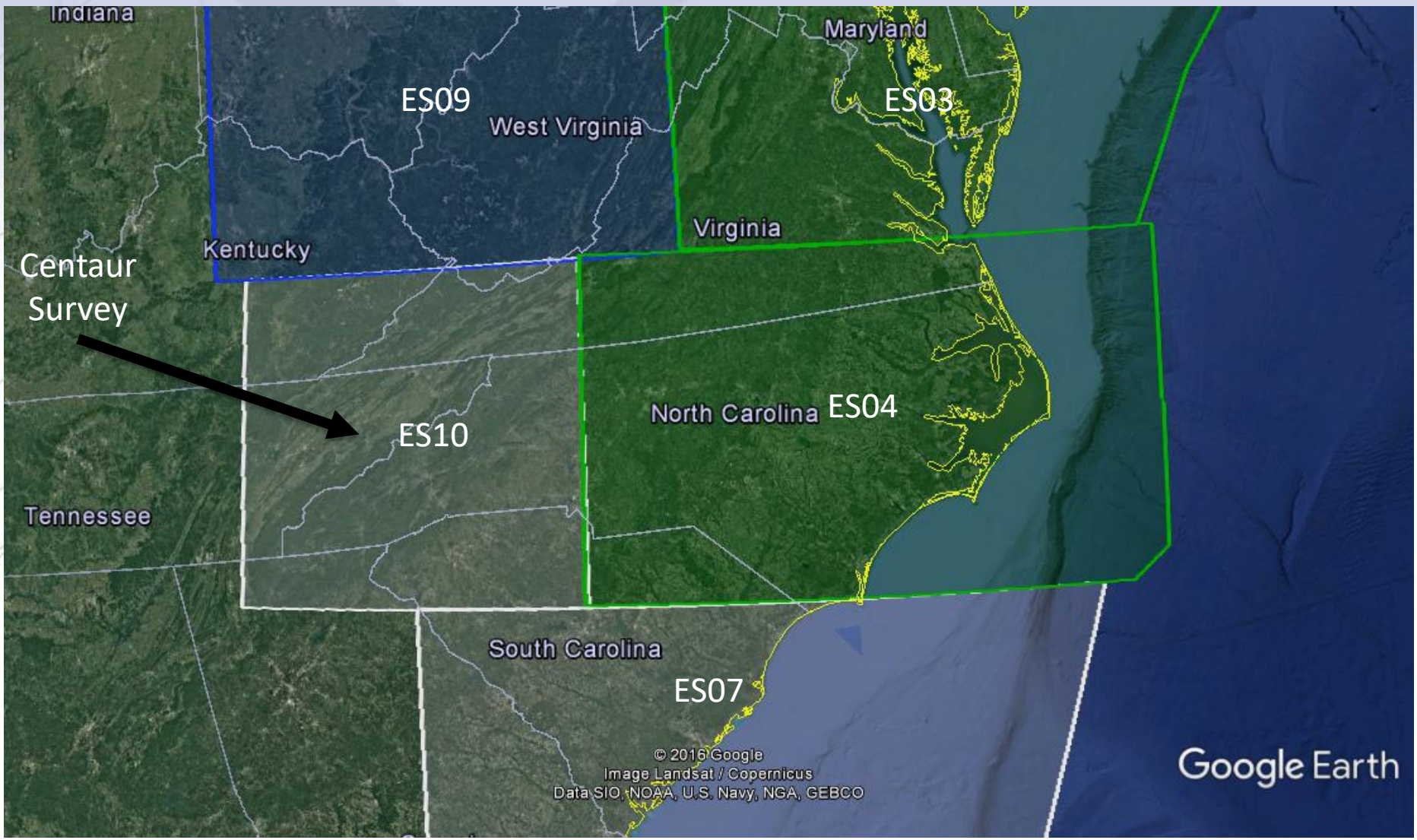
New Vertical Datum



GRAV-D Project Overview



- **Overall Target**: 2 cm accuracy orthometric heights from GNSS and a geoid model
- **GRAV-D Goal**: Create gravimetric geoid accurate to 1 cm where possible using airborne gravity data
- **GRAV-D**: Two thrusts of the project
  - Airborne gravity survey of entire country and its holdings
  - Long-term monitoring of geoid change


Indiana
ES09
West Virginia
Maryland
ES03
Virginia
Kentucky
Centaur
Survey
ES10
North Carolina
ES04
Tennessee
South Carolina
ES07
© 2016 Google
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google Earth

Modes of Operation - Hybrid

Hybrid Mode: Fly like a UAV, but a "hands-off" safety pilot is on-board the aircraft – control of the vehicle is from the ground station

Operational Benefits:

- Allows use of the aircraft in restricted airspace with UAV control
  - Realistic unmanned testing can be performed almost anywhere (Ex: Testing Sense-n-Avoid technologies and airspace integration capabilities)
  - Realistic UAV training can be performed almost anywhere
  - Eliminates need for a COA or the expense of a controlled range location to operate
  - Robot can fly aircraft during dull missions to take stress off pilot (Ex: Large area geo mapping in a "lawn mowing" pattern is extremely dull.)

Installation

Relative and Absolute Gravity Meters

County/State Boundaries

County Boundary Surveys in Progress

Plats Recorded

- Mitchell – Yancey
- Greene - Lenoir

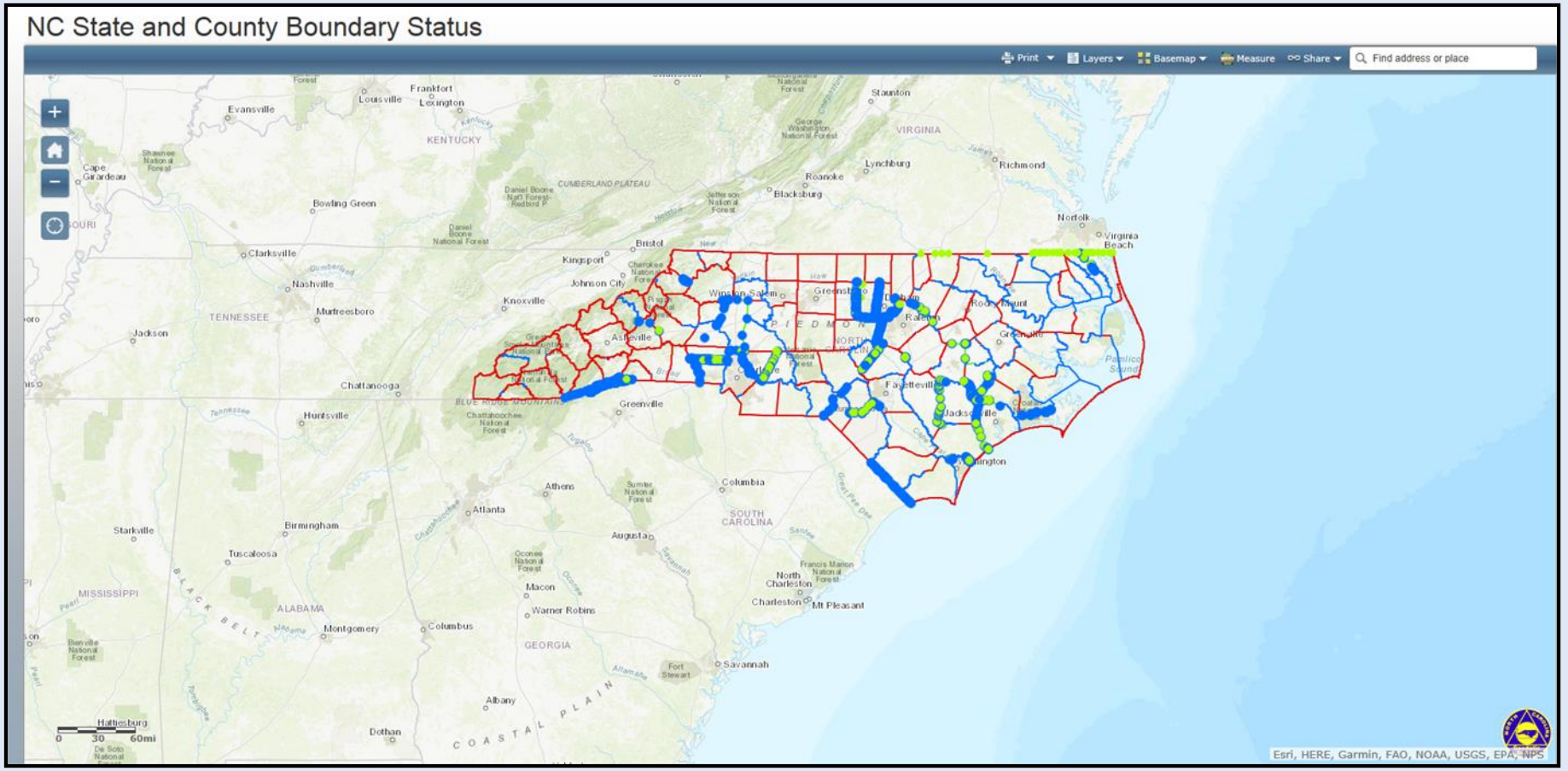
Report submitted to the counties

- Alamance – Guilford
- Hoke – Robeson
- Cabarrus – Rowan
- Chatham – Harnett – Wake
- Union – Mecklenburg
- Harnett – Wake
- Chatham – Harnett

County Boundary Surveys in Progress

Projects in progress

- Davie – Yadkin
- Jackson - Macon
- Bladen – Columbus – Brunswick
- Granville – Franklin
- Polk – Rutherford
- Chowan - Perquimans



DEPARTMENT OF PUBLIC SAFETY

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North Carolina Emergency Management

EMERGENCY MANAGEMENT NORTH CAROLINA

NC – VA Boundary

How did North Carolina get its shape?

- **North Carolina/Virginia boundary**
  - In 1728 by his Majesty's Order, assented to by the Lords Proprietors [appointed rulers], *"The Dividing Line"* was to be surveyed, *"that neither the King's Grants may hereafter encroach upon the Lords Proprietors, nor theirs on the Right of his Majesty."*
  - William Byrd's crew surveyed the line in 1728, but ran into a few issues: