NOAA's National Geodetic Survey

Update

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AEC Summit

Some updates since last we met…

- OPUS-Projects
- GRAV-D and new experimental geoid models
- Geoid Slope Validation Survey of 2014 (GSVS14)
- NGS 58/59 update project
- GPS on bench marks campaign
- Transformation tools

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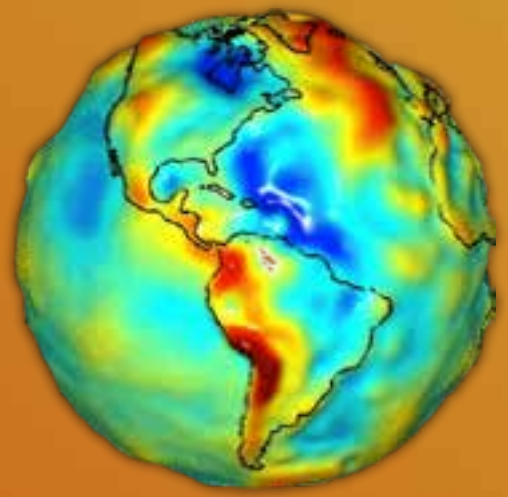
NGS Mission Statement

To define, maintain and provide access to the National Spatial Reference System (NSRS) to meet our nation's economic, social, and environmental needs.

The **NSRS** is a consistent coordinate system that defines latitude, longitude, height, scale, gravity, and orientation throughout the United States.



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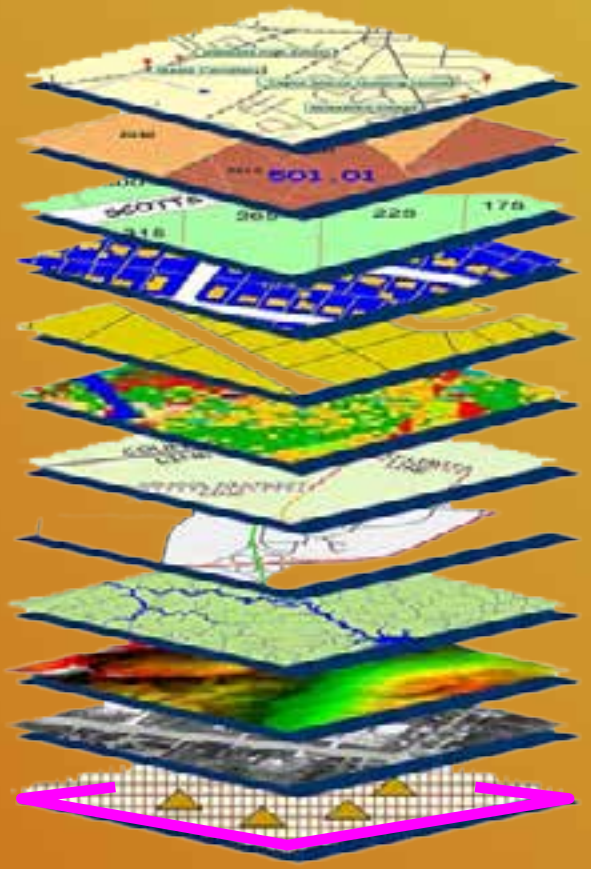
Accurate positioning begins with *accurate* coordinates

geodetic control (the NSRS) is the foundation for all geospatial products.

without Geodetic Control as a “base map” layer, GIS applications will not work properly

Source: Zurich-American Insurance Group



The NGS-defined NSRS provides the Geospatial Infrastructure essential to our economy

Precision Agriculture

Aviation

Satellite Operations

Trucking & Shipping

Surveying & Mapping

Disaster Response

Personal Navigation

Oil Exploration

Fishing & Boating

The NSRS Supports:

National Oceanic and Atmospheric Administration

NSRS positioning data provides the reference for NOAA's **Nautical Charts**, among many other geospatial applications

Federal Emergency Management Agency

FEMA uses NSRS elevations to determine flood zones for the **National Flood Insurance Program**

United States Army Corps of Engineers

USACE uses NSRS elevations to determine levee heights and positions in their **Levee Safety Program**

United States Geological Survey

USGS uses the NSRS to geospatially reference their **Topographic Maps and interior water data for the nation**

National Geospatial Intelligence Agency

NSRS gravity data contributes to the geospatial mission of NGA

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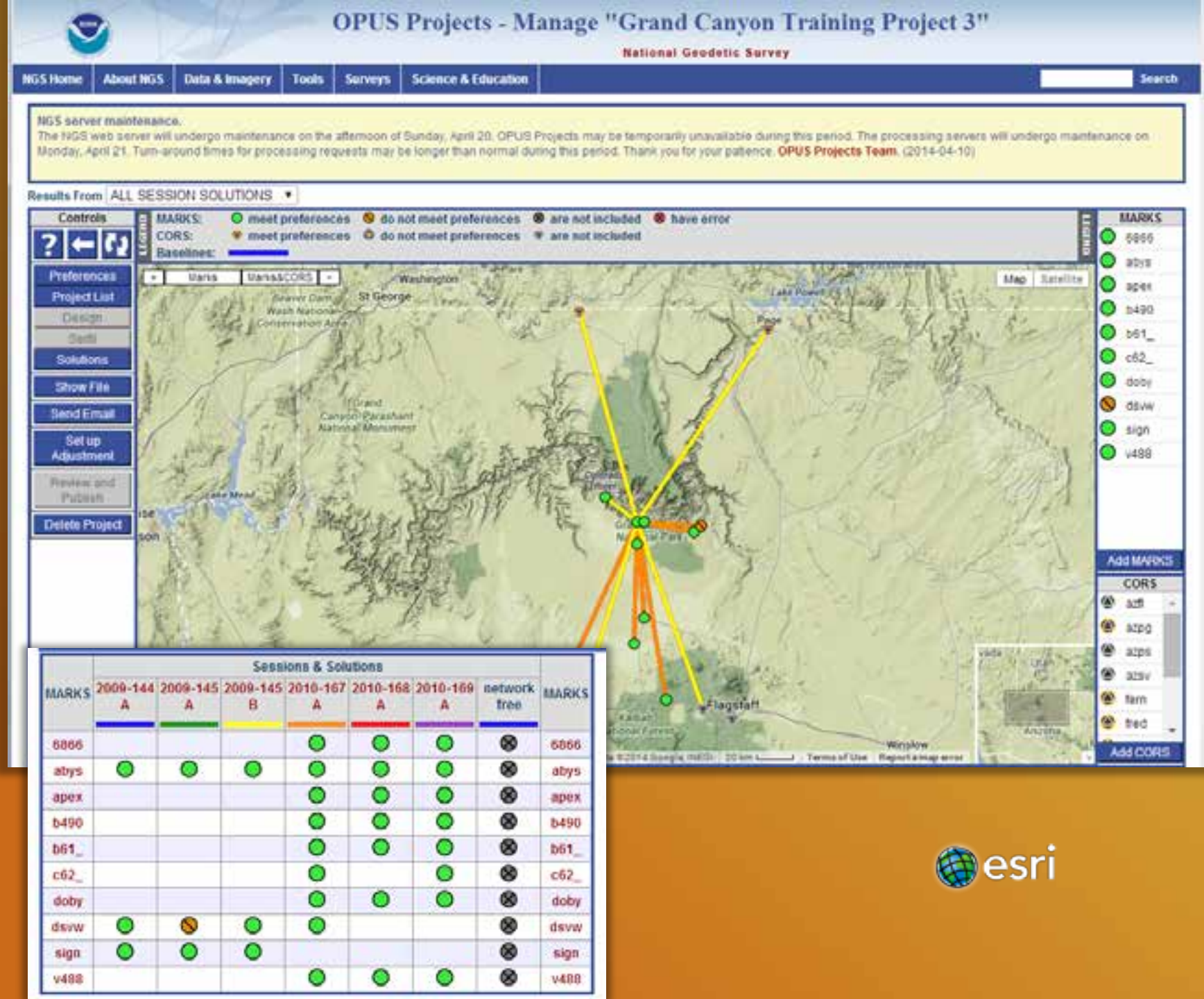
OPUS-Projects

- Officially operational Jan 2014
- Enhancement to OPUS-Static
- Network solution of GPS data from multiple receivers and occupations
- Intuitive graphical user interface
- Requires attending training to get access



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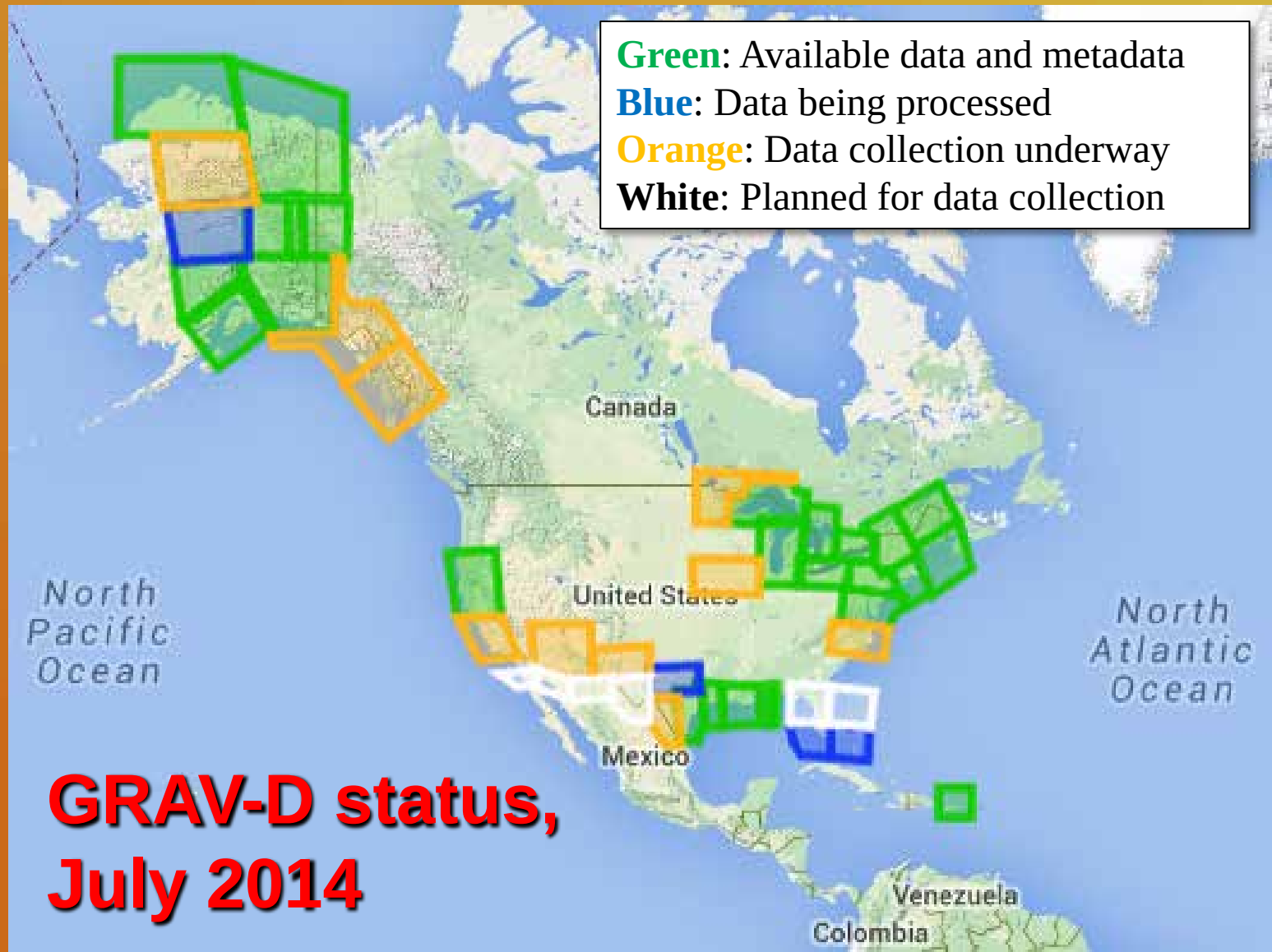
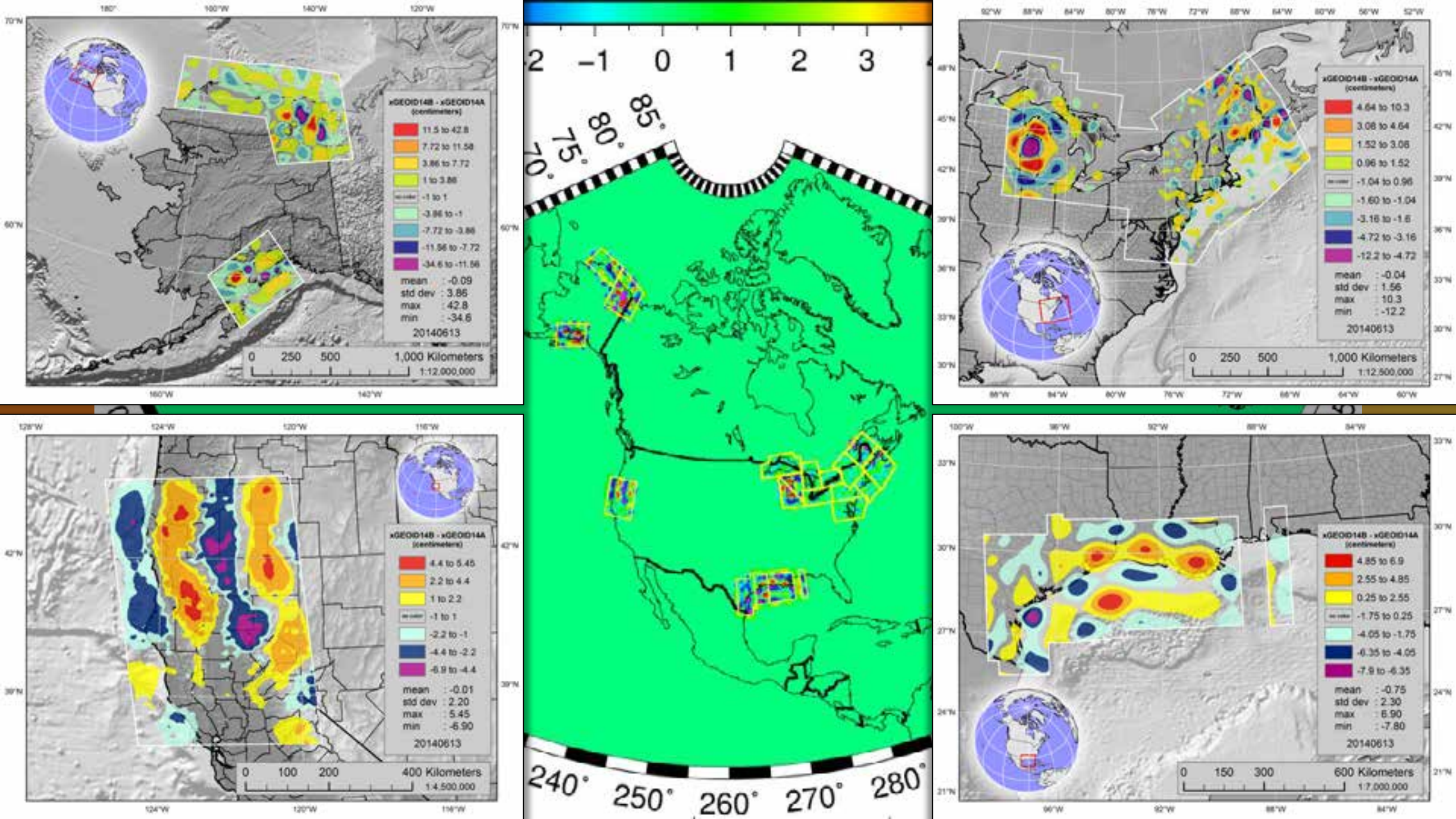
GRAV-D and new experimental geoid models

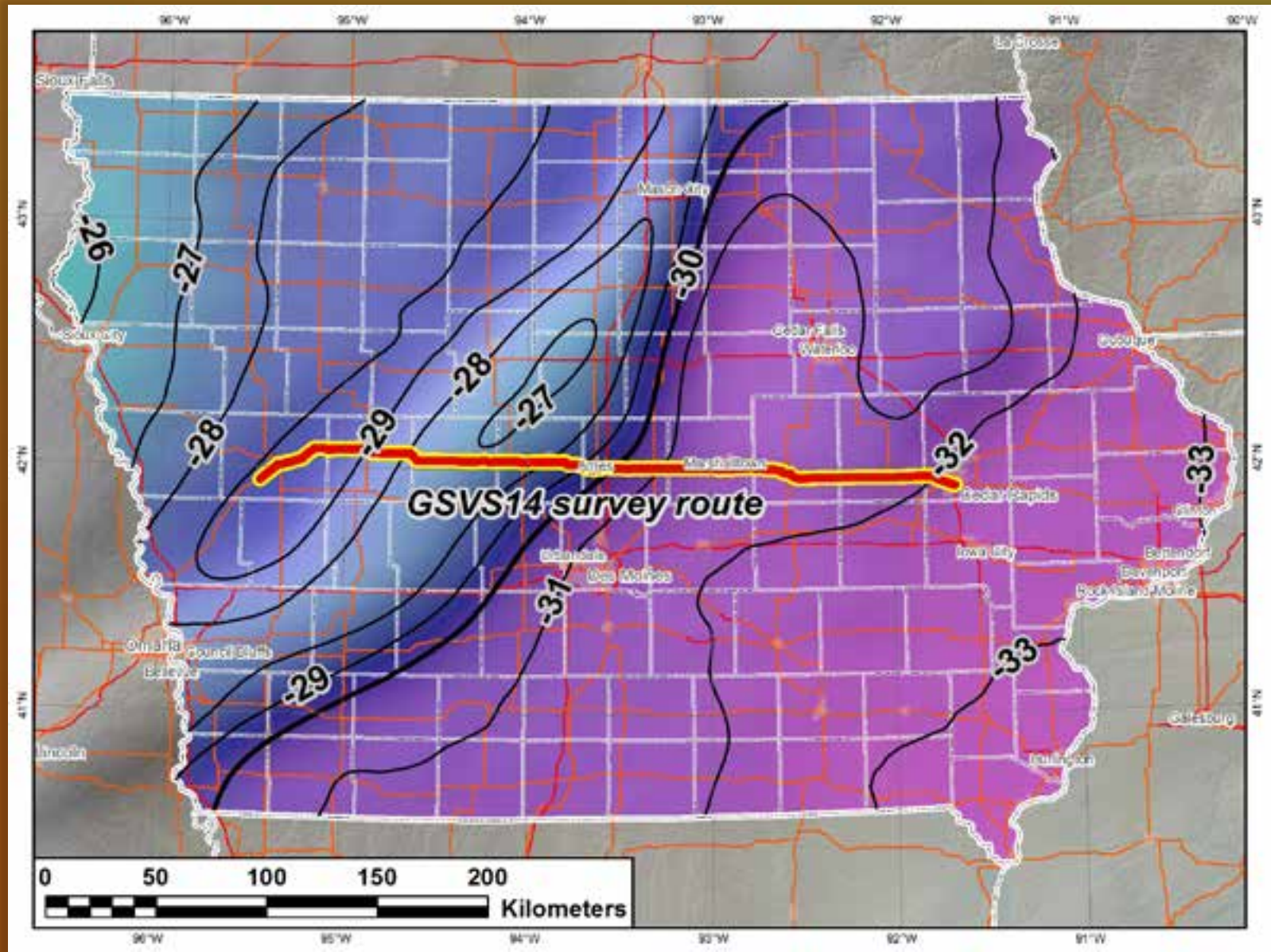
- Data collection > 35% complete
- Basis for new vertical datum
- Data used in new (beta) experimental geoid model, *xGEOID14B*
  - Spans one-quarter of Earth
  - Includes all available gravity data
  - GRAV-D data has significant impact (geoid height change from -35 to +43 cm)




xGEOID14B - xGEOID14A
(centimeters)
11.5 to 42.8
7.72 to 11.58
3.86 to 7.72
1 to 3.86
-1 to 1
-3.86 to -1
-7.72 to -3.86
-11.56 to -7.72
-34.6 to -11.56
mean : -0.09
std dev : 3.86
max : 42.8
min : -34.6
20140613
0 250 500 1,000 Kilometers
1:12,000,000
-2 -1 0 1 2 3
85° 80° 75° 70°
240° 250° 260° 270° 280°
xGEOID14B - xGEOID14A
(centimeters)
4.64 to 10.3
3.08 to 4.64
1.52 to 3.08
0.96 to 1.52
-1.04 to 0.96
-1.60 to -1.04
-3.16 to -1.6
-4.72 to -3.16
-12.2 to -4.72
mean : -0.04
std dev : 1.56
max : 10.3
min : -12.2
20140613
0 250 500 1,000 Kilometers
1:12,500,000
xGEOID14B - xGEOID14A
(centimeters)
4.4 to 5.45
2.2 to 4.4
1 to 2.2
-1 to 1
-2.2 to -1
-4.4 to -2.2
-6.9 to -4.4
mean : -0.01
std dev : 2.20
max : 5.45
min : -6.90
20140613
0 100 200 400 Kilometers
1:4,500,000
xGEOID14B - xGEOID14A
(centimeters)
4.85 to 6.9
2.55 to 4.85
0.25 to 2.55
-1.75 to 0.25
-4.05 to -1.75
-6.35 to -4.05
-7.9 to -6.35
mean : -0.75
std dev : 2.30
max : 6.90
min : -7.80
20140613
0 150 300 600 Kilometers
1:7,000,000

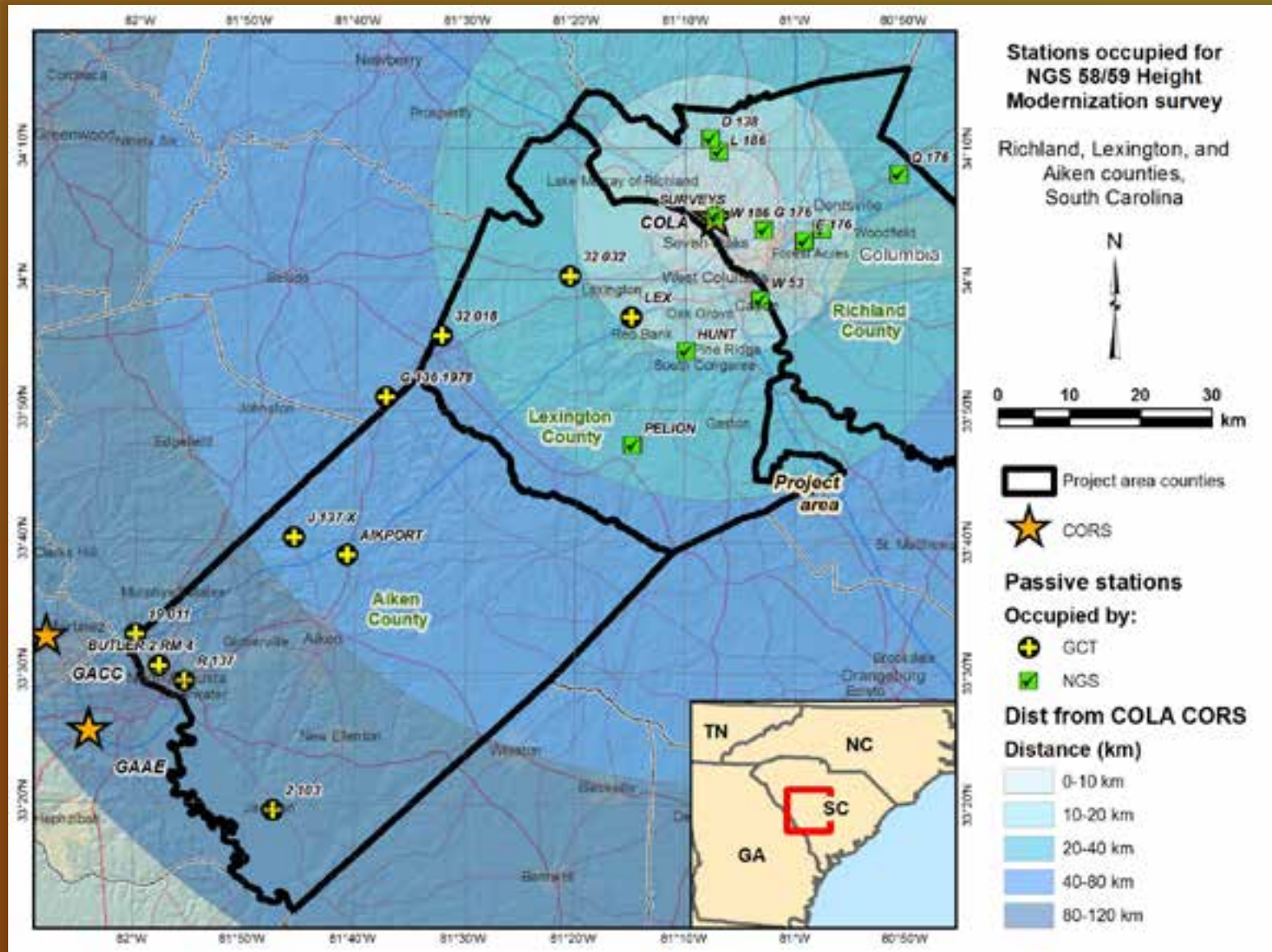
Geoid Slope Validation Survey of 2014 (GSVS14)

- Research toward new vertical datum
- E-W line across Iowa
- Observations began in May 2014
- Includes:
  - Differential leveling
  - GPS
  - Terrestrial gravity
  - Aerial gravity
  - Deflection of vertical
- This is the second GSVS project
  - First in 2011 (GSVS11)



NGS 58/59 update project

- An update for guidelines on GNSS-derived ellipsoid and orthometric heights
- Two phases
  - Vertical precision (FL)
  - GPS bench mark Height Mod (SC)
- Fieldwork done Dec 2013
- Analysis of data underway
- Will be used for new guidelines to replace NGS 58/59 documents

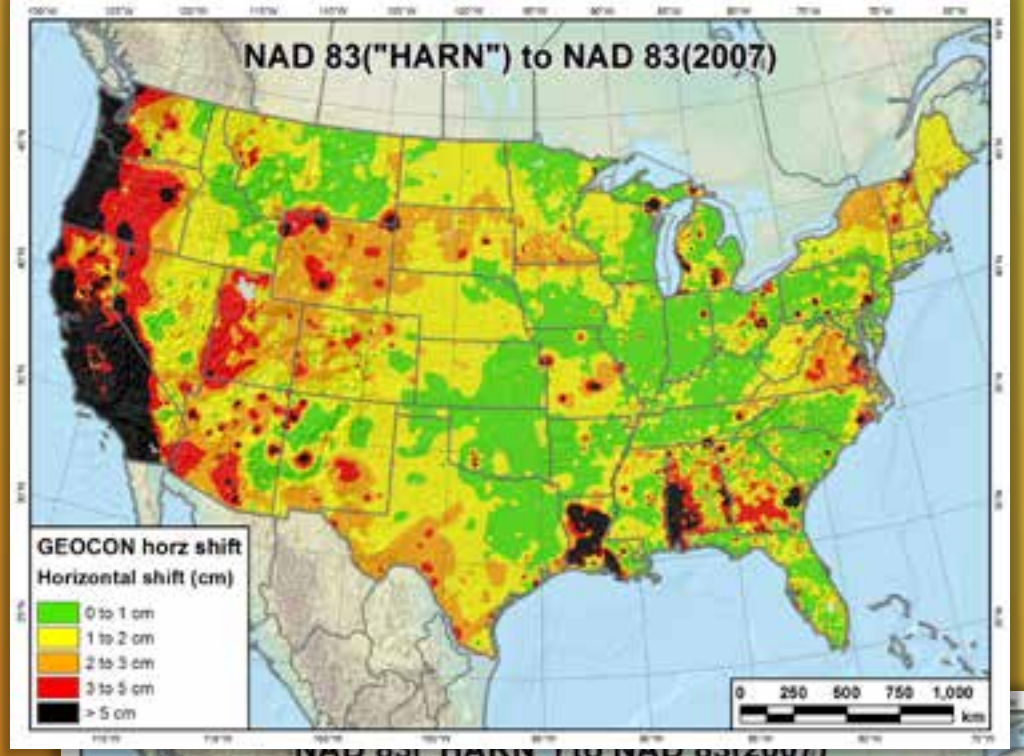


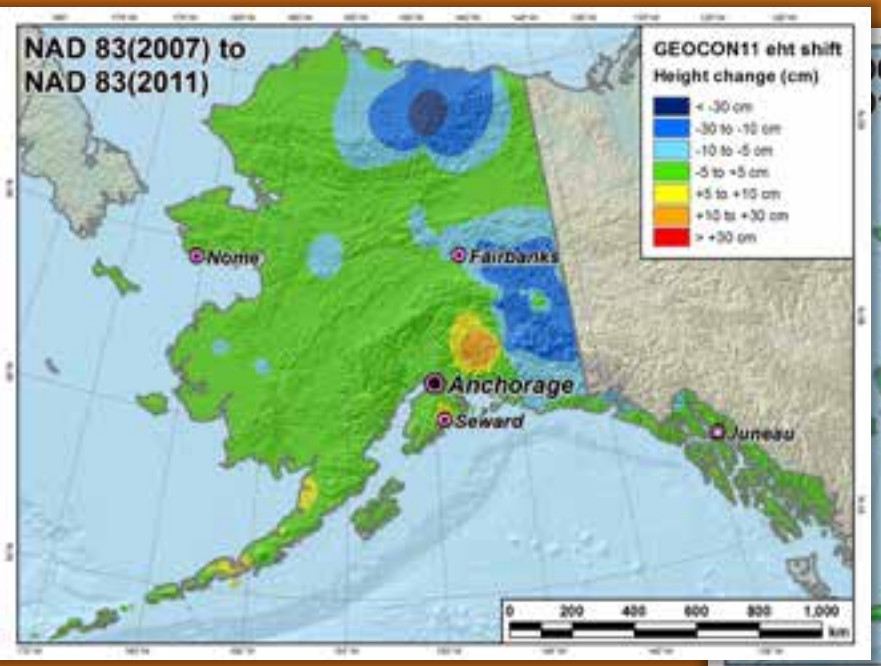
GPS on bench marks campaign

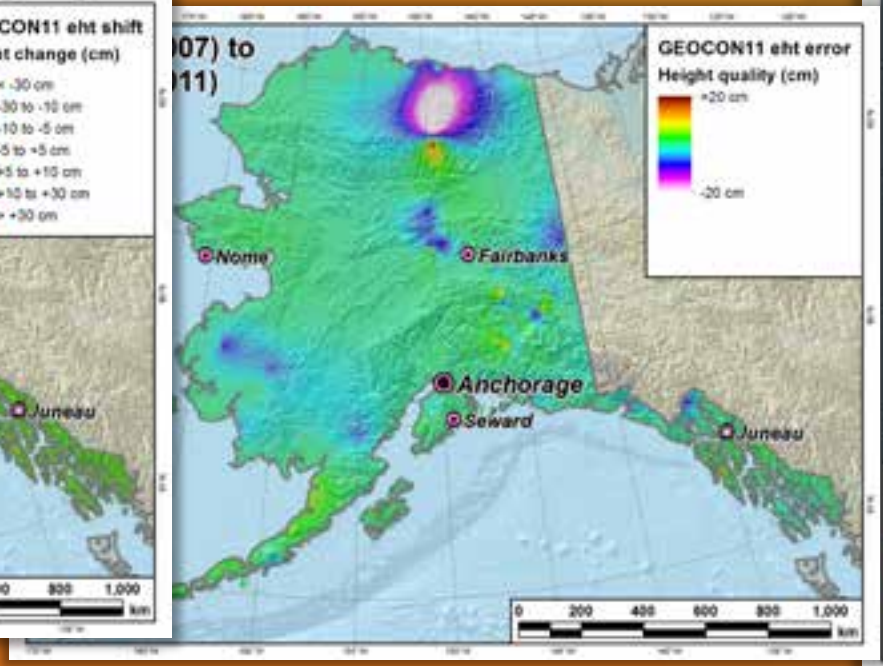
- Performed during GPS Week (Mar 16-22)
- Volunteers occupied leveled bench marks with GPS
- Record number of shared OPUS solutions
- Will help improved hybrid geoid model and conversion to new vertical datum

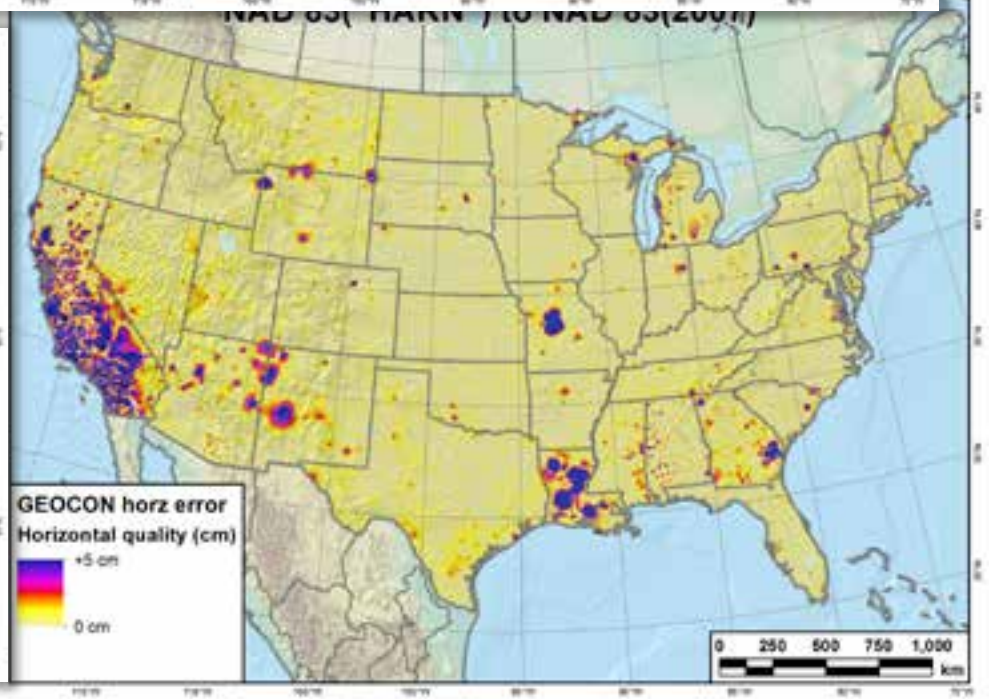
Transformation tools

- GEOCON and GEOCON11
  - Version 1.0 operational Jan 2014
  - Continued improvements over time
  - Will include Pacific
- VDatum and HTDP
  - Also being improved over time









The NGS mission remains the same

Define **Maintain** **Provide access**

NSRS

National Spatial Reference System

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More information at www.geodesy.noaa.gov

Understanding our world.