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)

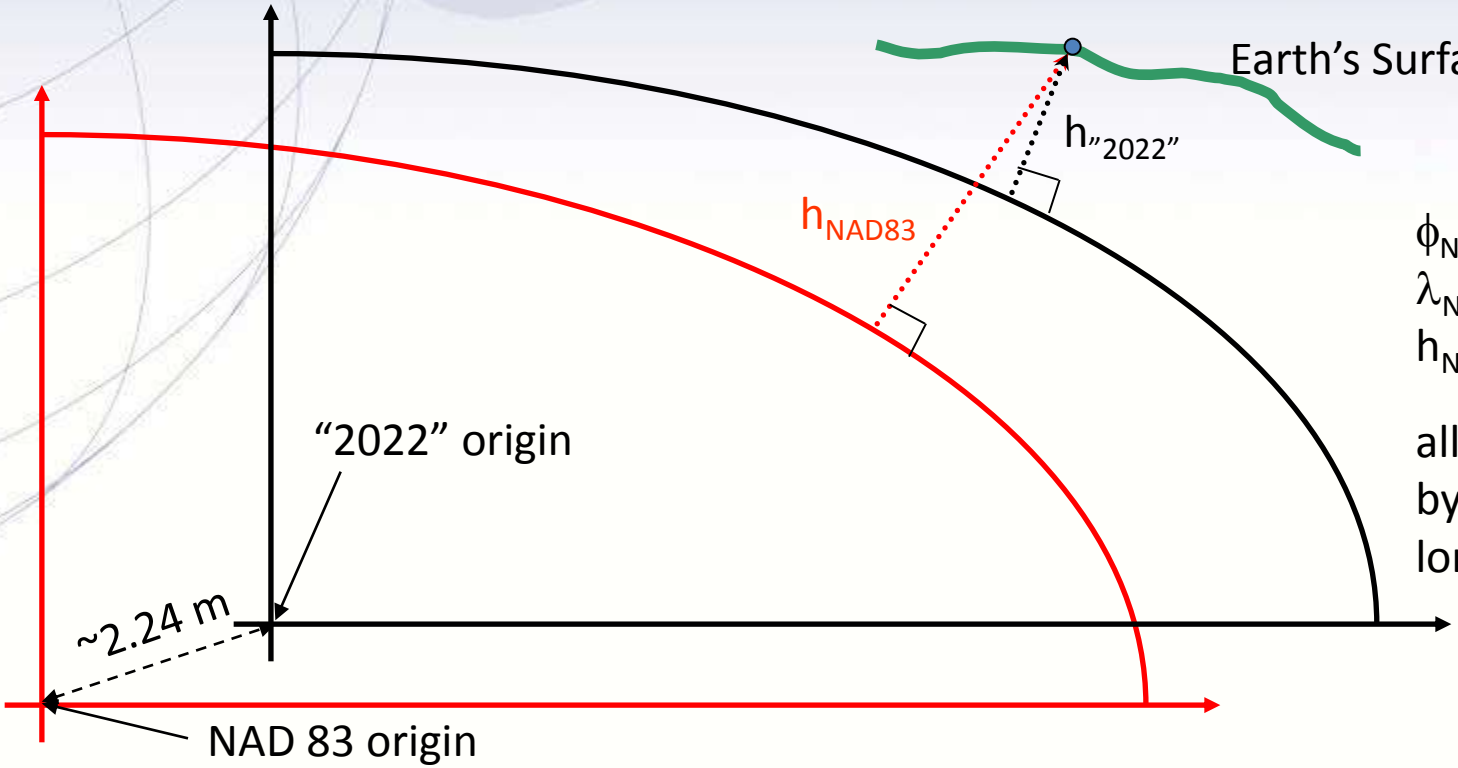
NAVD88 becomes:

- 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

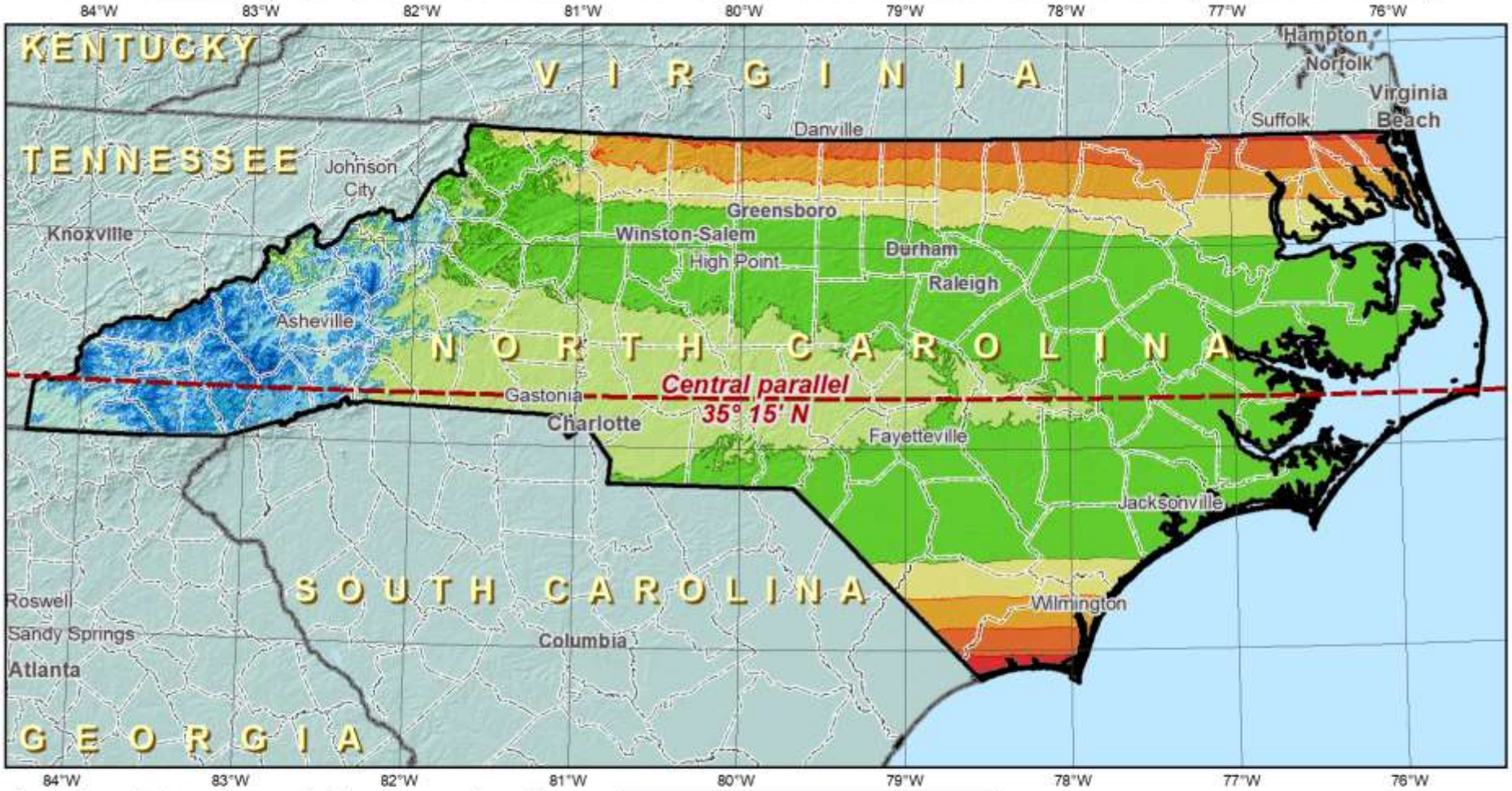
SPCS2022 in North Carolina

- New State Plane Coordinate System in 2022
  - Will replace SPCS 83
  - Referenced to new terrestrial reference frames
- Two conflicting desires for SPCS2022 coordinates:
  - Change coordinates as little as possible
    - Preserve systems based on SPCS 83 coordinates (sft)
    - E.g., parcel numbering system, FEMA flood mapping tiles
  - Change coordinates by large amount
    - Reduces confusion with SPCS 83 coordinates
    - Satisfies NGS policy on SPCS2022

SPCS2022 characteristics

- Characteristics pertinent to North Carolina:
  - Minimize distortion at **ground surface**
  - Lambert Conformal Conic: **1-parallel definition**
    - Central parallel defined to **nearest arc-minute**
    - Central parallel scale **≤ 6 decimal places**
  - Coordinates must change **≥ 10,000 m (~33,000 ft)**
  - Grid origins rounded to **nearest 1000 m**

Preliminary SPCS2022 default design: North Carolina Zone (alternative 1)



Lambert Conformal Conic projection

North American Terrestrial Reference Frame of 2022

Central parallel: 35° 15' N

Cen parallel scale: 0.999 95 (exact)

Areas within ±100 ppm distortion (±0.53 ft per mile):

76% of entire zone

78% of all cities and towns

90% of population

Distortion values (ppm)

Entire zone:

Min = -341 Range = 597

Max = +256 Mean = -14

Cities:

Min = -222 Range = 469

Max = +246 Median = -32

Mean = -25

(weighted by population)

Linear distortion at topographic surface (parts per million)

< -400	to -200	to +150
to -400	to -150	to +200
to -350	to -100	to +250
to -300	±50	to +300
to -250	to +100	> +300

0 60 120 180 240 km