CSRS EPOCH 2017.50 – WHAT YOU SHOULD KNOW

2018 CLSA CONFERENCE

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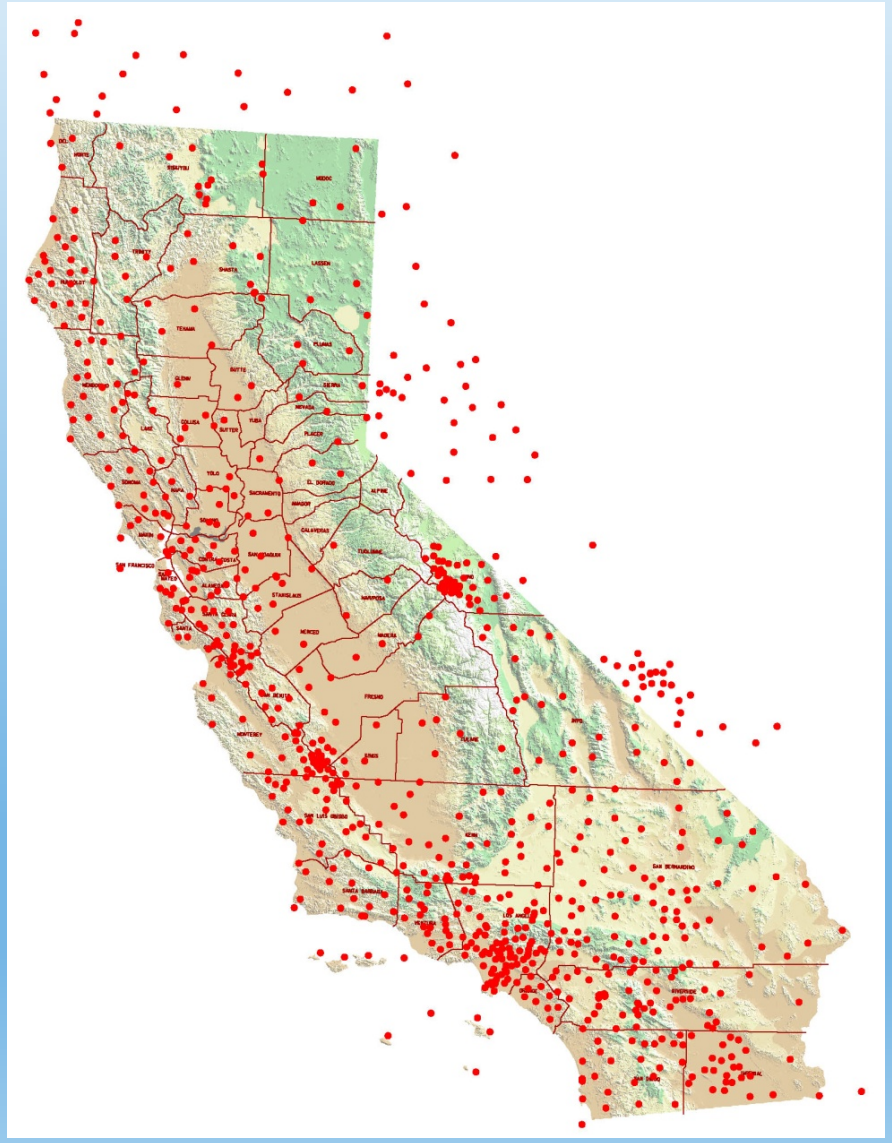
Epoch Update

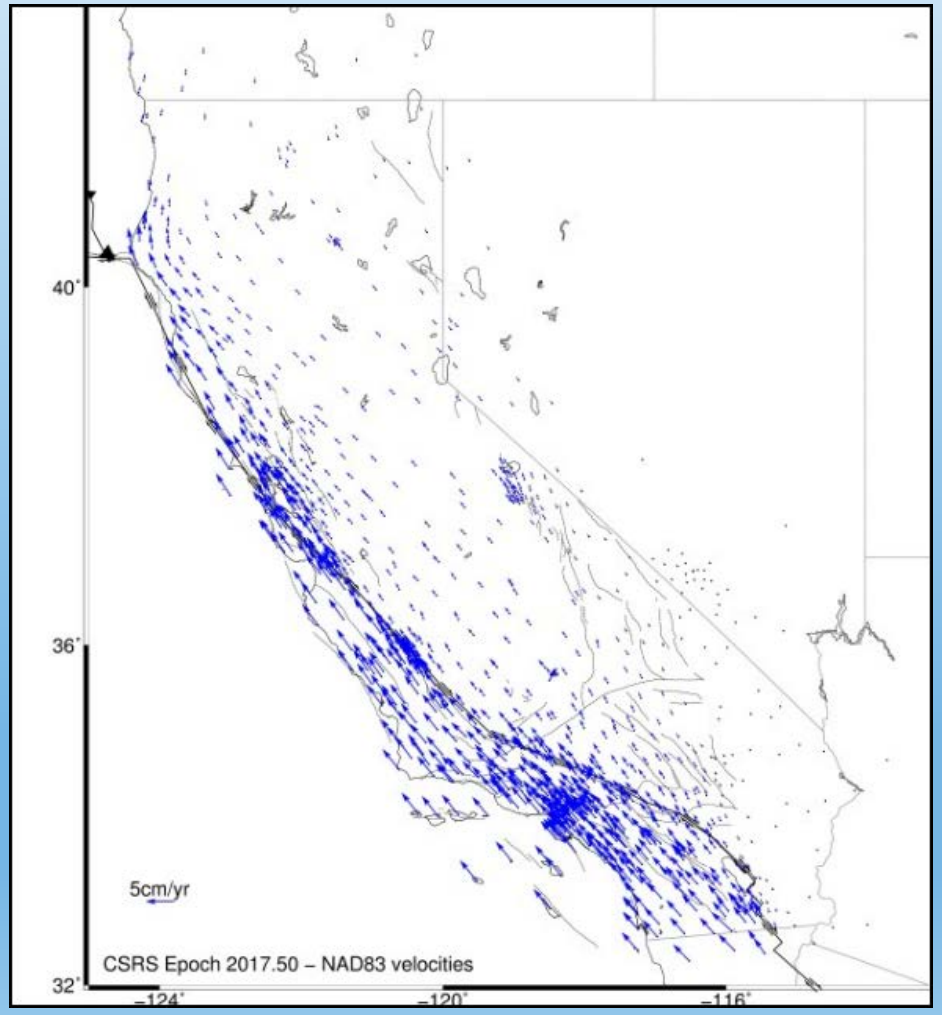
California Spatial Reference System (CSRS)



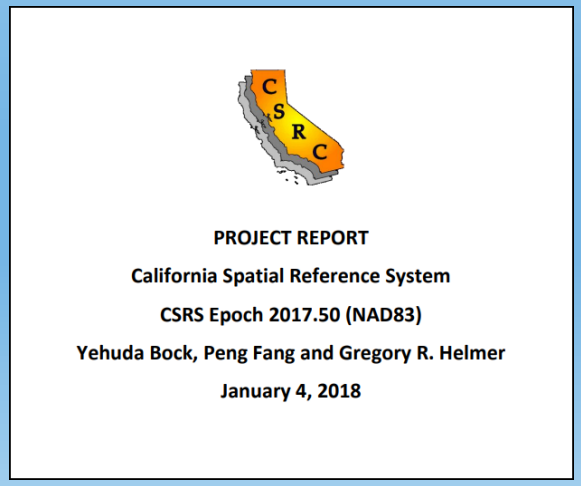
- ~ 950 CGPS sites, including several Caltrans owned stations
- Coordinates, velocities, & positional uncertainties, plus report
- CSRS Epoch 2017.50 now published and broadcast through CRTN
- Is aligned to the NSRS through CORS stations

Epoch Update

California Spatial Reference System (CSRS)

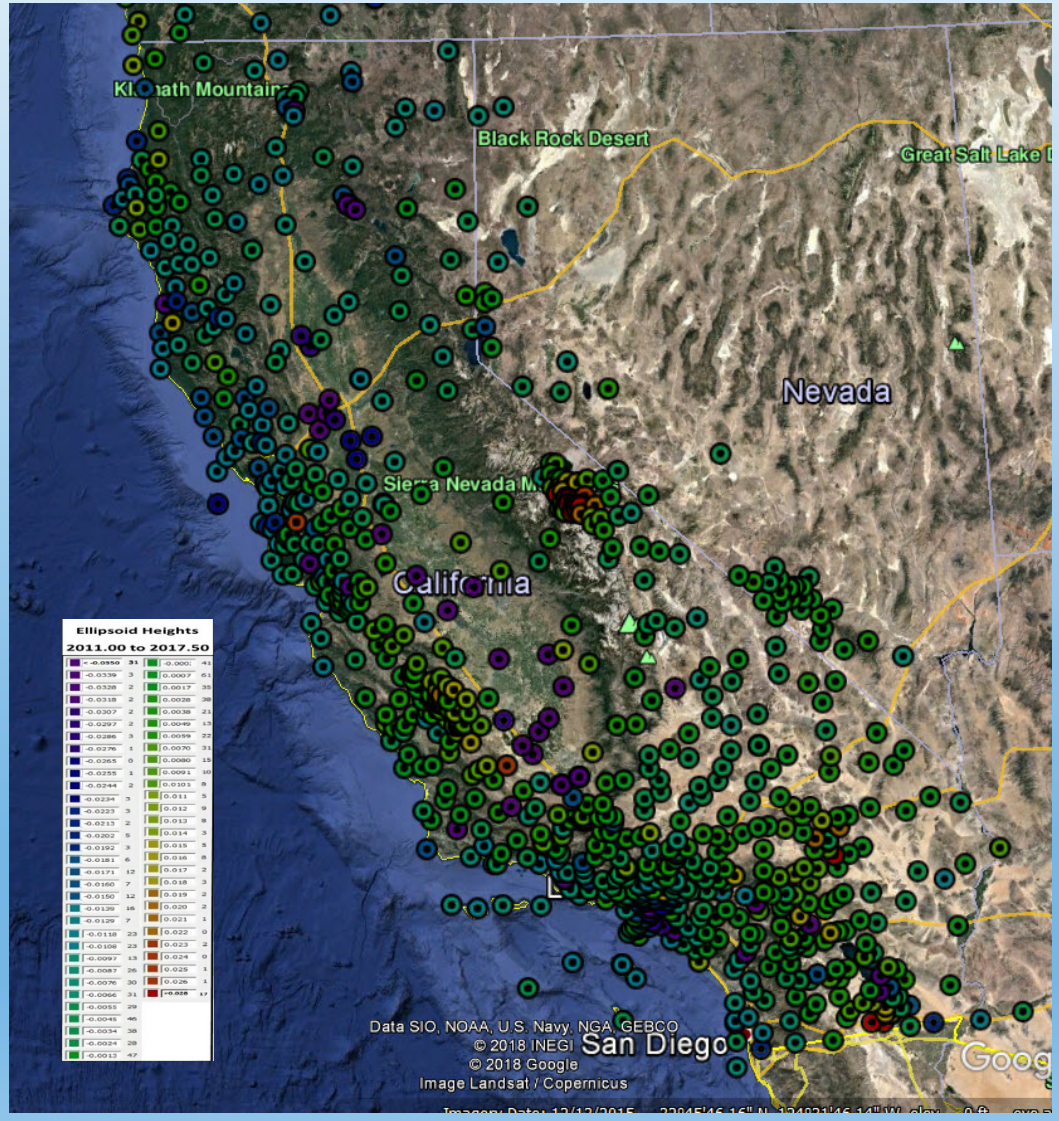


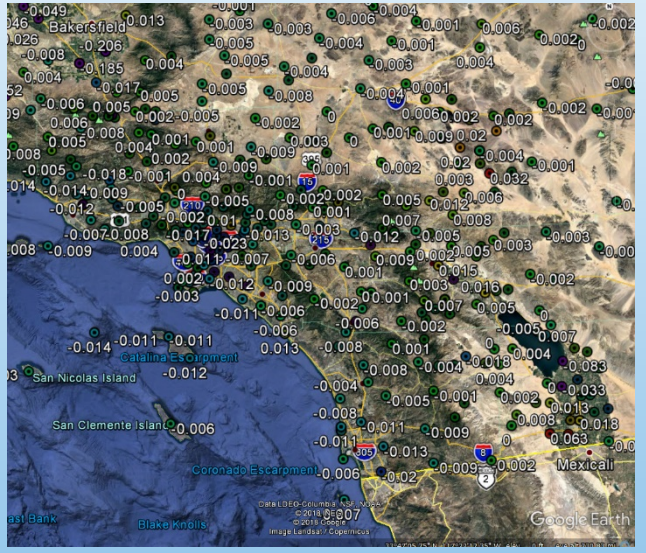
- More correct and rigorous geometric solution for California.
- Average horiz. shift from epoch 2011.00 to epoch 2017.50 = 15 cm northwesterly (max of approx. 50cm)
- Will fit true of date observations much better in many areas of California than NAD83(2011)2010.00
- Likely the last until switch to NATRF2022 by NGS
- Data available here: http://csrc.ucsd.edu/CSRC_Epoch2017_50.shtml

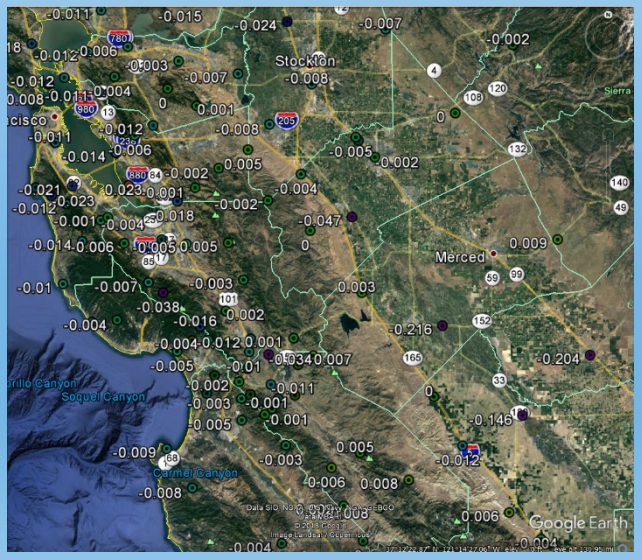


Ellipsoid Height Changes

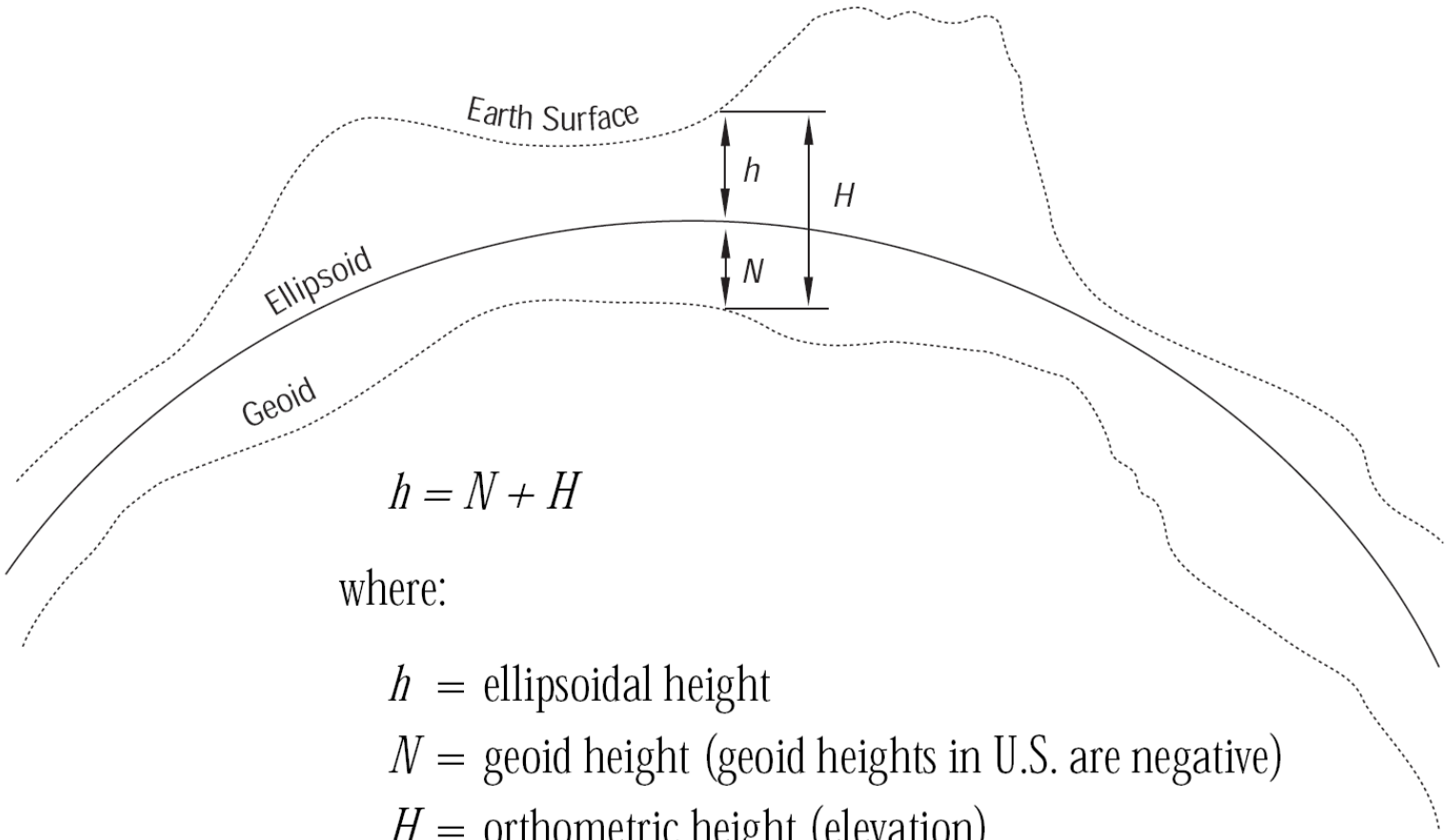
2017.50 minus 2011.00







Heights: NAVD88 vs. COH



$$h = N + H$$

where:

h = ellipsoidal height

N = geoid height (geoid heights in U.S. are negative)

H = orthometric height (elevation)

Heights: NAVD88 vs. COH

They are not the same – based on different geometric solutions

- NAVD88

  H = h – N where:

  H = NAVD88 orthometric height

  h = NAD83 epoch 2010.00 ellipsoid ht.

  N = GEOID 12B geoid height

- COH

  H = h – N where:

  H = California orthometric height

  h = CSRS epoch 2017.50 ellipsoid ht.

  N = GEOID12B geoid height (per PRC 8895)

Heights: NAVD88 vs. COH

They are not the same – varies by location

Examples of differences because of different ellipsoid heights

MONP (East SD Mountains)
NAVD88 (m): 1875.133 = 1843.323 – (-31.810)
COH (m): 1875.123 = 1843.313 – (-31.810)
Difference = **0.010 meters**

P566 (Southern Sierras)
NAVD88 (m): 110.304 = 78.805 – (-31.499)
COH (m): 110.207 = 78.708 – (-31.499)
Difference = **0.097 meters**

TIBB (SF Bay Area)
NAVD88 (m): 11.810 = -20.565 – (-32.375)
COH (m): 11.790 = -20.585 – (-32.375)
Difference = **0.020 meters**

Heights: NAVD88 vs. COH

They are not the same – varies by location

Examples of differences because of different ellipsoid heights

TRAK (Orange County)

NAVD88 (m): 150.938 = 116.252 – (-34.686)

COH (m): 150.931 = 116.245 – (-34.686)

Difference = **0.007 meters**

P304 (Central SJ Valley)

NAVD88 (m): 51.160 = 17.735 – (-33.425)

COH (m): 51.027 = 17.602 – (-33.425)

Difference = **0.133 meters**

P307 (Central SJ Valley)

NAVD88 (m): 82.572 = 49.987 – (-32.585)

COH (m): 82.387 = 49.802 – (-32.585)

Difference = **0.185 meters**

Heights: NAVD88 vs. COH

Solutions/options

- NAVD88 (or a local datum)
  - Localize on (RTK) or occupy local bench marks to use as constraints in post-processing (PRC 8896 allows for a "local orthometric height correction.")
  - Use NAD83 epoch 2010.00 ellipsoid heights with GEOID12B and CSRS2017.50 latitude/longitude – difference will not matter because of geoid grid size. Will only work when using NGS CORS stations.
- COH
  - Apply GEIOD12B to CRTN broadcast coordinates
  - Use CSRS COH values as constraints for post-processing and make sure you report them as such on your survey products.