

# CSRS EPOCH 2017.50 – WHAT YOU SHOULD KNOW 2018 CLSA CONFERENCE

SCOTT P. MARTIN, PLS

SENIOR TRANSPORTATION SURVEYOR

CALIFORNIA DEPARTMENT OF TRANSPORTATION

OFFICE OF LAND SURVEYS

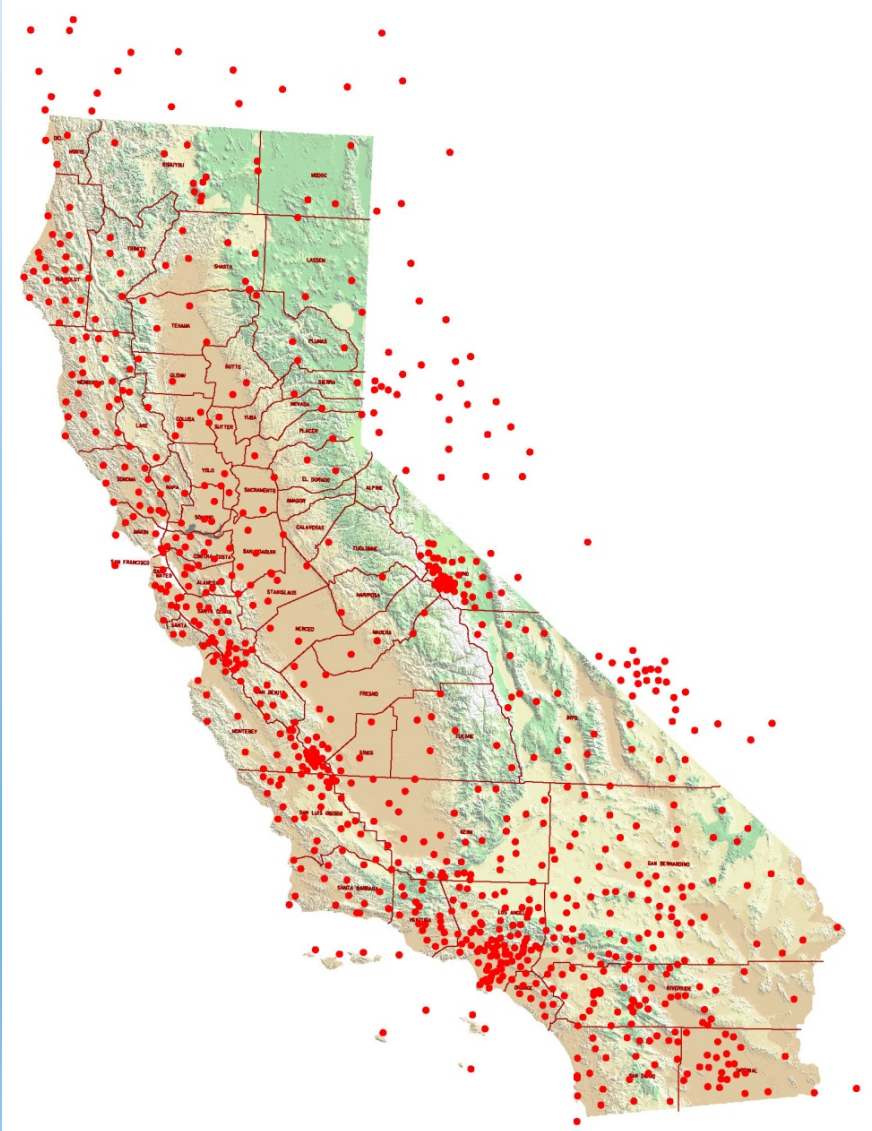
(916) 227-7328

SCOTT.MARTIN@DOT.CA.GOV



# Epoch Update

## California Spatial Reference System (CSRS)



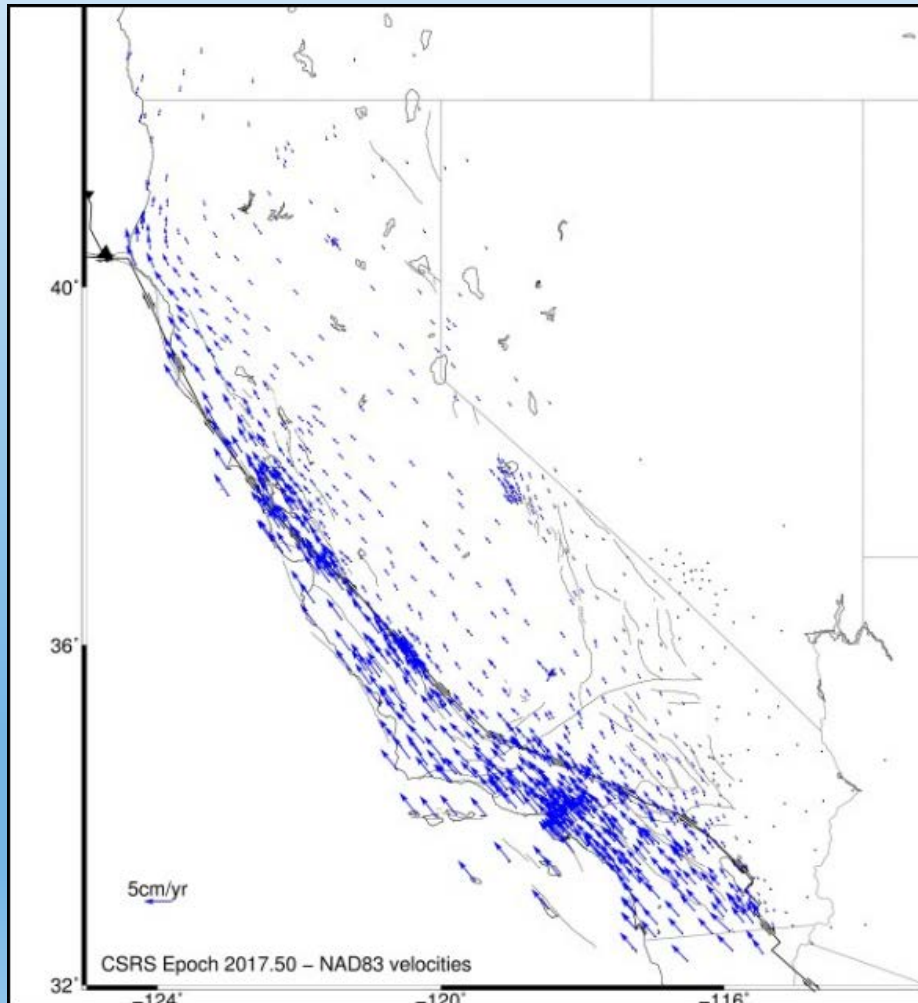
- ~ 950 CGPS sites, including several Caltrans owned stations
- Coordinates, velocities, & positional uncertainties, plus report
- CSRS Epoch 2017.50 now published and broadcast through CRTN
- Is aligned to the NSRS through CORS stations



# 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](http://csrc.ucsd.edu/CSRC_Epoch2017_50.shtml)



### PROJECT REPORT

California Spatial Reference System

CSRS Epoch 2017.50 (NAD83)

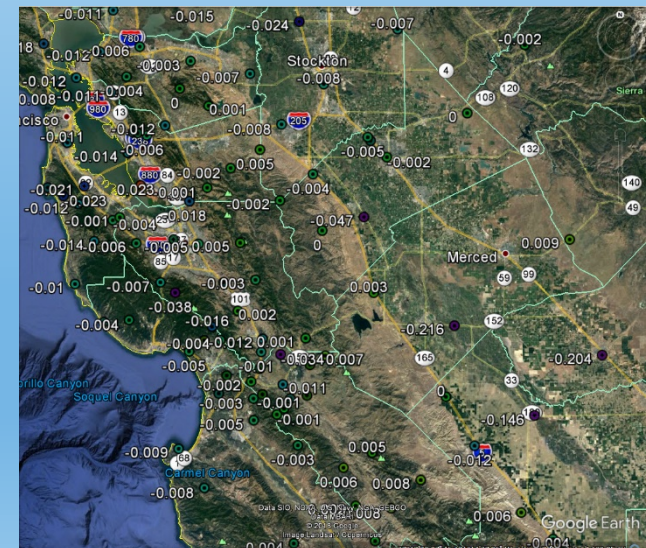
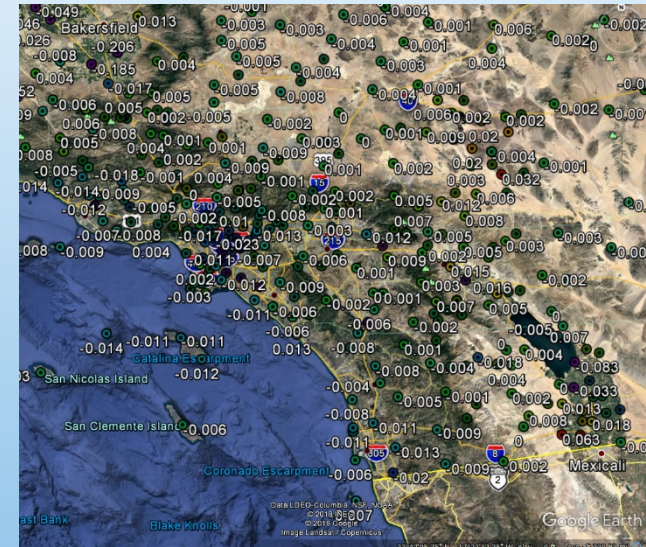
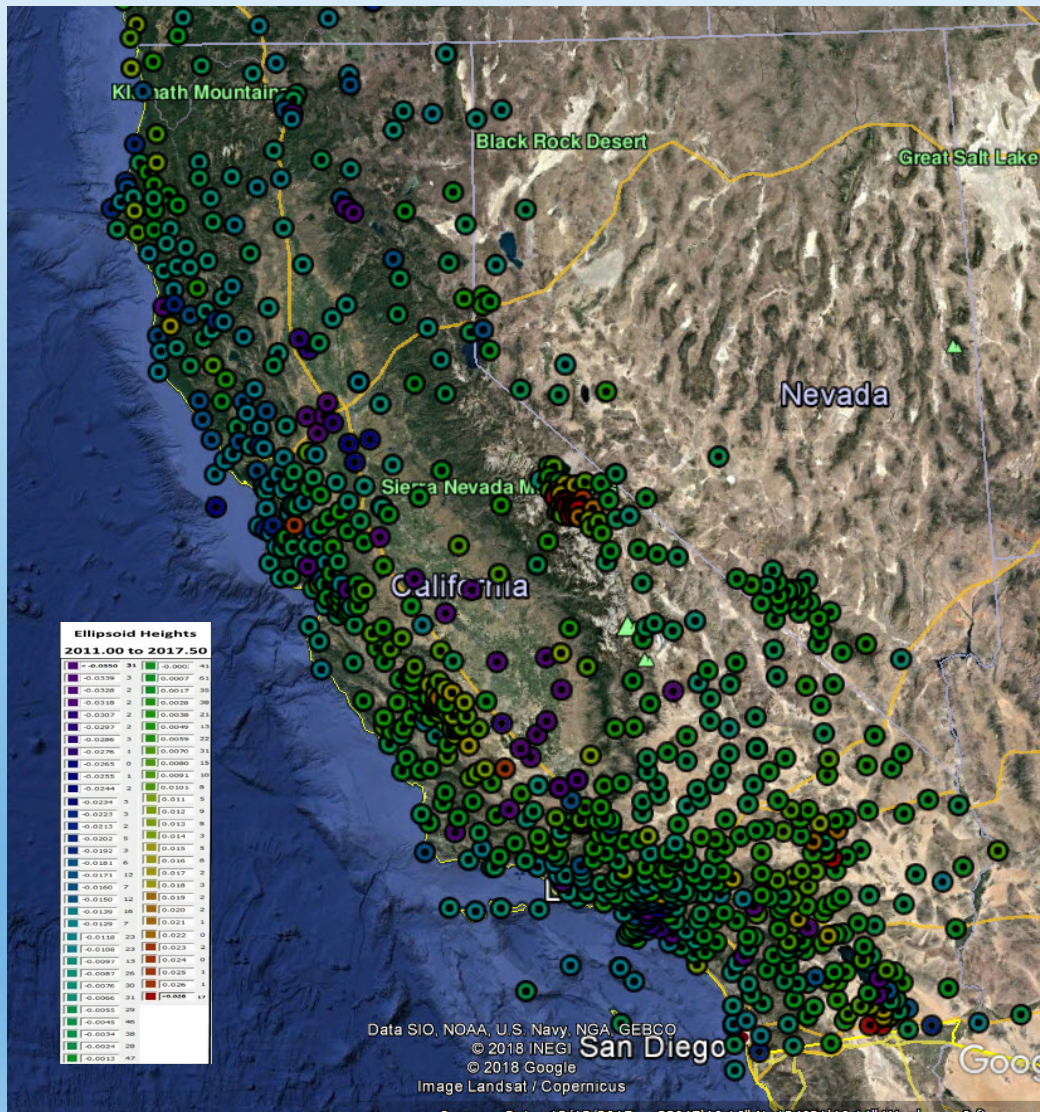
Yehuda Bock, Peng Fang and Gregory R. Helmer

January 4, 2018

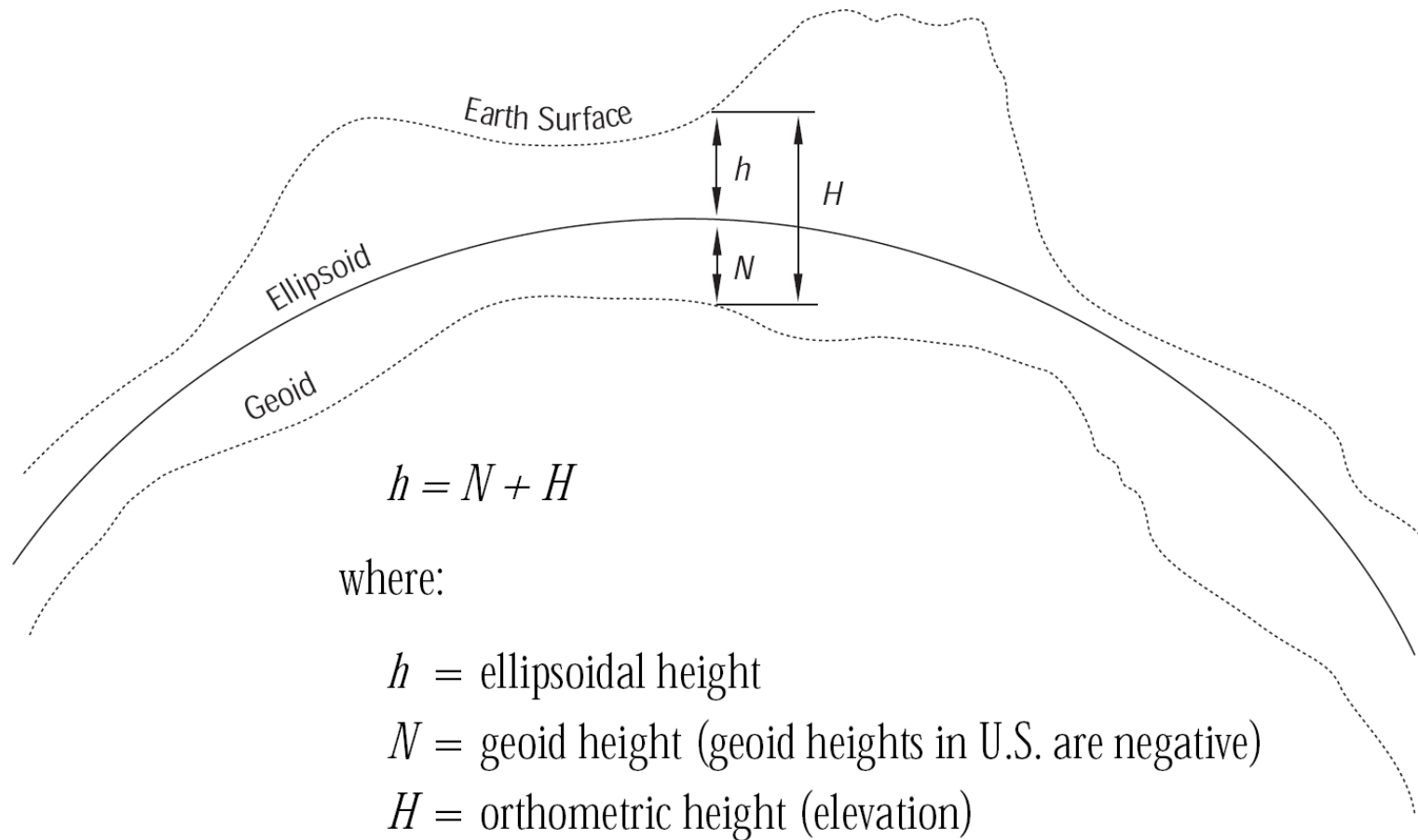


# Ellipsoid Height Changes

## 2017.50 minus 2011.00



# Heights: NAVD88 vs. COH





# 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 GEOID12B 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.