

Continuous GPS contribution to the CGM

Thomas Herring and Mike Floyd,
MIT

Sources of data (Historically)

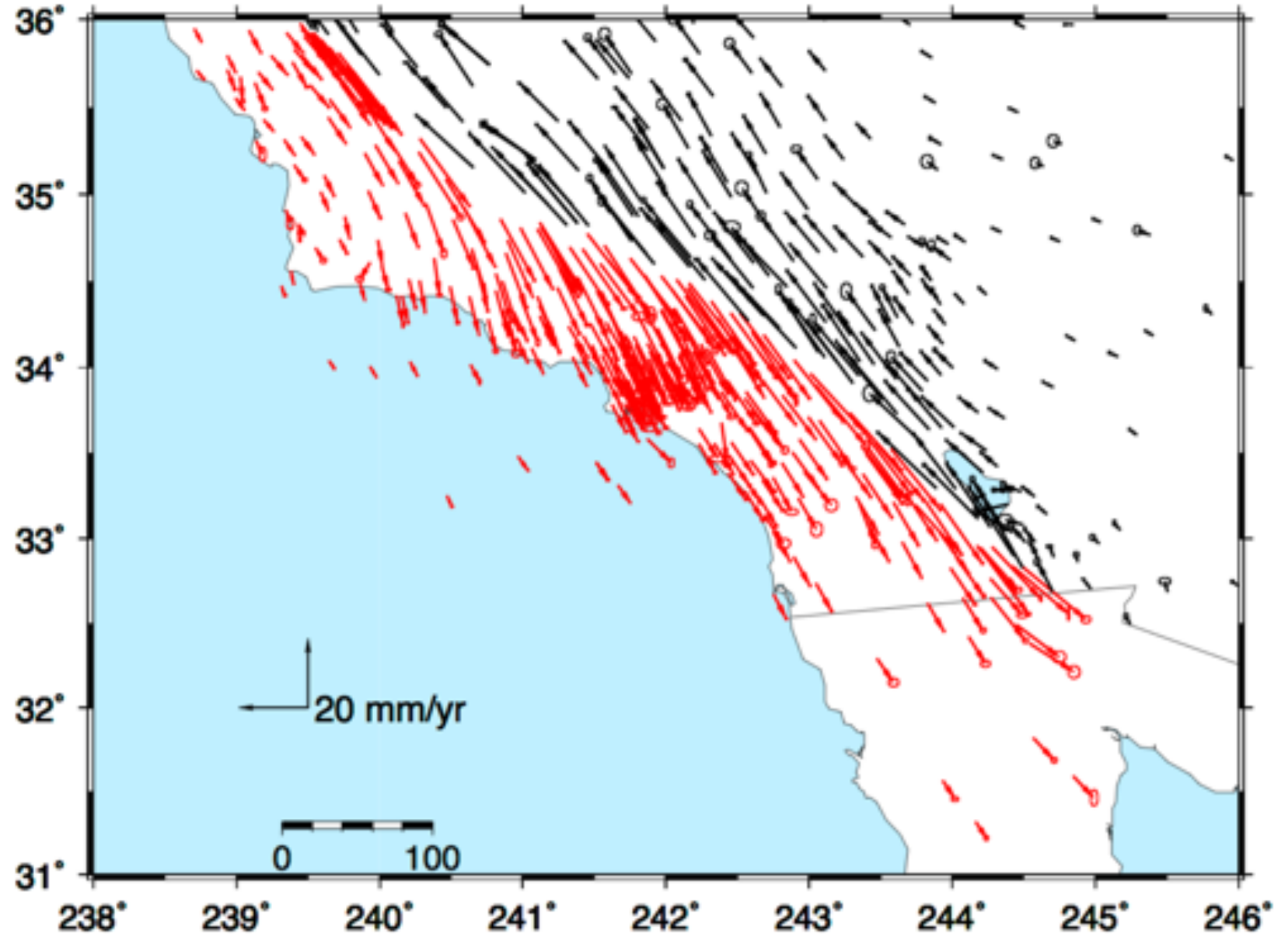
- GAGE/PBO time series with NMT GAMIT processing, CWU GIPSY, PBO combined <ftp://data-out.unavco.org/pub/products/position> : ONLY CWU after 2018/09/15.
- JPL IGS08 time series from ftp://sideshow.jpl.nasa.gov/pub/JPL_GPS_Timeseries/repro2011b/raw/position/xyzseries/
- NASA Measures program combined results (separate GAMIT and GIPSY input XYZ files not currently available) from <ftp://garner.ucsd.edu/pub/timeseries/measures/> (ends 20160608)
- USGS from (other regions also included to define North America) http://earthquake.usgs.gov/monitoring/gps/data/networks/Southern_California/Southern_California_ITRF2008_xyz_files.tar.gz
- University of Nevada Reno (UNR) from http://geodesy.unr.edu/gps_timeseries/txyz/NA12/ and IGS08. The UNR time series, while extensive, has an error in the east coordinates of the sites that we correct so that we can use these time series in the merged products
- NASA Measures: CDDIS ftp://cddis.gsfc.nasa.gov/pub/GPS_Explorer/latest/

Sources of GPS Time series

- USGS Not found:
http://earthquake.usgs.gov/monitoring/gps/data/networks/Southern_California/Southern_California_ITRF2008_xyz_files.tar.gz
- JPL Not found:
ftp://sideshow.jpl.nasa.gov/pub/JPL_GPS_Timeseries/repro2011b/raw/position/xyzseries/<4-charID>.xyzseries
ends 2017.440; later directories have only "env" files with no obvious reference position.
- Scale changes need to be re-applied to JPL(USGS) and UNR series.

Velocity field

- NAM08 Frame
- Generated from merged time series with fitting for breaks, earthquakes (post-seismic logs in some cases).
- ~300 sites on Pacific side, ~200 on NA side



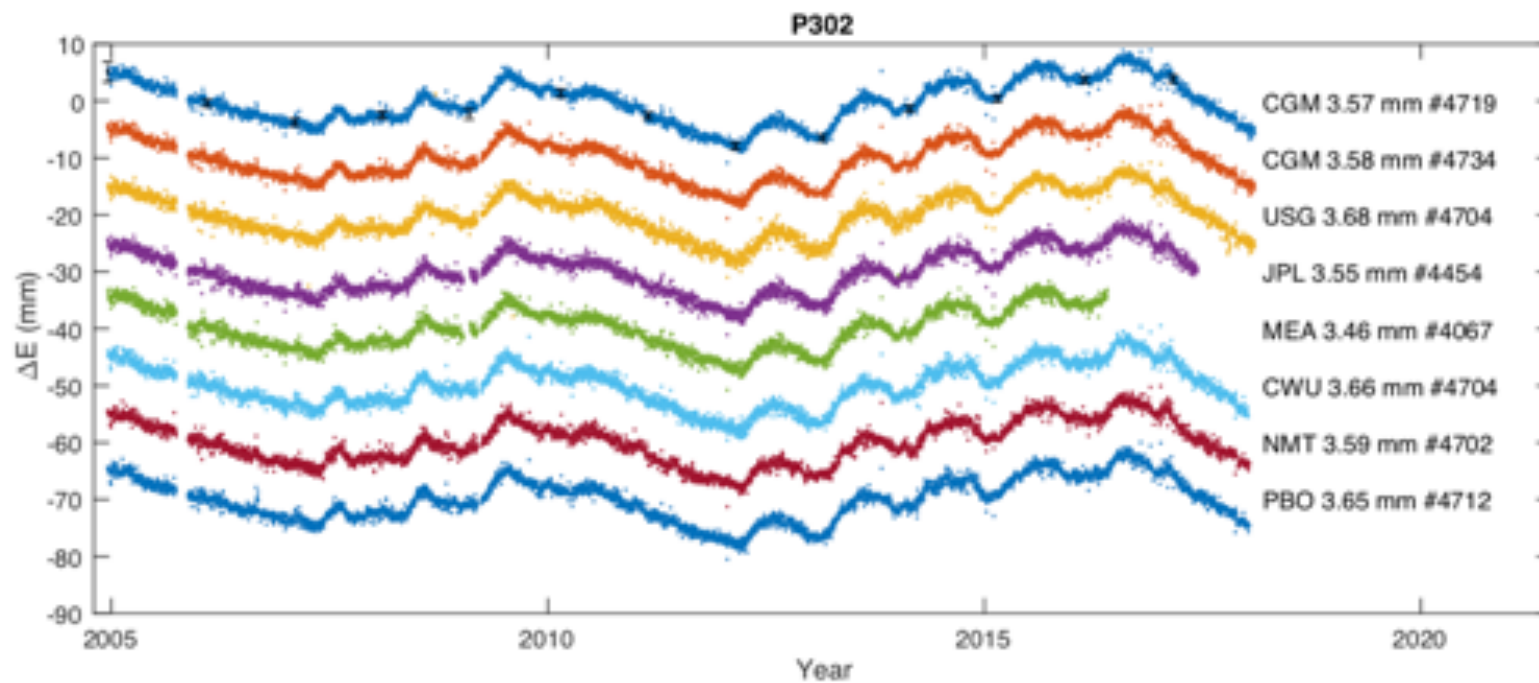
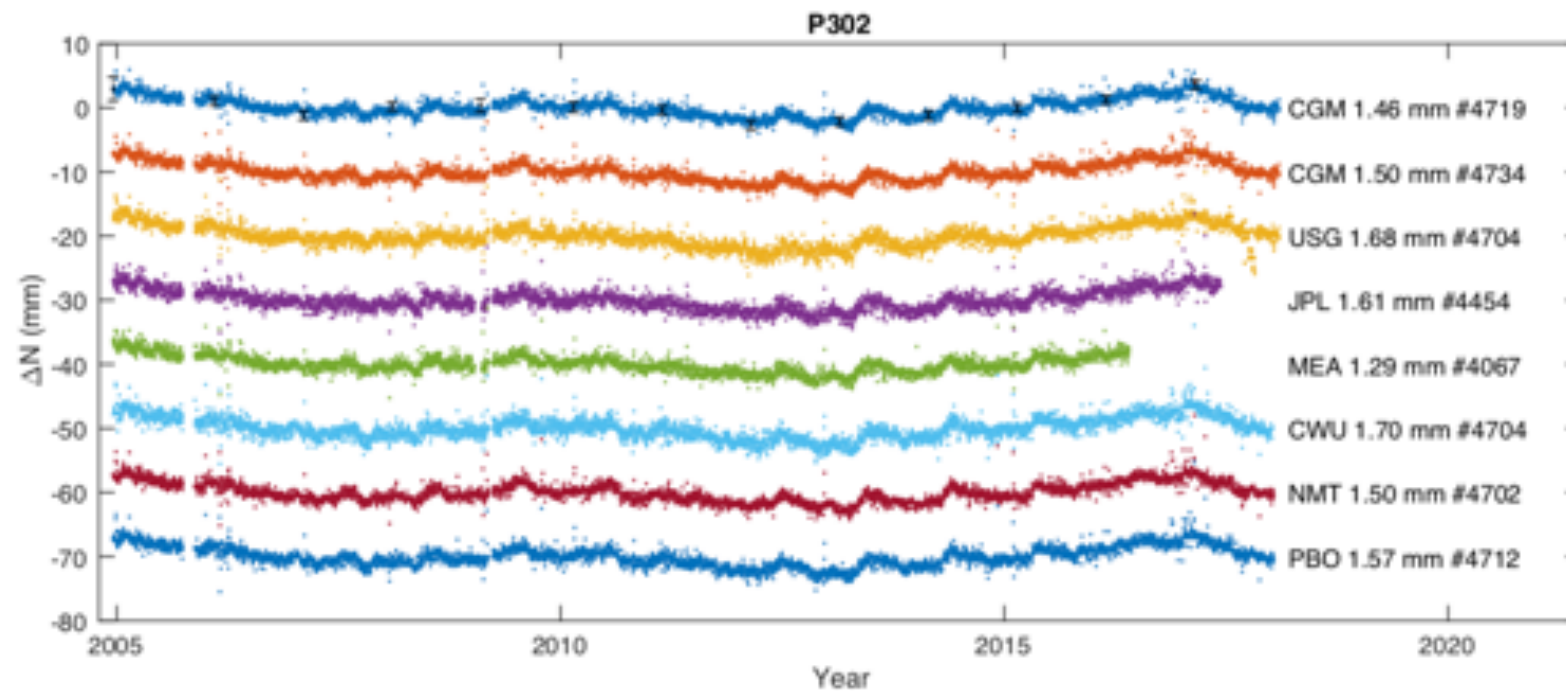
Position comparison

- Time series RMS differences velocity model (All NA/Pacific)

Analysis	# stats	N WRMS (mm)	N NRMS	E WRMS (mm)	E NRMS	U WRMS (mm)	U NRMS
CWU	2160	1.32	0.64	1.28	0.76	6.02	0.81
NMT	2169	1.11	0.59	1.18	0.67	5.83	0.86
PBO	2170	1.11	0.66	1.13	0.76	5.38	0.88
JPL NAM08	1636	1.27	1.91	1.19	2.20	5.64	2.66
UNR NA12	2116	1.38	2.14	1.31	2.50	5.21	2.51
UNR IGS08	2184	1.91	3.06	1.98	3.88	6.34	3.11
JPL IGS08	1636	1.85	2.88	1.97	3.85	5.55	2.67

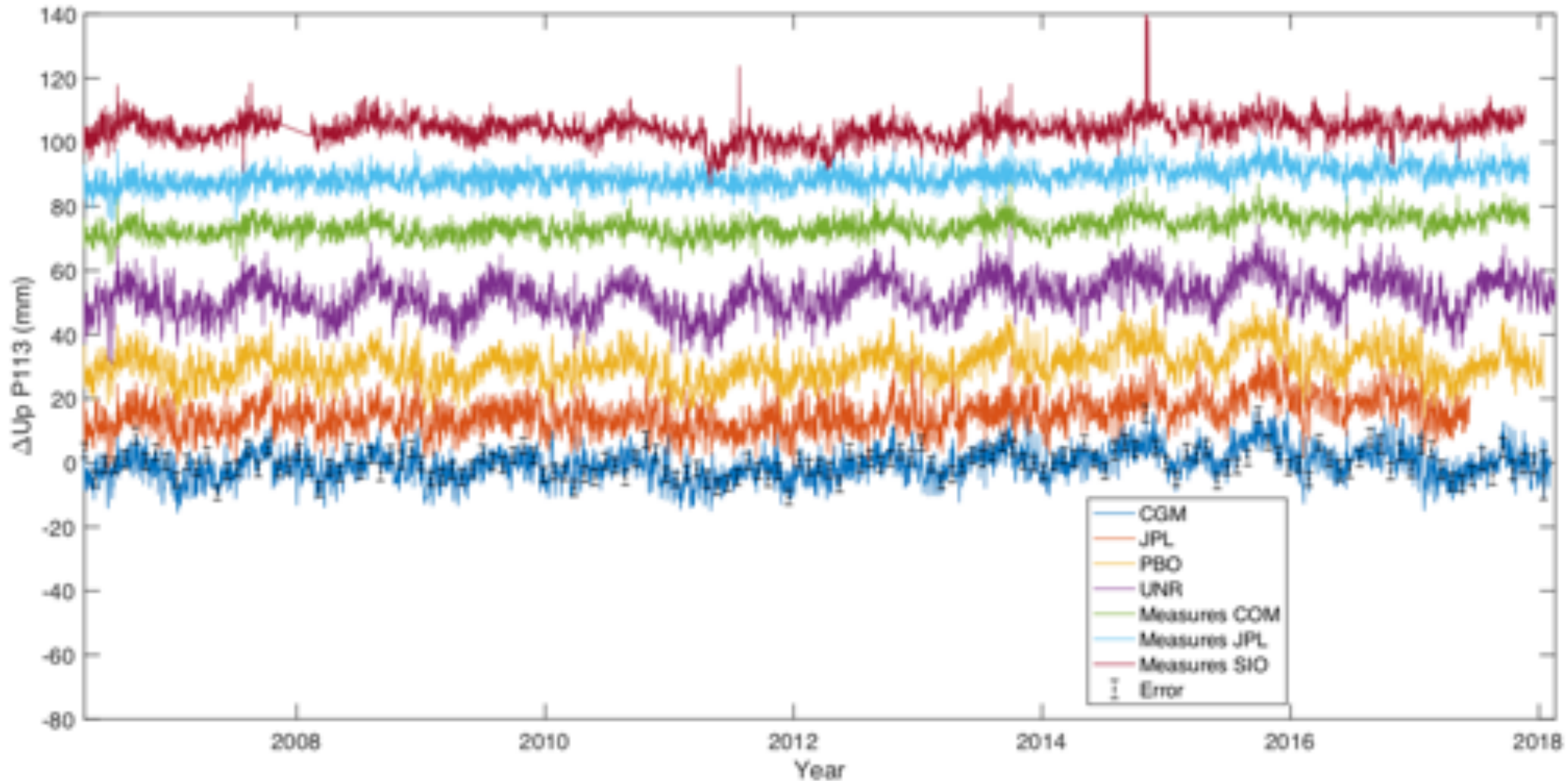
Example Time series

- P302



Height signals

- Differences with Measures solution. Treatment of scale is not clear.
- (site P113)



Problems

- URLs for different processing groups have changed and in many cases XYZ positions are not available. Local delta NEU files are available but determining what reference position to use is difficult (needed if we are to average time series from different groups).
 - The NASA Measures CDDIS files are NEU and need to a model re-added to get to positions we can average.
 - Height differences in CDDIS Measures time series compared to other analyses. Most likely scale treatment.
- Availability of XYZ coordinates with 3x3 covariance matrix would be most useful for creating merged time series.
 - List of URLs where results are available would be useful also.