

L2CNAV Message Accuracy through 12 August 2014

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GPS Operations

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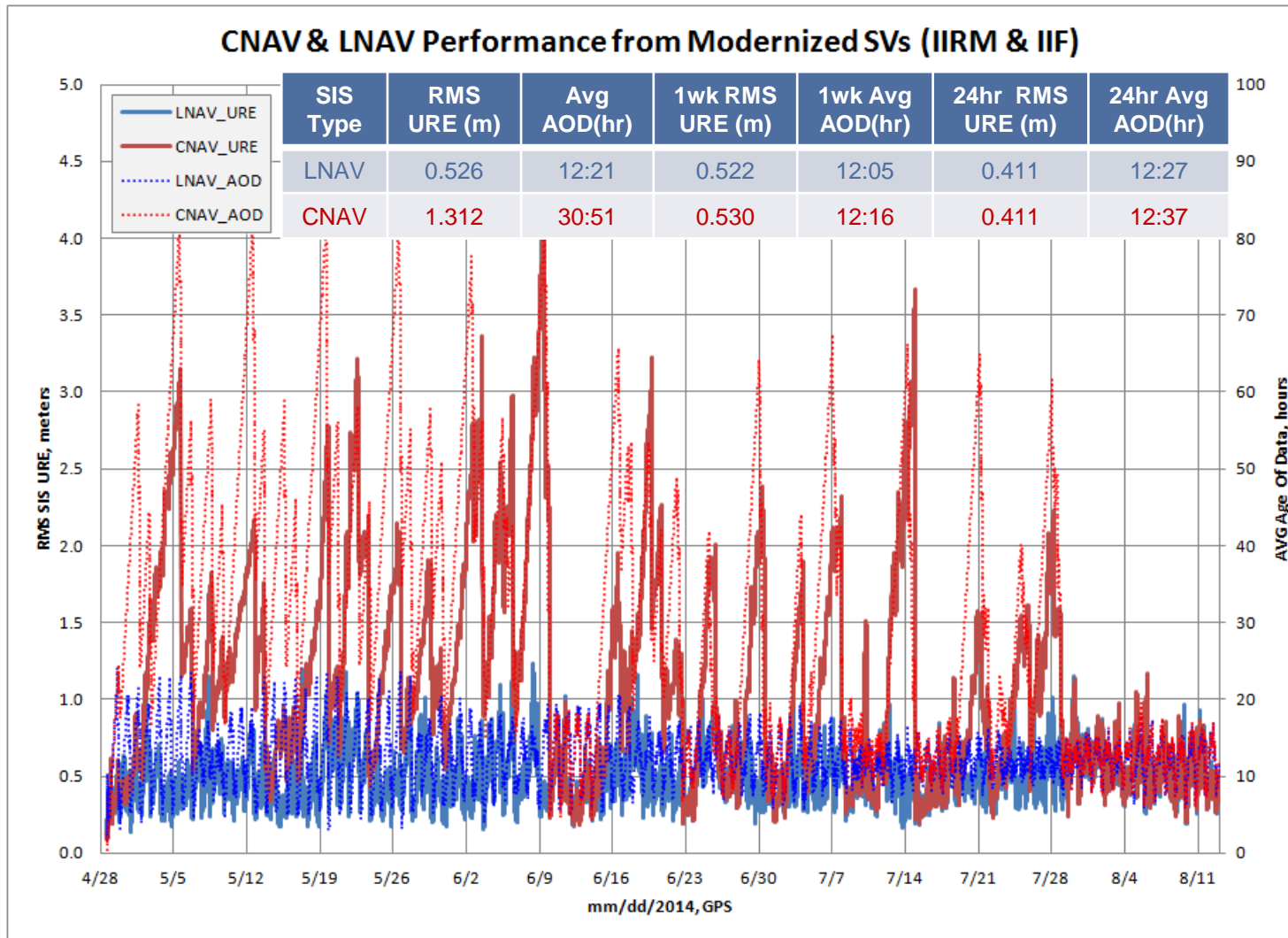
W: 719-567-2428

C: 719-439-4244

Notes

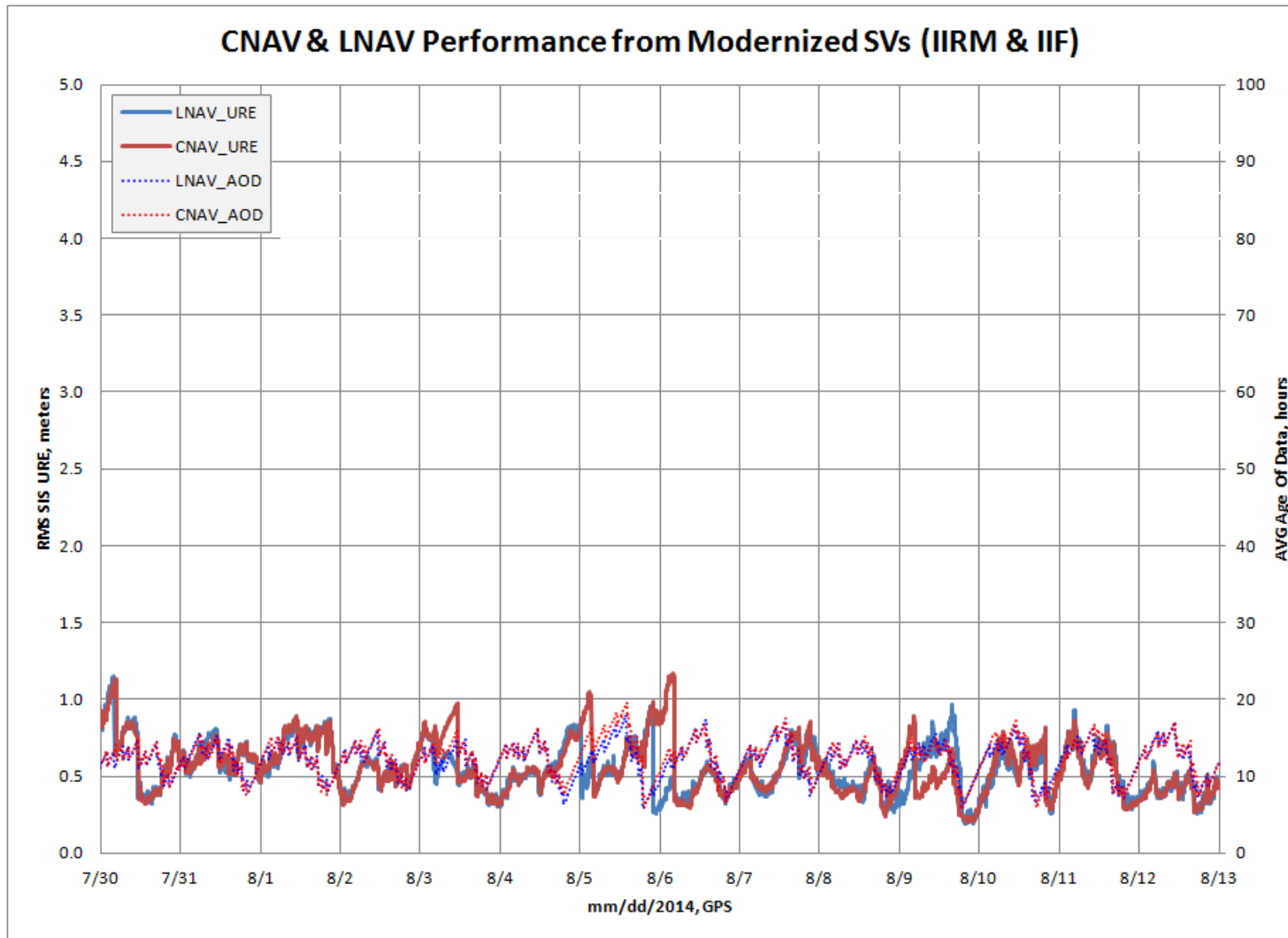
- SVN67 is participating in CNAV constellation as of 2014/07/30/23:31:24 GPS (HOW)
- Daily CNAV uploads began on 7/28 with 40 hour datasets
- L2CNAV source data
 - *NGA MSN from Brent Renfro & Jon Little, ARL*
 - *JPL GDGPS RTGX*
 - Continuing small gaps on a by SV basis
 - JPL researching root cause
 - *All NGA/JPL CNAV is merged for this analysis*

L2CNAV Upload Performance, from Start



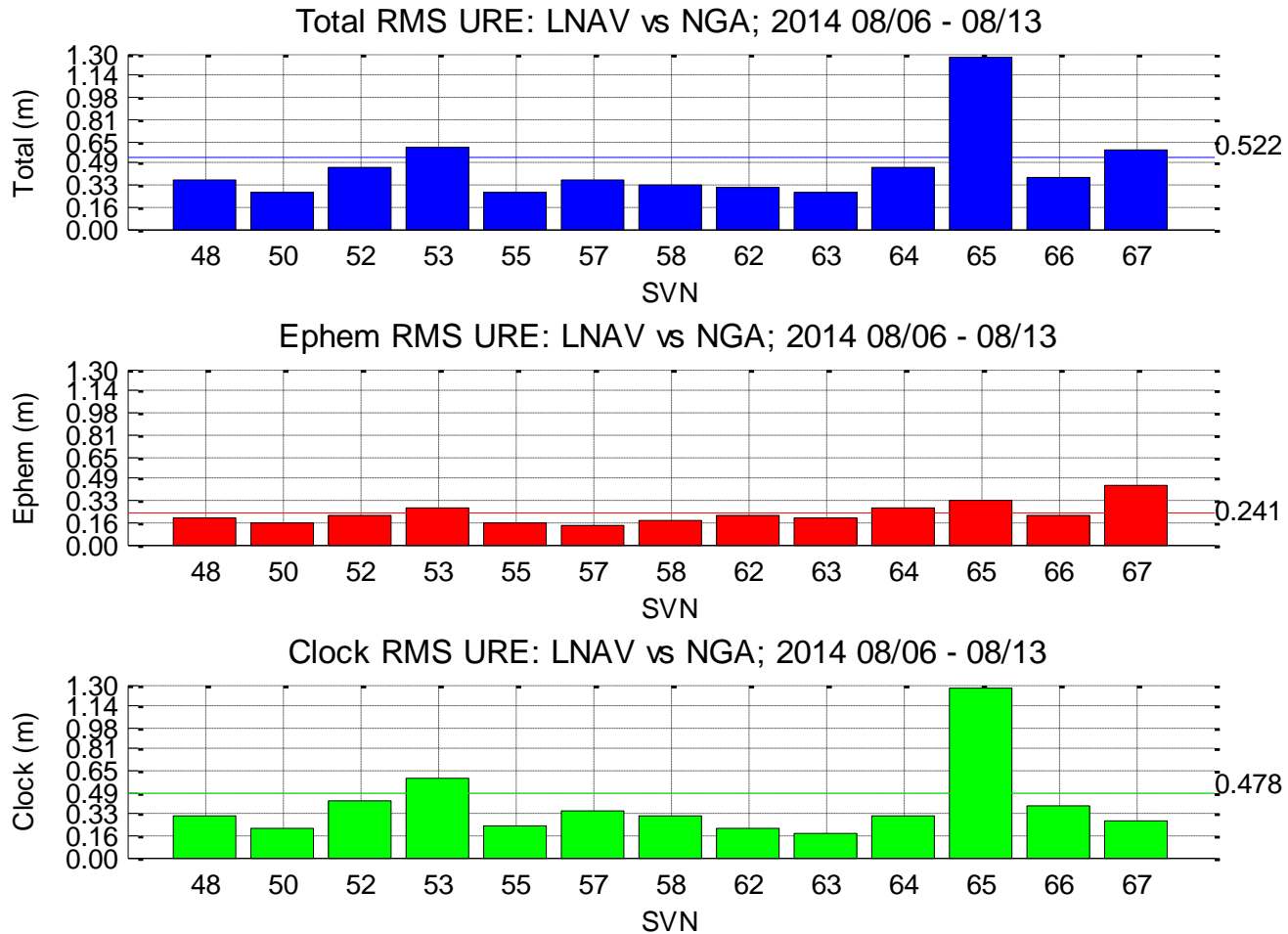
CNAV performance within expectations

L2CNAV Upload Performance, Current 2 Weeks

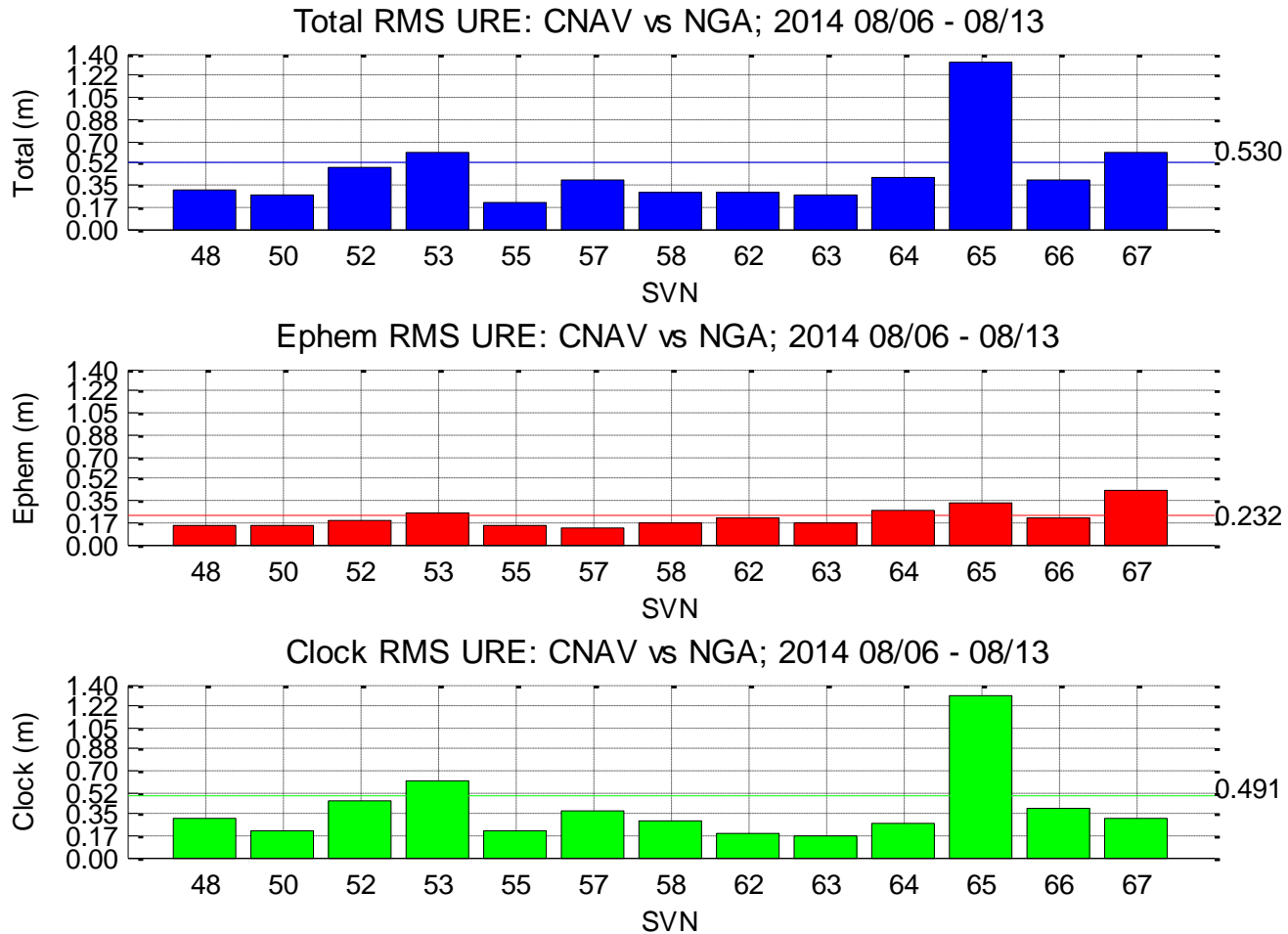


CNAV performance within expectations

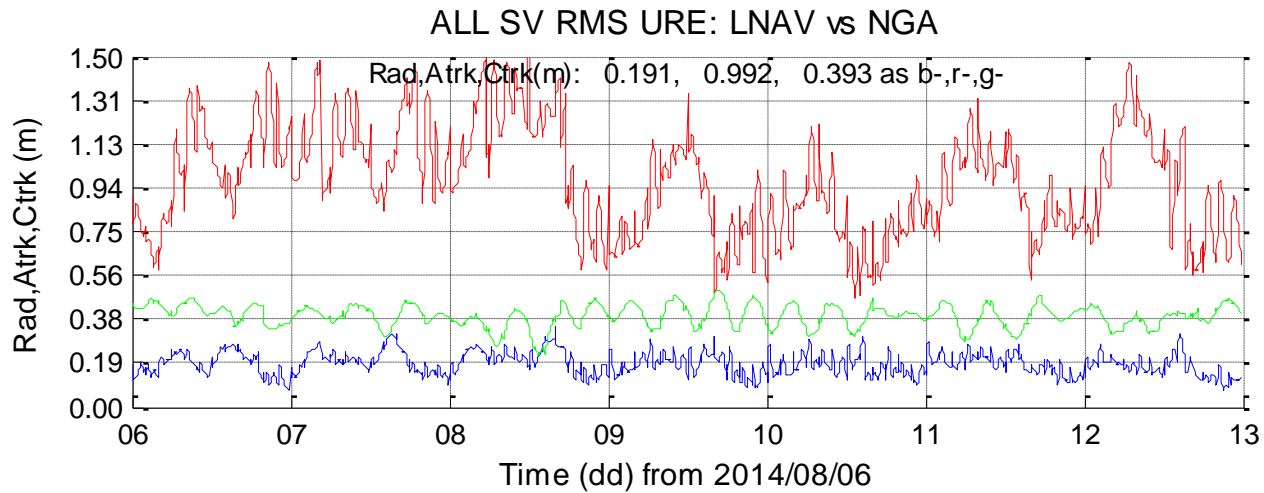
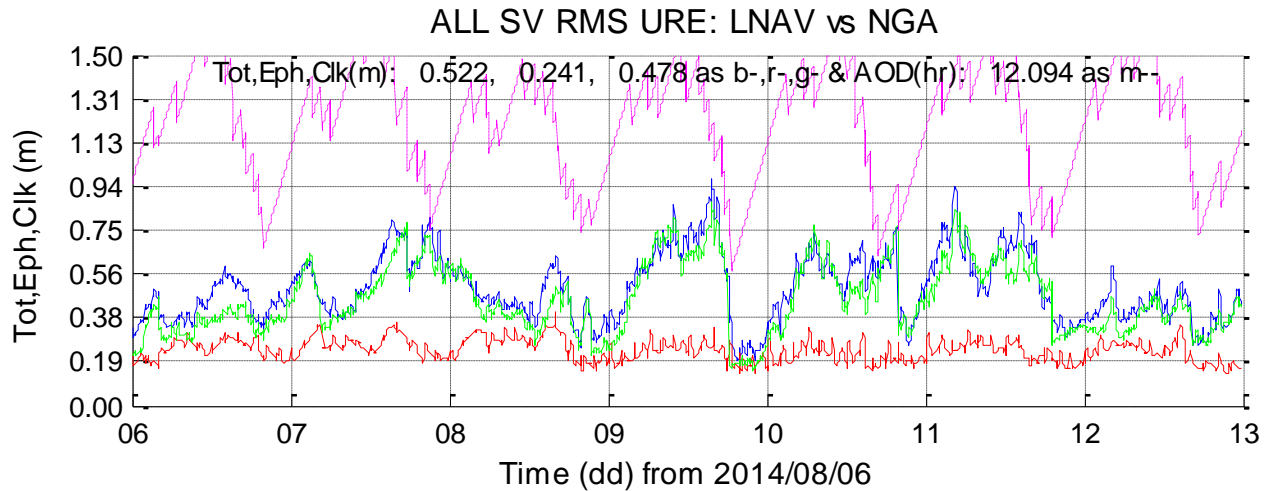
RMS URE: LNAV vs NGA; 2014 08/06 - 08/13



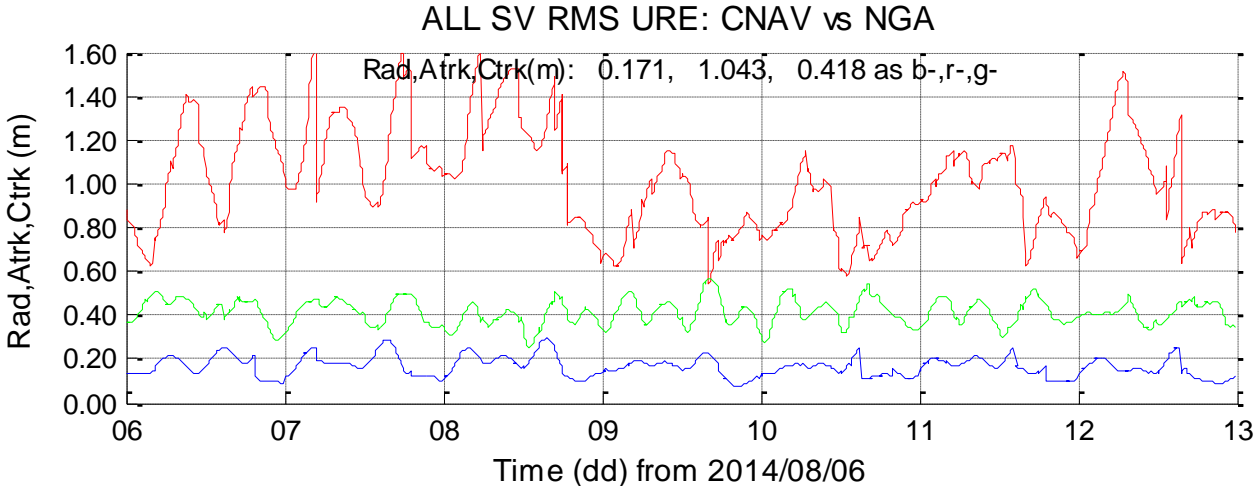
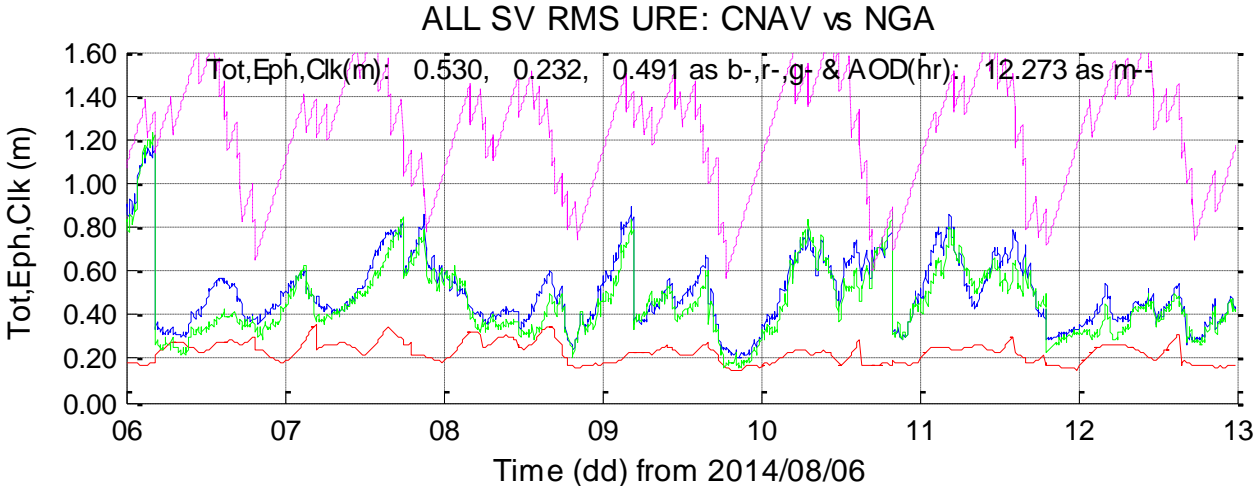
RMS URE: CNAV vs NGA; 2014 08/06 - 08/13



ALL SV RMS URE: LNAV vs NGA



ALL SV RMS URE: CNAV vs NGA



Backups

14 July Example: CNAV AOD Effects on RMS URE

- Root Mean Square (RMS) is statistically weighted towards outliers due to the squaring of the individual errors

$$RMS = \sqrt{\frac{\sum_{i=1}^n URE_i^2}{n}}$$

- With a small sample, a single error can and does drive the RMS
 - *CNAV has only 12 SV's UREs in each time step (n = 12)*
 - *Simple pseudo-random example (modified from Kovach):*

	SV01	SV02	SV03	SV04	SV05	SV06	SV07	SV08	SV09	SV10	SV11	SV12	RMS	Avg
Case1	-0.4	2.0	-2.0	1.7	-1.8	-0.8	1.8	-0.2	-1.4	0.7	11.5	-4.5	3.8	0.6
Case2	-0.4	2.0	-2.0	1.7	-1.8	-0.8	1.8	-0.2	-1.4	0.7	0.3	-4.5	1.8	-0.4
Case3	-0.4	2.0	-2.0	1.7	-1.8	-0.8	1.8	-0.2	-1.4	0.7	0.3	-0.3	1.3	0.0
Case4	-0.4	2.0	-2.0	1.7	-1.8	-0.8	1.8	-0.2	-1.4	0.7	11.5	-0.3	3.6	0.9

In RMS statistics... One bad apple really does spoil the whole barrel
-Kovach

14 July Example: CNAV AOD Effects on RMS URE

- SVNs 65 and 57 contributed majority of the RMS CNAV URE
 - Individual SV uploads from 05:30 to 16:30 where URE < 1.5 m are insignificant compared to ongoing SVN65 > 6 m and SVN57 > 3 m
 - So, CNAV RMS URE continues to grow with SVN's 65 and 57, even as CNAV AOD drops through the day
 - CNAV RMS URE finally drops shortly after 2200 with subsequent uploads to SVNs 65 and 67

