



**Federal Aviation  
Administration**

**WAAS Technical Report  
William J. Hughes Technical Center  
Atlantic city International Airport, NJ  
April 12, 2016**

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***DR #131 PRN-18 SVN-54  
Elevated Correlation Peak Distortion  
Observed Starting  
3/8/16***

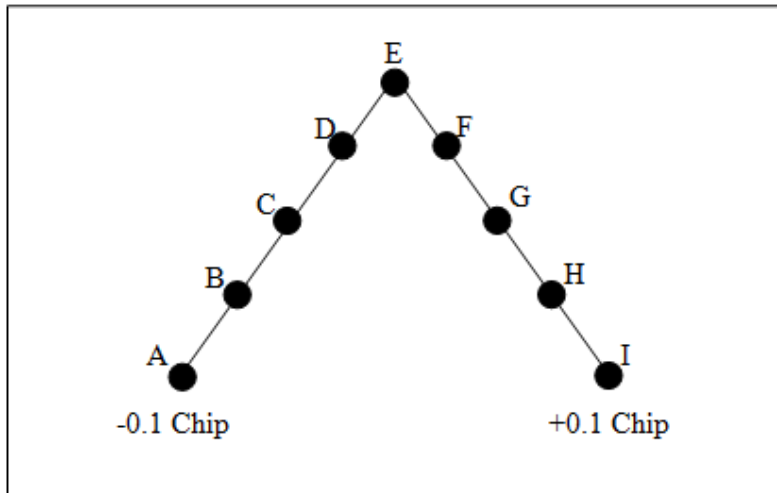
**GPS Week/Day: Week 1887 Day 2  
(03/08/2016)**

# Background

- **Distortions in the correlation peak of a GPS signal can cause errors where the magnitudes are receiver design dependent**
  - Correlator design, filter design
- **Can cause hazardously misleading information (HMI) in SBAS's and GBAS's because the user equipment can see different errors than the ground**
  - The WAAS SQM monitor tracks correlation peak distortion to detect problems
  - The IFOR has agreements for the limits on correlation peak distortion
- **PRN-18 exhibited a prior increase and subsequent return to normal correlation peak distortion from 7/26/09 to 8/7/09 after NANU 2009047**
- **This instance of increased distortion for PRN-18 was observed by WAAS to start at ~ 09:21:53 (GPS) on 3/8/16 and still continues**
  - The WAAS monitor has only reached ~ 80% of the trip threshold so far, and the issue has not yet caused degradation of the WAAS service availability
  - The SQM monitors in the GBAS systems at Newark NJ, Houston TX, and Atlantic City NJ are currently causing PRN-18 to be excluded.
    - TBD how international SBAS's and GBAS's are reacting

# WAAS SQM Detection Metrics

- WAAS uses 4 detection metrics (DM's) to monitor for correlation peak distortion
- The DM's are computed from the correlator counts from various early late correlator spacing's
  - Each DM protects a different section of the threat space

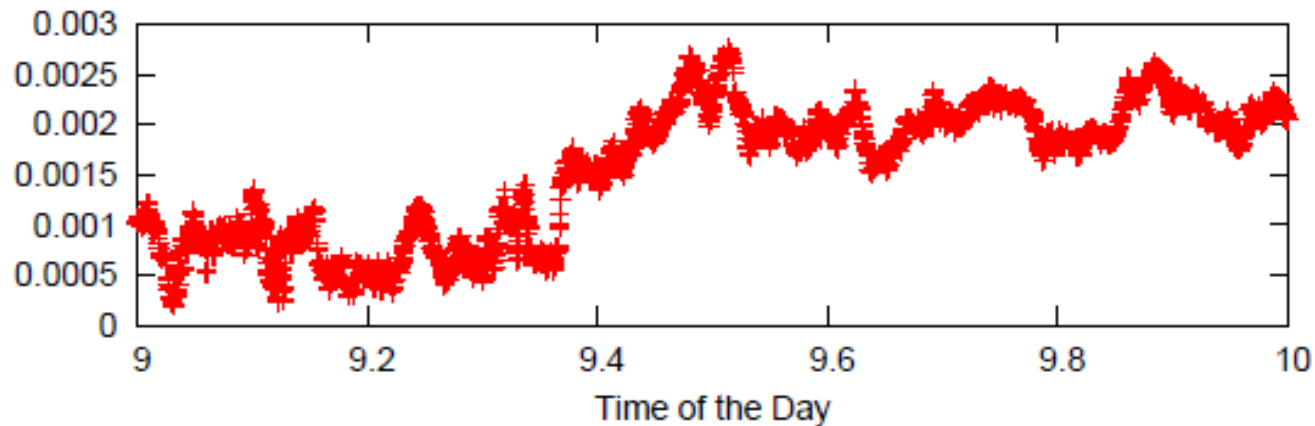


Lable	Spacing	Note
A	- 0.102300	Early -Full (0.1 chip)
B	- 0.076725	Early - 3/4 (of 0.1 chip)
C	- 0.051150	Early - 1/2 (of 0.1 chip)
D	- 0.025575	Early - 1/4 (of 0.1 chip)
E	+/- 0.000000	Prompt
F	+ 0.025575	Late - 1/4 (of 0.1 chip)
G	+ 0.051150	Late - 1/2 (of 0.1 chip)
H	+ 0.076725	Late - 3/4 (of 0.1 chip)
I	+ 0.102300	Late - Full ( 0.1 chip)

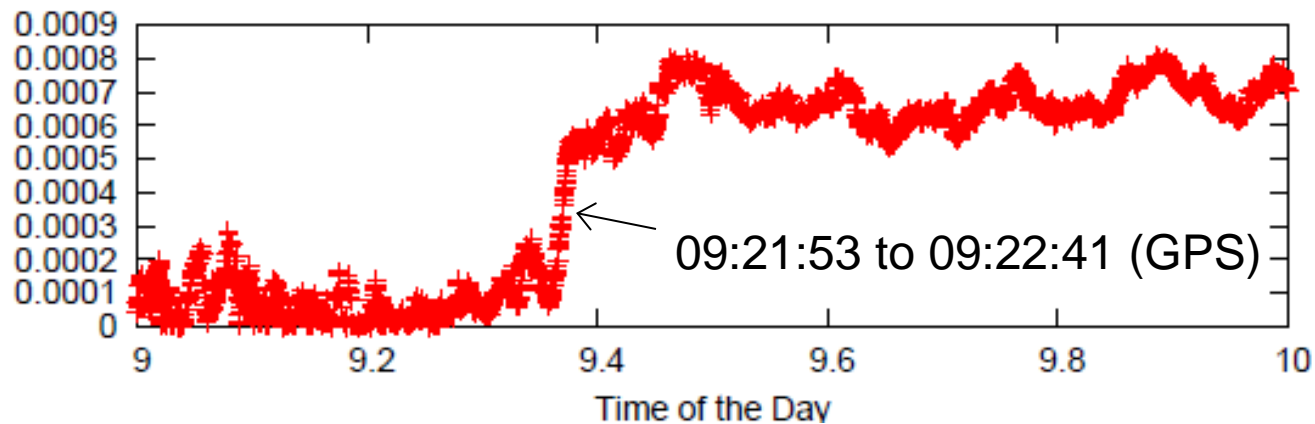
# Start of Event

SQM PRN-18 Week 1887 Day 2 (March 8, 2016)

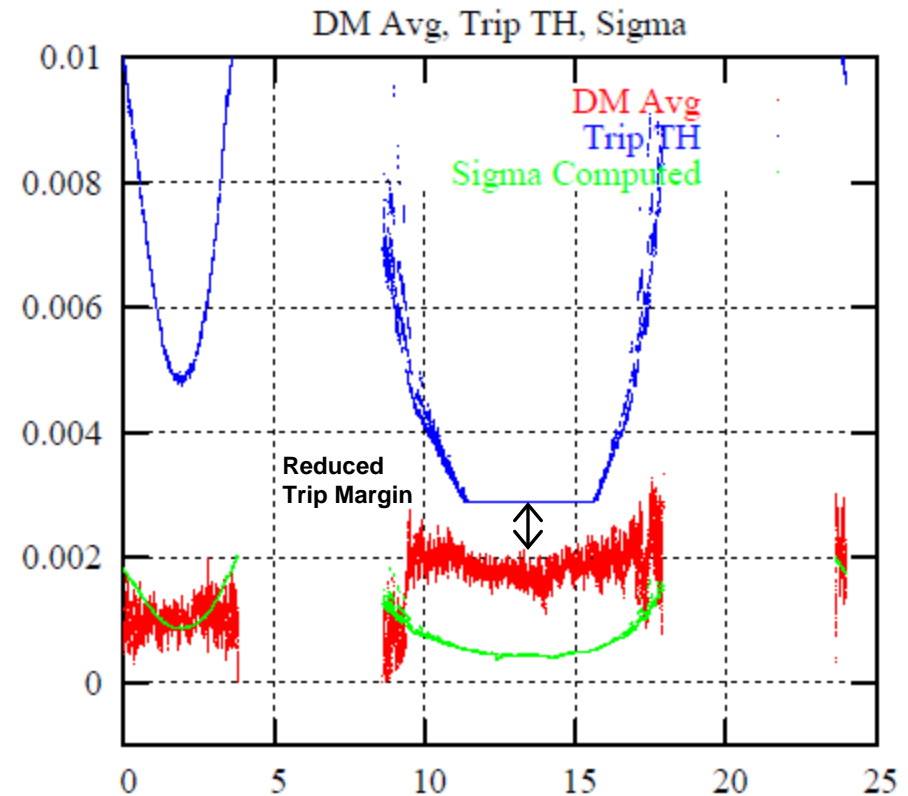
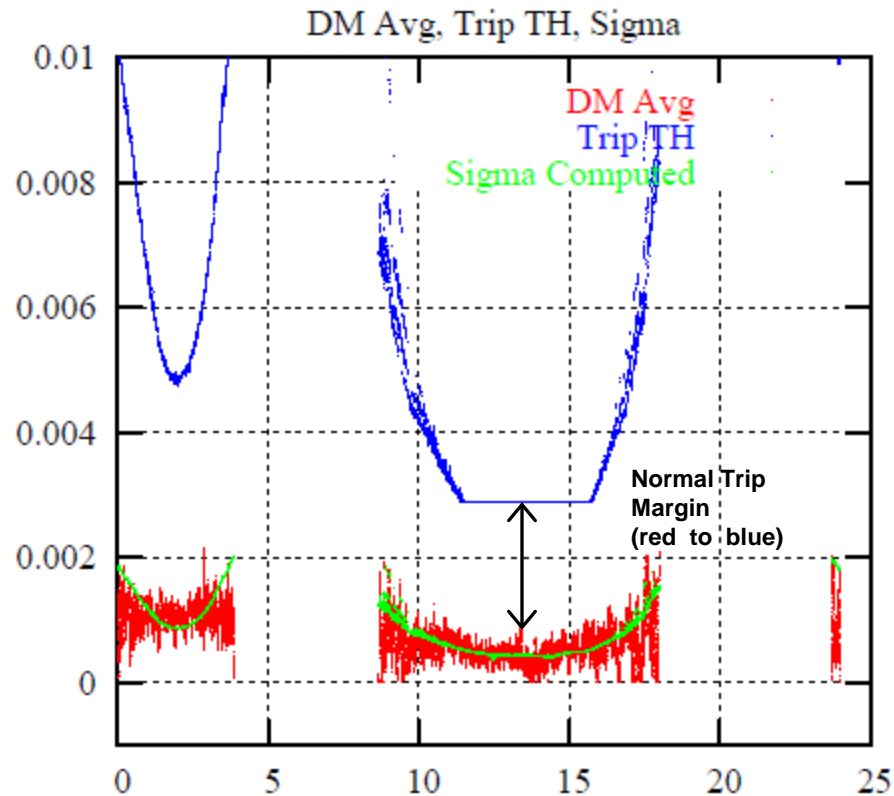
PRN 18 DM1

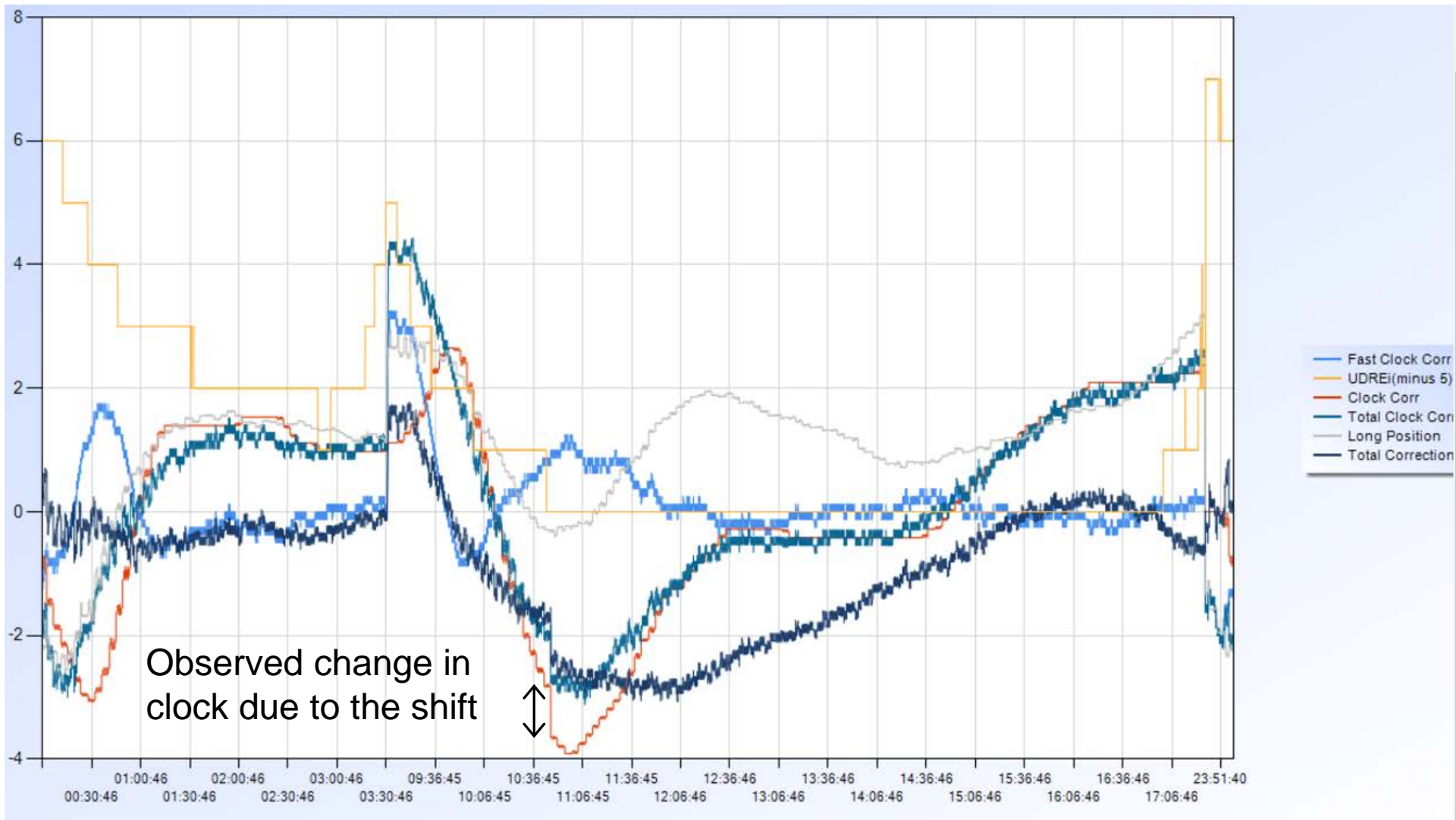


PRN 18 DM2



# Before (3/7) vs After (3/8) for DM1





3/8/16 PRN-18 Distortion  
3/15/16



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