WAAS Technical Memorandum
William J. Hughes Technical Center
Pomona, New Jersey
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Author(s): Noah Rosen

DR #85 PRN 23 NANU Affects WAAS Coverage
GPS Week/Day: Week 1549 Day 5 (9/18/09)

Discussion:

On September 18, 2009, a GPS NANU (Notice Advisory to Navstar User) was issued which alerted GPS users that PRN 23 was unusable from 08:28 GMT to 15:25 GMT. During this time, there was a significant loss of LPV200 coverage in Alaska and a pronounced effect on CONUS LPV200 coverage.

PRN 23 is a critical satellite to the geometry in both CONUS and Alaska. The loss of PRN 23 as a ranging source during the NANU times caused a reduction in WAAS coverage.

Figure 1 shows a plot of WAAS Coverage when there was no LPV200 coverage in Alaska. The complete loss of Alaska LPV200 service lasted approximately 15 minutes, which affected the 99% availability. Alaska LPV200 coverage at 99% availability was 8.99% for the day.

Figure 2 shows a plot of WAAS Coverage when there was a significant drop in LPV200 coverage in CONUS. Figure 3 shows a plot of the SPS PDOP at the time of the coverage drop. The PDOP plot emphasizes how the loss of PRN23 led to a poor geometry, reducing LPV200 coverage to 75.95% at 99% availability in the CONUS region.

Figures 4 shows the LPV200 coverage plot for September 18, 2009.

Figure 1:

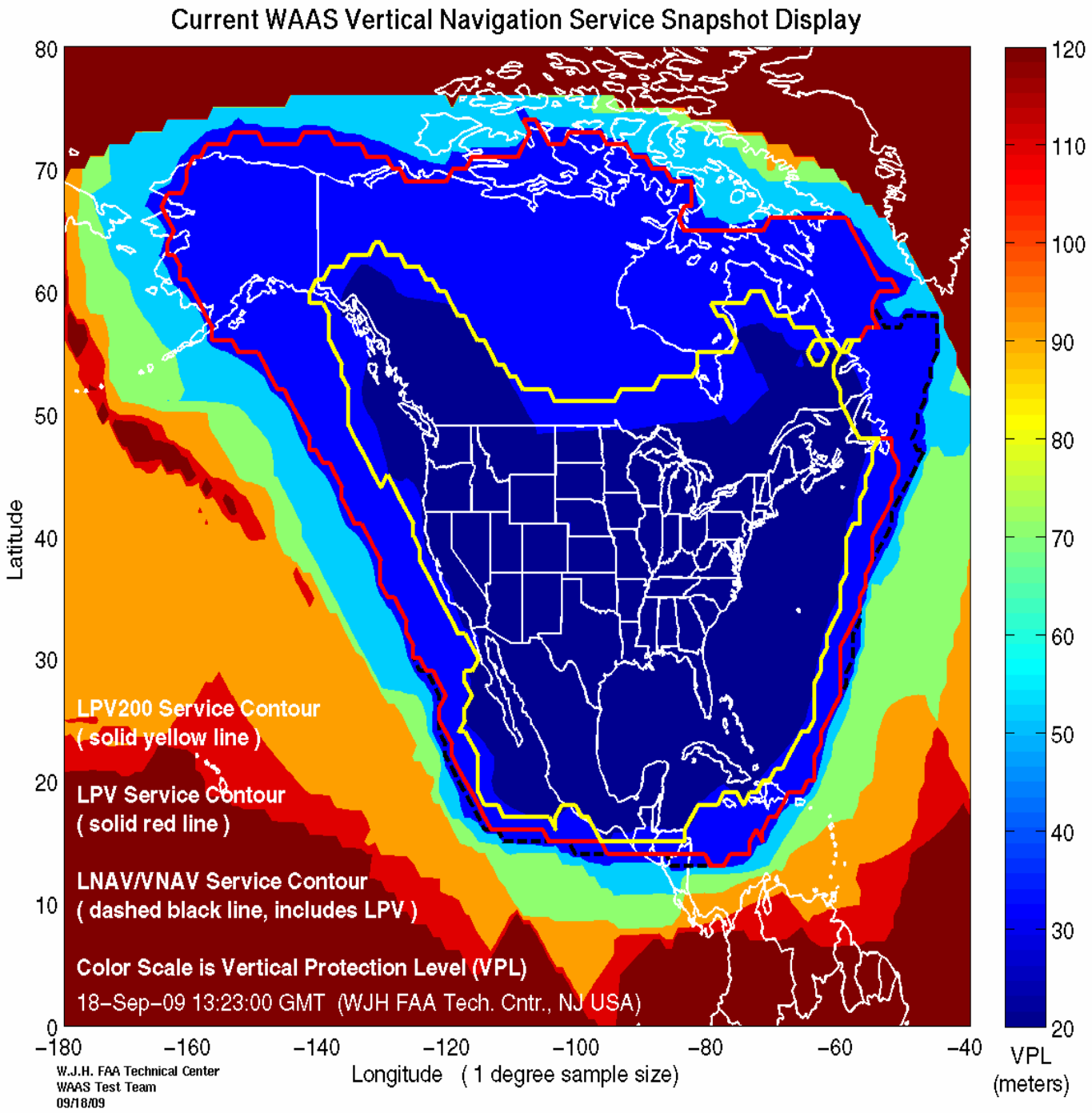

Current WAAS Vertical Navigation Service Snapshot Display
Latitude
Longitude (1 degree sample size)
VPL
(meters)
LPV200 Service Contour
(solid yellow line)
LPV Service Contour
(solid red line)
LNAV/VNAV Service Contour
(dashed black line, includes LPV)
Color Scale is Vertical Protection Level (VPL)
18–Sep–09 13:23:00 GMT (WJH FAA Tech. Cntr., NJ USA)
W.J.H. FAA Technical Center
WAAS Test Team
09/18/09

Figure 2:

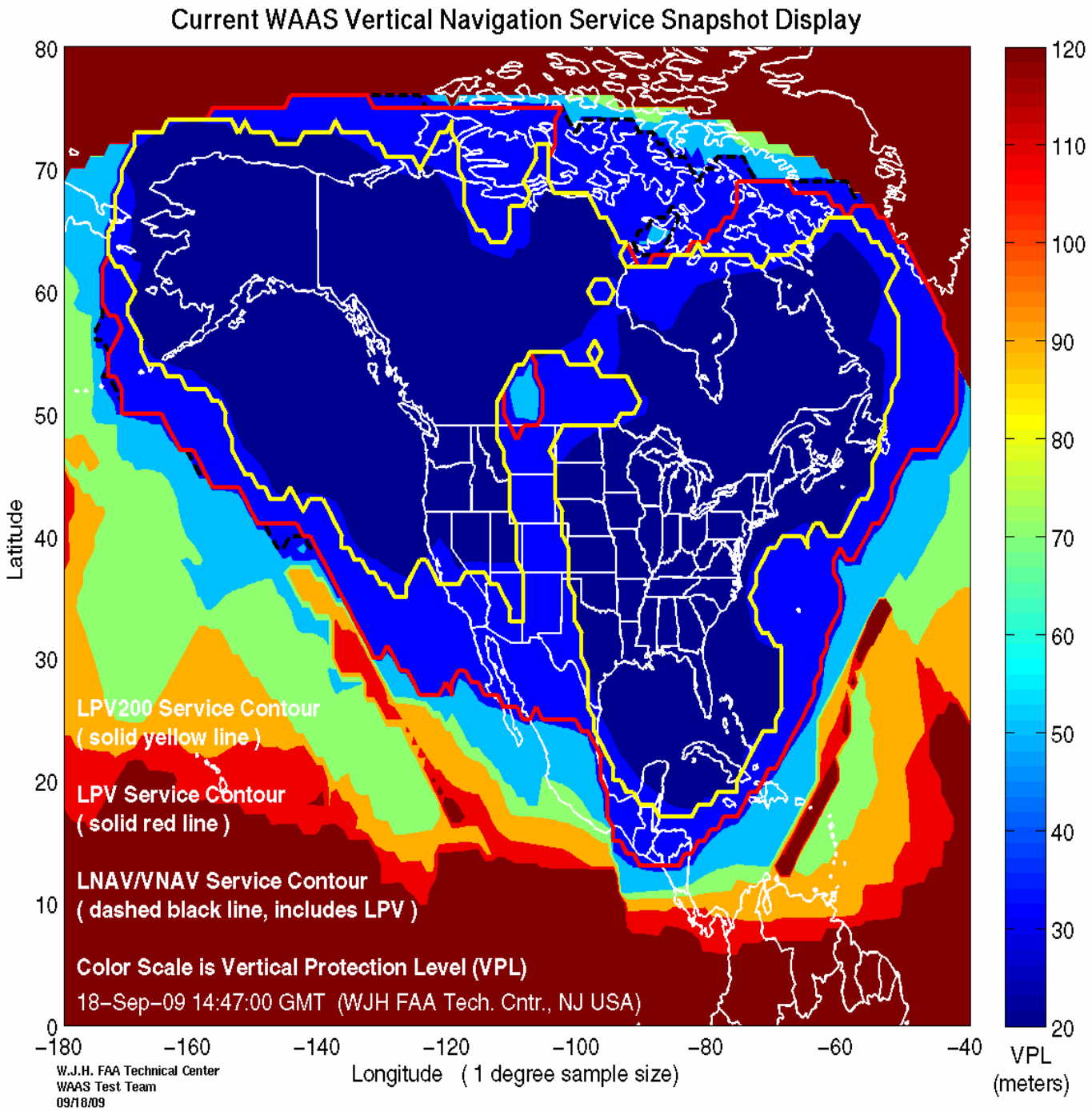

Current WAAS Vertical Navigation Service Snapshot Display
LPV200 Service Contour
(solid yellow line)
LPV Service Contour
(solid red line)
LNAV/VNAV Service Contour
(dashed black line, includes LPV)
Color Scale is Vertical Protection Level (VPL)
18–Sep–09 14:47:00 GMT (WJH FAA Tech. Cntr., NJ USA)
Latitude
Longitude (1 degree sample size)
VPL
(meters)
W.J.H. FAA Technical Center
WAAS Test Team
09/18/09

Figure 3:

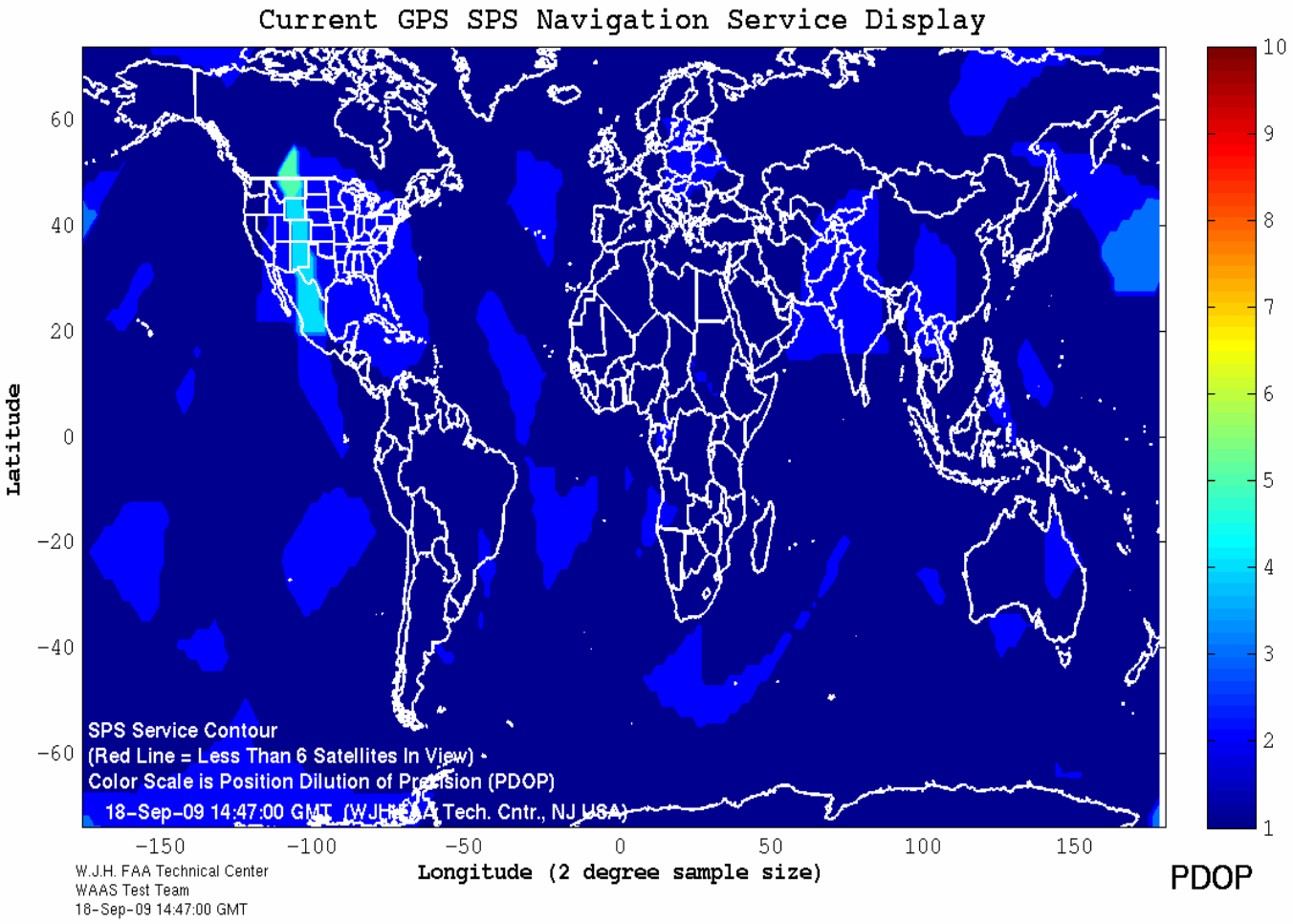
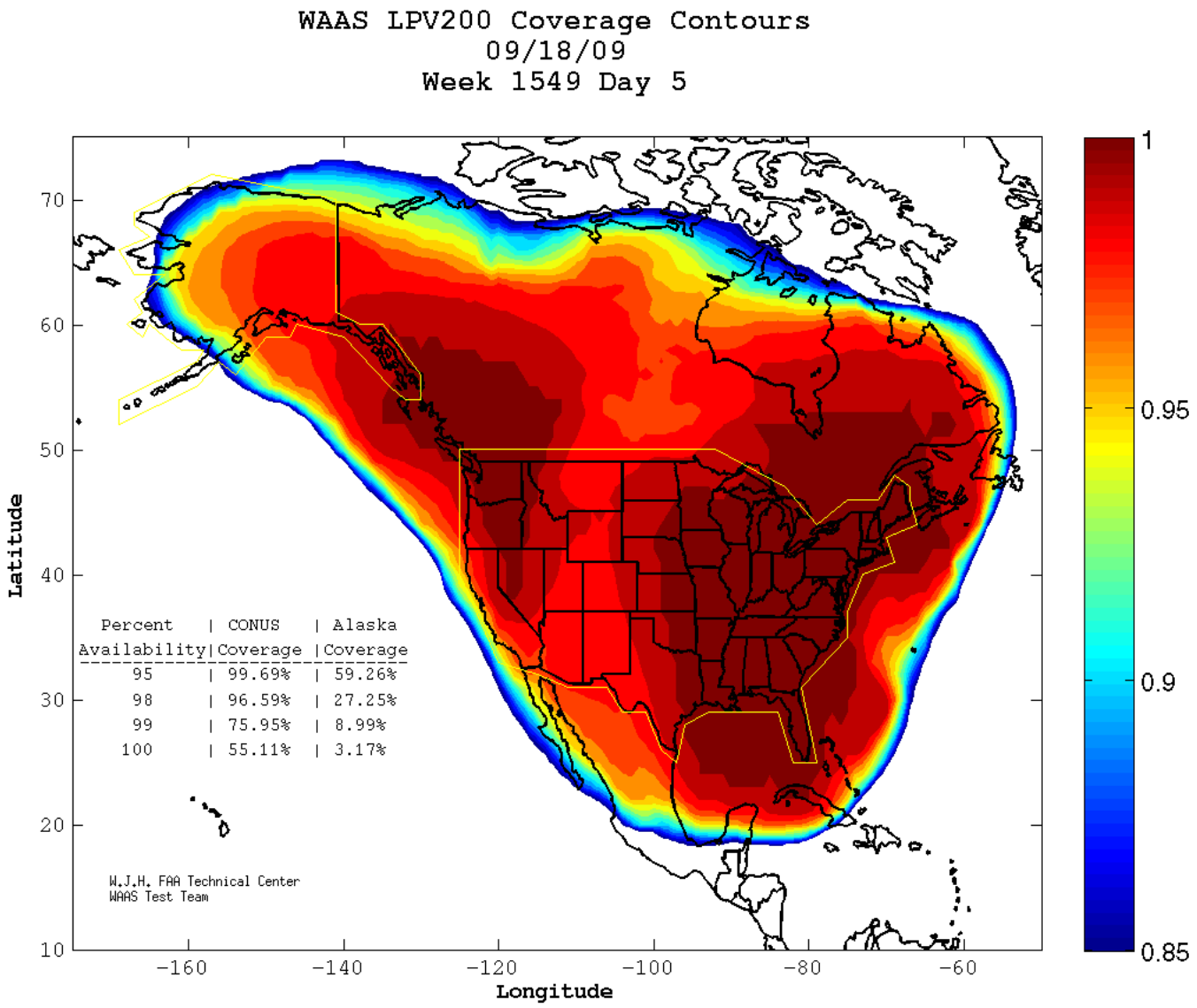

Current GPS SPS Navigation Service Display
Latitude
60
40
20
0
-20
-40
-60
-150
-100
-50
0
50
100
150
Longitude (2 degree sample size)
SPS Service Contour
(Red Line = Less Than 6 Satellites In View)
Color Scale is Position Dilution of Precision (PDOP)
18-Sep-09 14:47:00 GMT (WJHTFA Tech. Cntr., NJ USA)
W.J.H. FAA Technical Center
WAAS Test Team
18-Sep-09 14:47:00 GMT
10
9
8
7
6
5
4
3
2
1
PDOP

Figure 4:



Conclusion:

The PRN 23 outage had a large impact on Alaska LPV200 coverage and CONUS LPV200 coverage because its unavailability for use as a ranging source caused poor geometry.