WAAS Technical Report
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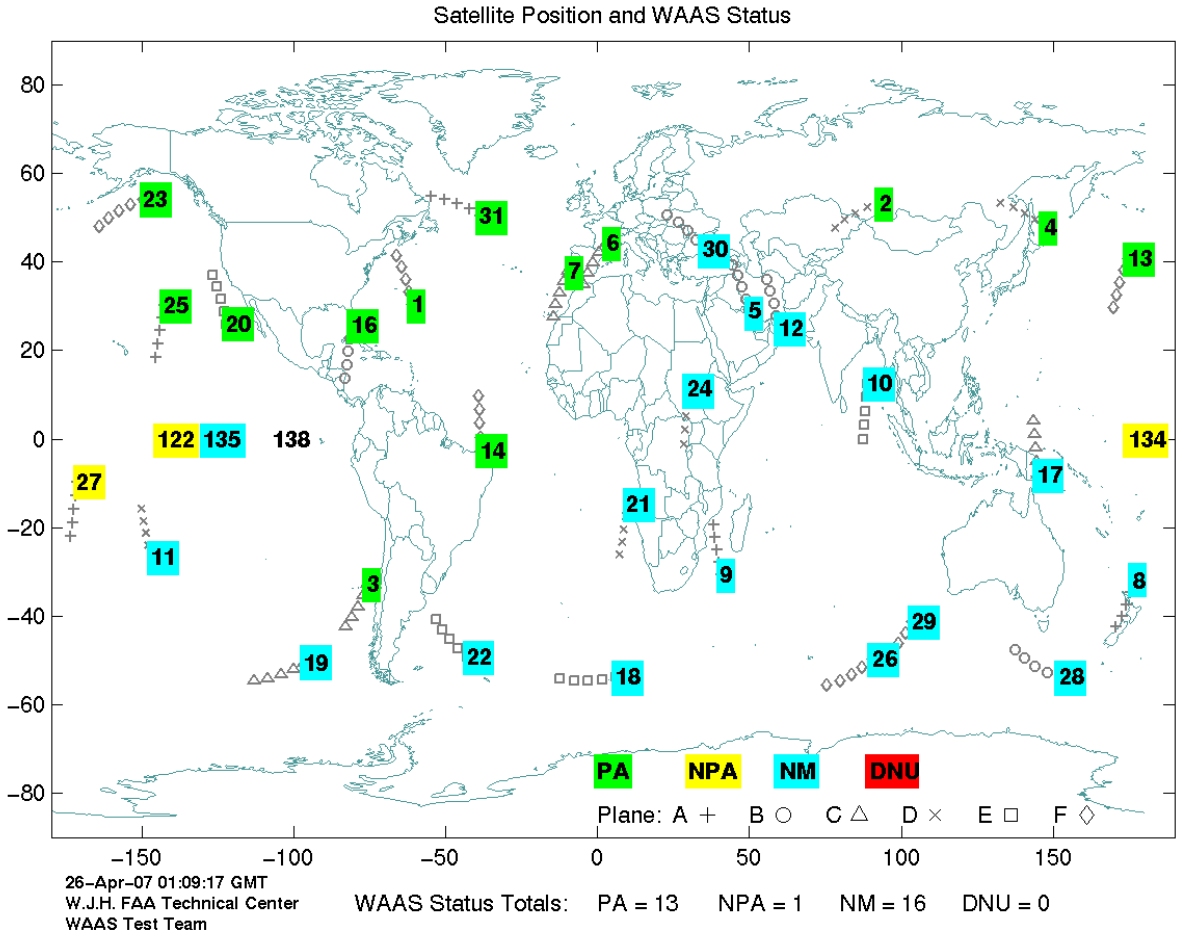
DR #56 : Loss of 100% WAAS Availability in Southwest CONUS region

Discussion:

Beginning on April 5, 2007 until May 4, 2007, analysis has indicated a loss of 100% WAAS availability in the southwest CONUS region. The coverage loss occured because the Vertical Protection Level (VPL) exceeded 50 meters. This drop in service occurred within the first two hours of the GPS day.

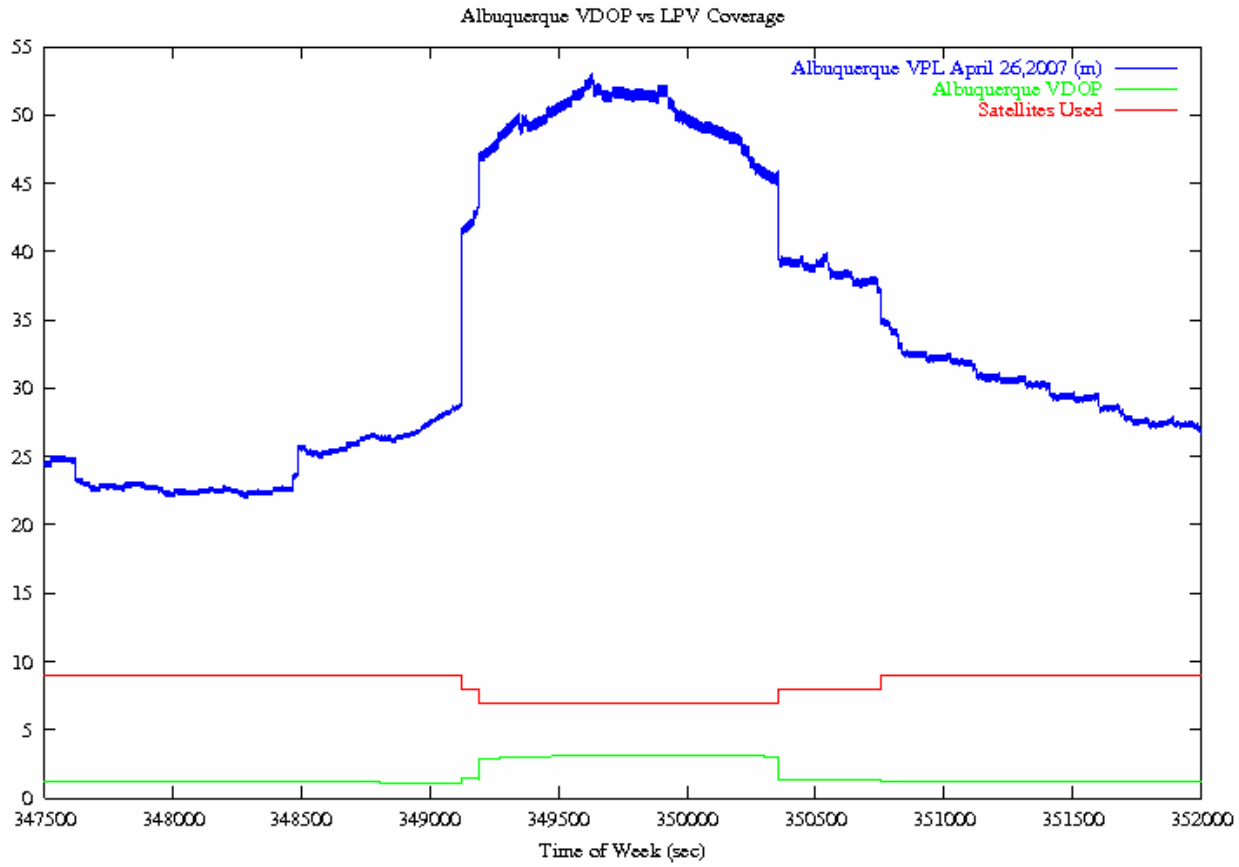
The loss in LPV service occured because of high Dilution of Precision (DOP) measurements, which are caused by poor satellite geometry. Figure 1 shows the satellite geometry at 01:09 GMT on April 26, 2007. At this time, LPV service loss of the southwest region was largest. There are no satellites directly over CONUS during this time and the number of PA-Quality satellites is low.

Figure 1 – Satellite Constellation at 01:09 GMT April 26, 2007



The effects of a poor satellite constellation can be seen at the Albuquerque WRS on April 26, 2007. Figure 2 shows the portion of the day when VPL exceeded 50 meters, which caused a loss of LPV service, thereby reducing availability below 100%. Just before LPV service is lost, the number of satellites used in the navigation solution drops from nine to seven in a just over one minute, and as the VDOP rises due to the seven-satellite constellation, the VPL exceeds 50 meters, causing a loss of LPV service for just over eight minutes on this particular day.

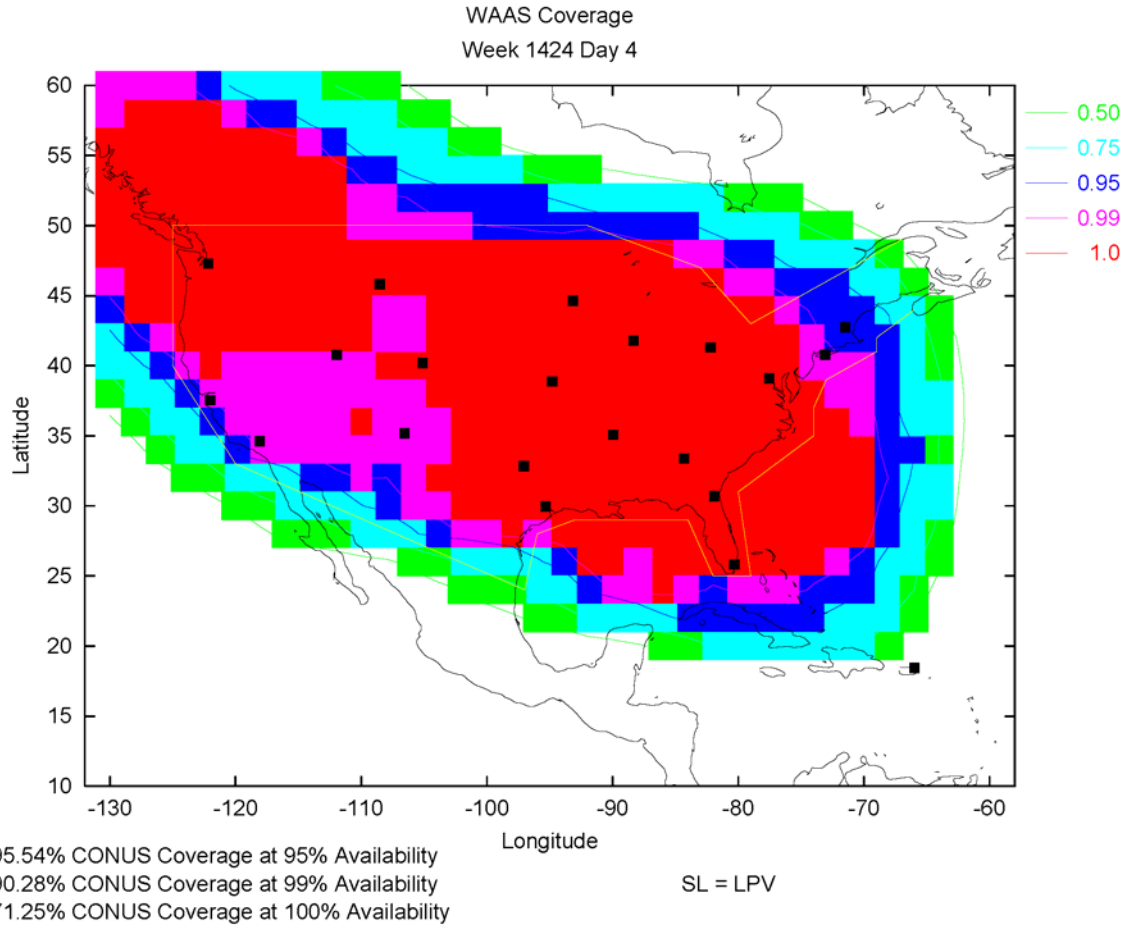
Figure 2 – Albuquerque April 26, 2007 VDOP vs LPV Coverage



Analysis of the Albuquerque WRS shows a fall in the number of satellites used in the navigation solution, a rise in VDOP and a loss of LPV service occurring daily between April 5, 2007 and May 4, 2007.

Figure 3 is a plot of WAAS Coverage for April 26, 2007, showing availability contours. The loss of 100% availability in the southwest region of the United States is evident.

Figure 3 – WAAS Coverage Week 1424 Day 4



Conclusions:

The southwest region has traditionally been an area that featured high DOPs as well as high VPLs. From April 5, 2007 to May 4, 2007, the VPL exceeded 50 meters, causing a drop in LPV coverage. This drop in coverage is due to a poor satellite constellation geometry, which introduces high VDOPs. On May 4, 2007, antennas were upgraded at the LA WRS. After the upgrade, the southwest region of CONUS reverted to 100% LPV coverage on days where no satellite maintenance was performed.