*WAAS Technical Memorandum*
***William J. Hughes Technical Center***
***Pomona, New Jersey***
***6/16/09***
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## *DR #88 Effect of CRW UDREi changes on Alaska LPV200 Coverage*
## *GPS Week/Day: Week 1531 Day 1 (5/11/09)*

**Discussion:**

Alaska LPV200 Coverage is sensitive to changes in the UDREi (User Differential Ranging Error Index) that is broadcast from the CRW geostationary satellite. This sensitivity reduces availability and is especially evident at WAAS Reference Stations that are located at the edge of WAAS service volume in Alaska, such as Barrow and Cold Bay.

CRW serves as a critical satellite to achieve good constellation geometry in Alaska. The use of CRW as a ranging source is particularly necessary to achieve high availability of LPV200 service at Alaska WAAS reference stations which are located at the edge of WAAS service. A UDREi increase from 10 (UDRE = 7.5) to 11 (UDRE = 15) causes a reduction in Alaska LPV200 coverage.

The differences between May 9, 2009 and May 11,2009 will be highlighted in this memorandum to show how Alaska LPV200 coverage is effected when higher UDREi values broadcast are from CRW, even while CRW is used as a precision approach ranging source.

On May 9, the UDREi of CRW was 10 for the entire day. Alaska LPV200 Coverage was 85.19% at 99% availability and 77.78% at 100% availability. LPV200 availability at Barrow was 95.50%. LPV200 availability at Cold Bay was 96.70%

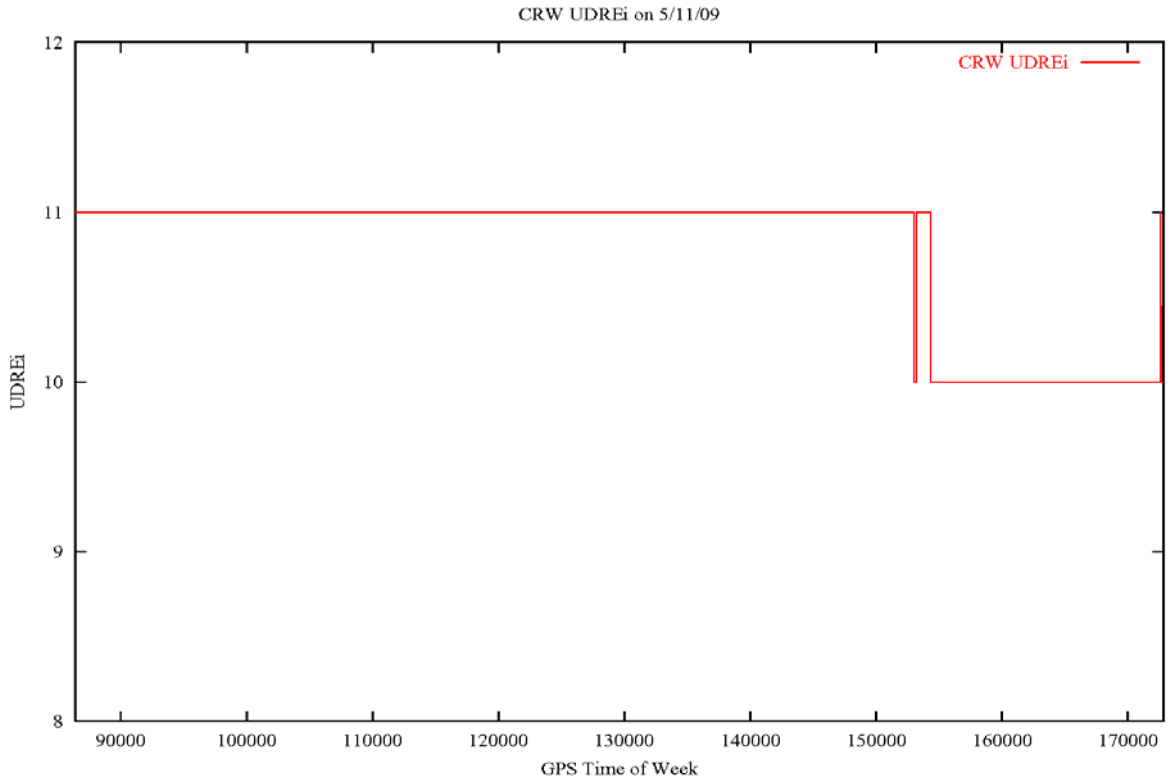
On May 11, there were several UDREi changes on CRW. The UDREi changes are listed in Table 1. Alaska LPV200 coverage was 64.29% at 99% Availability and 45.50% at 100% availability.LPV200 availability at Barrow was 90.44%. LPV200 availability at Cold Bay was 90.47%

**Table 1: CRW UDREi changes on 5/11/09**

| Previous UDREi | Current UDREi | Previous Time | Current Time |
|---|---|---|---|
| | | | |
| 11 | 10 | 18:29:33 | 18:29:39 |
| 10 | 11 | 18:32:51 | 18:32:57 |
| 11 | 10 | 18:51:33 | 18:51:39 |
| 10 | 11 | 23:55:45 | 23:55:51 |
| 11 | 10 | 23:56:45 | 23:56:51 |

Figure 1 shows the CRW UDREi plot for 5/11/09. CRW was usable as a ranging source in precision approach mode the entire day.

**Figure 1: CRW UDREi on 5/11/09**




Figures 2 and 3 show plots of coverage versus time in the Alaska region for LP, LPV, and LPV200 service levels. On May 11, LPV200 service is lower throughout the day than on May 9, particularly at times when there are less satellites available for use as ranging sources.

**Figure 2: Coverage versus time plot on 5/9/09**

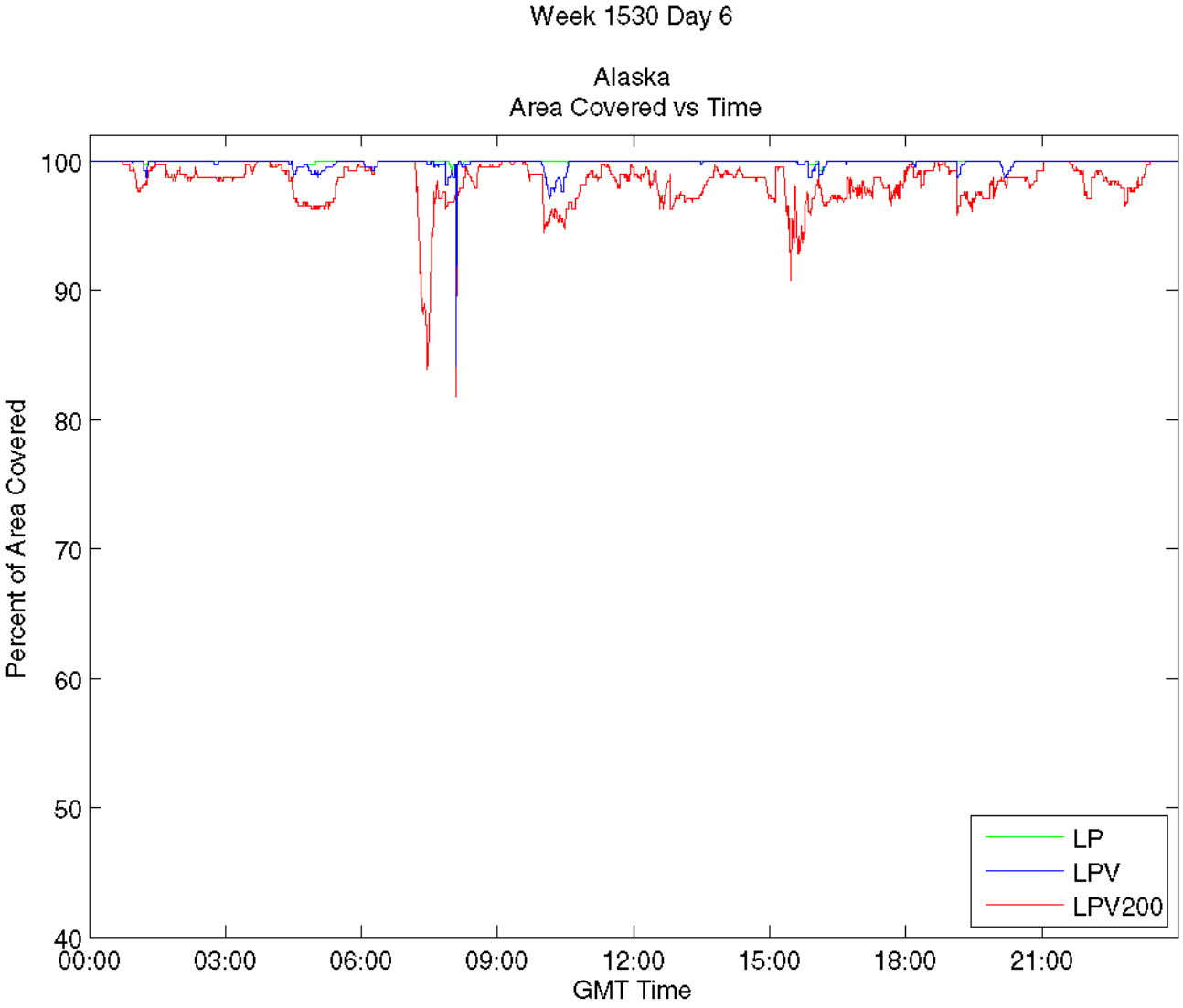
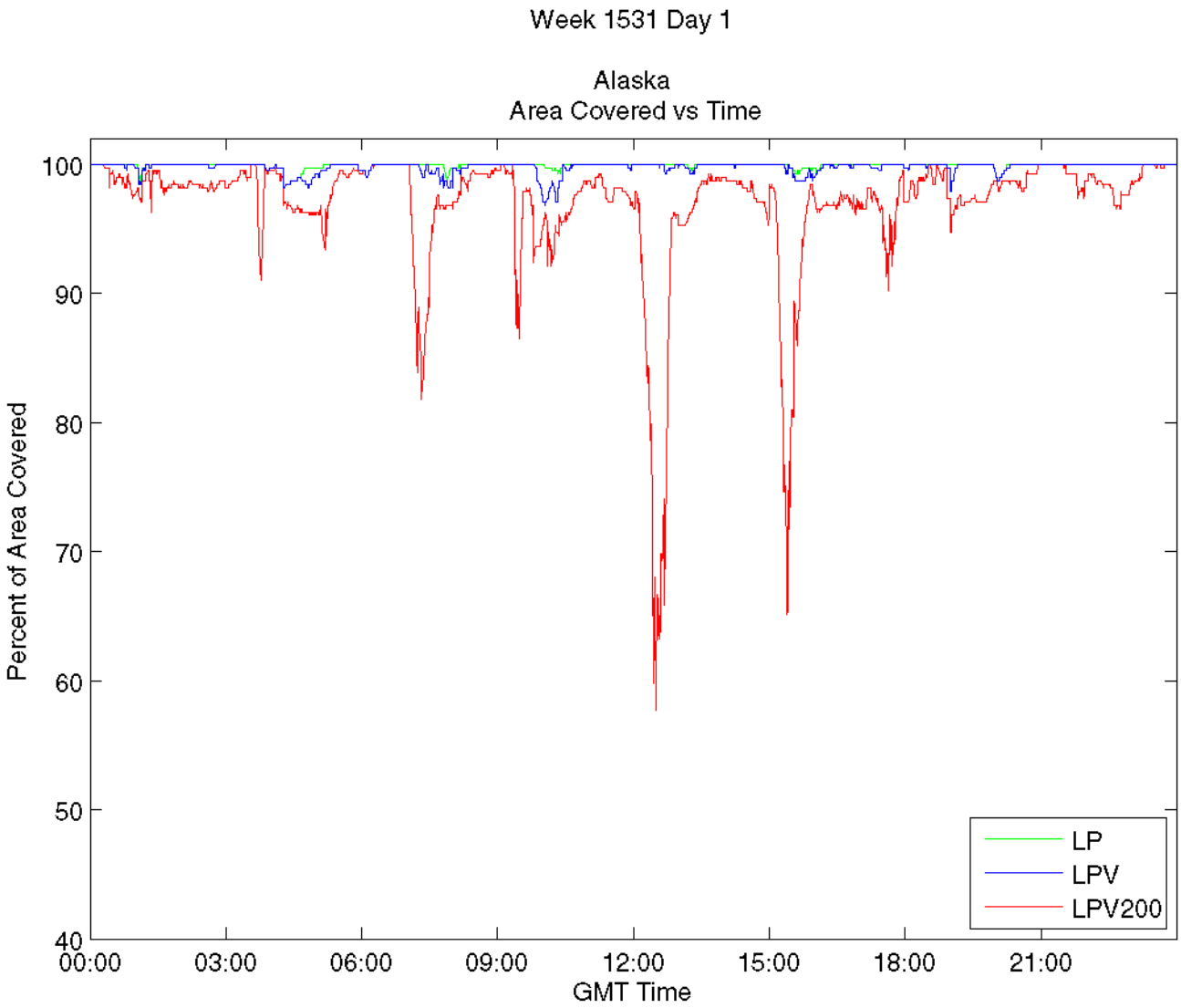


**Figure 3: Coverage versus time plot on 5/11/09**



Figures 4 and 5 show LPV200 coverage for both days. A higher UDREi from CRW has a detrimental effect on LPV200 coverage, particularly in Alaska, on May 11.

**Figure 4: WAAS LPV200 Coverage on 5/9/09**

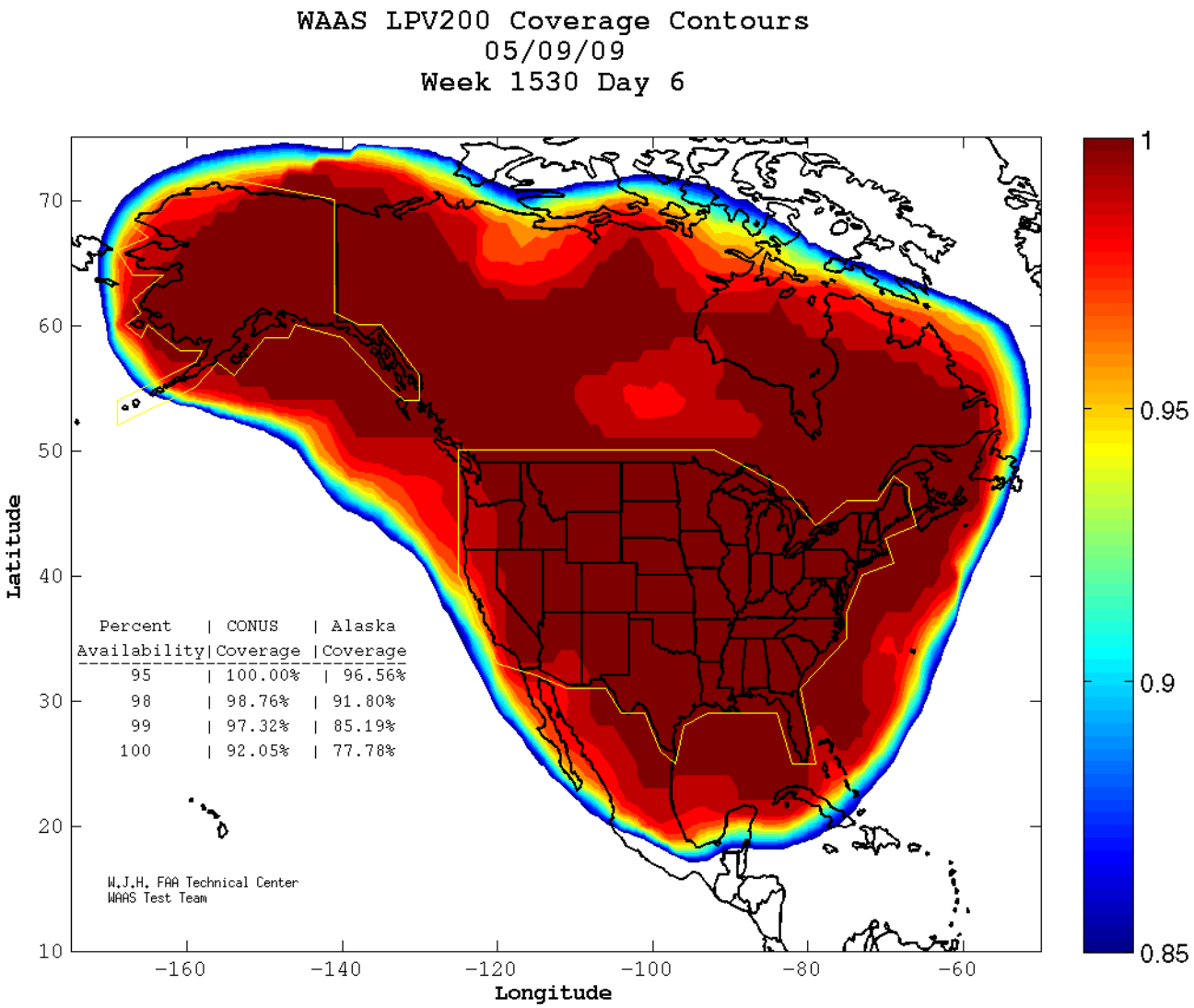
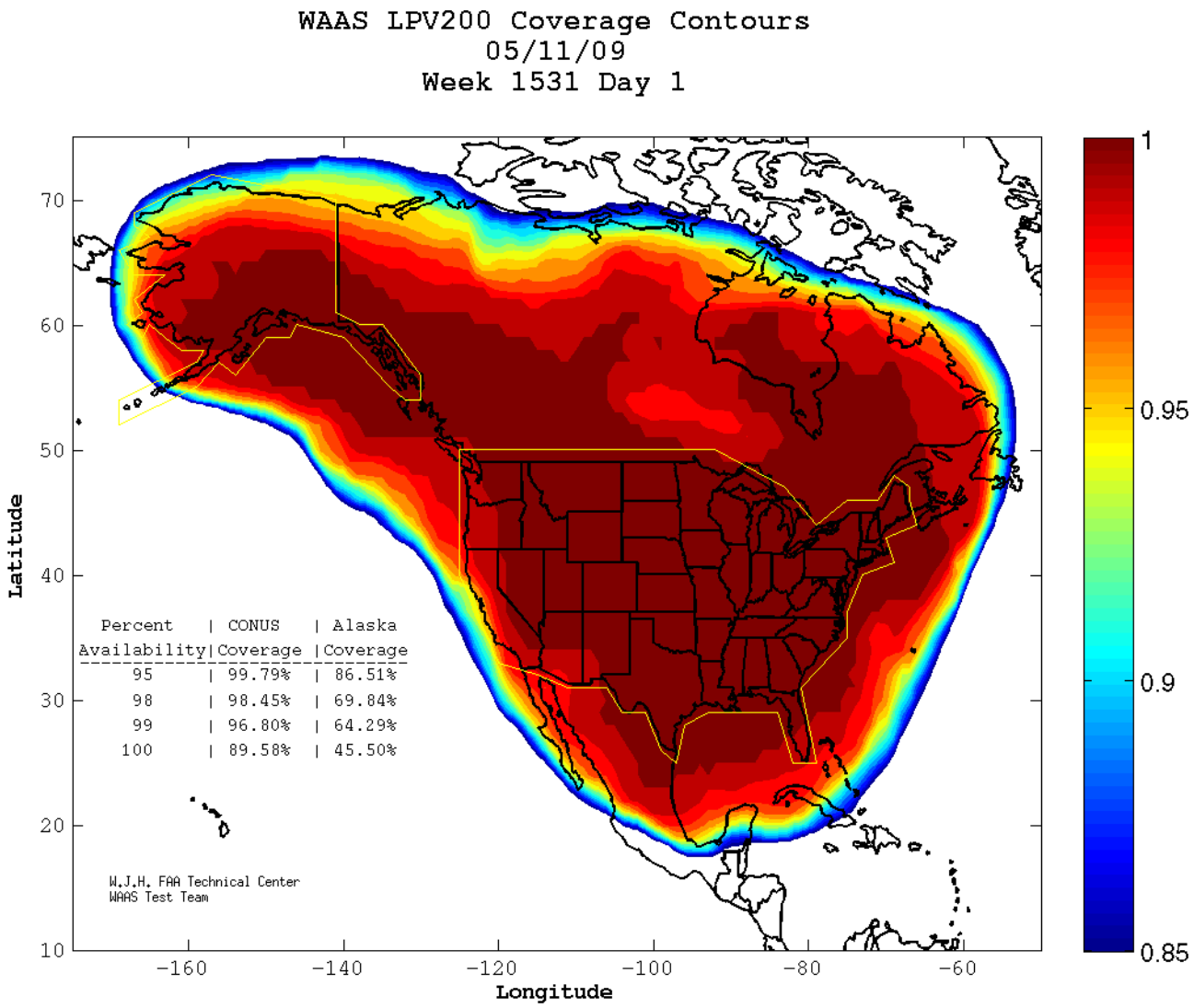


**Figure 5: WAAS LPV200 Coverage on 5/11/09**




**Conclusion:**

Alaska LPV200 coverage is particularly sensitive to changes in the UDREi that is broadcast from the CRW geostationary satellite. When the UDREi of CRW is 11, the satellite may be used in precision approach mode, but there is a significant impact on LPV200 coverage in Alaska and a small impact on LPV200 coverage in Conus due to the additional ranging error from the satellite.