WAAS Technical Report
William J. Hughes Technical Center
Atlantic City International Airport, NJ
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DR#119: Geomagnetic Activity and common WRS communication outages at Barrow, Bethel, Fairbanks, and Kotzebue cause loss of LPV200 service in Alaska and Canada

GPS Week/Day: Week 1783 Day 3 (3/12/2014)

Discussion:

On March 12, 2014, several IGP's in Alaska and the northwestern part of Canada that had elevated GIVE values and a number of IGP's were set to GIVE = 45 meters between 03:30 and 05:00 GMT. The planetary Kp Index, which quantifies disturbances in the horizontal component of earth's magnetic field, had a measurement of 3. Vertical protection levels (VPL) became elevated during the time when GIVE values were high. Figures 1 and 2 show increased VPL at Kotzebue and Barrow airports on March 12th (red line) in comparison with VPL on March 11th (yellow line). Blue line shows the divergence in protection levels between two days.

Figure 1. Vertical protection levels at Kotzebue airport on March 11th -12th

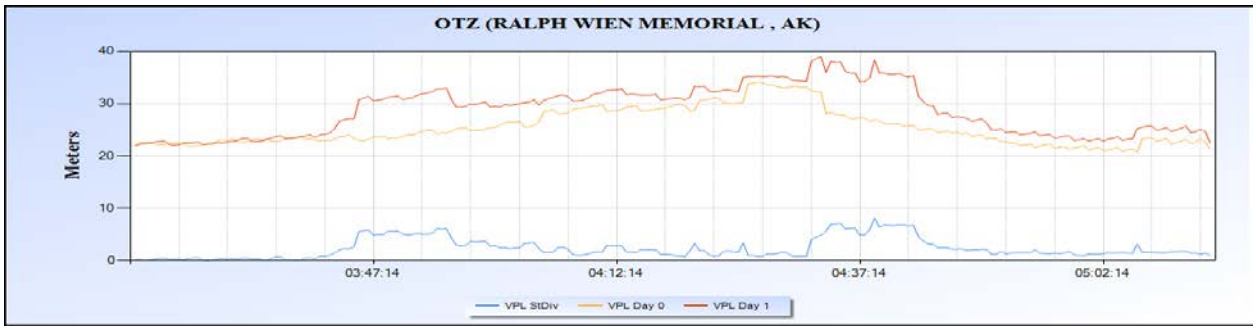
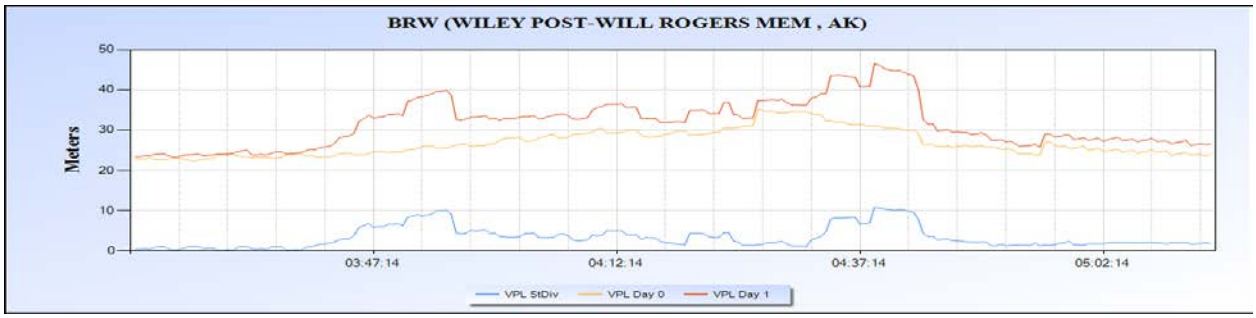
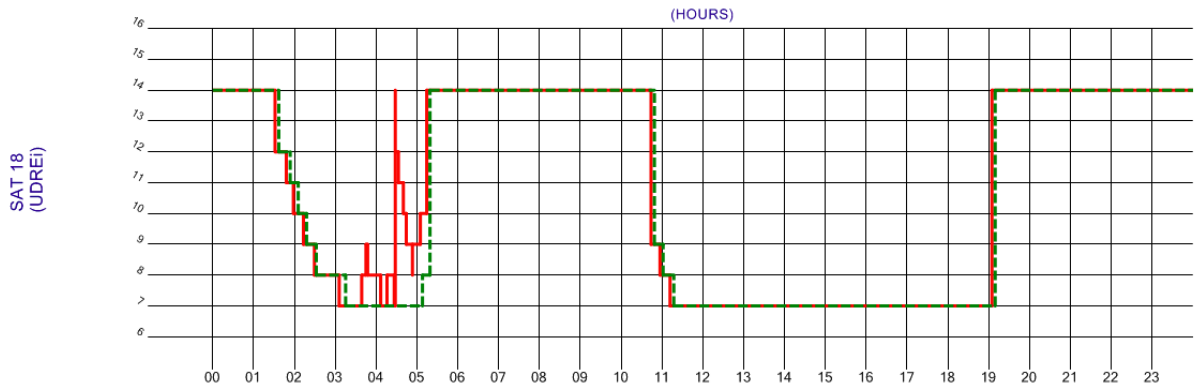


Figure 2. Vertical protection levels at Barrow airport on March 11th -12th



WRS at Barrow, Bethel and Kotzebue had 5 sec common communication outage at 03:38 GMT followed by another 12 sec outage at 04:28 GMT at Barrow, Fairbanks, and Kotzebue. As a result several IGP GIVEs were set to "Not Monitored" (25 meters) at 04:29 GMT. In addition PRN18, which was tracked by WRSs in Alaska, was set to "Not Monitored" at 04:28 GMT and had elevated UDREi values until it went out of view as seen on Figure 3 (the green trace is expected UDREi and the red trace is actual UDREi).

Figure 3. UDREi plot for PRN18 on March 12th, 2014



Figures 4 and 5 show VPL and number of satellites used at Barrow and Kotzebue airports and compared to the previous day (March 11th). At around 04:28 GMT number of satellites in NAV solution decreased from 10 to 9 and an increase in VPL was observed when PRN18 was set to "Not Monitored".

Figure 4. VPL and Number of Satellites at BRW airport

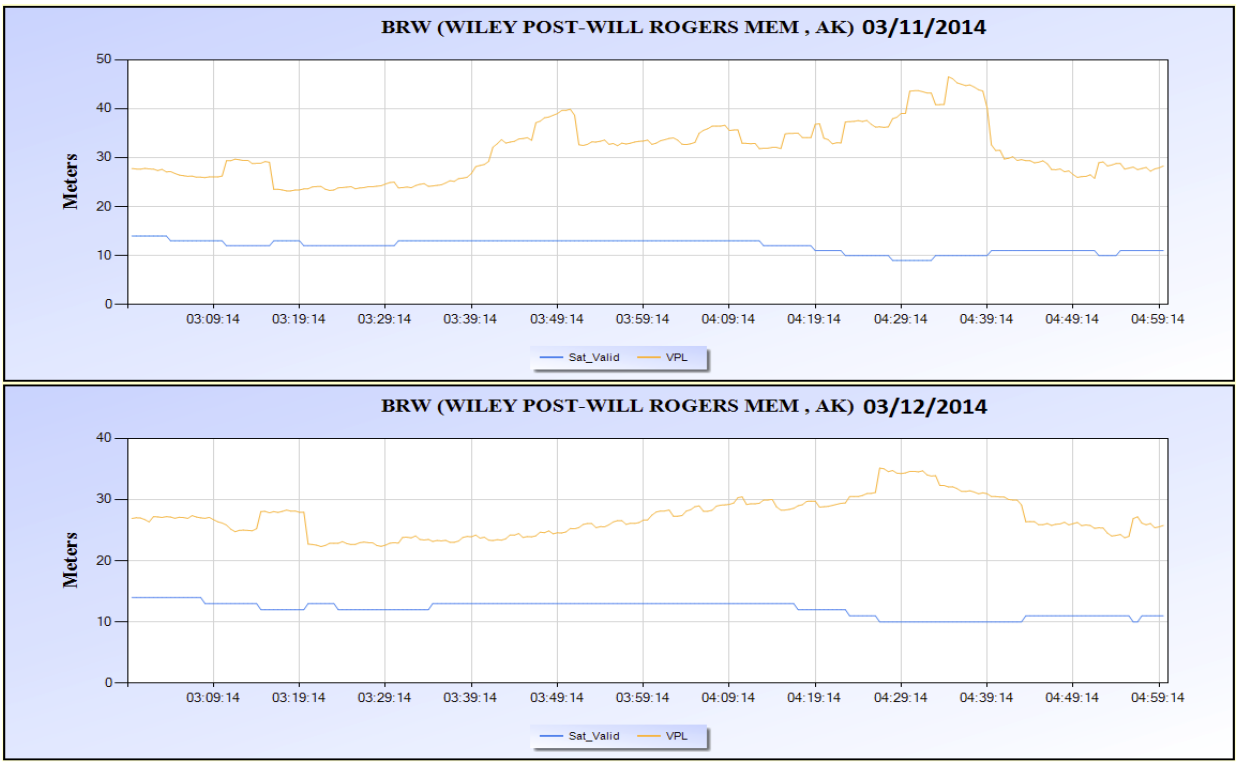
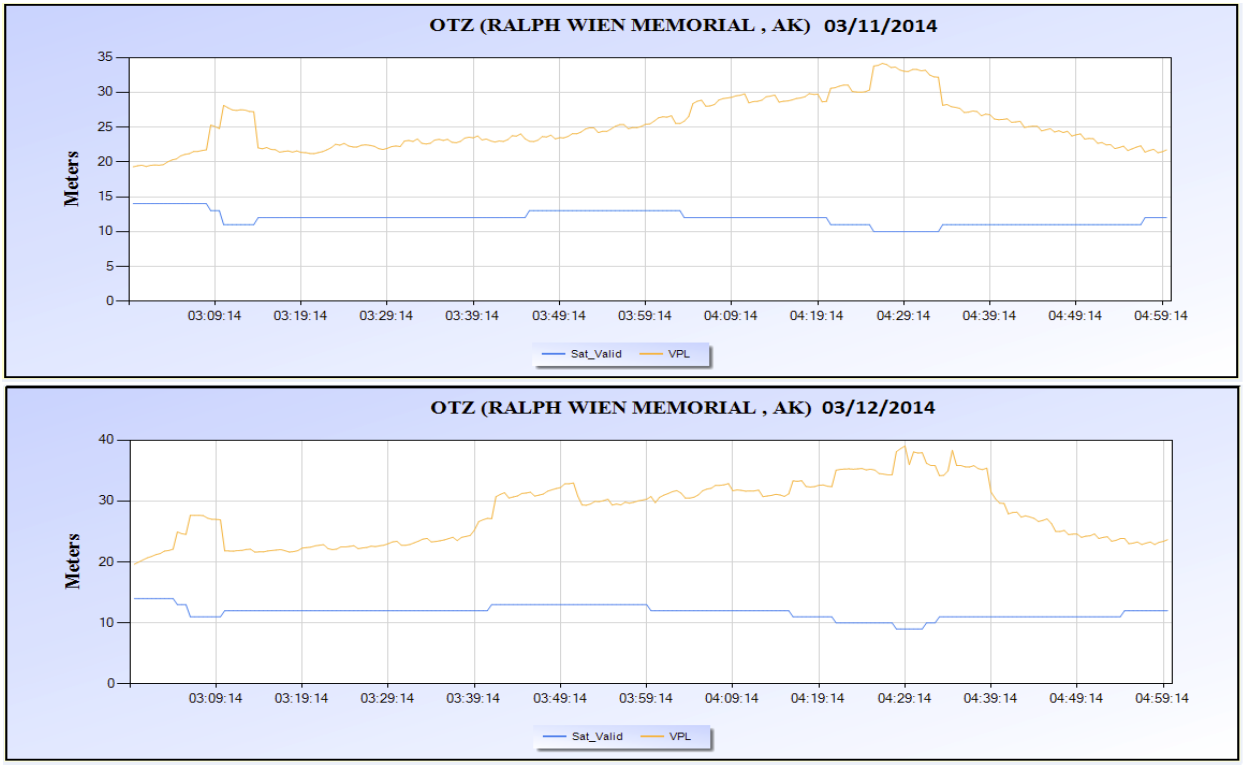


Figure 5. VPL and Number of Satellites at OTZ airport



Conclusion:

Several IGPs in Alaska between 03:00 and 06:00 GMT were elevated on March 12th due to increased geomagnetic activity and number of IGP GIVEs was set to 45 meters. Communication outages at 04:28 GMT at Barrow, Bethel, Fairbanks, and Kotzebue caused a number of IGP GIVEs to be set to "Not Monitored" (25 meters) and also caused PRN18 to be set to "Not Monitored". Combination of the events resulted in increase of Vertical Protection Levels and degradation of service in Alaska.