WIDE-AREA AUGMENTATION SYSTEM PERFORMANCE ANALYSIS REPORT

Report #38

Reporting Period: June 1 to September 30, 2011

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Executive Summary

Since 1999 the WAAS Test Team at the William J. Hughes Technical Center has reported GPS performance as measured against the GPS Standard Positioning Service (SPS) Signal Specification. These quarterly reports are known as the PAN (Performance Analysis Network) Report. In addition to that report, the WAAS Test Team reports on the performance of the Wide-Area Augmentation System (WAAS). This report is the thirty-eighth such WAAS quarterly report. This report covers WAAS performance during the period from June 1, 2011 to September 30, 2011.

The following table shows observations for accuracy and availability made during the reporting period for CONUS and Alaska sites. The international sites are excluded from this table, but are included in the body of the report. See the body of the report for additional results in accuracy, availability, safety index, range accuracy, WAAS broadcast message rates, and GEO ranging availability. LP service is available when the calculated Horizontal Protection Level (HPL) is less than 40 meters. LPV service is available when the calculated HPL is less than 40 meters and the Vertical Protection Level (VPL) is less than 50 meters. LPV 200 service is available when the calculated HPL is less than 40 meters and the VPL is less than 35 meters. Please note that the accuracy results in the table below are calculated when the VPL is less 50 meters for vertical and HPL is less than 40 meters for Horizontal.

Parameter	CONUS Site/Maximum	CONUS Site/Minimum	Alaska Site/Maximum	Alaska Site/Minimum
95% Horizontal Accuracy	Grand Forks 1.774 meters	Denver 0.56 meters	Kotzebue 0.683 meters	Bethel .572 meters
95% Vertical Accuracy	Arcata 2.202 meters	Billings 0.844 meters	Barrow 1.36 meters	Juneau 1.024 meters
LP Availability (HPL <= 40 meters)	Jacksonville 100%	Grand Forks 99.61%	Cold Bay 99.95%	Juneau 99.83%
LPV Availability (HPL <= 40 meters & VPL <= 50 meters)	Jacksonville 100%	Grand Forks 99.60%	Cold Bay 99.93%	Barrow 99.75%
LPV 200 Availability (HPL <= 40 meters & VPL < =35 meters)	Jacksonville 100%	Arcata 97.80%	Bethel 99.83%	Cold Bay 91.92%
99% HPL	Oakland 18.49 meters	Memphis 11.62 meters	Cold Bay 29.77 meters	Anchorage 14.82 meters
99% VPL	Oakland 34.3 meters	Memphis 20.54 meters	Cold Bay 40.74 meters	Juneau 23.64 meters

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1.0 INTRODUCTION

The FAA began monitoring GPS SPS performance in order to ensure the safe and effective use of the satellite navigation system in the National Airspace System (NAS). The Wide Area Augmentation System (WAAS) adds more timely integrity monitoring of GPS and improves position accuracy and availability of GPS within the WAAS coverage area.

Objectives of this report are:

a. To evaluate and monitor the ability of WAAS to augment GPS by characterizing important performance parameters.
b. To analyze the effects of GPS satellite operation and maintenance, and ionospheric activity on the WAAS performance.
c. To investigate any GPS and WAAS anomalies and determine their impact on potential users.
d. To archive performance of GPS and WAAS for future evaluations.

The WAAS data transmitted from Geostationary satellites (GEO) PRN#135 (CRW), PRN#138 (CRE) and PRN#133 (AMR) are used in the evaluation. CRE and CRW GEOs provide a precision approach (PA) ranging capability that supports all levels of WAAS service. AMR GEO came into operational service on 11/11/2010 and is expected to provide a non-precision approach (NPA) ranging service in the WAAS Follow On Release 3 upgrade to the WAAS in early 2012.

The terms "PA" and "NPA" are used in this report to refer to the two modes of user equipment operation. PA and NPA are terms used in the original WAAS specification, FAA-E-2892. See Table 1-1 for a mapping of these terms to the user service levels.

Receivers in PA mode are required to: use all WAAS corrections, use only corrected satellites, not mix corrections from multiple GEOs, only use the designated Space Based Augmentation System (SBAS) for the published approach procedure, and not use ranging from a GEO having a User Differential Range Error (UDRE) status of greater than 15 meters. Receiver in NPA mode may: mix corrected and uncorrected satellites, mix corrections from different GEOs or SBASs, use either the WAAS ionosphere corrections or the GPS Klobachar model for ionosphere corrections, and use ranging from GEOs that have a UDRE status of greater than 15 meters. NPA mode receivers may also operate using Fault Detection / Fault Detection Exclusion (FD/FDE) in the absence of a SBAS. The data presented in this report does not take credit for the additional NPA mode availability and continuity provided by the use of FD/FDE, whether full FD/FDE or partial FD/FDE used to allow the mixing of corrected and uncorrected satellites. The NPA accuracy data presented in this report uses Klobachar ionosphere corrections in order to be conservative.

The results in this report are based on the application of the WAAS corrections to receiver data from the WAAS receiver network and receivers of the FAA's National Satellite Test Bed (NSTB) network and from analysis based on the correction data broadcast by WAAS. Table 1.2 lists the receivers used in the PA analyses. Table 1.3 lists the receivers used in the NPA analyses.

Table 1-1 WAAS Service Levels

User Service	NPA or PA	WAAS Protection Levels
RNP 0.3	NPA	HPL <= 0.3 nmi
RNP 0.1	NPA	HPL <= 0.1 nmi
LNAV	NPA	HPL <= 556 m
LNAV/VNAV	PA	HPL <= 556 m VPL <= 50 m
LP	PA	HPL <= 40 m
LPV	PA	HPL <= 40 m VPL <= 50 m
LPV200	PA	HPL <= 40 m VPL <= 35 m

Table 1-2 PA Sites

	Number of Days Evaluated	Number of Samples
NSTB:		
Arcata	78	6732605
Grand Forks	89	7669478
Oklahoma City	48	4155138
WAAS:		
Albuquerque	91	7862212
Anchorage	92	7940710
Atlanta	91	7857089
Barrow	92	7946102
Bethel	90	7773165
Billings	92	7946267
Boston	92	7932389
Chicago	92	7931982
Cleveland	92	7934576
Cold Bay	92	7935165
Dallas	92	7931707
Denver	92	7935652
Fairbanks	92	7942039
Gander	92	7948612
Goose Bay	92	7948610
Houston	91	7861075
Iqaluit	92	7946539
Jacksonville	92	7924901
Juneau	91	7858345
Kansas City	92	7938325
Kotzebue	92	7944033
Los Angeles	92	7930718
Memphis	91	7862212
Merida	92	7946649
Mexico City	92	7946578
Miami	91	7862103
Minneapolis	91	7844418
New York	91	7862112
Oakland	92	7936952
Puerto Vallarta	92	7941178
Salt Lake City	92	7933621
San Jose Del Cabo	92	7947573
Seattle	92	7935904
Washington DC	92	7928132
Winnipeg	92	7946791

Table 1-3 NPA Sites

Location	Number of Days Evaluated	Number of Samples
Albuquerque	92	7923102
Anchorage	92	7937164
Atlanta	92	7908411
Barrow	92	7946469
Bethel	88	7571878
Billings	92	7943540
Boston	92	7932215
Cleveland	92	7935686
Cold Bay	92	7933751
Fairbanks	92	7931982
Gander	92	7944482
Honolulu	92	7929464
Houston	92	7926134
Iqaluit	92	7944943
Juneau	92	7918594
Kansas City	92	7933598
Kotzebue	92	7944001
Los Angeles	92	7929720
Merida	92	7942138
Miami	92	7923734
Minneapolis	88	7620101
Oakland	92	7936852
Salt Lake City	92	7931582
San Jose Del Cabo	92	7938080
San Juan	92	7922011
Seattle	92	7935821
Washington DC	92	7927772

The report is divided in the performance categories listed below. This report also includes WAAS LPV and LPV 200 Service Availability at Selected Airports, WAAS Deterministic Code Noise and Multipath (CNMP) Bounding Analysis, WAAS reference station survey validation and SQM type and PRN bias monitoring.

1. WAAS Position Accuracy
2. WAAS Operational Service Availability
3. Coverage
4. Integrity
5. WAAS Range Domain Accuracy
6. GEO Ranging Performance

Table 1.4 lists the performance parameters evaluated for the WAAS in this report. Please note that these are the performance parameters associated with the WAAS system. These requirements are extracted from the FAA Specification FAA-E-2892C and FAA Specification FAA-E-2976, as applicable.

Table 1-4 WAAS Performance Parameters

Performance Parameter	Expected WAAS Performance
LPV Accuracy Horizontal	≤ 1.5m error 95% of the time
LPV Accuracy Vertical	≤ 2m error 95% of the time
LNAV Accuracy Horizontal	≤ 36m error 95% of the time
Availability LPV CONUS	99% availability of 100% of CONUS
Availability LPV Alaska	95% availability of 75% of Alaska
Availability LNAV CONUS	99.99% availability with HPL < 556m
Availability LNAV Alaska	99.9% availability with HPL < 556m
Availability En route OCONUS	99.9% availability with HPL < 2nmi
Probability of Hazardously Misleading Information (HMI)	< 10e-7 per approach

* Instantaneous availability (i.e. Availability is calculated every second.)

1.1 Event Summary

Table 1.5 lists test events that occurred during the reporting period that affected WAAS performance or the ability to determine the WAAS performance. These events include GPS or WAAS anomalies, relevant receiver malfunctions, and receiver maintenance conducted. Detailed analyses of particular events are documented in the Discrepancy Reports (DR). The DRs are posted on the website http://www.nstb.tc.faa.gov under 'WAAS Technical Reports' and can also be accessed via hyperlink from Table 1.5 below.

Table 1.6 lists events related to WAAS upgrades that happened this quarter. Table 1.7 lists events related to GUS switchovers. A GUS switchover is the transition from one uplink site to the other uplink site for a GEO. The switchovers result in an approximately 14 second gap in data and require the users to reacquire the set of corrections from that GEO. Re-collecting the set of corrections can take up to 5 minutes depending on where the switch occurs in the 5 minute ionosphere corrections update cycle.

Table 1-5 Test Events

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
05/13/11	08/16/11	PRN30	None	SVN30/PRN30 was set UNUSUFN and eventually decommisioned. SVN35/PRN30 was set to usable on August 16 2011. The following NANUs reference this event: 2011042, 2011055, 2011057, 2011061, and 2011062.
07/01/11	07/01/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	Alaska	Kp of 4. Geomagnetic activity affected LPV & LPV200 Alaska.

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
07/02/11	07/02/11	Washington D.C. (CnV), Los Angeles (CnV)	LPV_CONUS, LPV200_CONUS	On July 2nd, there were unexpected LPV and LPV200 outages around 13:00 GMT at Washington state and Central California. The outages were due to an elevated IGP (45,-135) with the GIVE value set to 15. This increased the VPL to approximately 51 m (daily VPL at that time is around 47m).
07/11/11	07/11/11	GEO135, Littleton (APA)	LPV_Alaska, LPV200_CONUS	GUS manual switchover, Littleton to Napa TOW 115238-115242. LPV200 East Coast of CONUS was affected.
07/16/11	07/16/11	Pamalu (HDH), Santa Paula (SZP), NAPA (APC), Littleton (APA), Brewster (BRE-B), Woodbine (QWE)	All	Software upgrade to version G5.055L as part of Release 2b. This corresponds to the GUS Switchovers on this day for all 3 GEOs. Elevated UDRE values caused a slight decrease in coverage.
07/16/11	07/16/11	GEO138, Woodbine (QWE)	LPV200_CONUS	GUS manual switchover, Woodbine to Brewster TOW 543585-543590. Router upgrade. Software upgrade to version G5.055L as part of Release 2b.
07/16/11	07/16/11	GEO135, NAPA (APC)	Alaska, LPV200_CONUS	GUS manual switchover, Napa to Littleton, TOW 547233-547238. Router upgrade. Software upgrade to version G5.055L as part of Release 2b.
07/30/11	07/30/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	LPV_Canada, LPV200_CONUS, LPV200_Canada	Geomagnetic activity in Canada. Kp of 5 caused several IGPs to go to storm state.
08/04/11	08/04/11	Miami (ZMA1), Miami (ZMA2), Miami (ZMA3)	None	Miami WRS software upgrade to Release 2B.
08/05/11	08/06/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	All	Geomagnetic activity with Kp of 8 affected coverage everywhere. See DR 103 WAAS Reaction to Iono Activity August 5-6 2011
08/10/11	08/10/11	PRN27	LPV200_Alaska	SVN27 decommissioned as PRN27. Reduced LPV200 coverage in Alaska. NANU2011159.
08/11/11	08/12/11	PRN17	LPV_CONUS, LPV_Canada, LPV200_CONUS, LPV200_Alaska, LPV200_Canada	Planned maintenance for approx 7 hours. NANU 2011060.
08/24/11	08/24/11	GEO135, Littleton (APA)	Alaska, LPV200_CONUS	Manual GUS switchover, Littleton to Napa. TOW 288016-288021.
08/24/11	08/24/11	GEO135, NAPA (APC)	Alaska, LPV200_CONUS	GUS switchover, Napa to Littleton. C&V commanded. TOW 289676-289694.
08/24/11	08/24/11	GEO135, Littleton (APA)	Alaska, LPV200_CONUS	Manual GUS switchover, Littleton to Napa. TOW 290264-290269.

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
08/25/11	08/25/11	GEO138, Brewster (BRE-B)	LPV200_CONUS	GUS switchover, Brewster faulted. TOW 388736-388752
08/26/11	08/30/11	PRN30	LPV200_CONUS, LPV200_Alaska	NANU 2011071.
08/26/11	08/26/11	PRN8	None	NANU 2011068.
08/30/11	08/31/11	PRN2	LPV200_CONUS, LPV200_Alaska	NANU 2011072.
09/01/11	09/01/11	PRN13	LPV200_CONUS	NANU 2011073.
09/02/11	09/02/11	Miami (ZMA1)	Local	RFI event lasted 12 minutes causing a 50 second LPV200 outage.
09/07/11	09/14/11	PRN30	Alaska, LPV200_CONUS	NANU 2011078
09/09/11	09/10/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	Alaska, Canada, LPV200_CONUS	Kp of 7 caused IGP trips in north and central Canada. Impacted North central CONUS, Canada and Alaska coverage.
09/10/11	09/10/11	GEO135	Alaska, LPV200_CONUS	Doppler spikes caused both automatic and manual switchovers from Napa to Littleton affected coverage. At 12:13 Doppler spike of ~4.6 Hz, missed 1 WUM TOW 562442-562444. At 14:31 Doppler spike of ~3.2 Hz, missed 3 WUMs TOW 570706-570710. At 16:47 Doppler spike of ~1.6 Hz, missed 1 WUM TOW 578880-578882. At 17:49 Doppler spike of ~0.8 Hz, missed 1 WUM TOW 582571-582573. At 20:20 Doppler spike of ~2.9 Hz, missed 9 WUMs TOV 591627-591637.
09/11/11	09/11/11	PRN135	Alaska, LPV200_CONUS	The coverage loss in CONUS for LPV 200 was due to elevated UDRE values on PRN135 after multiple GUS switches on previous day. UDRE value of 13 early in the day.
09/13/11	09/13/11	PRN21	LPV200_CONUS	Glitch event and alert cause the satellite to go to Not Monitored. Event followed missing SQM data 2 minutes earlier.
09/14/11	09/14/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	LPV_CONUS, LPV200_CONUS	LPV outage in California due to increased IGP GIVE values.
09/15/11	09/16/11	GEO135, Littleton (APA)	Alaska, LPV200_CONUS	GUS switchover, Littleton faulted with SE 143 (?RFU Equipment Uplink Fault) TOW 389943-389958.
09/17/11	09/17/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	LPV_Alaska, LPV_Canada, LPV200_CONUS, LPV200_Alaska, LPV200_Canada	Kp of 6. IGPs in storm state between 1-4 hours.

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
09/19/11	09/19/11	PRN21	LPV_Alaska, LPV200_Alaska	There was a coverage drop in Alaska for LPV and LPV200 due to SV alert on PRN21 (2:15:09 GMT).
09/20/11	09/20/11	PRN16	LPV200_CONUS	NANU 2011081
09/26/11	09/27/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	CONUS, Alaska, Canada	Kp of 8. Geomagnetic storm caused CONUS and Alaska to lose service for approximately 6 hours. See DR 104 WAAS Reaction To Iono Activity September 26 2011.

Table 1-6 WAAS Upgrades

Start Date	End Date	Event Description
07/16/2011	07/16/2011	Software upgrade to version G5.055L as part of Release 2b. This corresponds to the GUS Switchovers on this day for all 3 GEOs. Elevated UDRE values caused a slight decrease in coverage.
07/18/2011	07/19/2011	Goose Bay WRS software upgrade to Release 2B.
07/19/2011	07/19/2011	Merida and Iqaluit WRS software upgrade to Release 2B.
07/19/2011	07/20/2011	Mexico City WRS software upgrade to Release 2B.
07/21/2011	07/21/2011	Gander WRS software upgrade to Release 2B.
07/22/2011	07/22/2011	Fairbanks and Puerto Vallarta WRS software upgrade to Release 2B.
07/23/2011	07/24/2011	San Jose Del Cabo and Winnipeg WRS software upgrade to Release 2B.
07/25/2011	07/25/2011	Atlanta WRS software upgrade to Release 2B.
07/26/2011	07/26/2011	Los Angeles WRS software upgrade to Release 2B.
07/26/2011	07/26/2011	The current software build W6.077L at Fairbanks is causing CV thread switching problems at the Oklahoma City Enhanced Shadow due to the tracking of POR and latency for the data to get to the lab. This impacts the test of the next release WFO 3A. Build W6.077L is working fine for the field, but needs to fallback to W6.012L until the Final Shadow Test for WFO release 3A is completed.
07/27/2011	07/27/2011	San Juan and Dallas WRS software upgrade to Release 2B.
07/28/2011	07/28/2011	Honolulu WRS software upgrade to Release 2B. At the HNL site, one of the Access Router console ports did not work, so the spare was used. Raytheon will work with the site to swap the spare with a working Access Router.
08/01/2011	08/01/2011	The 2C cutover will upgrade the C&Vs 12 hours apart. This will update the PRN mask.
08/01/2011	08/01/2011	Houston WRS software upgrade to Release 2B.
08/02/2011	08/02/2011	Jacksonville WRS software upgrade to Release 2B.
08/03/2011	08/03/2011	Houston WRS software upgrade to Release 2B.
08/04/2011	08/04/2011	Miami WRS software upgrade to Release 2B. Due to a problem with one of the routers at the ZMA site, the spare was used. Raytheon will work with the site to swap the spare with a working Access Router.
08/08/2011	08/08/2011	Denver WRS software upgrade to Release 2B.
08/09/2011	08/09/2011	Memphis WRS software upgrade to Release 2B.

Start Date	End Date	Event Description
08/10/2011	08/10/2011	Albuquerque WRS software upgrade to Release 2B. Additional activities in Albuquerque included installation of antenna mounting plates at the base of each antenna. This raised the antennas about 1/2 inch. The mounting plates were missing since a previous antenna upgrade.
08/11/2011	08/11/2011	Washington D.C. WRS software upgrade to Release 2B.
08/15/2011	08/15/2011	Chicago WRS software upgrade to Release 2B.
08/16/2011	08/16/2011	Salt Lake City WRS software upgrade to Release 2B. The only issue encountered was a bad cable at ZLC. A spare cable was installed and no further problems occurred.
08/17/2011	08/17/2011	Cleveland WRS software upgrade to Release 2B.
08/18/2011	08/18/2011	Oakland WRS software upgrade to Release 2B.
08/22/2011	08/22/2011	New York WRS software upgrade to Release 2B.
08/23/2011	08/23/2011	Seattle WRS software upgrade to Release 2B.
08/24/2011	08/24/2011	Barrow WRS software upgrade to Release 2B.
08/24/2011	08/24/2011	Boston WRS software upgrade to Release 2B.
08/25/2011	08/25/2011	Juneau WRS software upgrade to Release 2B. There was a problem with the communication links following the router upgrade. The problem was isolated to the ASTI V.35 patch panel in Juneau (outside WAAS baseline). There was no comm to the site when connected through the V.35 patch panel on either network 1 or network 2. The workaround was to bypass ASTI's patch panel and connect the WAAS external WAN cable to ASTI's HDSL campus modem. Will work with ASTI to determine what the problem is and identify a permanent solution.
08/26/2011	08/26/2011	Bethel WRS software upgrade to Release 2B.
08/29/2011	08/29/2011	Billings WRS software upgrade to Release 2B.
08/29/2011	08/29/2011	Anchorage and Billings WRS software upgrade to Release 2B.
08/30/2011	08/30/2011	Kansas City WRS software upgrade to Release 2B.
08/31/2011	08/31/2011	Cold Bay WRS software upgrade to Release 2B.
09/01/2011	09/01/2011	Minneapolis WRS software upgrade to Release 2B. While on site at Minneapolis (ZMP), the display for the processor on WRE-A was not showing up on the KVM. The WRE-A processor was swapped out with the on-site spare.
09/07/2011	09/07/2011	Kotzebue WRS software upgrade to Release 2B.

Table 1-7 GUS Switchovers

Start Date	End Date	GUS Switch	Location/ Satellite	Service Affected	Even Description
07/11/11	07/11/11	Manual	GEO135, Littleton (APA)	LPV_Alaska, LPV200_CONUS	GUS manual switchover from Littleton to Napa TOW 115238-115242. LPV200 East Coast of CONUS was affected
07/14/11	07/14/11	Faulted	GEO133, Santa Paula (SZP)	None	GUS switchover, SZP faulted. TOW 429731-429747.
07/16/11	07/16/11	Manual	GEO138, Woodbine (QWE)	LPV200_CONUS	Router upgrade. GUS manual switchover, from Woodbine to Brewster TOW 543585-543590. Software upgrade to version G5.055L as part of Release 2b.
07/16/11	07/16/11	Manual	GEO135, NAPA (APC)	Alaska, LPV200_CONUS	Router upgrade. GUS manual switchover from Napa to Littleton TOW 547233-547238. Software upgrade to version G5.055L as part of Release 2b.
07/16/11	07/16/11	Manual	GEO133, Pamalu (HDH)	None	Router Upgrade. GUS manual switchover from HDH to SZP TOW 540058-540063. Software upgrade to version G5.055L as part of Release 2b. All GUST Software has been upgraded. A problem occurred with HDH while being returned to service. The KPA attenuators had to be manually adjusted by site maintainers. This is a known issue and not related to the cutover
07/26/11	07/26/11	Manual	GEO133	None	GUS switchover. SZP faulted TOW 257554-257570.
07/29/11	07/29/11	Manual	GEO133, Pamalu (HDH)	None	Manual GUS switchover from HDH to SZP TOW 475750-475755.
08/24/11	08/24/11	Faulted	GEO135, NAPA (APC)	Alaska, LPV200_CONUS	GUS switchover from Napa to Littleton. C&V commanded TOW 289676-289694.
08/24/11	08/24/11	Manual	GEO135, Littleton (APA)	Alaska, LPV200_CONUS	Manual GUS switchover from Littleton to Napa TOW 288016-288021.
08/24/11	08/24/11	Manual	GEO135, Littleton (APA)	Alaska, LPV200_CONUS	Manual GUS switchover from Littleton to Napa TOW 290264-290269.
08/25/11	08/25/11	Faulted	GEO138, Brewster (BRE-B)	LPV200_CONUS	GUS switchover. Brewster faulted TOW 388736-388752.
08/27/11	08/27/11	Manual	GEO138, Woodbine (QWE)	None	GUS manual switchover from Woodbine to Brewster TOW 550815-550820.

Start Date	End Date	GUS Switch	Location/ Satellite	Service Affected	Even Description
09/10/11	09/10/11	Manual	GEO135	Alaska, LPV200_CONUS	Doppler spikes caused both automatic and manual switchovers from Napa to Littleton affected coverage. At 12:13 Doppler spike of ~4.6 Hz, missed 1 WUM TOW 562442-562444. At 14:31 Doppler spike of ~3.2 Hz, missed 3 WUMs TOW 570706-570710. At 16:47 Doppler spike of ~1.6 Hz, missed 1 WUM TOW 578880-578882. At 17:49 Doppler spike of ~0.8 Hz, missed 1 WUM TOW 582571-582573. At 20:20 Doppler spike of ~2.9 Hz, missed 9 WUMs TOV 591627-591637.
09/12/11	09/12/11	Manual	GEO133, Pamalu (HDH)	None	Manual GUS switchover from HDH to SZP TOW 115022-115027. Inmarsat installing emergency M&C modification.
09/12/11	09/12/11	Manual	GEO133, Santa Paula (SZP)	None	Manual GUS switchover from SZP to HDH TOW 113954-113960. Inmarsat installing emergency M&C modification.
09/13/11	09/13/11	Manual	GEO133, Santa Paula (SZP)	None	GUS manual switchover from SZP to HDH TOW 201515-201520. Inmarsat installing emergency M&C modification.
09/14/11	09/14/11	Manual	GEO133, Pamalu (HDH)	None	Gus switchover, HDH faulted TOW 345536-345552.
09/15/11	09/16/11	Faulted	GEO135, Littleton (APA)	Alaska, LPV200_CONUS	GUS switchover, Littleton faulted with SE 143 (?RFU Equipment Uplink Fault) TOW 389943-389958.
09/19/11	09/19/11	Manual	Santa Paula (SZP)	None	GUS manual switchover from SZP to HDH TOW 115215-115220.

1.2 Report Overview

Section 2 provides the vertical and horizontal position accuracies from data collected, on a daily basis, at one-second intervals. The 95% accuracy index and the maximum accuracy for the reporting period are tabulated. The daily 95% accuracy index is plotted graphically for each receiver. Histograms of the vertical and horizontal error distribution are provided for the combined WAAS receiver locations (see Table 1-2) within the WAAS service area.

Section 3 summarizes the WAAS instantaneous availability performance, at each receiver, for three operational service levels during the reporting period. Daily availability is also plotted for each receiver evaluated. The number of outages and outage rate for each site is reported.

Section 4 provides the percent of coverage provided by WAAS on a daily basis. Quarterly roll-up graphs presented indicate the portions of service volume covered, and the percentage of time that WAAS was available.

Section 5 summarizes the number of HMI events detected during the reporting period and presents a safety margin index for each receiver. The safety margin index reflects the amount of over bounding of position error by WAAS

protection levels. This section also includes update rates of WAAS messages transmitted from CRE, CRW, and AMR.

Section 6 provides the UDRE and GIVE bounding percentage and the 95% index of the range and ionospheric accuracy for each satellite tracked by the WAAS receiver at 12 locations.

Section 7 provides the GEO ranging performance for CRE and CRW.

Section 8 provides WAAS LPV availability and outages at selected airports.

Section 9 provides the assessment of WAAS CNMP bounding for the 114 WAAS receivers.

Section 10 provides the surveyed positions of all WREs and the difference between the WRE survey positions in the current operational software and the survey positions in this report.

Section 11 provides the daily and quarterly average of SQM PRN type biases and PRN biases.

2.0 WAAS POSITION ACCURACY

Navigation error data, collected from WAAS and NSTB reference stations, was processed to determine position accuracy at each location. This was accomplished by utilizing the GPS/WAAS position solution tool to compute a RTCA DO-229D weighted least squares user navigation solution, and WAAS horizontal and vertical protection levels (HPL & VPL), once every second. The user position calculated for each receiver was compared to the surveyed position of the antenna to assess position error associated with the WAAS SIS over time. The position errors were analyzed and statistics were generated for four operational service levels: WAAS LP, WAAS LPV, WAAS LPV 200, and WAAS LNAV/VNAV, as shown in Table 2.1. For this evaluation, the WAAS operational service level is considered available at a given time and location, if the computed WAAS HPL and VPL are within the horizontal and vertical alarm limits (HAL & VAL) specified in Table 2.1.

Table 2-1 Operational Service Levels

WAAS Operational Service Levels	Horizontal Alert Limit HAL (meters)	Vertical Alert Limit VAL (meters)
LNAV/VNAV	556	50
LP	40	N/A
LPV (LOC/VNAV)	40	50
LPV 200	40	35

Table 2.2 shows PA horizontal and vertical position accuracy maintained for 95% of the time at LP, LPV and LNAV/VNAV operational service levels for the quarter. The table also includes 95% SPS accuracy for certain locations. Figures 2.1 to 2.6 show the daily horizontal and vertical 95% accuracy for LPV operational service level for the period. Note that WAAS accuracy statistics presented are compiled only when all WAAS corrections (fast, long term, and ionospheric) for at least 4 satellites are available. This is referred to as PA navigation mode. The percentage of time that PA navigation mode was supported by WAAS at each receiver is also shown in Table 2.2. A user is considered to be in NPA navigation mode if only WAAS fast and long term corrections are available to a user (i.e. no ionospheric corrections). Table 2.3 shows NPA horizontal position accuracy for 95% and 99.999% of the time. This table also shows the maximum NPA horizontal position error for the quarter. Figures 2.7 to 2.8 show the daily horizontal 95% accuracy for NPA.

During this reporting period, the maximum 95% CONUS horizontal and vertical LPV errors are 1.774 meters at Grand Forks and 2.202 meters at Arcata, respectively. The minimum 95% CONUS horizontal and vertical LPV errors are 0.56 meters at Denver and 0.844 meters at Billings, respectively. The maximum 95% and 99.999% NPA horizontal errors are 3.793 meters at Honolulu and 11.246 meters at Gander, respectively. The minimum 95% and 99.999% horizontal errors are 1.137 meters at Salt Lake City and 3.638 meters at Atlanta, respectively. The increases in accuracy on 8/5/11 and 9/26/11 in Figure 2.1 to 2.8 are due to geomagnetic activity.

Table 2.4 shows the maximum horizontal and vertical position errors while the calculated HPL and VPL met the LPV service levels. The column marked 'Horizontal (or Vertical) Error/HPL (or VPL)' is the ratio of position error to protection level at the time the maximum error occurred. The column marked 'Horizontal (or Vertical) Maximum Ratio' is the maximum position error to protection level ratio for the quarter. High vertical error at Iqaluit was due to geomagnetic activity.

Figures 2.9 to 2.12 show the distributions of the vertical and horizontal errors at all 38 WAAS receiver locations combined in triangle charts and 2-D histogram plots for the quarter. The triangle charts in Figure 2.9 and 2.10 show the distributions of vertical position errors (VPE) versus vertical protection levels (VPL) and horizontal position errors (HPE) versus horizontal protection levels (HPL). The horizontal axis is the position error and the vertical axis is the WAAS protection levels. Lower protection levels equate to better availability. The diagonal line shows the point where error equals protection level. Above and to the left of the diagonal line in the chart, errors are bounded (WAAS is providing integrity in the position domain); below and to the right, errors are not bounded (HMI could be present). The 2-D histogram plots in Figure 2.11 and 2.12 show the distributions of vertical and horizontal position errors and normalized position errors. The blue trace shows the distributions of the actual vertical and horizontal errors. The horizontal axis is the position errors and the vertical axis is the total count of data samples (log scale) in each 0.1-meter bin. The magenta trace show the distributions of the actual vertical and horizontal errors normalized by one-sigma value of the protection level; vertical - (VPL/5.33) and horizontal - (HPL/6.0). The horizontal axis is the standard units and vertical axis is the observed distribution of normalized errors data samples in each 0.1-sigma bin. Narrowness of the normalized error distributions shows very good observed safety performance.

Table 2-2 PA 95% Horizontal and Vertical Accuracy

Location	Horizontal (HAL=40m) (Meters)	Horizontal (HAL=556m) (Meters)	Vertical (VAL=50m) (Meters)	Percentage in PA mode (%)	SPS Accuracy	
					95% Horizontal (Meters)	95% Vertical (Meters)
Arcata	1.544	1.544	2.202	100	*	*
Grand Forks	1.774	1.785	2.119	100	*	*
Oklahoma City	0.827	0.827	1.451	100	*	*
Albuquerque	0.636	0.636	0.908	100	2.089	3.788
Anchorage	0.585	0.586	1.191	100	*	*
Atlanta	0.628	0.628	1.036	100	2.039	4.178
Barrow	0.656	0.658	1.36	99.98394	*	*
Bethel	0.572	0.573	1.156	100	2.434	4.134
Billings	0.865	0.869	0.844	100	1.966	3.461
Boston	0.749	0.757	1.14	100	1.954	3.564
Chicago	0.793	0.798	0.966	100	*	*
Cleveland	0.668	0.674	1.063	100	1.874	3.763
Cold Bay	0.667	0.668	1.076	100	*	*
Dallas	0.596	0.596	1.337	100	*	*
Denver	0.56	0.561	0.863	100	*	*
Fairbanks	0.611	0.612	1.293	100	2.570	3.910
Gander	0.903	0.923	1.165	100	*	*
Goose Bay	0.915	0.945	1.017	100	*	*
Houston	0.667	0.667	1.382	100	2.507	4.127
Iqaluit	0.836	0.852	1.444	100	*	*
Jacksonville	0.587	0.587	1.297	100	*	*
Juneau	0.682	0.683	1.024	100	*	*
Kansas City	0.621	0.623	0.995	100	1.912	3.831
Kotzebue	0.683	0.685	1.27	99.98483	2.588	4.152
Los Angeles	0.838	0.838	1.652	100	2.296	4.257
Memphis	0.582	0.582	1.046	100	*	*
Merida	0.804	0.805	1.384	100	*	*
Mexico City	0.993	0.993	1.98	100	*	*
Miami	0.736	0.736	1.175	100	2.865	4.368
Minneapolis	0.711	0.718	0.926	100	1.890	3.498
New York	0.775	0.781	1.102	100	*	*
Oakland	0.805	0.807	1.754	100	2.163	4.453
Puerto Vallarta	1.015	1.015	1.677	100	*	*
Salt Lake City	0.635	0.635	0.875	100	1.957	3.795
San Jose Del Cabo	0.898	0.898	1.612	100	*	*
Seattle	0.875	0.882	0.931	100	2.113	3.871
Washington DC	0.716	0.718	1.06	100	1.947	3.824
Winnipeg	0.647	0.658	0.996	100	*	*

* = SPS Data not processed.

Table 2-3 NPA 95% and 99.999% Horizontal Accuracy

Location	95% Horizontal (meters)	99.999% Horizontal (meters)	Percentage in NPA mode (%)	Maximum Horizontal Error
Albuquerque	1.239	4.231	100	4.481
Anchorage	2.419	5.11	100	5.709
Atlanta	1.31	3.659	99.99798	8.033
Barrow	2.067	4.934	99.99332	5.096
Bethel	2.338	5.535	100	5.747
Billings	1.681	6.507	100	6.714
Boston	1.387	7.855	100	8.026
Cleveland	1.275	5.554	100	5.699
Cold Bay	1.619	5.141	100	5.289
Fairbanks	2.497	5.349	100	7.86
Gander	1.72	11.246	100	11.645
Honolulu	3.793	9.133	100	9.373
Houston	2.01	5.436	100	5.628
Iqaluit	1.623	4.541	100	4.664
Juneau	2.069	4.656	100	4.779
Kansas City	1.144	4.513	100	4.808
Kotzebue	2.372	5.861	99.99367	6.137
Los Angeles	1.635	4.579	100	4.766
Merida	2.845	5.908	100	6.097
Miami	2.214	5.403	100	5.565
Minneapolis	1.341	5.471	100	5.657
Oakland	1.353	4.812	100	4.952
Salt Lake City	1.137	4.843	100	4.998
San Jose Del Cabo	3.021	8.889	100	9.274
San Juan	2.576	8.048	100	8.309
Seattle	1.449	5.151	99.99782	5.454
Washington DC	1.374	5.081	100	5.218

Table 2-4 Maximum LPV Error Statistics

Location	Horizontal Error (m)	Horizontal Error/HPL	Horizontal Maximum Ratio	Vertical Error (m)	Vertical Error/VPL	Vertical Maximum Ratio
Arcata	3.903	0.244	0.244	6.336	0.143	0.221
Grand Forks	4.641	0.137	0.419	9.75	0.251	0.298
Oklahoma City	3.897	0.191	0.301	9.589	0.229	0.29
Albuquerque	1.706	0.156	0.189	3.023	0.142	0.175
Anchorage	2.5	0.066	0.197	4.036	0.202	0.202
Atlanta	1.645	0.127	0.158	3.527	0.091	0.166
Barrow	3.14	0.1	0.178	5.653	0.151	0.204
Bethel	2.621	0.148	0.148	4.133	0.13	0.144
Billings	3.886	0.157	0.226	4.939	0.159	0.2
Boston	3.195	0.14	0.215	5.714	0.143	0.189
Chicago	4.574	0.123	0.178	7.977	0.177	0.21
Cleveland	3.661	0.102	0.197	5.969	0.144	0.247
Cold Bay	3.311	0.097	0.137	3.84	0.145	0.146
Dallas	1.749	0.164	0.168	3.995	0.143	0.24
Denver	2.198	0.066	0.156	6.345	0.147	0.209
Fairbanks	2.728	0.098	0.151	6.008	0.184	0.248
Gander	3.283	0.089	0.136	5.207	0.146	0.151
Goose Bay	4.437	0.122	0.18	6.117	0.224	0.239
Houston	1.757	0.189	0.188	3.406	0.133	0.225
Iqaluit	3.176	0.136	0.174	7.715	0.2	0.2
Jacksonville	1.866	0.189	0.199	3.514	0.155	0.23
Juneau	3.643	0.112	0.193	4.624	0.115	0.195
Kansas City	1.946	0.149	0.188	5.647	0.24	0.254
Kotzebue	3.008	0.201	0.251	9.201	0.357	0.357
Los Angeles	2.268	0.131	0.162	4.242	0.129	0.198
Memphis	2.295	0.072	0.189	5.387	0.222	0.247
Merida	2.648	0.145	0.188	4.346	0.147	0.177
Mexico City	4.344	0.195	0.217	5.852	0.174	0.185
Miami	2.303	0.174	0.18	3.795	0.141	0.157
Minneapolis	4.685	0.122	0.171	4.995	0.223	0.223
New York	3.99	0.109	0.182	5.659	0.178	0.184
Oakland	2.133	0.164	0.166	4.531	0.102	0.189
Puerto Vallarta	4.526	0.186	0.2	8.338	0.255	0.255
Salt Lake City	2.313	0.119	0.169	3.927	0.154	0.162
San Jose Del Cabo	3.778	0.163	0.164	4.844	0.145	0.158
Seattle	4.211	0.148	0.251	4.278	0.133	0.208
Washington DC	3.154	0.089	0.17	4.642	0.099	0.191
Winnipeg	3.584	0.259	0.258	6.337	0.13	0.299

Figure 2-1 LPV 95% Horizontal Accuracy

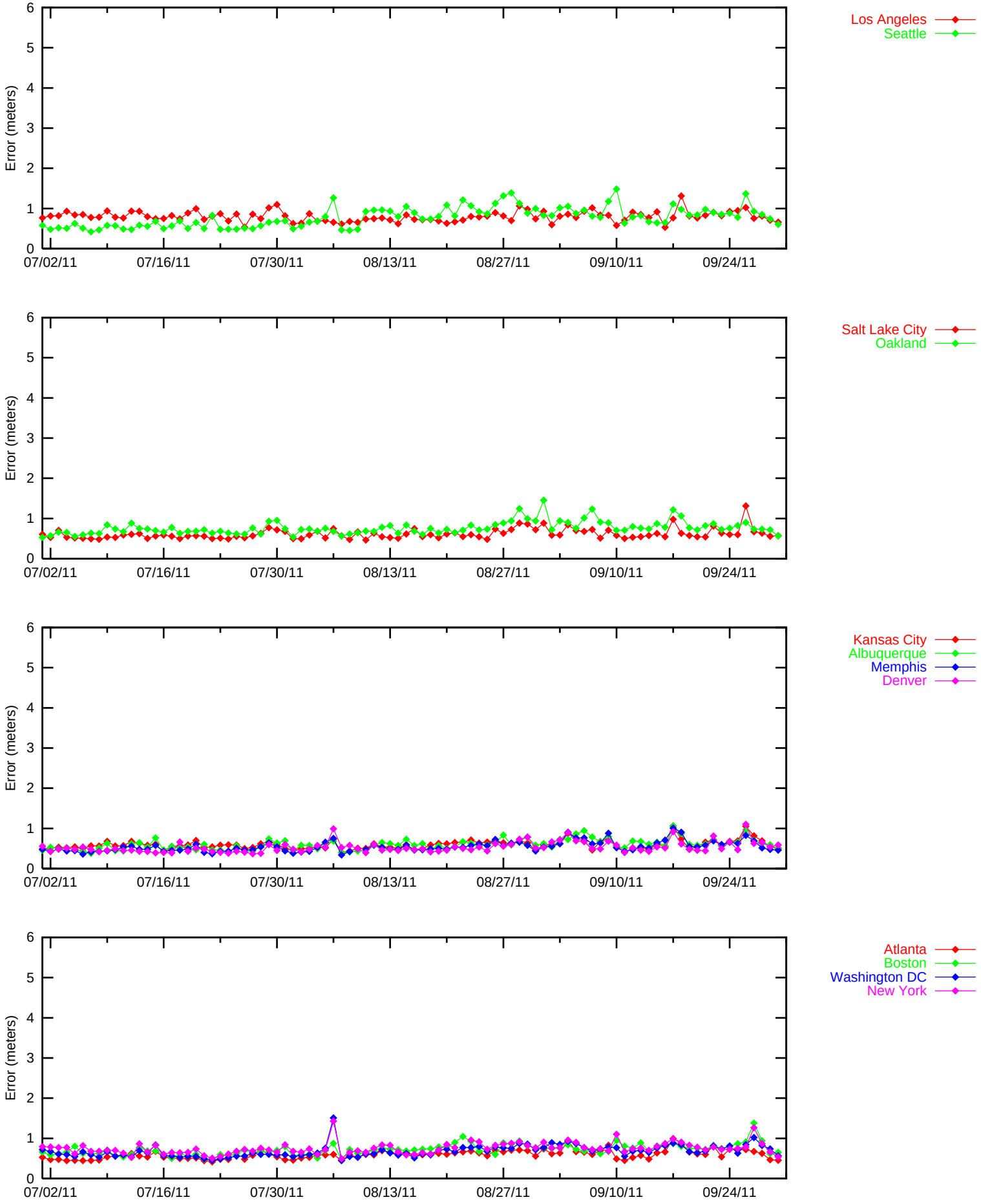


Figure 2-2 LPV 95% Horizontal Accuracy

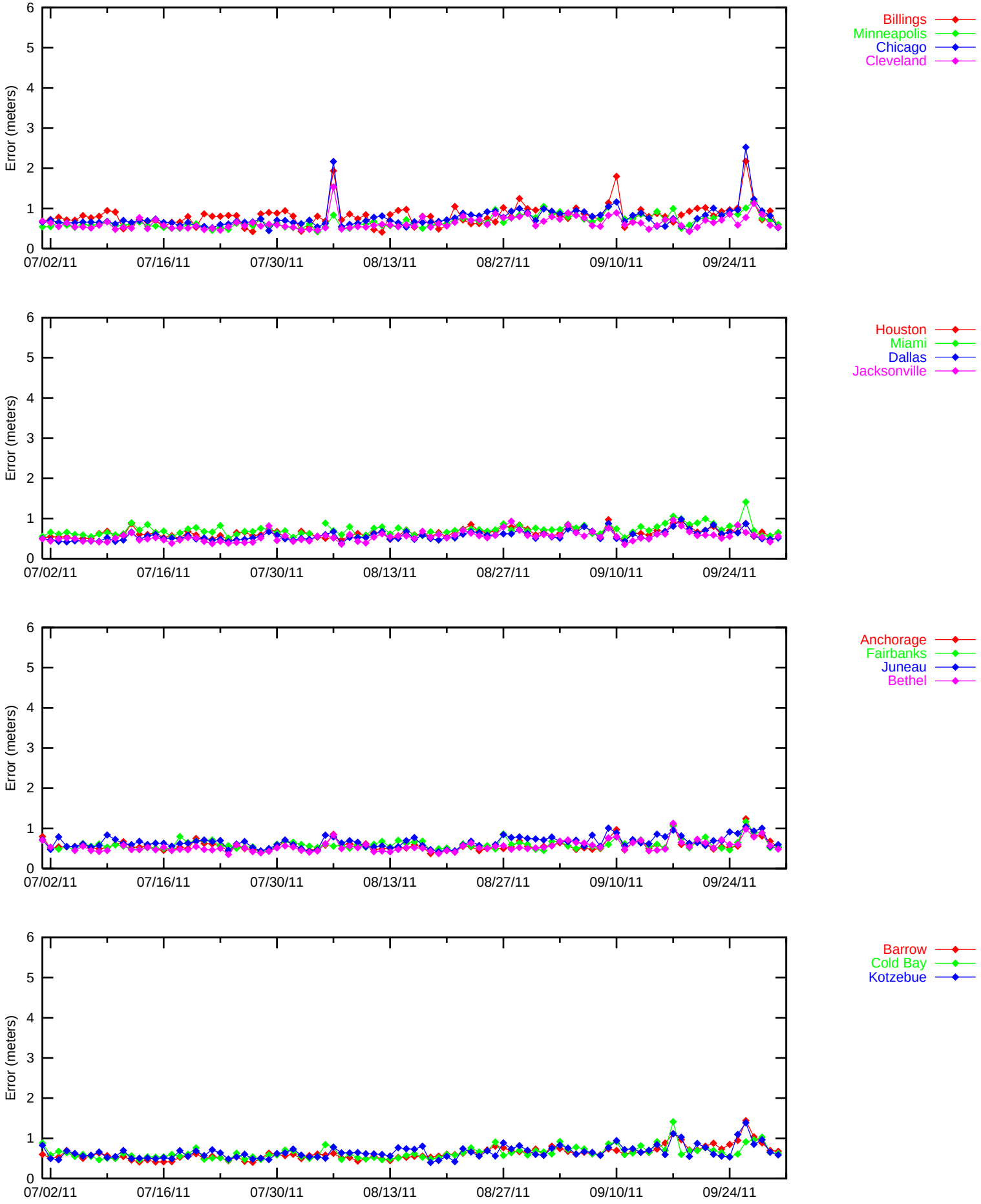


Figure 2-3 LPV 95% Horizontal Accuracy

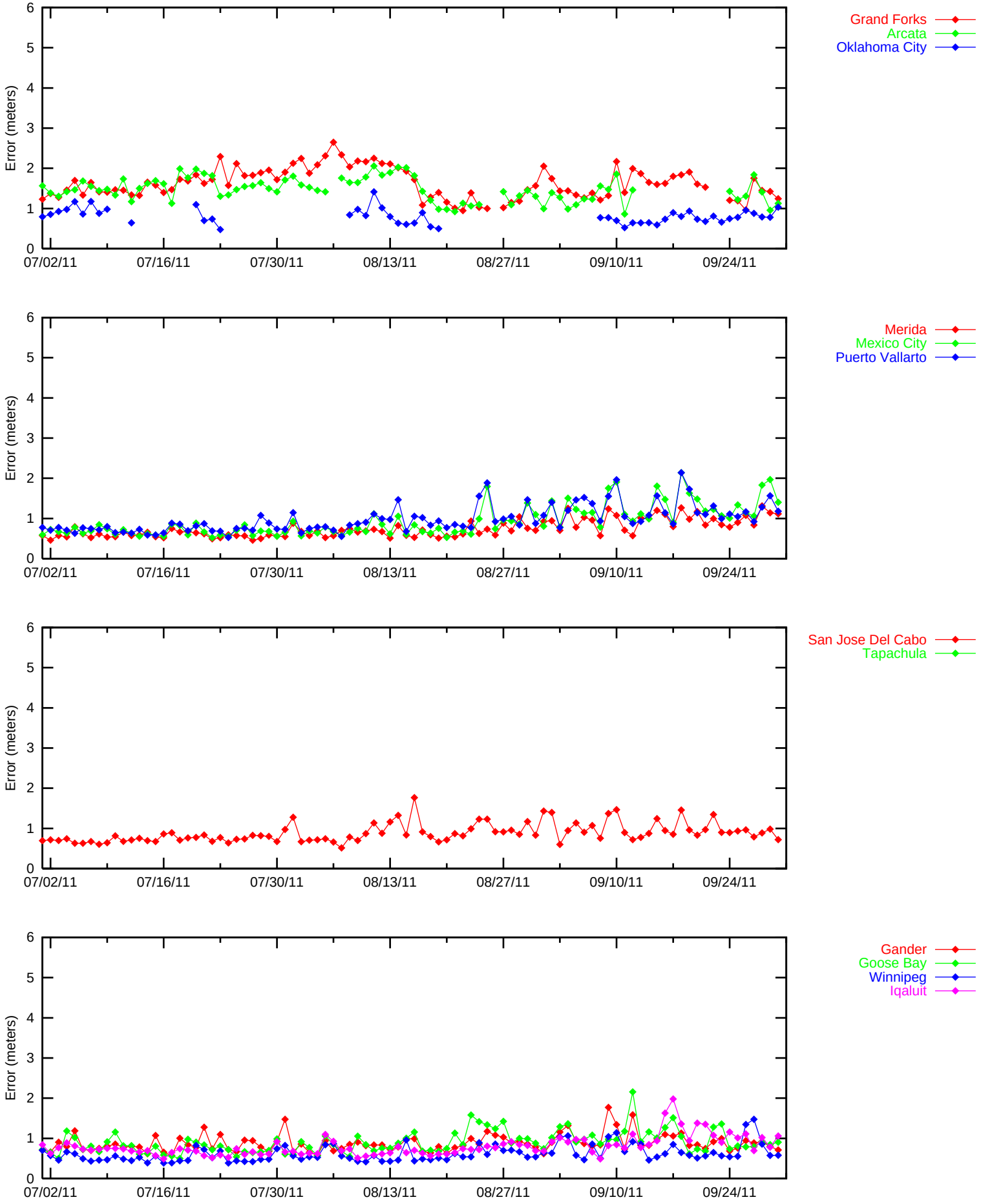


Figure 2-4 LPV 95% Vertical Accuracy

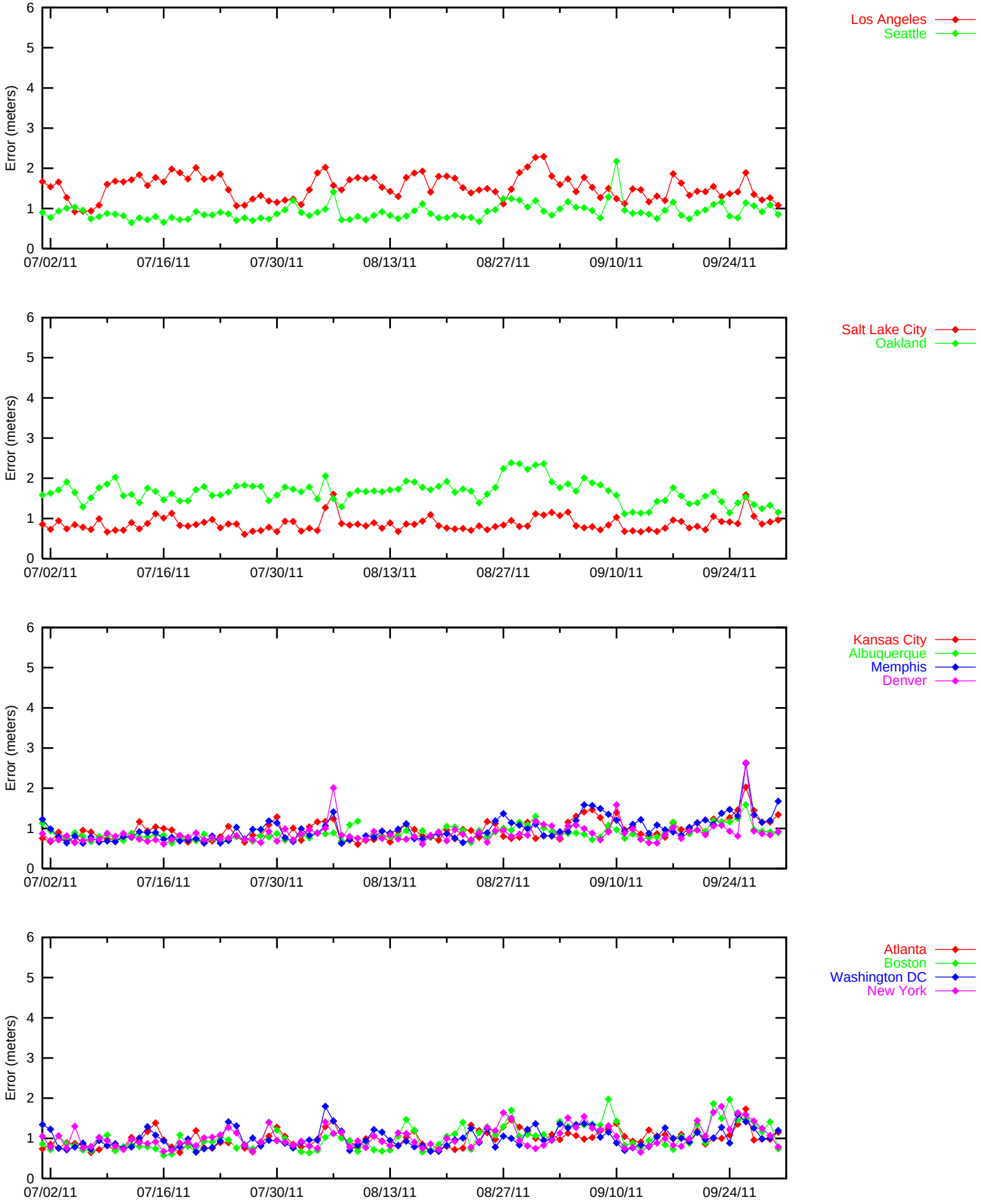


Figure 2-5 LPV 95% Vertical Accuracy

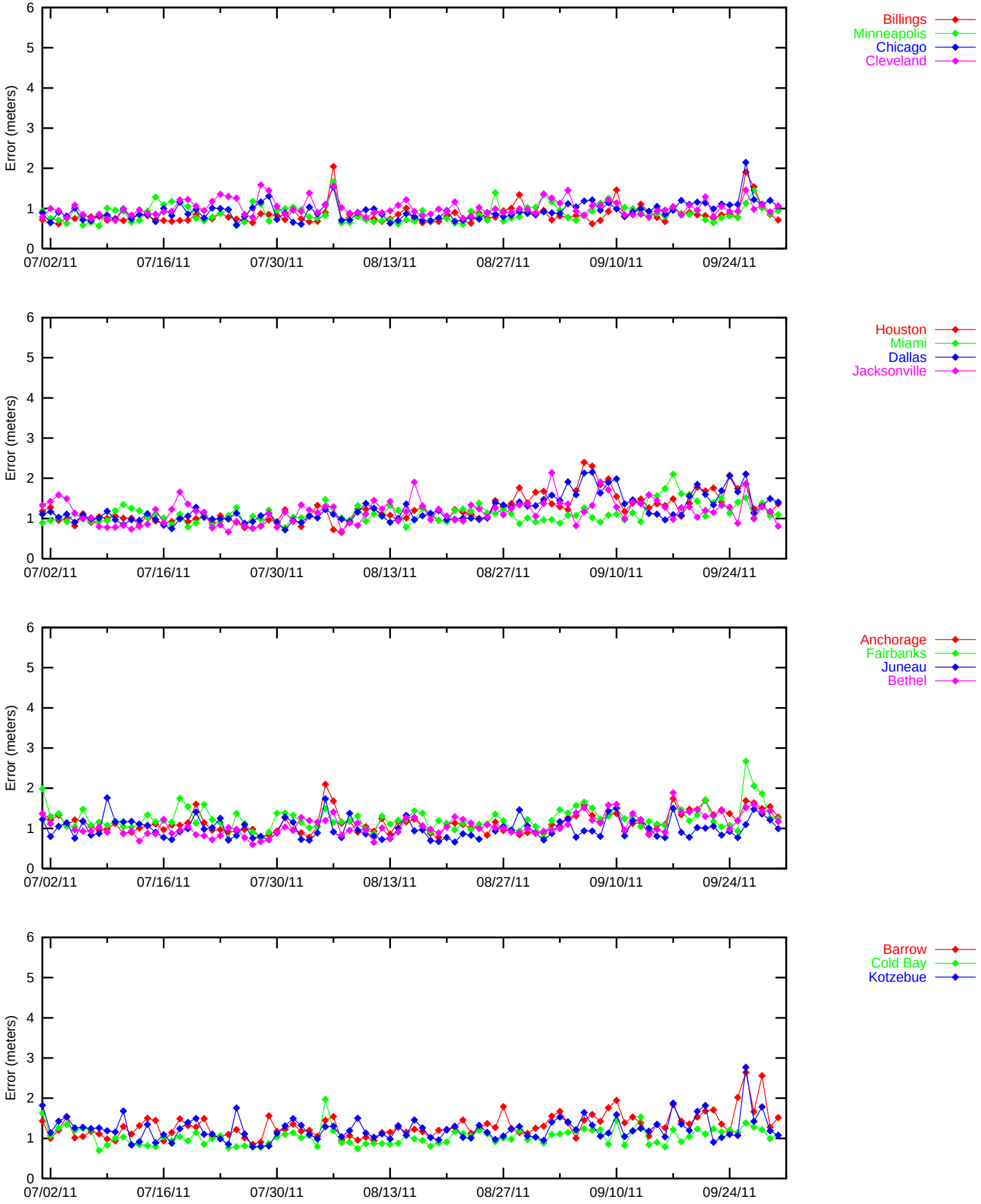


Figure 2-6 LPV 95% Vertical Accuracy

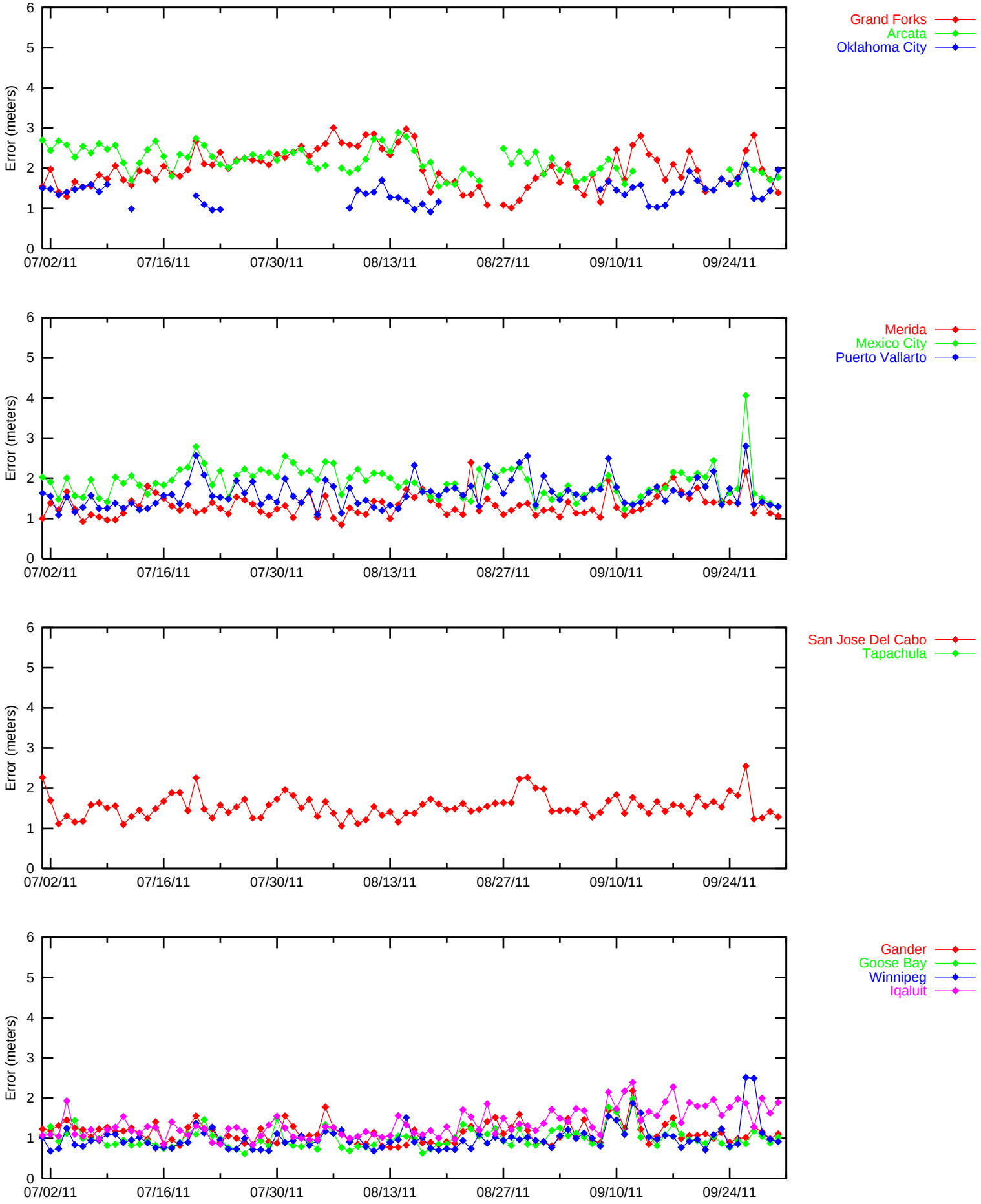


Figure 2-7 NPA 95% Horizontal Accuracy

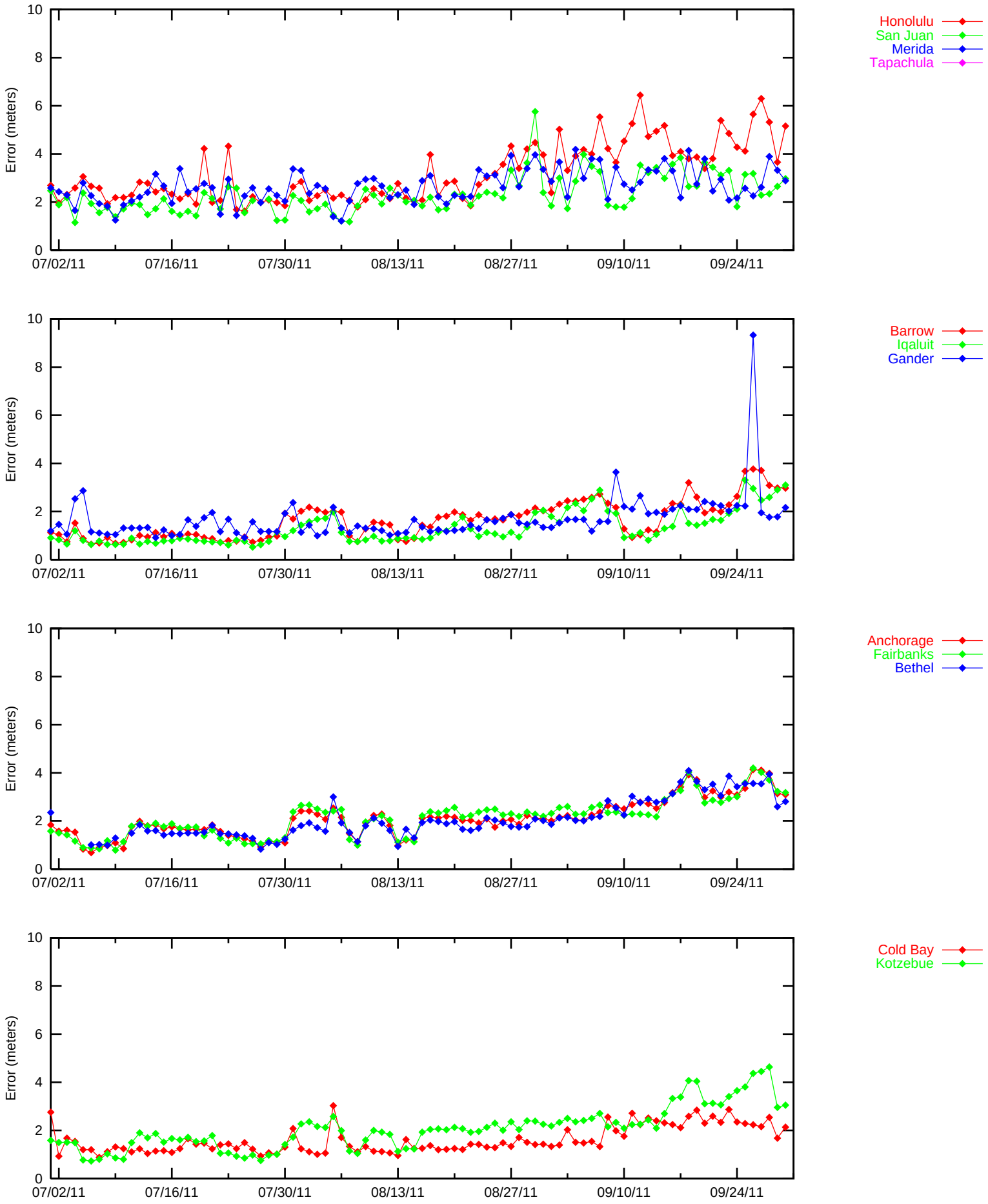


Figure 2-8 NPA 95% Horizontal Accuracy

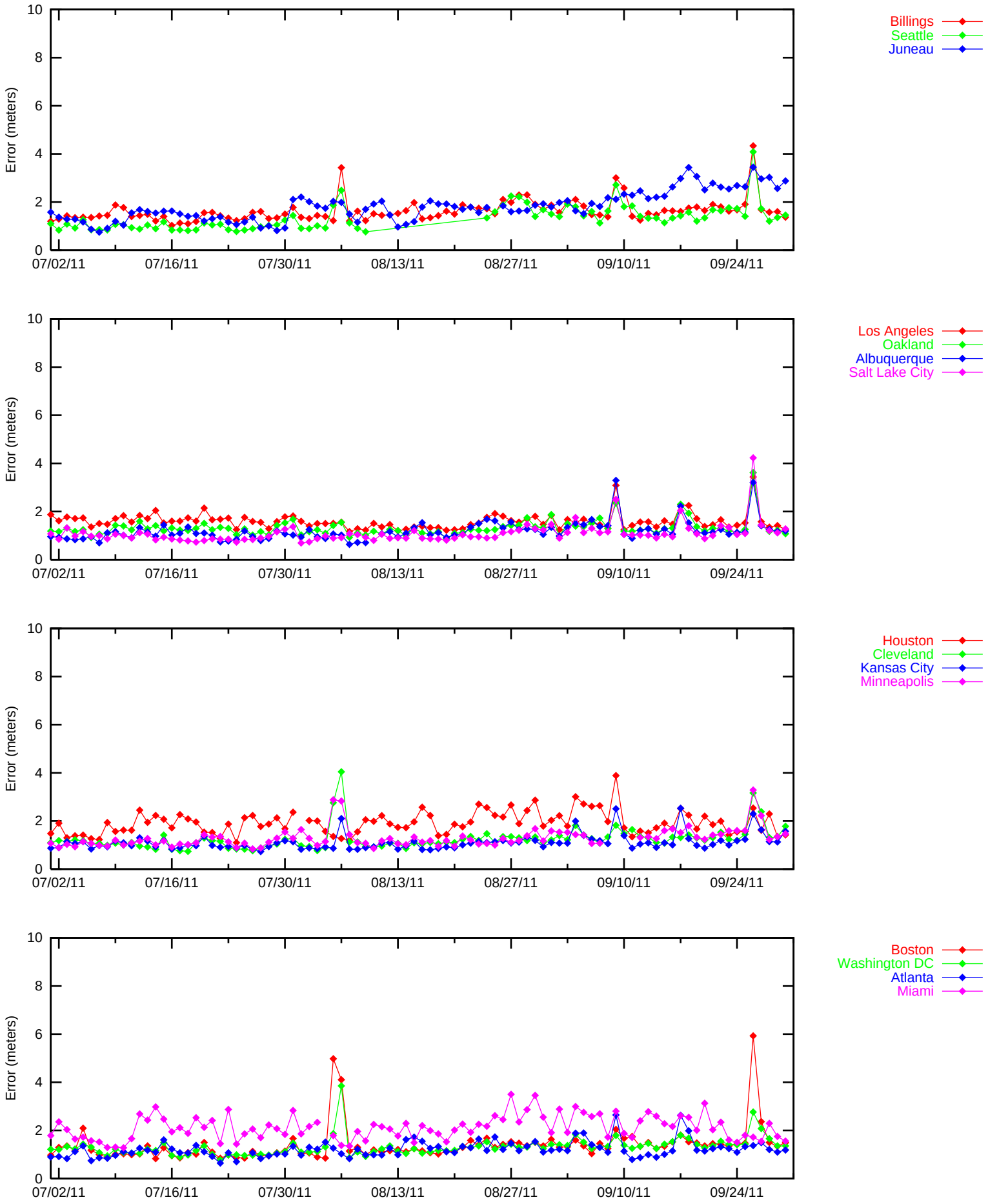


Figure 2-9 LPV Horizontal Error Bounding Triangle Chart

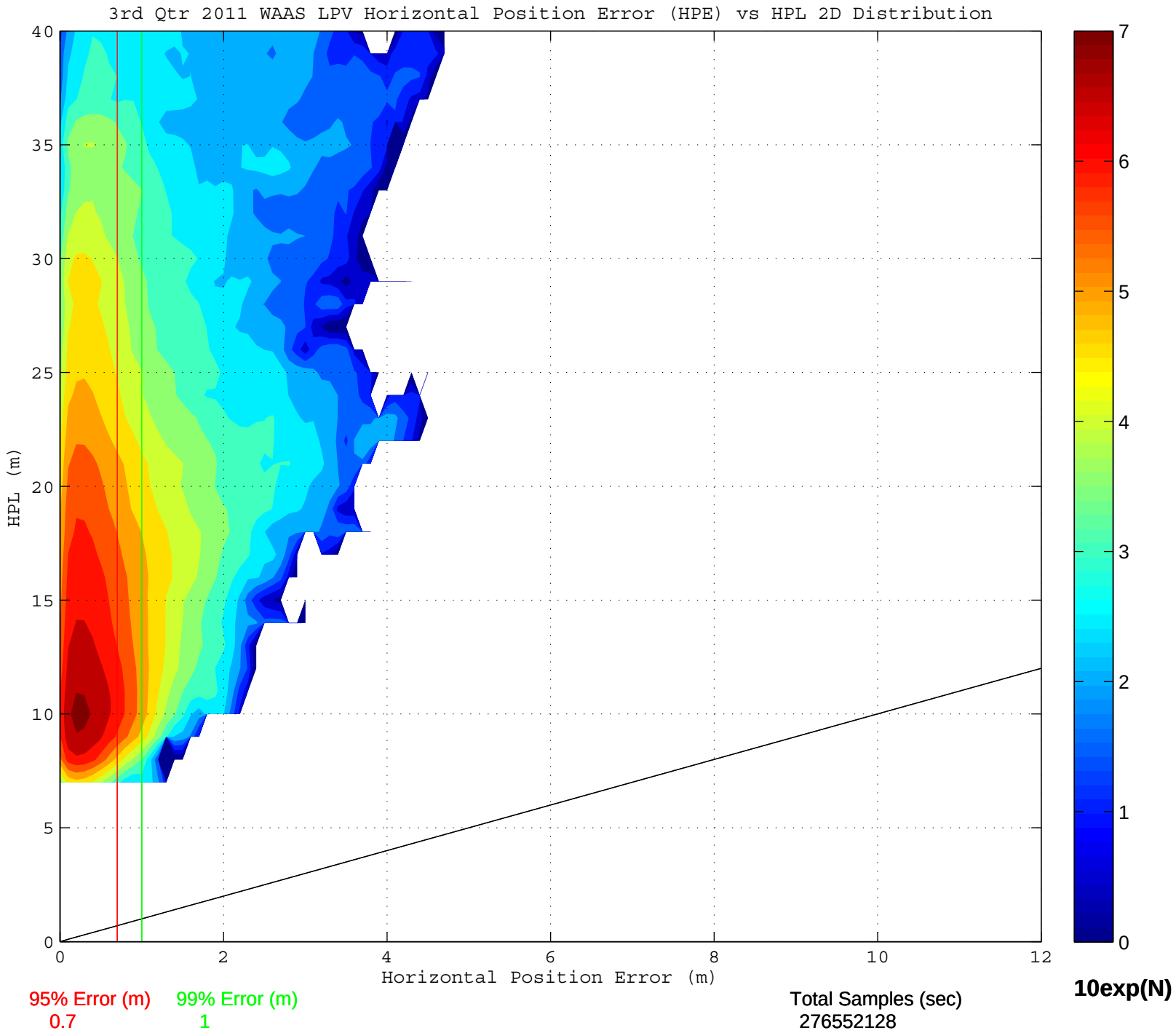


Figure 2-10 LPV Vertical Error Bounding Triangle Chart

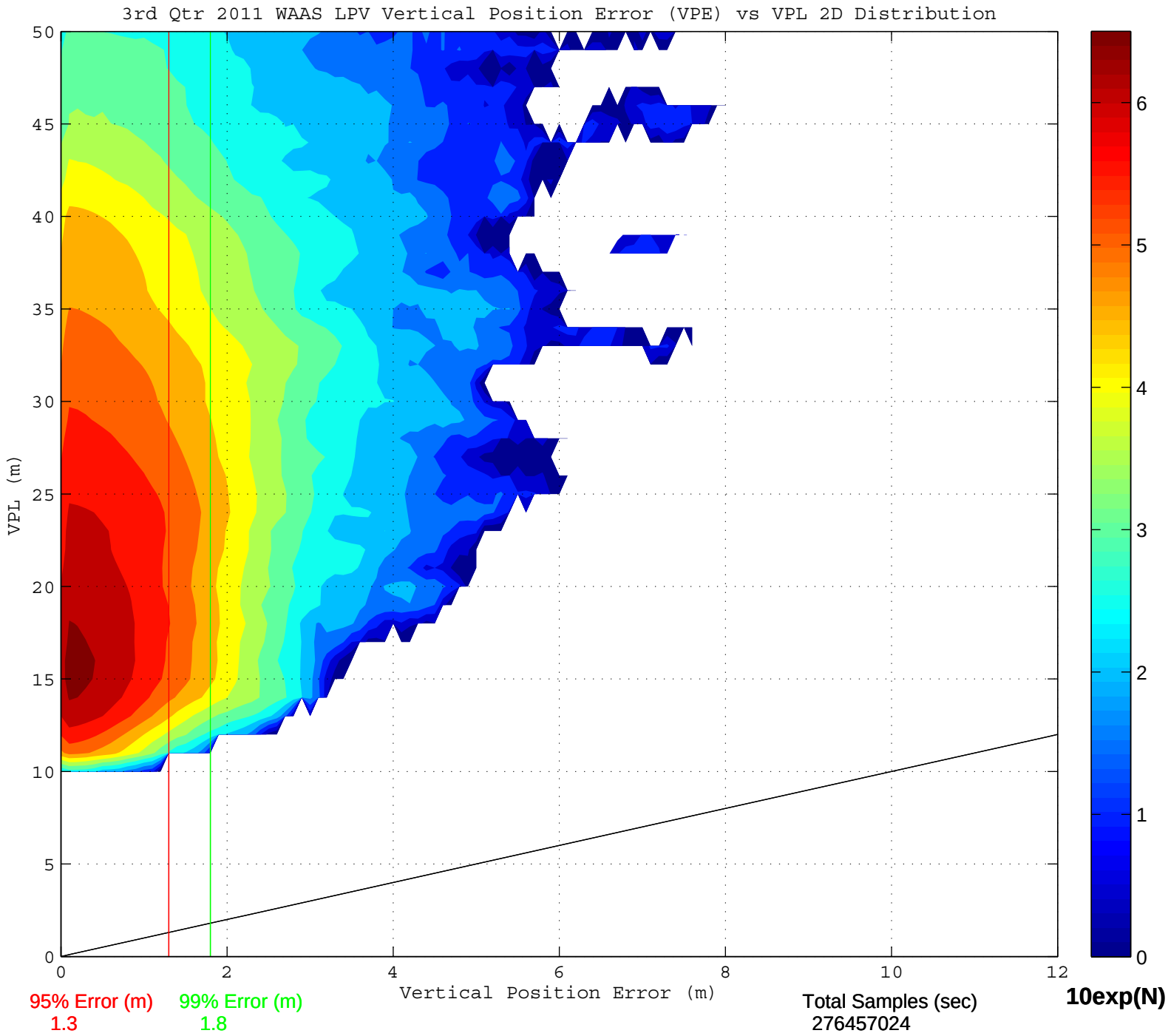


Figure 2-11 LPV 2-D Horizontal Error Distribution Histogram

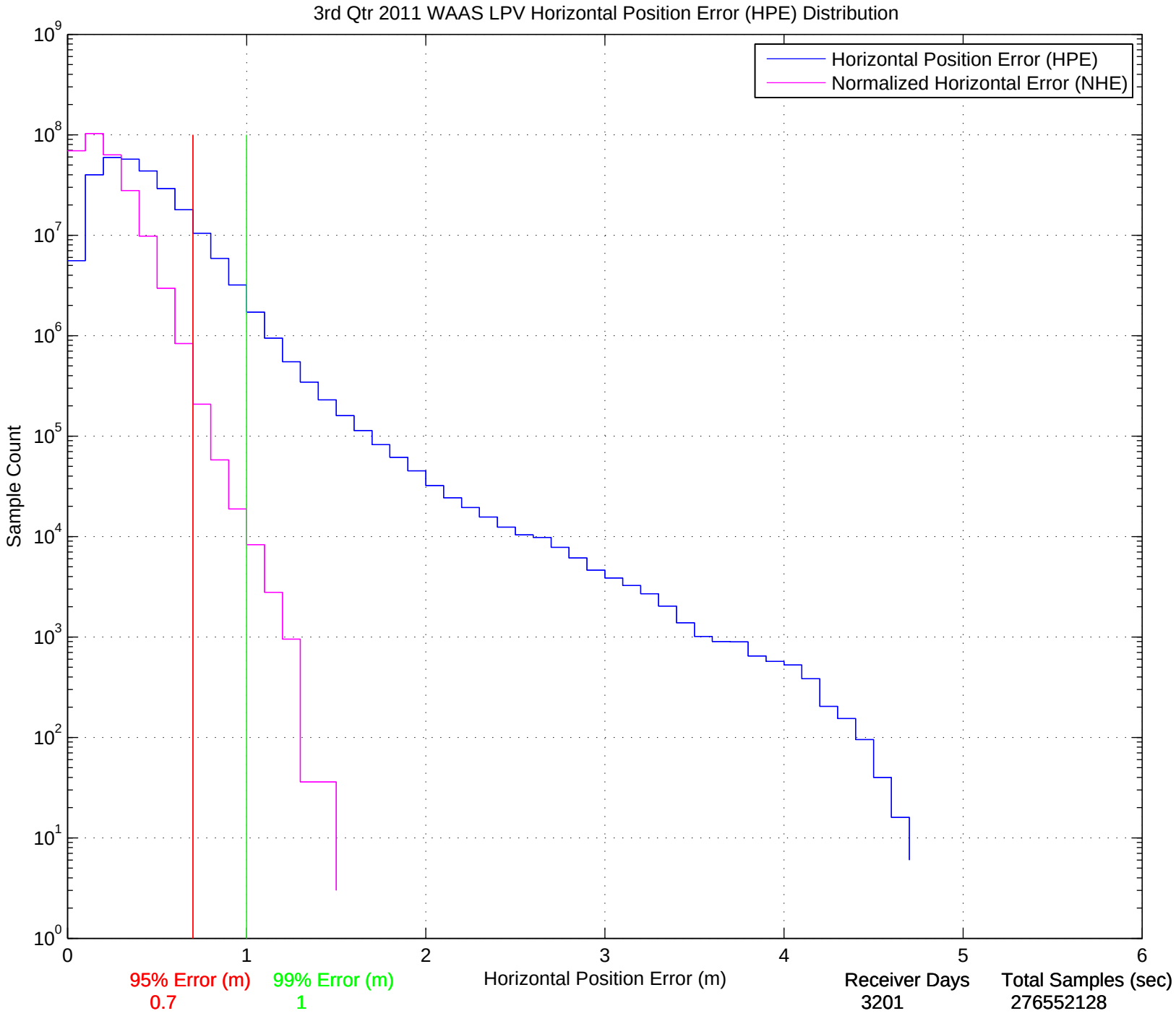
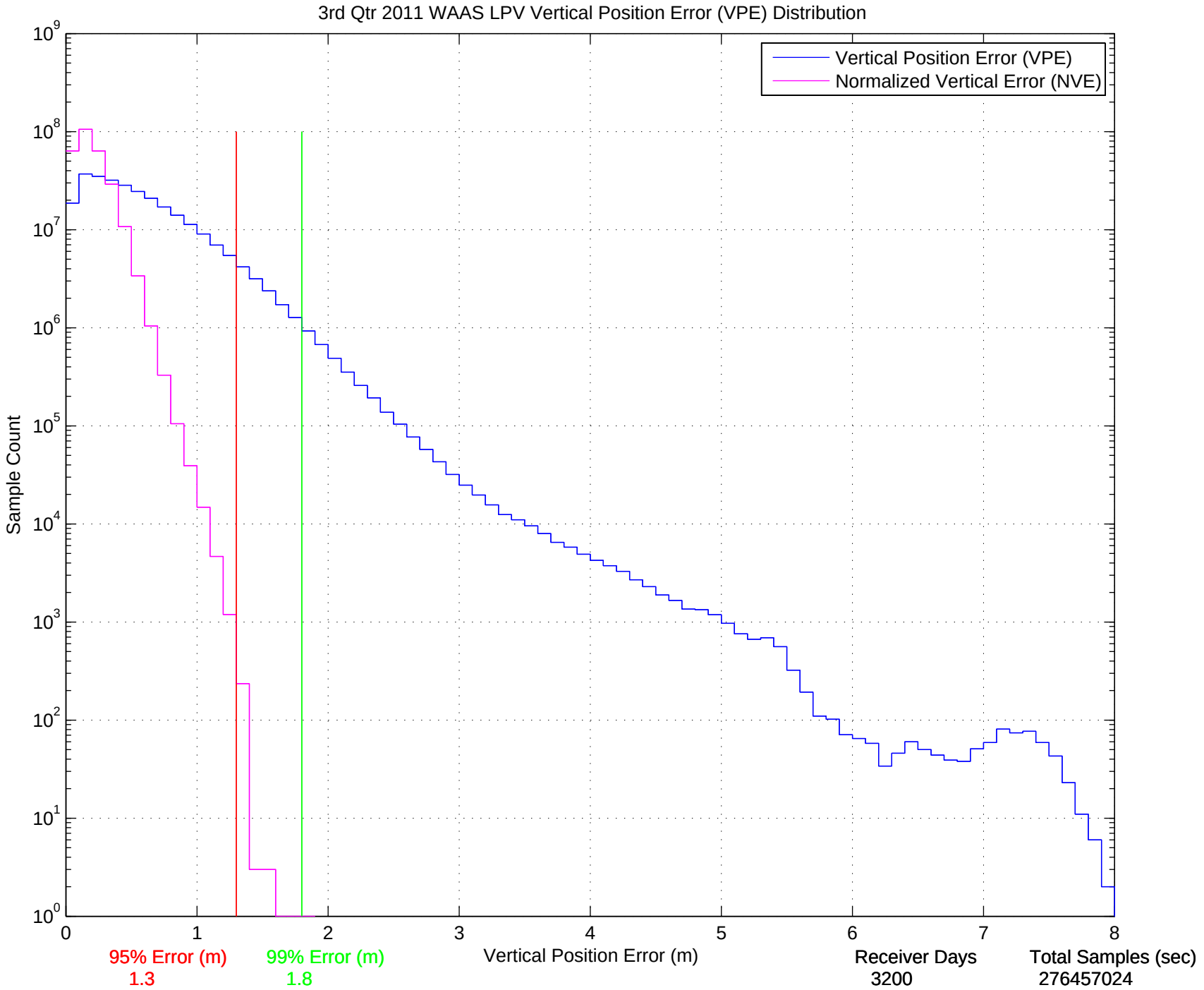


Figure 2-12 LPV 2-D Vertical Error Distribution Histogram



3.0 AVAILABILITY

The WAAS availability evaluation documents the percentage of time that the WAAS provided service for the operational service levels defined in Table 2.1. RTCA DO-229D Vertical and Horizontal Protection Levels were computed for each receiver being evaluated. Table 3.1 shows the protection levels that were maintained for 99% of the time for each receiver location for the quarter. The table also included the percentage in PA mode as described in section 2.0.

For this reporting period, the maximum 99% CONUS HPL and VPL are 18.49 meters and 34.3 meters, both at Oakland, respectively. The minimum 99% CONUS HPL and VPL are 11.62 meters and 20.54 meters, both at Memphis, respectively. The maximum 99% Alaska HPL and VPL are 29.77 meters and 40.74 meters, both at Cold Bay, respectively. The minimum 99% Alaska HPL and VPL are 14.82 meters at Anchorage and 23.64 meters at Juneau, respectively.

Availability of LP, LPV and LPV 200 service are evaluated by monitoring the WAAS protection levels at receiver locations throughout the test period. If both the vertical and horizontal protection levels are not greater than their respective alert limits (VAL and HAL) then the service is available. If either of the protection levels exceeds the required alert limit then the operational service at that location is considered unavailable and an outage in service is recorded with its duration. The operational service is not considered available again until the protection levels are both within the alert limits for at least 15 minutes. Although this will reduce operational service availability minimally, it substantially reduces the number of service outages and prevents excessive switching in and out of service availability. The percent of time that LP, LPV, and LPV 200 service is available using the fifteen-minute window criteria is presented in Table 3.2. The LP, LPV, and LPV 200 service outages and associated outage rate for the reporting period is presented in Table 3.4. The outage rate is the percent of approaches that theoretically would be interrupted by a loss of operational service once the approach had started. Figures 3.1 through 3.6 show the daily availability of LPV and LPV 200 service levels, and Figures 3.7 through 3.12 show the daily interruptions of LPV and LPV 200 service levels for the evaluation period.

Availability of NPA service is evaluated by monitoring the WAAS horizontal protection level at receiver locations throughout the test period. If the horizontal protection level is not greater than the horizontal alert limit (HAL = 556m) then the service is available. If the horizontal protection level exceeds the required alert level or if WAAS navigation message is not received then the NPA service at that location is considered unavailable and an outage in service is recorded with its duration. The NPA service is not considered available again until the horizontal protection level is within the alert limit for at least 15 minutes. The percent of time that NPA service is available using the fifteen-minute window criteria is presented in Table 3.3. The NPA service outages and associated outage rate for this period is presented in Table 3.5. The outage rate is the percent of NPA approaches that theoretically would be interrupted by a loss of operational service once the approach had started.

Low PA and NPA availability for this reporting period are due to GPS satellite outages, GUS switchovers, geomagnetic activity, and elevated GIVE values. Please refer to Table 1.5 for the events that affected availability.

The small decreases in availability on 7/11/11, 7/16/11, 8/24/11, 9/10/11, and 9/15/11due to GUS switchovers. The decommissioned of PRN 27 on 8/10/11 reduced Alaska LPV200 availability slightly. The PRN 17 outage on 8/12/11, PRN 30 outage on 8/30/11, PRN 2 outage on 8/31/11, and PRN 30 outage on 9/14/11 caused the small decreases in both CONUS and Alaska availability. The PRN 13 outage on 9/1/11 affected only CONUS LPV 200 availability. Elevated GIVE values on 7/2/11 caused the slight decrease in CONUS availability. Geomagnetic activity on 8/5/11 significantly reduced both CONUS and Alaska availability; see DR 103 WAAS Reaction to Iono Activity August 5-6 1022. and 9/26/11. Geomagnetic activity on 9/26/11 also significantly reduced both CONUS and Alaska availability; see DR 104 WAAs Reaction to Iono Activity September 26 2011. Geomagnetic activity on 7/1/11, 9/9/11 and 9/17/11 affected mainly Alaska availability.

Table 3-1 99% Protection Level

Location	99% HPL (meters)	99% VPL (meters)	Percentage in PA mode
Arcata	17.946	35.92	100
Grand Forks	15.501	24.659	100
Oklahoma City	12.299	22.183	100
Albuquerque	12.837	24.761	100
Anchorage	14.82	24.138	100
Atlanta	12.697	20.667	100
Barrow	19.891	39.13	99.98394
Bethel	18.954	30.718	100
Billings	15.786	22.294	100
Boston	16.98	24.476	100
Chicago	12.143	22.154	100
Cleveland	15.755	26.862	100
Cold Bay	29.771	40.741	100
Dallas	12.566	22.826	100
Denver	12.757	22.925	100
Fairbanks	14.227	25.366	100
Gander	32.542	43.461	100
Goose Bay	29.453	34.849	100
Houston	11.953	24.771	100
Iqaluit	35.399	50.71	100
Jacksonville	14.05	21.939	100
Juneau	16.137	23.643	100
Kansas City	12.004	21.272	100
Kotzebue	18.299	35.763	99.98483
Los Angeles	15.535	29.185	100
Memphis	11.622	20.541	100
Merida	19.551	34.893	100
Mexico City	22.14	37.414	100
Miami	17.814	26.337	100
Minneapolis	12.776	23.191	100
New York	15.987	24.542	100
Oakland	18.49	34.318	100
Puerto Vallarta	25.208	39.318	100
Salt Lake City	13.97	21.456	100
San Jose Del Cabo	24.335	37.572	100
Seattle	16.397	28.558	100
Washington DC	14.386	23.539	100
Winnipeg	17.4	25.257	100

Table 3-2 Quarterly Availability Statistics

Location	LP WAAS With 15 minute window	LPV WAAS With 15 minute window	LPV200 WAAS With 15 minute window
Arcata	0.998816	0.998183	0.978024
Grand Forks	0.996146	0.996084	0.995208
Oklahoma City	1	1	0.999797
Albuquerque	1	1	0.999995
Anchorage	0.999493	0.999241	0.998603
Atlanta	1	1	0.999979
Barrow	0.998575	0.997523	0.961897
Bethel	0.999341	0.999318	0.998394
Billings	0.99814	0.997298	0.996873
Boston	0.997138	0.996752	0.996058
Chicago	0.99764	0.996937	0.996068
Cleveland	0.9971	0.996874	0.996339
Cold Bay	0.999562	0.999355	0.919262
Dallas	1	1	0.999995
Denver	0.99976	0.99975	0.998893
Fairbanks	0.999467	0.998888	0.998101
Gander	0.992767	0.992029	0.8871
Goose Bay	0.991313	0.991817	0.988983
Houston	1	1	0.999907
Iqaluit	0.98981	0.988854	0.799999
Jacksonville	1	1	1
Juneau	0.998305	0.997599	0.996589
Kansas City	0.999316	0.999113	0.998812
Kotzebue	0.998605	0.998088	0.985318
Los Angeles	0.999876	0.999652	0.998176
Memphis	1	1	0.999813
Merida	0.999739	0.997347	0.987259
Mexico City	1	0.999726	0.948519
Miami	1	1	0.99996
Minneapolis	0.996452	0.996386	0.995978
New York	0.99708	0.996814	0.996392
Oakland	0.998877	0.998561	0.986097
Puerto Vallarta	1	0.998914	0.922084
Salt Lake City	0.99997	0.999832	0.999276
San Jose Del Cabo	1	0.99971	0.966065
Seattle	0.998036	0.997846	0.997321
Washington DC	0.998059	0.997531	0.997006
Winnipeg	0.996254	0.995877	0.995206

Table 3-3 NPA Availability

Location	NPA Availability (Excluding RAIM/FDE)
Albuquerque	1
Anchorage	1
Atlanta	1
Barrow	0.999872019
Bethel	1
Billings	1
Boston	1
Cleveland	1
Cold Bay	1
Fairbanks	1
Gander	1
Honolulu	1
Houston	1
Iqaluit	1
Juneau	1
Kansas City	1
Kotzebue	0.999871727
Los Angeles	1
Merida	1
Miami	1
Minneapolis	1
Oakland	1
Salt Lake City	1
San Jose Del Cabo	1
San Juan	1
Seattle	1
Washington DC	1

Table 3-4 LPV and LPV 200 Outage Rate (Per 150 sec approach)

Location	LP Outages	LP Outage Rates	LPV Outage	LPV Outage Rates	LPV200 Outages	LPV200 Outage Rates
Arcata	2	0.000044	4	0.000089	110	0.002506
Grand Forks	4	0.000079	4	0.000079	7	0.000138
Oklahoma City	0	0	0	0	1	0.000036
Albuquerque	0	0	0	0	1	0.000019
Anchorage	2	0.000038	2	0.000038	7	0.000132
Atlanta	0	0	0	0	1	0.000019
Barrow	12	0.000227	23	0.000435	383	0.007516
Bethel	3	0.00006	3	0.000059	14	0.000274
Billings	4	0.000076	4	0.000076	3	0.000057
Boston	3	0.000057	4	0.000076	4	0.000076
Chicago	4	0.000077	4	0.000076	7	0.000133
Cleveland	5	0.000092	4	0.000076	8	0.000152
Cold Bay	4	0.000076	8	0.000151	520	0.010693
Dallas	0	0	0	0	1	0.000019
Denver	1	0.000019	1	0.000019	3	0.000057
Fairbanks	2	0.000038	4	0.000076	7	0.000132
Gander	13	0.00025	13	0.000247	548	0.011661
Goose Bay	12	0.000228	9	0.000171	65	0.00124
Houston	0	0	0	0	1	0.000019
Iqaluit	20	0.000386	86	0.001642	1080	0.025483
Jacksonville	0	0	0	0	0	0
Juneau	6	0.000116	7	0.000134	7	0.000134
Kansas City	2	0.000038	2	0.000038	4	0.000076
Kotzebue	14	0.000268	17	0.000322	206	0.003948
Los Angeles	2	0.000038	2	0.000038	9	0.000171
Memphis	0	0	0	0	3	0.000057
Merida	1	0.000019	65	0.00123	183	0.003499
Mexico City	0	0	4	0.000076	427	0.008498
Miami	0	0	0	0	6	0.000114
Minneapolis	3	0.00006	3	0.000058	5	0.000096
New York	4	0.000077	4	0.000077	6	0.000115
Oakland	2	0.000038	2	0.000038	111	0.002127
Puerto Vallarta	0	0	29	0.000548	551	0.011287
Salt Lake City	1	0.000019	2	0.000038	7	0.000132
San Jose Del Cabo	0	0	4	0.000076	337	0.006584
Seattle	2	0.000038	2	0.000038	6	0.000114
Washington DC	4	0.000076	7	0.000133	9	0.000171
Winnipeg	4	0.000077	6	0.000114	8	0.000152

Table 3-5 NPA Outage Rates (Excluding FD/FDE)

Location	NPA Outages	NPA Outage Rate
Albuquerque	0	0
Anchorage	0	0
Atlanta	0	0
Barrow	6	0.000113272
Bethel	0	0
Billings	0	0
Boston	0	0
Cleveland	0	0
Cold Bay	0	0
Fairbanks	0	0
Gander	0	0
Honolulu	0	0
Houston	0	0
Iqaluit	0	0
Juneau	0	0
Kansas City	0	0
Kotzebue	6	0.000113308
Los Angeles	0	0
Merida	0	0
Miami	0	0
Minneapolis	0	0
Oakland	0	0
Salt Lake City	0	0
San Jose Del Cabo	0	0
San Juan	0	0
Seattle	0	0
Washington DC	0	0

Figure 3-1 LPV Instantaneous Availability

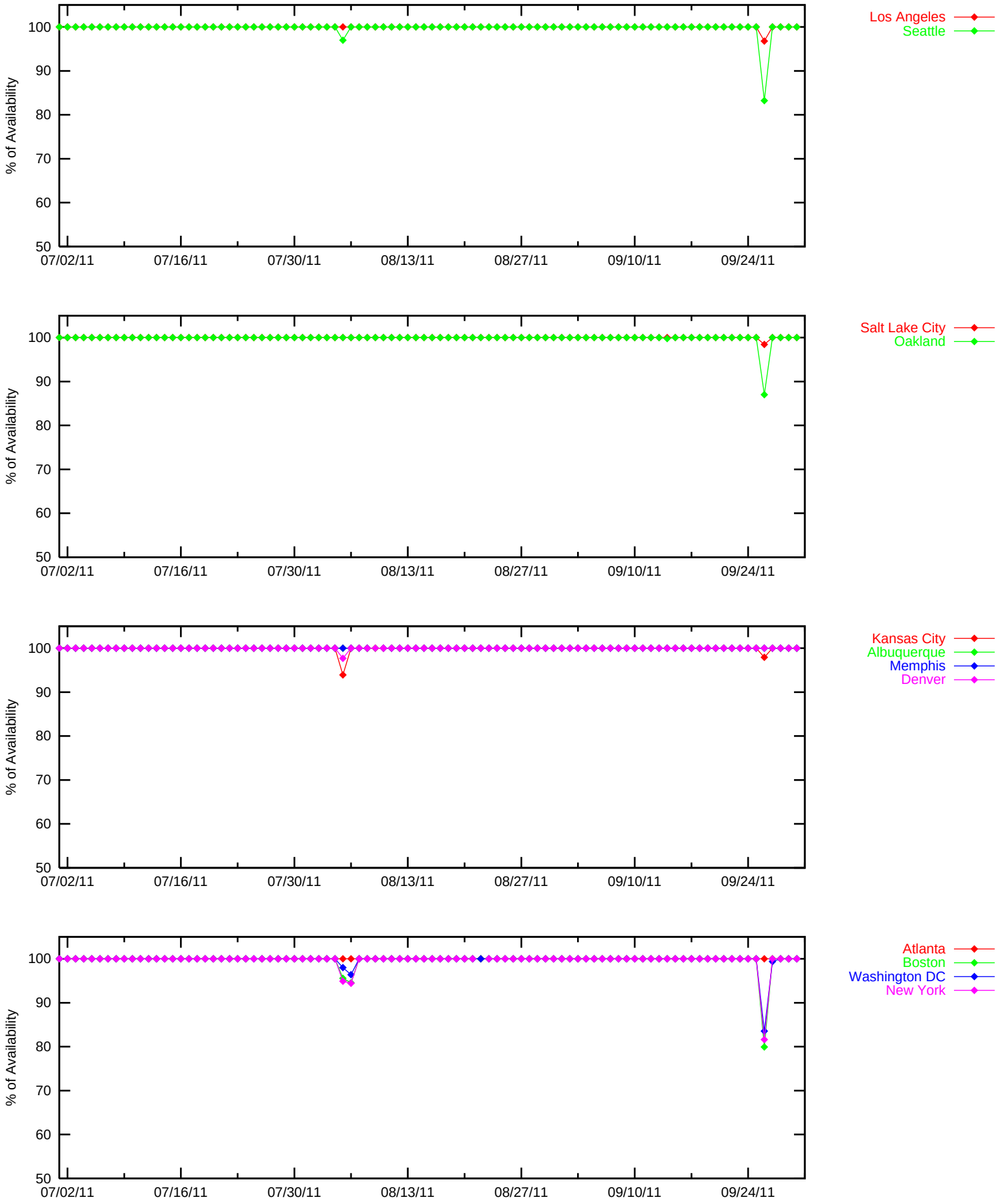


Figure 3-2 LPV Instantaneous Availability

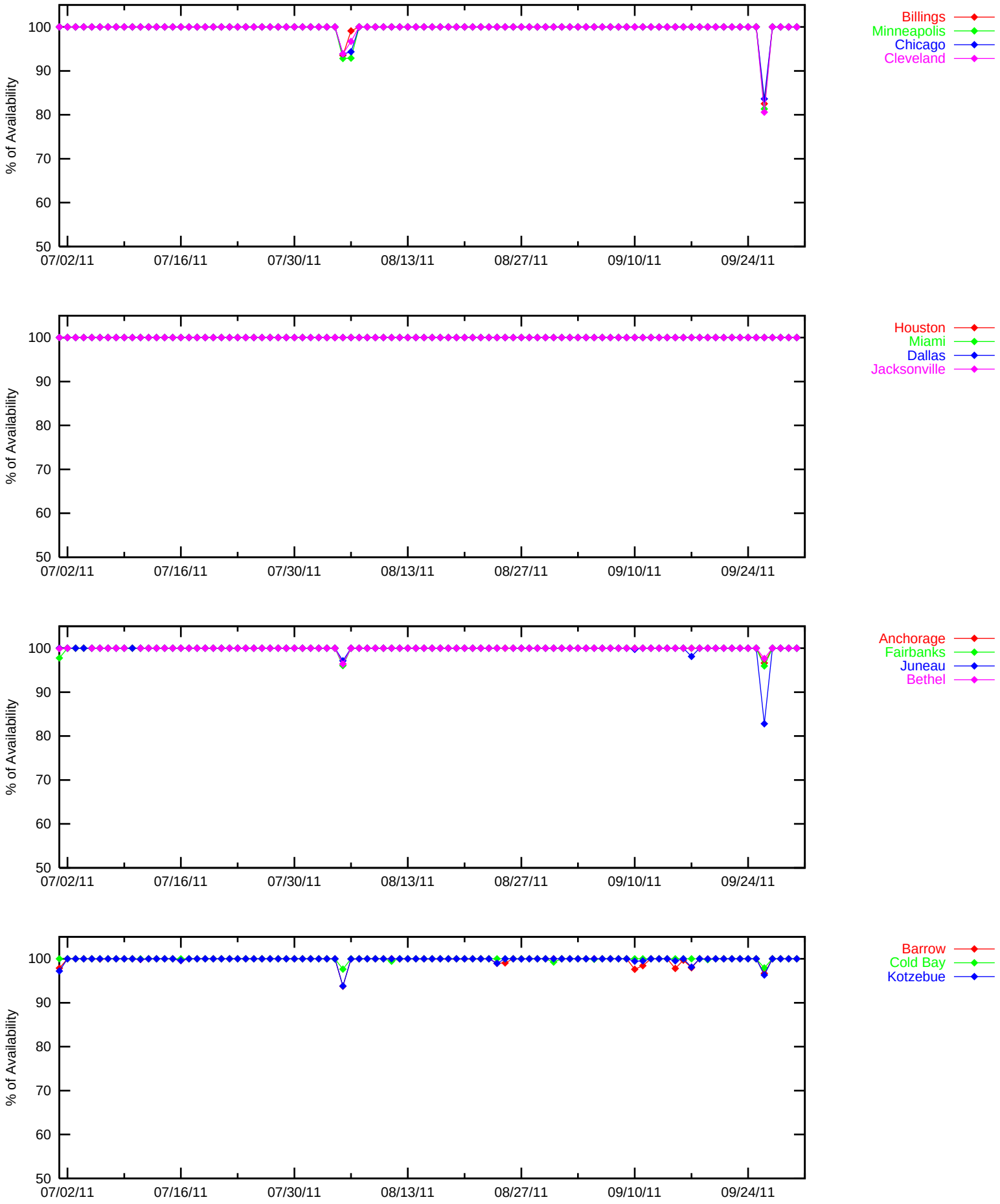


Figure 3-3 LPV Instantaneous Availability

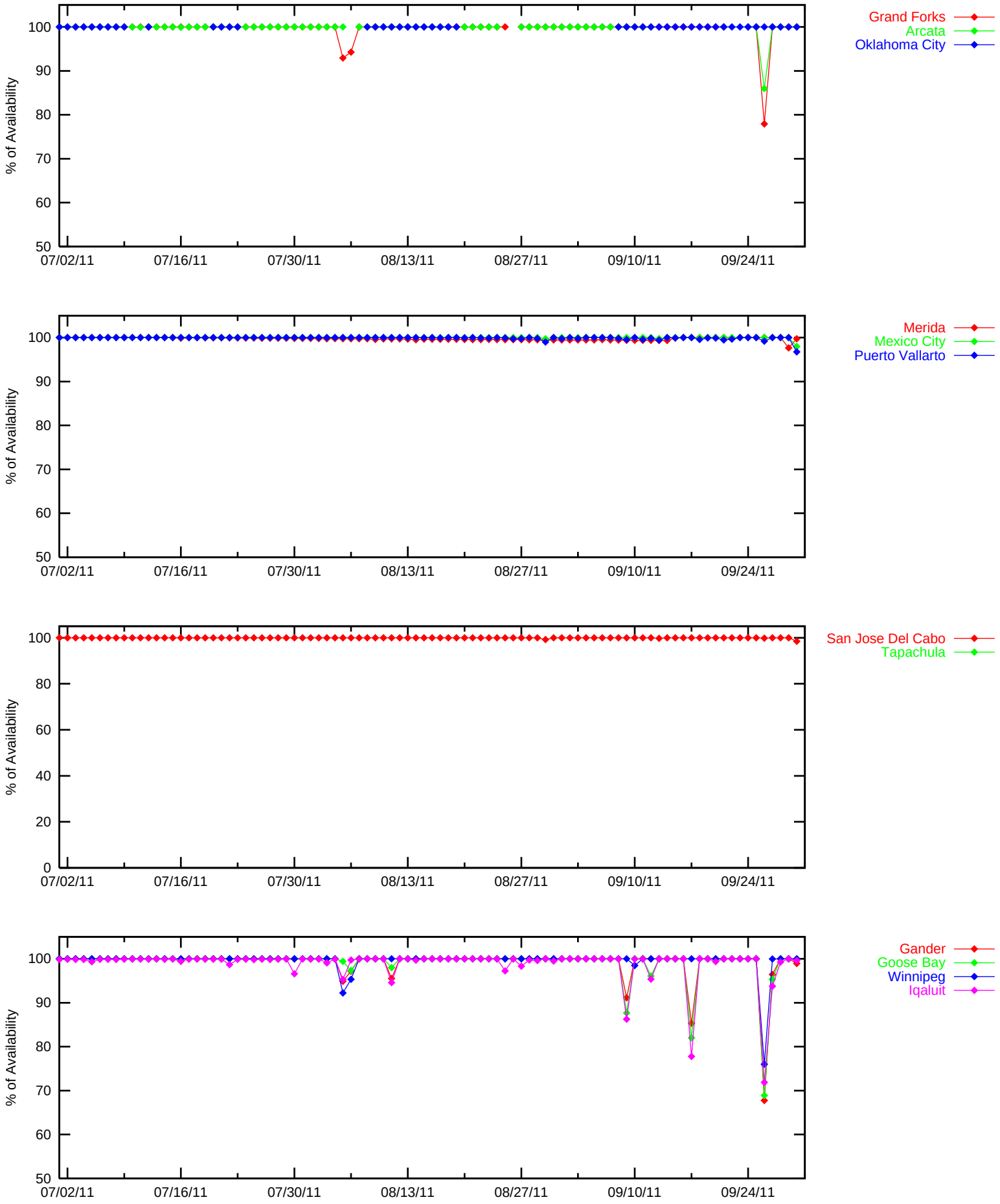


Figure 3-4 LPV 200 Instantaneous Availability

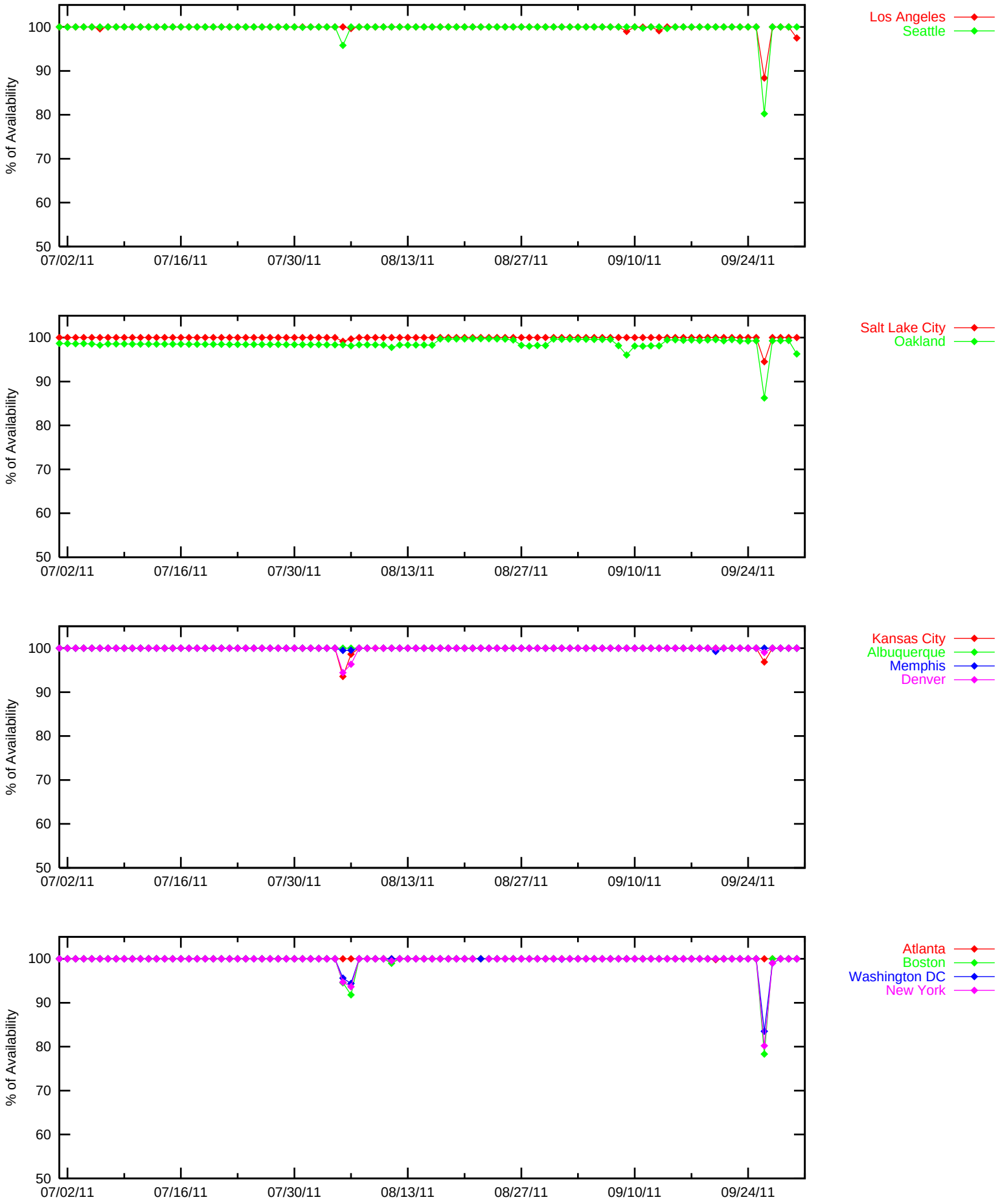


Figure 3-5 LPV 200 Instantaneous Availability

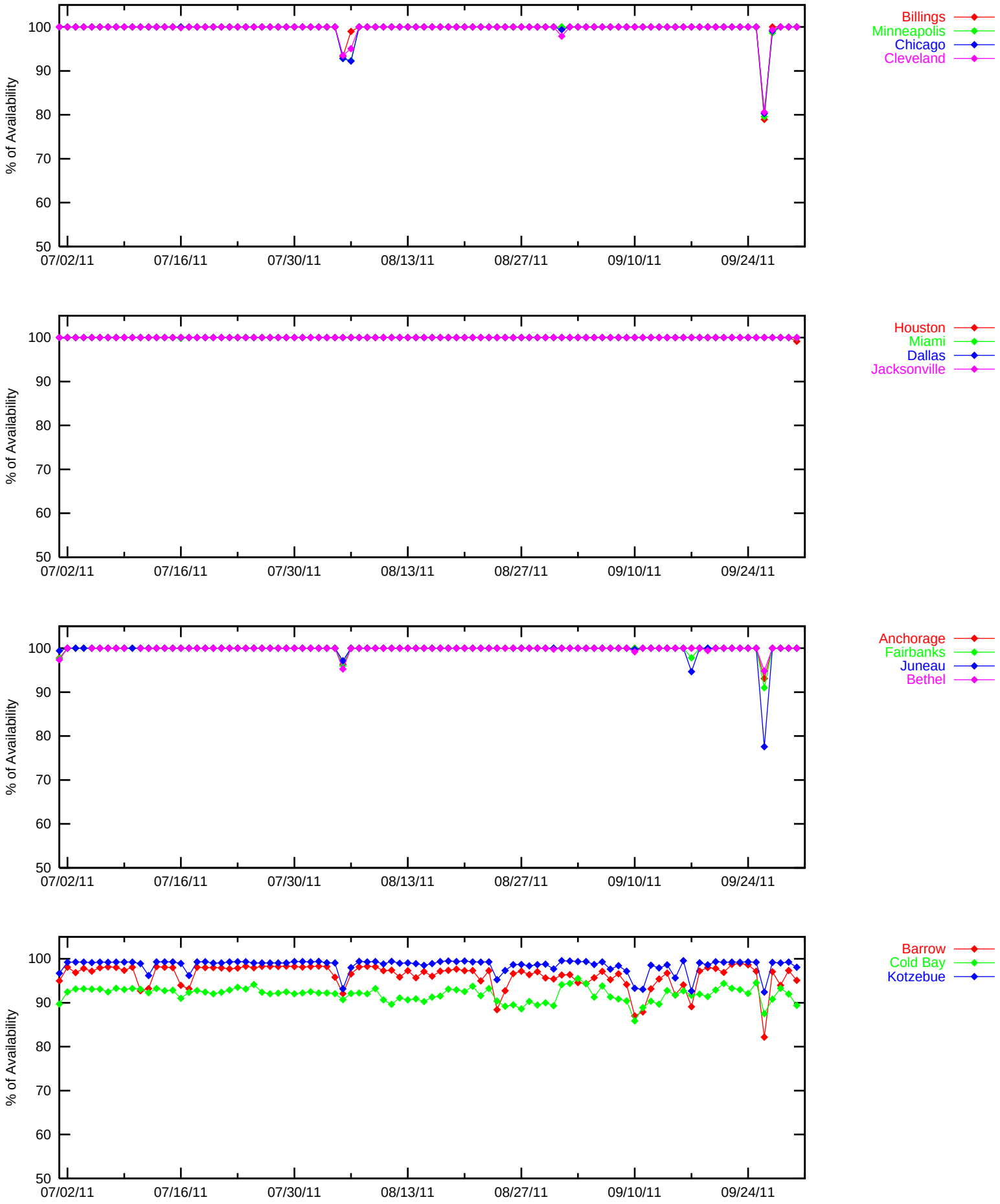


Figure 3-6 LPV 200 Instantaneous Availability

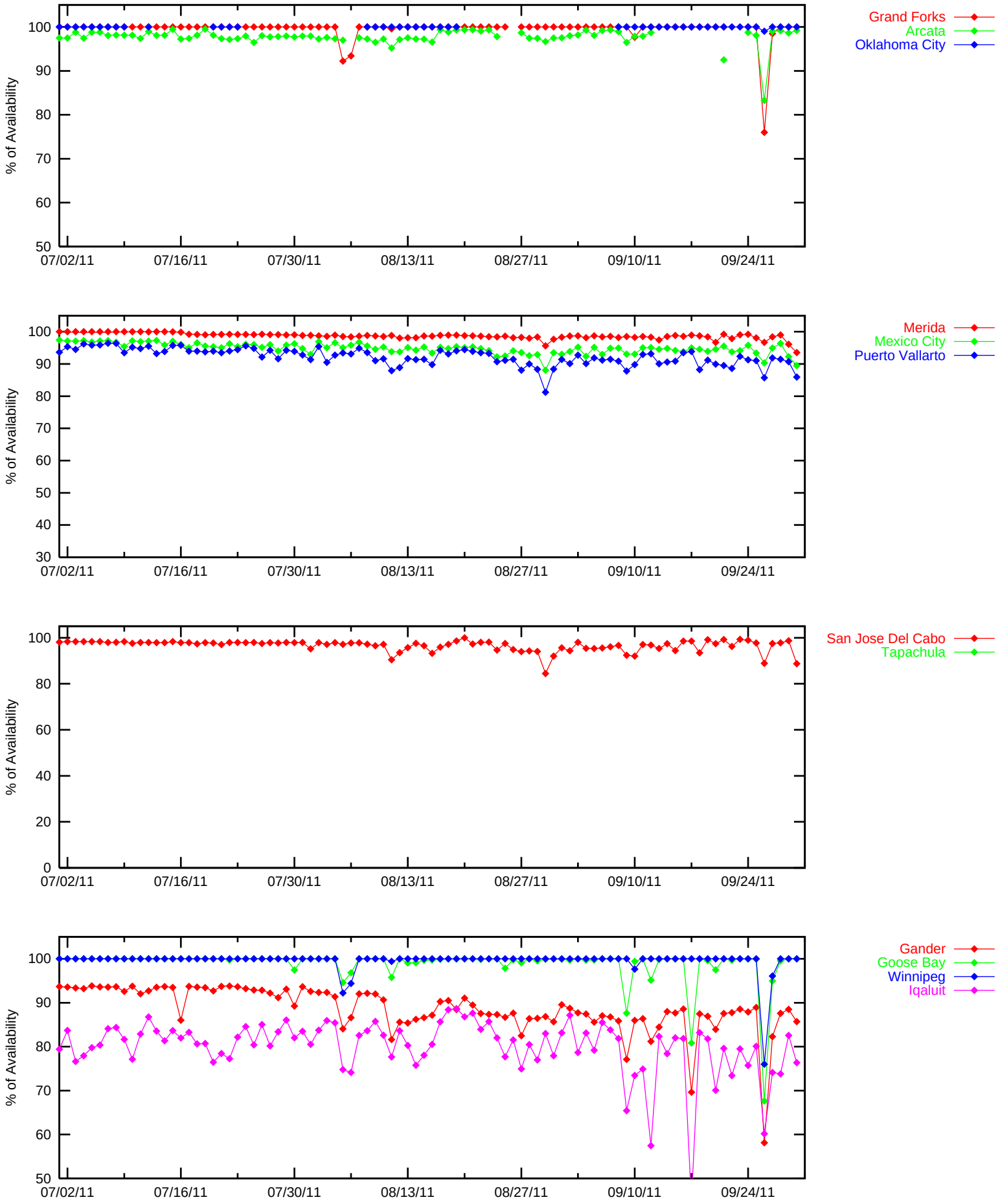


Figure 3-7 LPV Outages

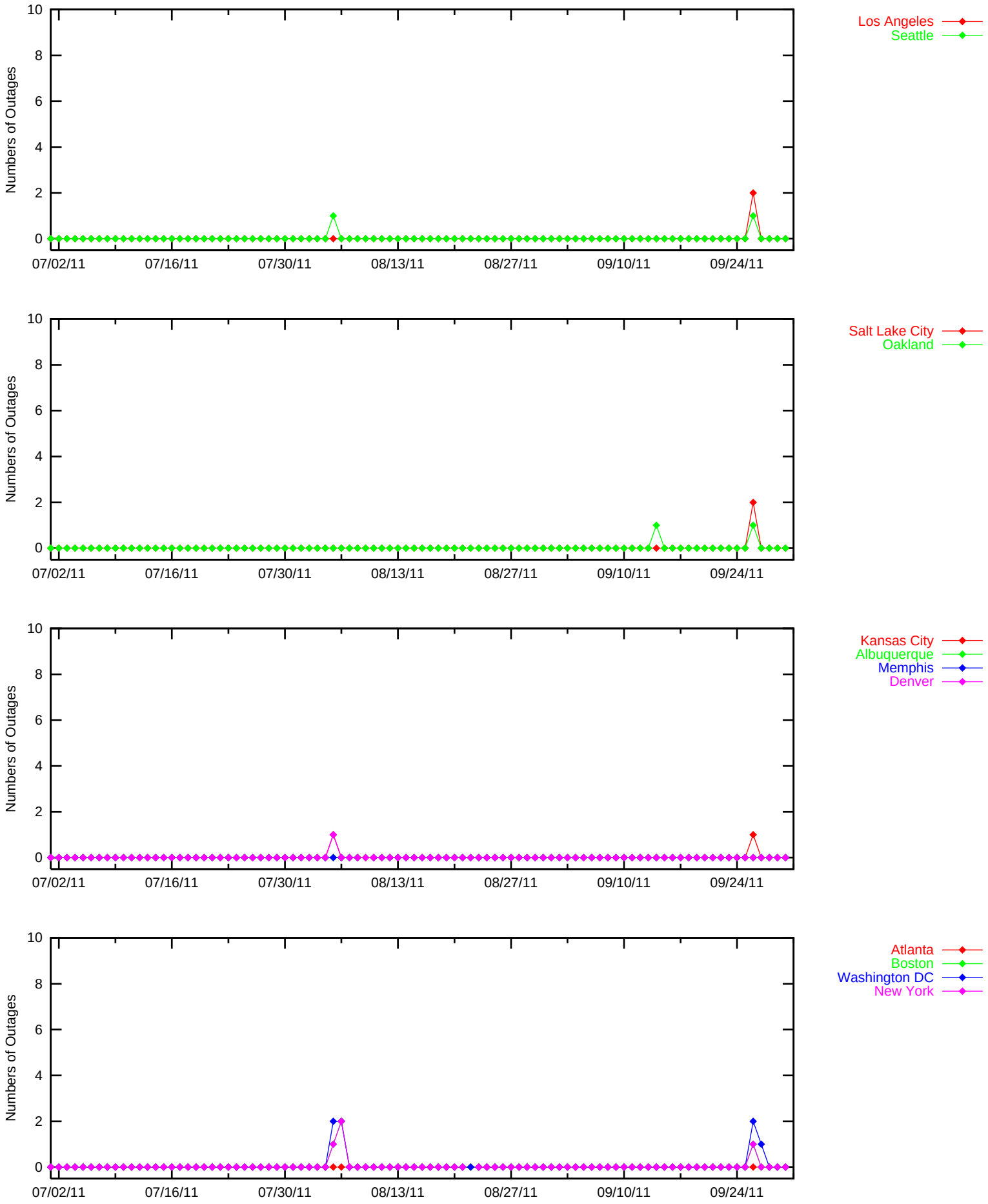


Figure 3-8 LPV Outages

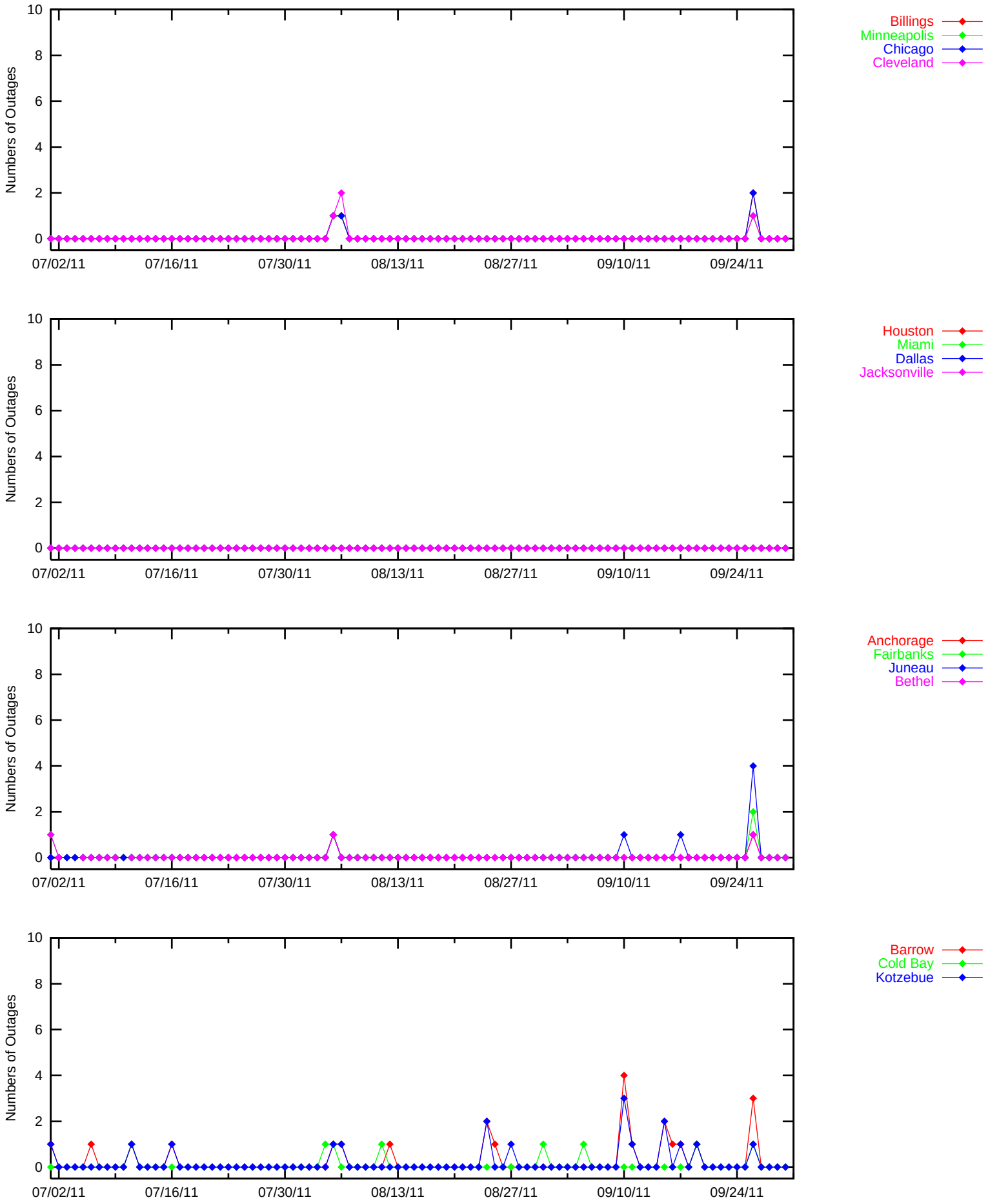


Figure 3-9 LPV Outages

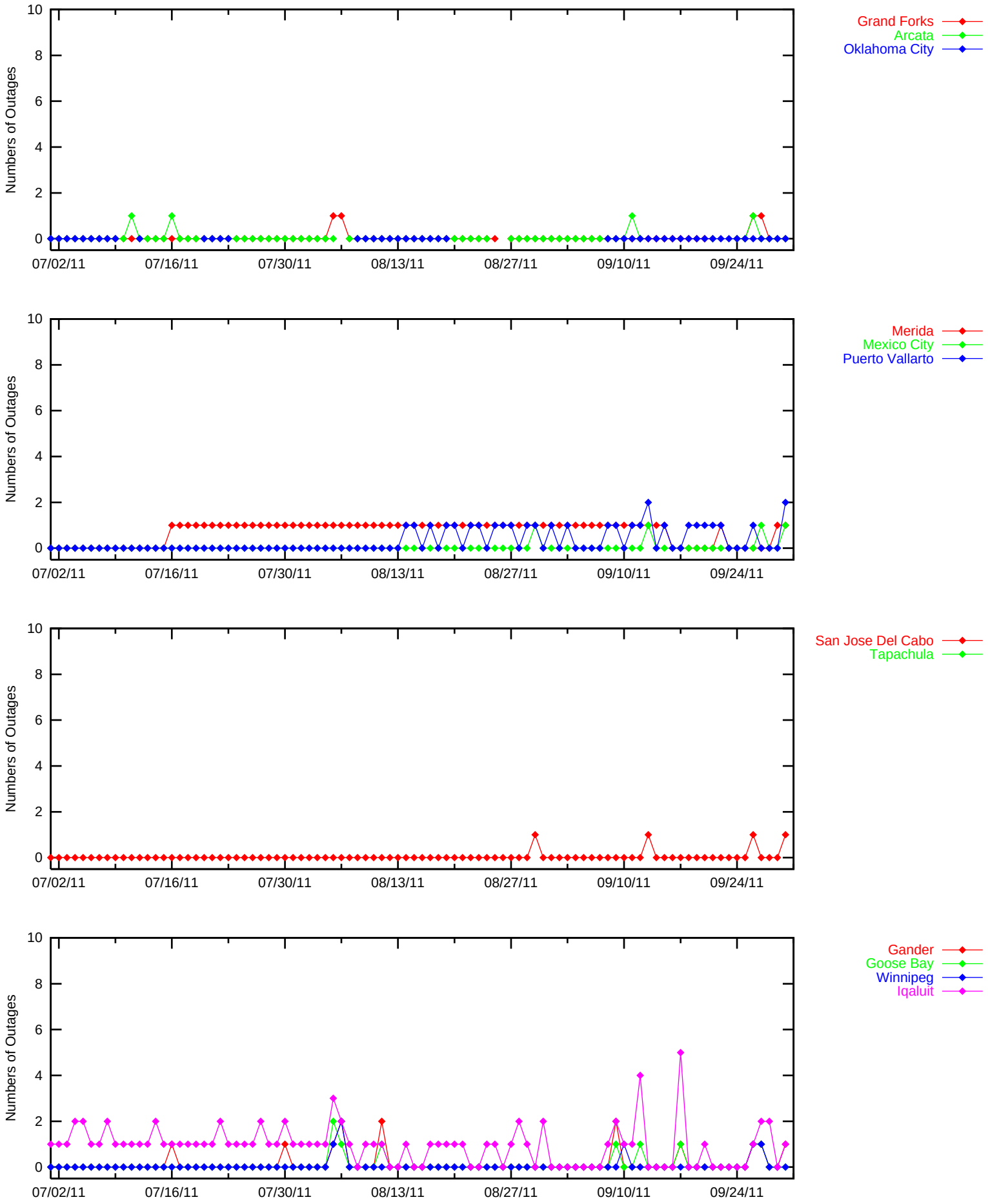


Figure 3-10 LPV 200 Outages

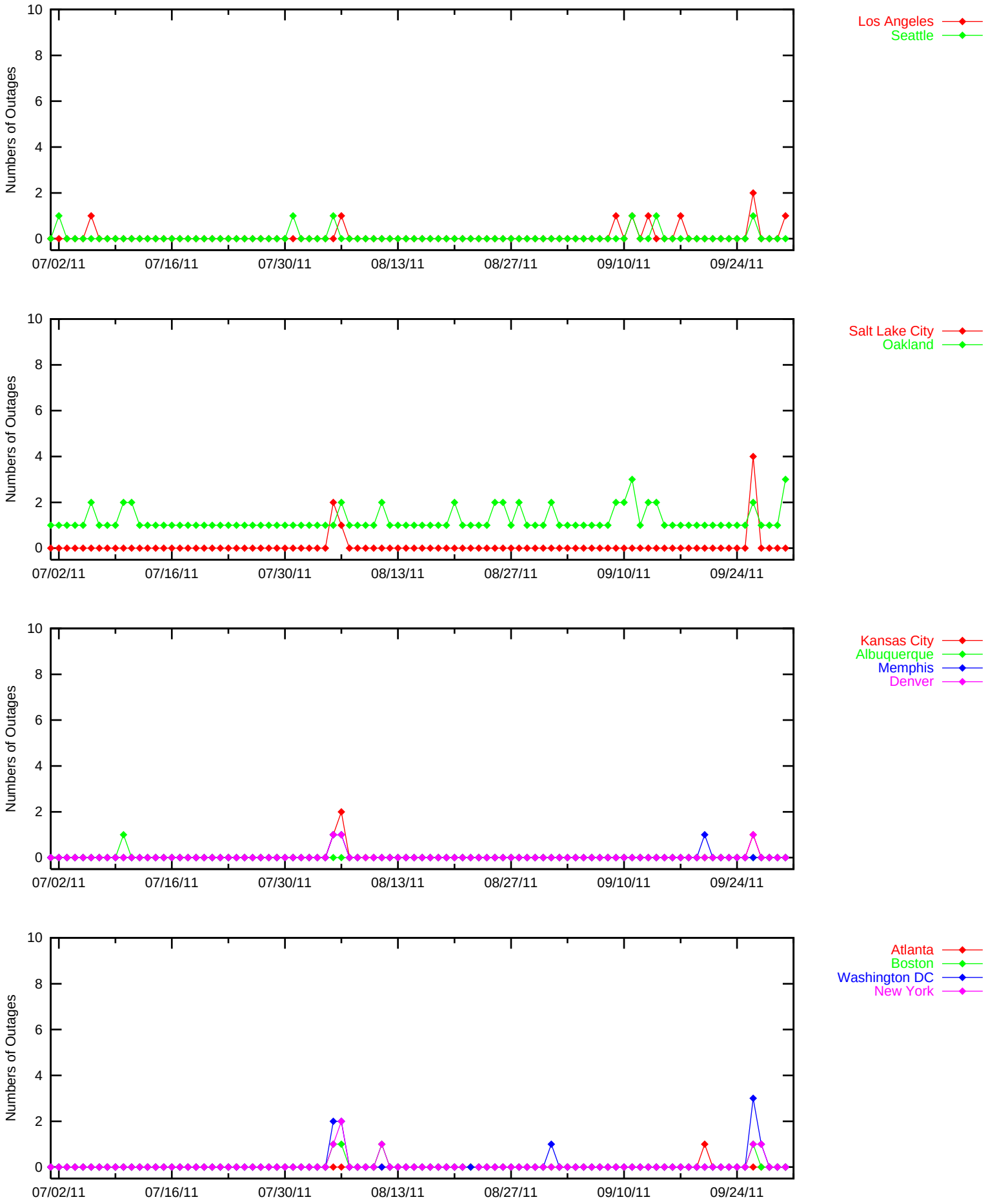


Figure 3-11 LPV 200 Outages

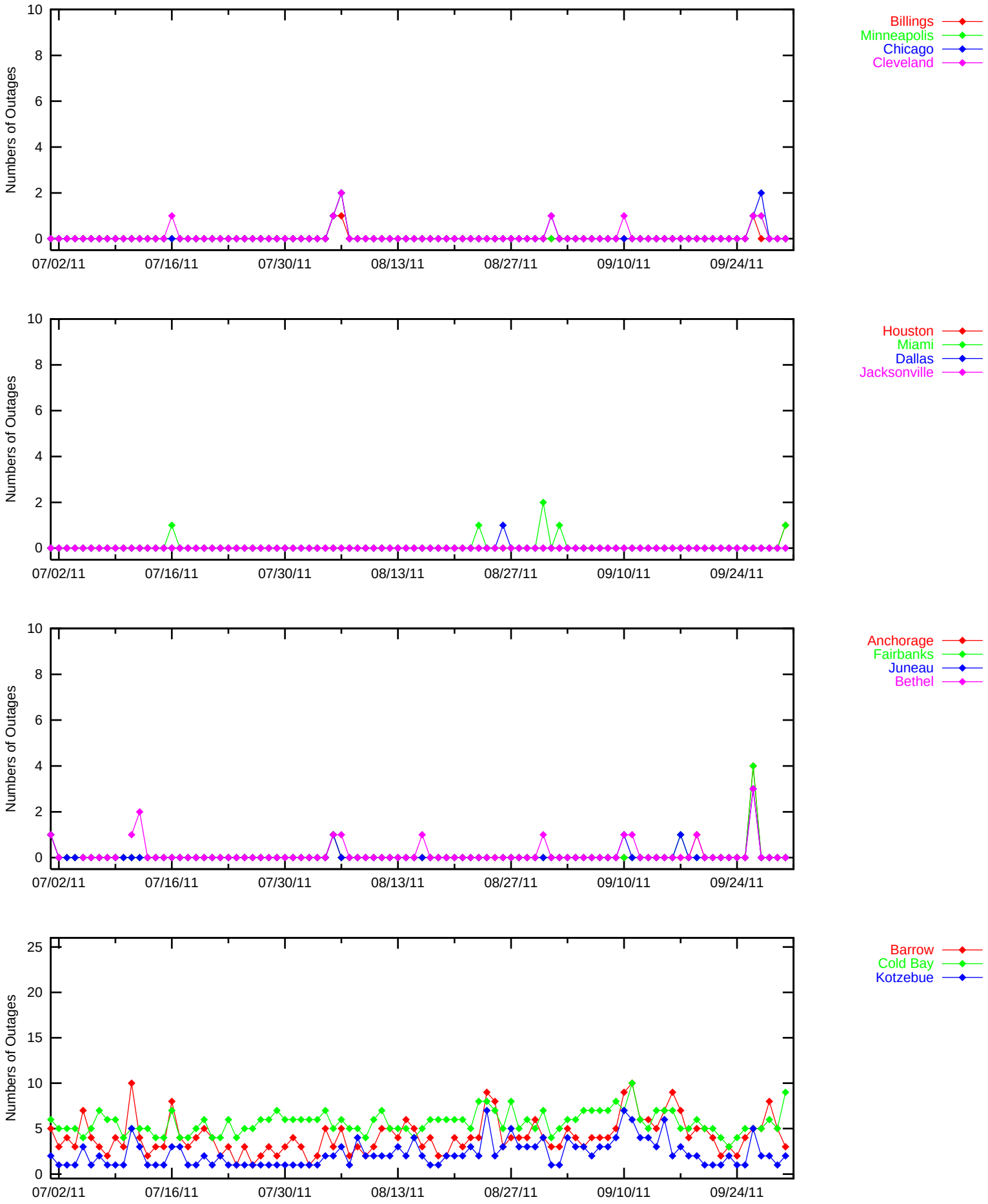
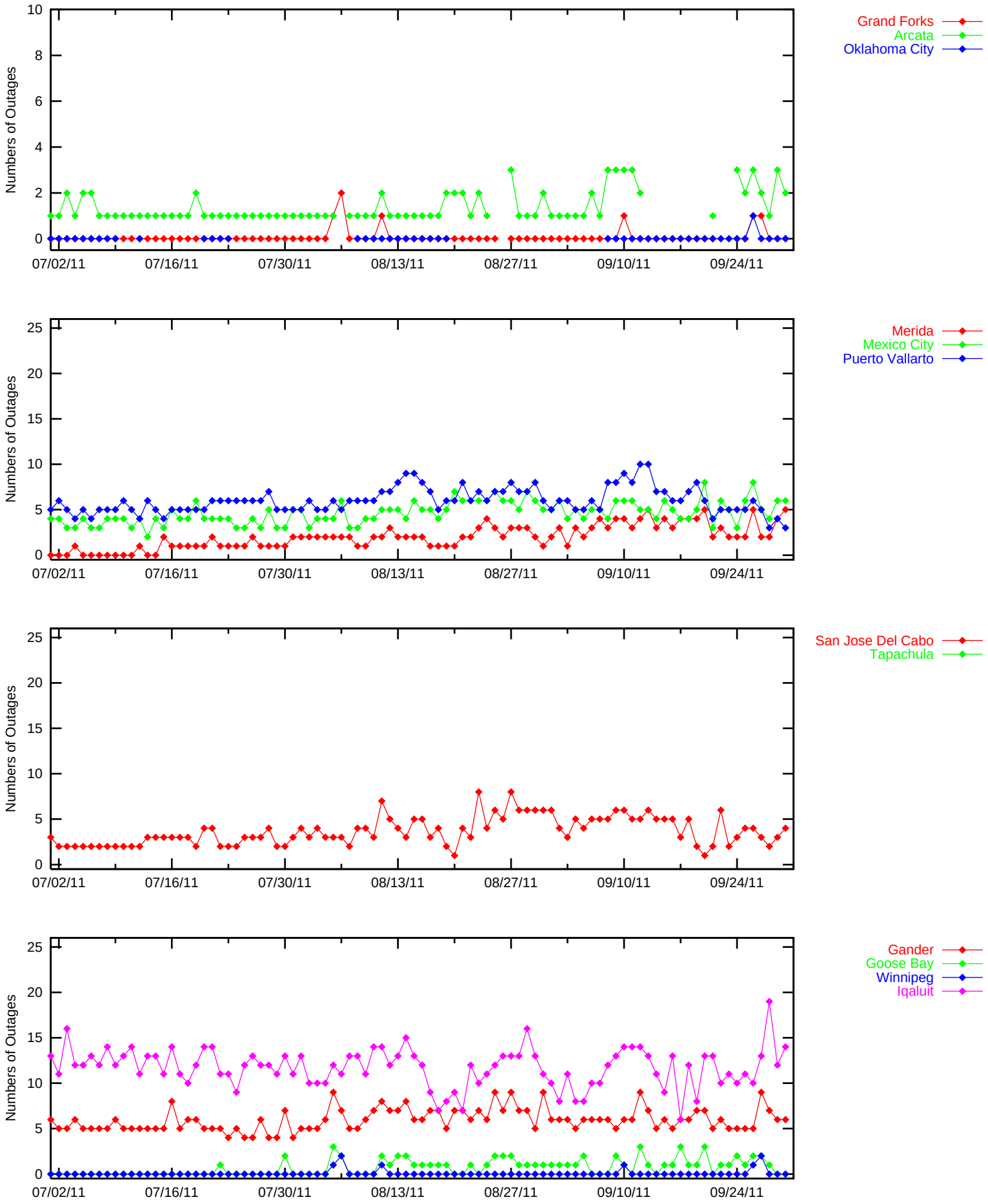


Figure 3-12 LPV 200 Outages



4.0 COVERAGE

WAAS coverage area evaluation estimates the percent of service volume where WAAS is providing LP, LPV, LPV 200, and NPA services. The WAAS message and the GPS/GEO satellite status are used to determine WAAS availability across North America. For PA coverage, protection levels were calculated at 30-sec intervals at one degree spacing over the PA service volume, while NPA coverage were calculated at 30-sec intervals at five degree spacing over the NPA service volume.

Daily analysis for PA was conducted for LP, LPV and LPV 200 service levels (see Table 2-1). The coverage plots provide 100, 99.9, 99, 98 and 95% availability contours. Figure 4.1 shows the rollup LP North America coverage. Figure 4.2 shows the rollup LPV North America coverage. Figure 4.3 shows the rollup LPV 200 North America coverage. Figure 4.6 shows the daily LPV and LPV 200 CONUS coverage, and Figure 4.7 shows the daily LPV Alaska coverage at 99% availability and ionosphere Kp index values for this quarter. Please see Appendix B for coverage plots of 98% LP and LPV availability contour, and 99% LPV 200 availability contour. Kp quantifies the disturbance in the earth's magnetic field and is an indicator of solar storms causing geomagnetic disturbances that can cause the ionosphere to become unpredictable. WAAS increases GIVE values making PA service unavailable when WAAS detects that the ionosphere is disturbed.

Daily analysis for NPA was conducted for RNP 0.1 and RNP 0.3 service levels based on a 100% availability requirement. RNP 0.1 service is asserted to be available when HPL is less than 185 meters and RNP 0.3 service is asserted to be available when HPL is less than 556 meters. The NPA coverage plots provide 100, 99.9 and 99% availability contours. Figure 4.4 shows the rollup RNP 0.1 coverage and Figure 4.5 shows the rollup RNP 0.3 coverage for the quarter. Figure 4.8 shows the daily RNP coverage at 100% availability and ionosphere Kp index values for this quarter.

The coverage decreases shown in Figures 4-6, 4-7, and 4-8 for this quarter are due to GUS switchovers, satellite outages, geomagnetic activity, and elevated GIVE values. Please refer to Table 1.5 for the events that affected coverage. The small decreases in RNP coverage on 7/11/11, 7/16/11, 8/24/11, 9/10/11, and 9/15/11 shown in Figure 4-8 are due to GUS switchovers.

The decommissioned of PRN 27 on 8/10/11 reduced Alaska LPV200 coverage slightly. The PRN 17 outage on 8/12/11, PRN 30 outage on 8/30/11, PRN 2 outage on 8/31/11, and PRN 30 outage on 9/14/11 caused the small decreases in both CONUS and Alaska coverage. The PRN 13 outage on 9/1/11 affected only CONUS LPV 200 coverage.

Elevated GIVE values on 7/2/11 caused the slight decrease in CONUS coverage. Geomagnetic activity on 8/5/11 significantly reduced both CONUS and Alaska coverage; see DR 103 WAAS Reaction to Iono Activity August 5-6 1022. and 9/26/11. Geomagnetic activity on 9/26/11 also significantly reduced both CONUS and Alaska coverage; see DR 104 WAAs Reaction to Iono Activity September 26 2011. Geomagnetic activity on 7/1/11, 9/9/11 and 9/17/11 affected mainly Alaska coverage.

Figure 4-1 LP North America Coverage for the Quarater

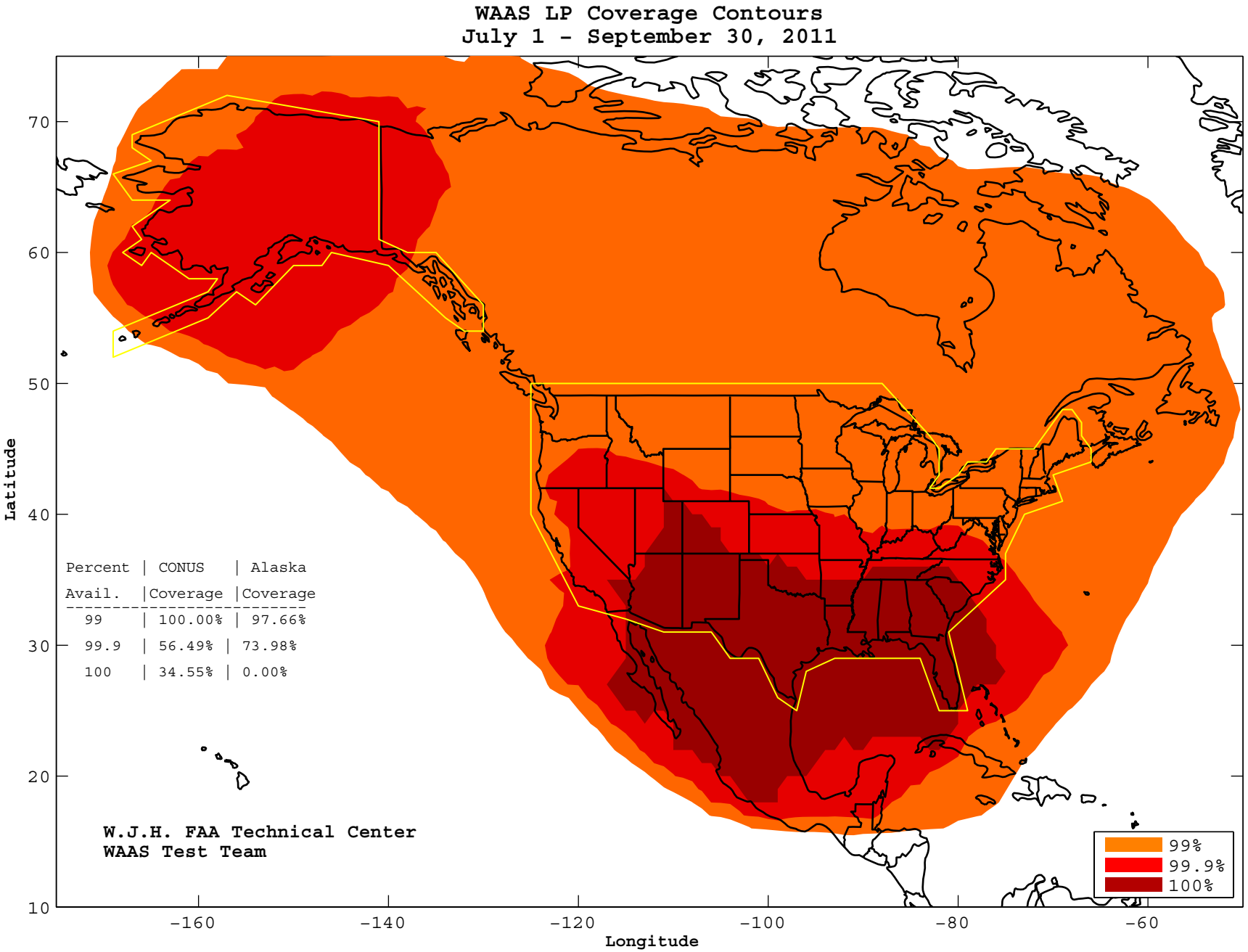


Figure 4-2 LPV North America Coverage for the Quarter

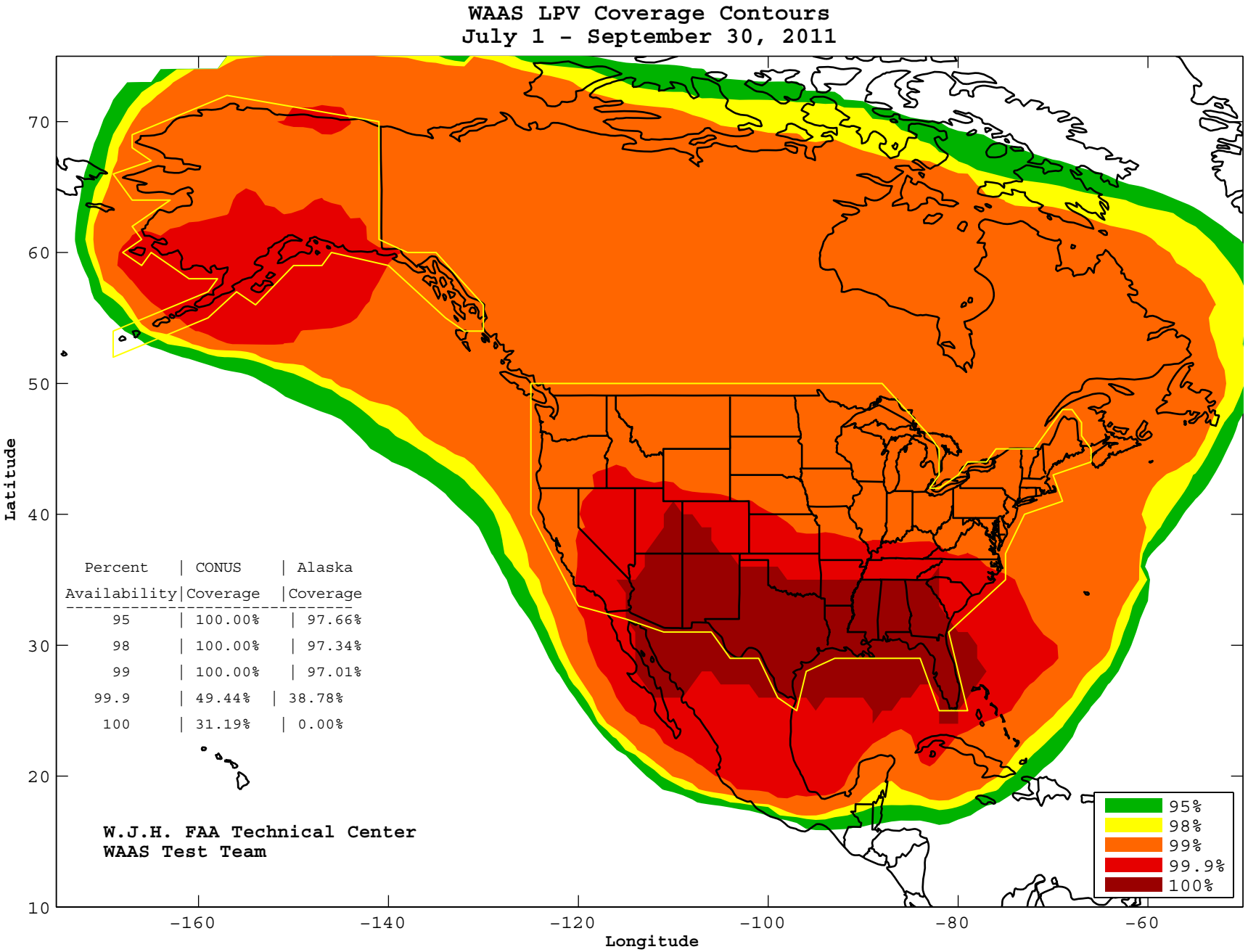


Figure 4-3 LPV 200 North America Coverage for the Quarter

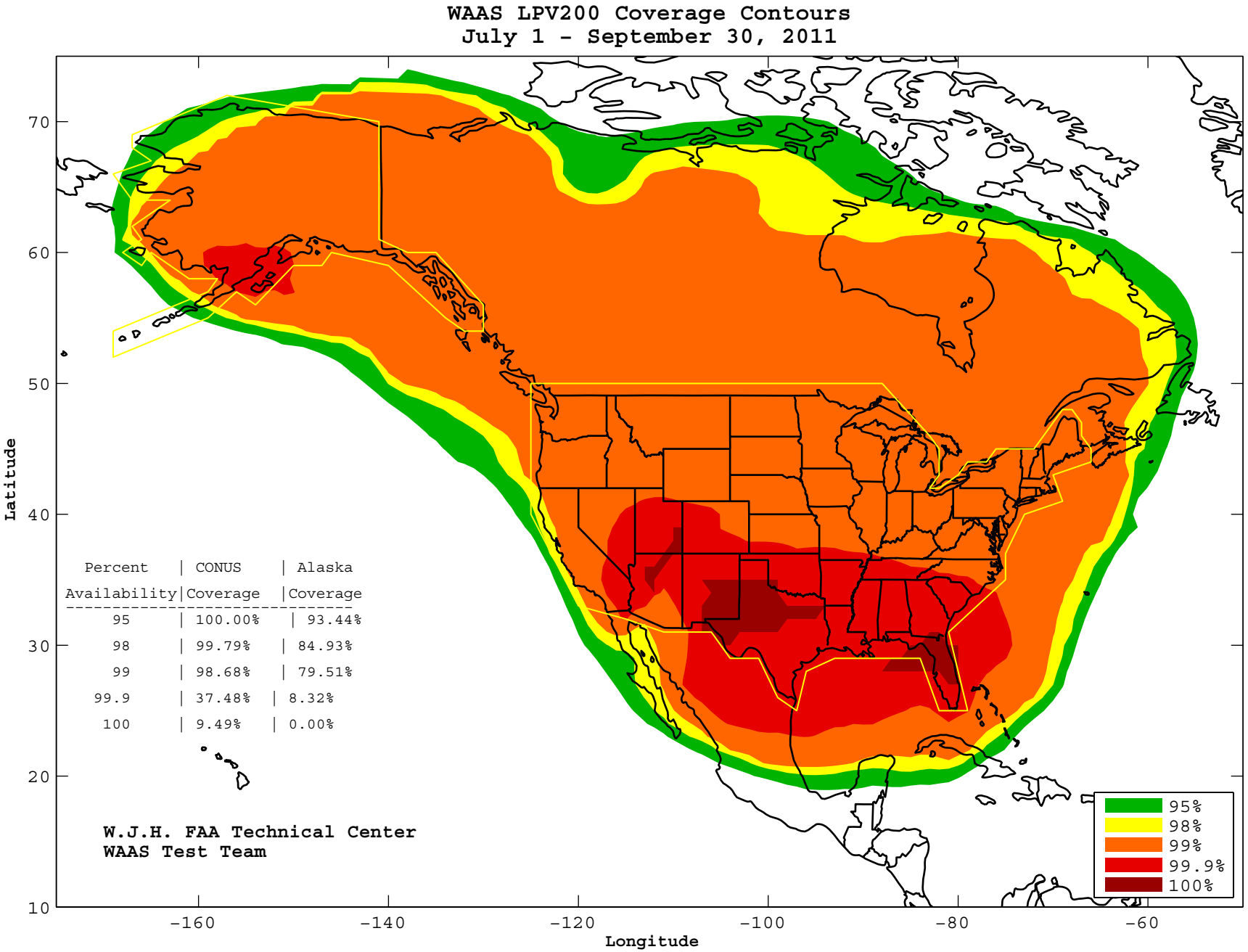


Figure 4-4 RNP 0.1 World Coverage for the Quarter

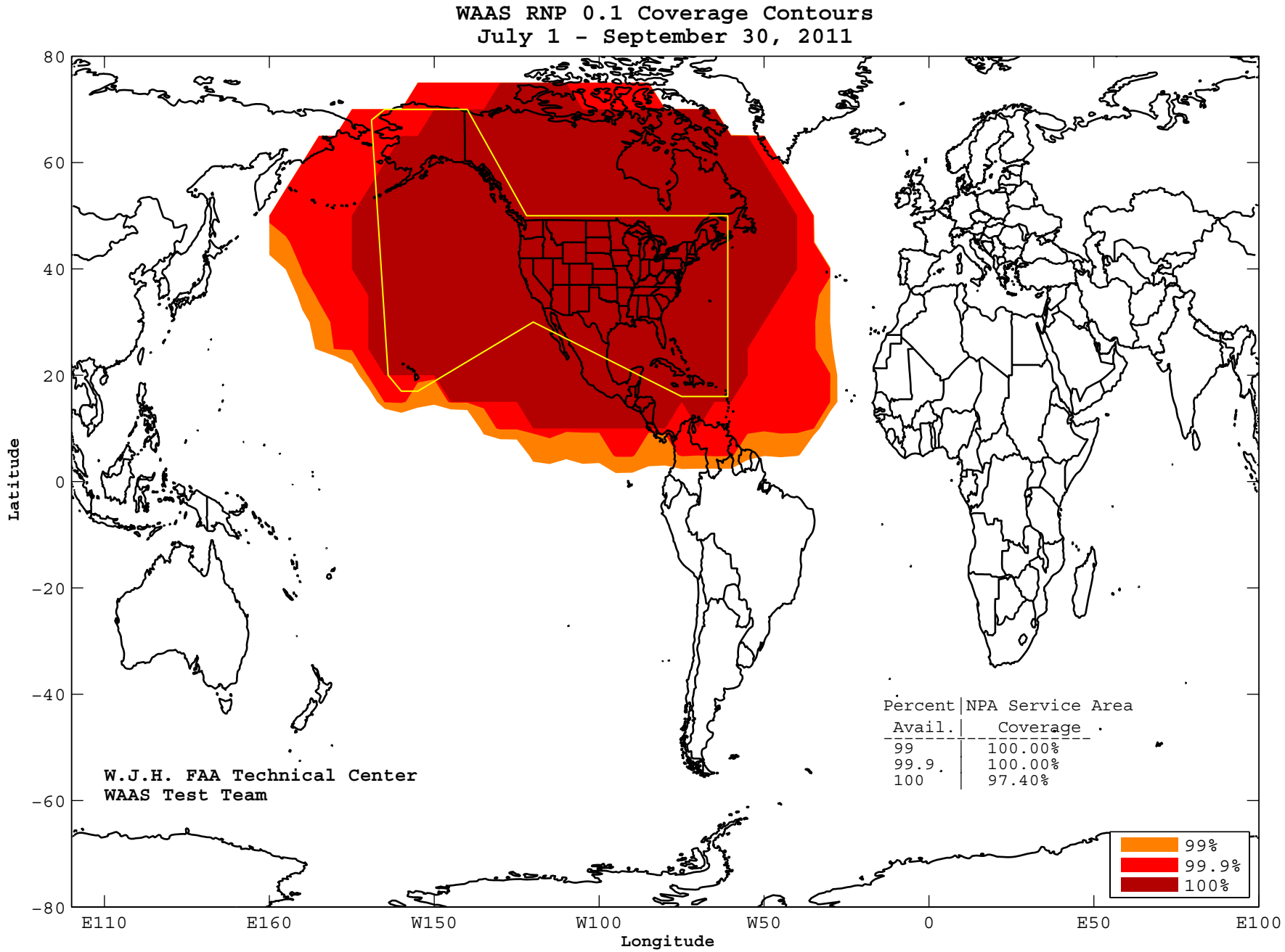


Figure 4-5 RNP 0.3 World Coverage for the Quarter

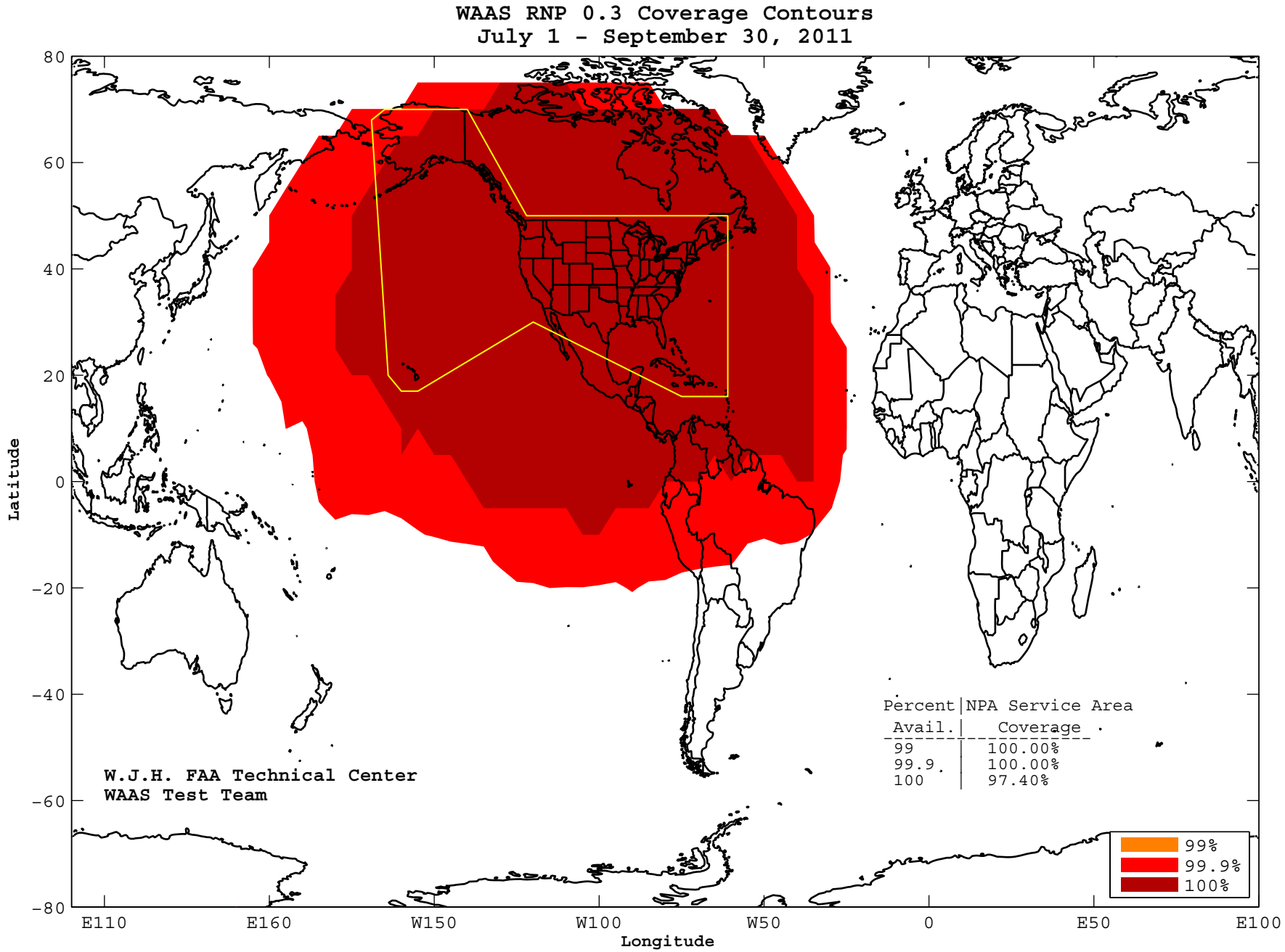


Figure 4-6 Daily LPV and LPV 200 CONUS Coverage

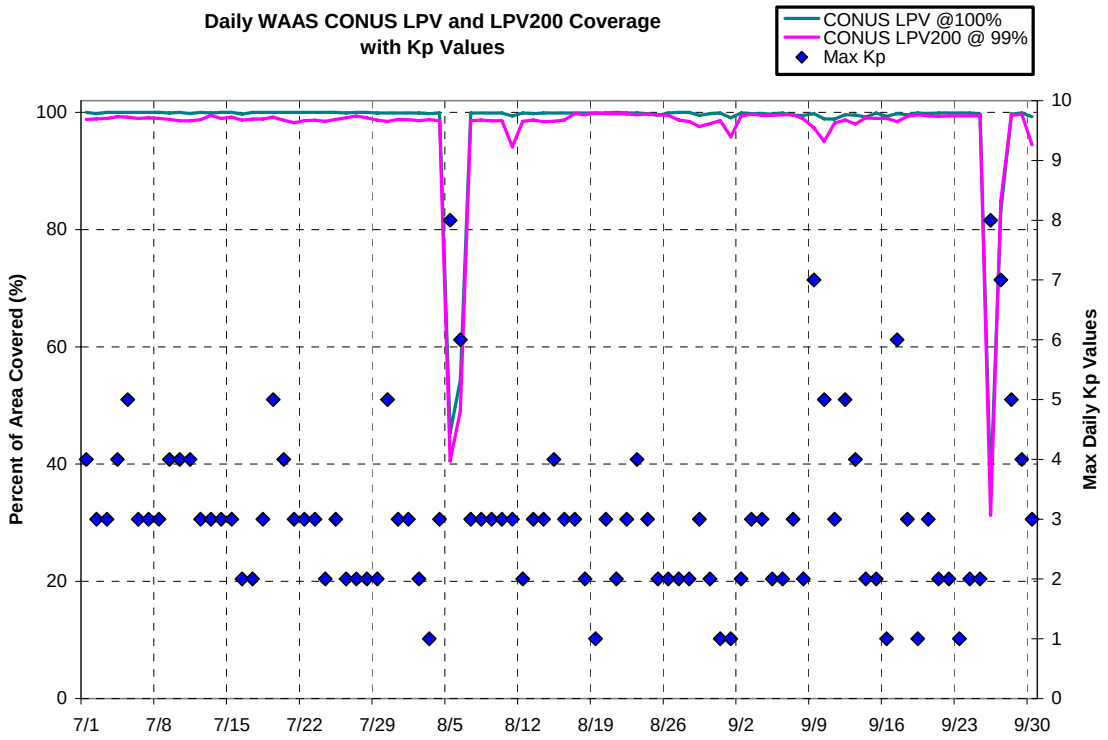


Figure 4-7 Daily LPV Alaska Coverage

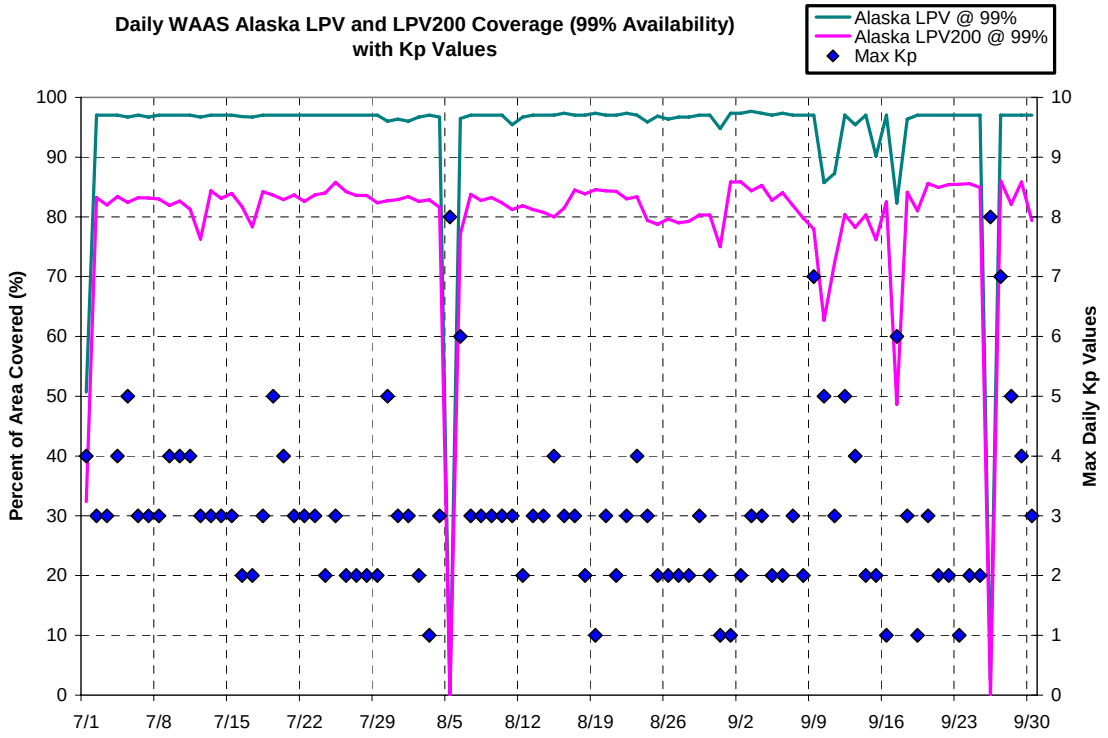
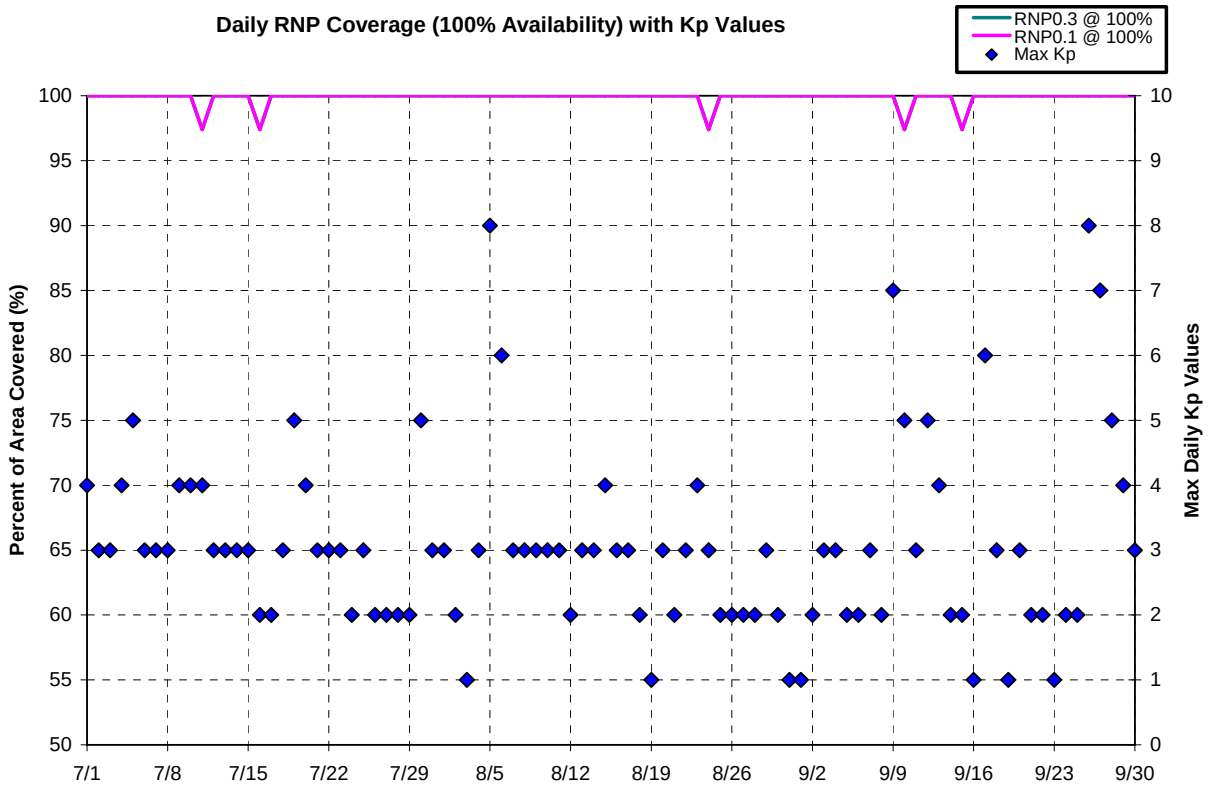


Figure 4-8 Daily RNP Coverage



5.0 INTEGRITY

5.1 HMI Analysis

Analysis of integrity includes the identification and evaluation of HMI (hazardously misleading information), as well as the generation of a safety index to illustrate the margin of safety that WAAS protection levels are providing. The safety index is a metric that shows how well the protection levels are bounding the maximum observed error when LPV service is available. The process for determining this index involves dividing the protection limit observed by the maximum observed error. An observed safety index of greater than one indicates safe bounding of the greatest observed error, less than one indicates that the maximum error was not bounded, and a result equal to one means that the error was equal to the protection level. An HMI occurs if the position error exceeds the protection level in the vertical or horizontal dimensions at any time and 6.2 seconds or more passes before this event is corrected by WAAS.

Table 5.1 lists the safety index and the number of HMI events. For this evaluation period, the lowest safety margin index is 2.80 at Kotzebue. There was no HMI event. Since WAAS was made available to the public in August 2000 there has not been an HMI event. WAAS was commissioned by the FAA for safety of life services in July 2003.

Table 5-1 Safety Margin Index and HMI Statistics

Location	Safety Index		
	Horizontal	Vertical	Number of HMIs
Arcata	4.10	6.98	0
Grand Forks	7.31	3.99	0
Oklahoma City	5.24	4.36	0
Albuquerque	6.41	7.02	0
Anchorage	15.26	4.94	0
Atlanta	7.87	10.99	0
Barrow	10.00	6.62	0
Bethel	6.77	7.69	0
Billings	6.36	6.29	0
Boston	7.12	6.97	0
Chicago	8.15	5.65	0
Cleveland	9.81	6.93	0
Cold Bay	10.32	6.88	0
Dallas	6.11	6.98	0
Denver	15.08	6.81	0
Fairbanks	10.19	5.43	0
Gander	11.24	6.85	0
Goose Bay	8.21	4.47	0
Houston	5.30	7.52	0
Iqaluit	7.36	4.99	0
Jacksonville	5.29	6.44	0
Juneau	8.95	8.67	0
Kansas City	6.72	4.16	0
Kotzebue	4.98	2.80	0
Los Angeles	17.23	7.73	0
Memphis	13.97	4.50	0
Merida	6.90	6.81	0
Mexico City	5.14	5.75	0
Miami	5.76	7.09	0
Minneapolis	8.22	4.49	0
New York	9.19	5.60	0
Oakland	6.10	9.81	0
Puerto Vallarta	5.37	3.93	0
Salt Lake City	8.37	6.47	0
San Jose Del Cabo	6.15	6.92	0
Seattle	6.76	7.52	0
Tapachula	0.00	0.00	0
Washington DC	11.18	10.14	0
Winnipeg	3.87	7.71	0

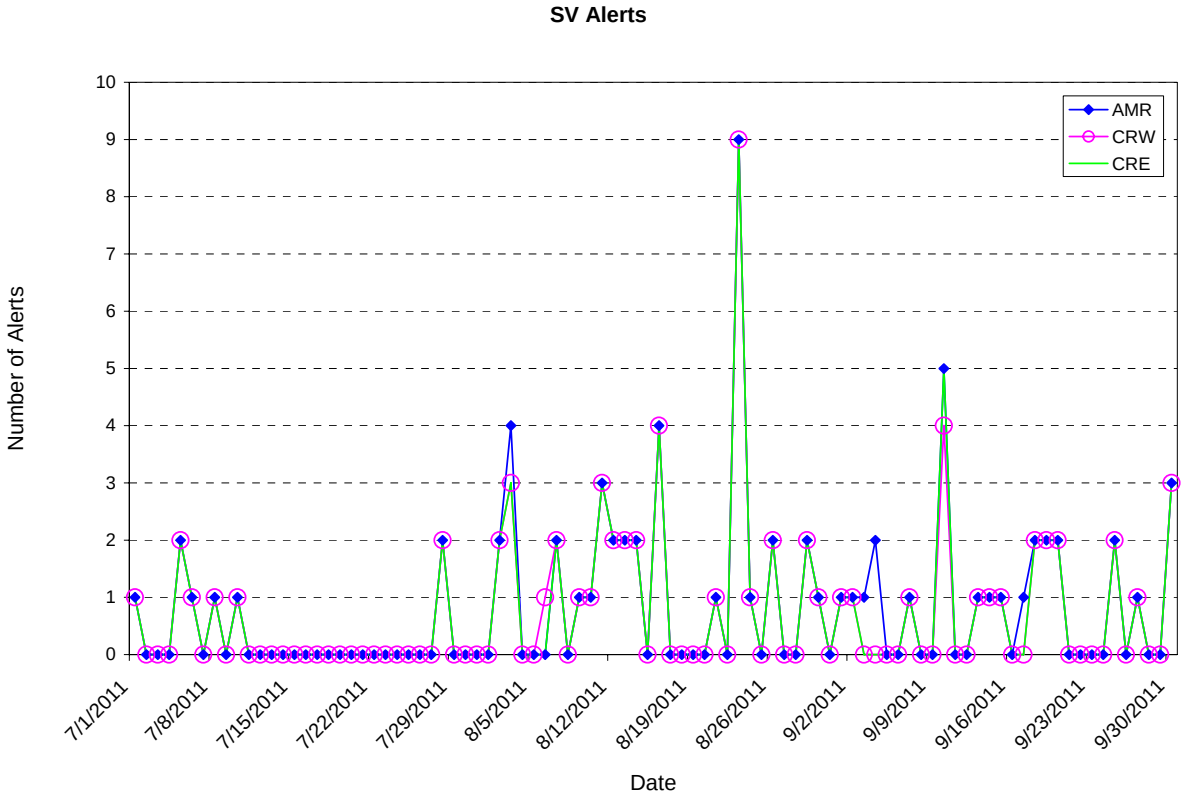
5.2 Broadcast Alerts

The WAAS transmits alert messages to protect the users if the active WAAS corrections are no longer bound by the UDREs. Alerts increase the User Differential Range Error (UDRE) for one or more PRNs, which can reduce the weighting of the satellite in the navigation solution, or completely exclude the satellite from the navigation solution. An increase in UDRE's after an alert effectively increases the user protection levels (HPL and VPL), which affects the availability. Additionally, if an alert message sequence lasts for more than 12 seconds, WAAS fast corrections can time out, causing a loss of continuity. Table 5.2 shows the total number of alerts and the average number of alerts per day. Figure 5.1 shows the number of SV alerts that occurred daily during the reporting period. Often the number of alerts on one GEO is the same as the number of alerts on the other GEO. Therefore, lines tend to overlap in most points on this plot.

Table 5-2 WAAS SV Alert

	Number of Alerts			Average Alerts Per Day		
Message Type	**AMR**	**CRW**	**CRE**	**AMR**	**CRW**	**CRE**
2	30	31	30	0.3261	0.3370	0.3261
3	25	21	21	0.2717	0.2283	0.2283
4	19	17	18	0.2065	0.1848	0.1957
5	0	0	0	0.0000	0.0000	0.0000
6	0	0	0	0.0000	0.0000	0.0000
24	0	0	0	0.0000	0.0000	0.0000
26	0	0	0	0.0000	0.0000	0.0000
Total Alerts	74	69	69	0.8043	0.7500	0.7500
Days in Service	92	92	92			

Figure 5-1 SV Daily Alert Trend



5.3 Availability of WAAS Messages (CRE , CRW, and AMR)

For an accurate and current user position to be calculated, the content of the WAAS message must be broadcast and received within precise time specifications. This aspect of the WAAS is critical to maintaining continuity requirements. Each message type in the WAAS SIS has a specific timeout interval and an expected worst case broadcast interval. Table 5.3 lists the maximum intervals at which each message must broadcast to meet system requirements.

GUS switchovers or broadcast WAAS alerts can interrupt the normal broadcast message stream. If these events occur at a time when the maximum interval of a specific message is approaching, that message may be delayed, resulting in its late transmittal.

Late messages statistics reported during the quarter were mainly caused by GEO SIS outages, GUS switchovers and SV alerts except message type 7 and 10. Occasionally, message type 7 and 10 were late and they were not caused by GEO SIS outages, GUS switchovers or SV alerts. The lateness of type 7 and type 10 messages has little or no impact on user performance and safety.

Tables 5.4 to 5.8 show fast correction, long correction, ephemeris covariance, ionosphere correction, and ionospheric mask message rates statistics broadcasted on AMR. Table 5.9 to 5.13 show message rates statistics broadcasted on CRW. Table 5.14 to 5.18 show message rates statistics on CRE.

Table 5-3 Update Rates for WAAS Messages

Data	**Associated Message Types**	**Maximum Update Interval** (seconds)	**En Route, Terminal, NPA Timeout** (seconds)	**Precision Approach Timeout** (seconds)
WAAS in Test Mode	0	6	N/A	N/A
PRN Mask	1	60	None	None
UDREI	2-6, 24	6	18	12
Fast Corrections	2-5, 24	See Table A-8 in RTCA DO-229C	See Table A-8 in RTCA DO-229C	See Table A-8 in RTCA DO-229C
Long Term Corrections	24, 25	120	360	240
GEO Nav. Data	9	120	360	240
Fast Correction Degradation	7	120	360	240
Weighting Factors	8	120	240	240
Degradation Parameters	10	120	360	240
Ionospheric Grid Mask	18	300	None	None
Ionospheric Corrections	26	300	600	600
UTC Timing Data	12	300	None	None
Almanac Data	17	300	None	None

Table 5-4 WAAS Fast Correction and Degradation Message Rates – AMR

Message Type	On Time	Late	Max Late Length (seconds)
1	1	103013	5
2	2	1324740	58
3	3	1324724	56
4	4	1324705	59
7	7	95630	12
9	9	93112	3
10	10	95668	14
17	17	31236	4

Table 5-5 WAAS Long Correction Message Rates (Type 24 and 25) - AMR

SV	On Time	Late	Max Late Length (seconds)
2	48129	1	159
3	51188	1	269
4	49018	2	185
5	49363	1	181
6	51802	0	0
7	48339	1	185
8	47425	1	180
9	50357	2	258
10	51436	1	164
11	52524	1	168
12	49739	3	167
13	48116	0	0
14	48638	2	180
15	50410	5	181
16	48804	0	0
17	48266	3	256
18	48079	1	269
19	51455	2	182
20	51465	3	185
21	47848	0	0
22	49220	2	185
23	47965	0	0
24	51801	3	258
25	51871	0	0
26	50255	1	168
27	23416	2	153
28	49538	2	264
29	48493	1	180
30	19387	0	0
31	49471	0	0
32	48932	0	0

Table 5-6 WAAS Ephemeris Covariance Message Rates (Type 28) – AMR

SV	On Time	Late	Max Late Length (seconds)
2	39514	0	0
3	42059	3	208
4	40287	0	0
5	40479	0	0
6	42534	1	192
7	39640	4	208
8	38953	2	210
9	41377	3	210
10	42249	4	208
11	43162	4	206
12	40894	0	0
13	39550	2	209
14	39976	0	0
15	41374	2	206
16	40096	2	173
17	39624	2	210
18	39473	1	312
19	42241	2	204
20	42221	0	0
21	39293	0	0
22	40416	3	312
23	39400	0	0
24	42586	4	204
25	42588	1	123
26	41269	5	210
27	19243	0	0
28	40665	3	206
29	39875	0	0
30	15928	0	0
31	40555	1	128
32	40180	1	155
135	76105	3	208
138	76299	3	210

Table 5-7 WAAS Ionospheric Correction Message Rates (Type 26) – AMR

Band	Block	On Time	Late	Max Late Length (seconds)
0	0	27569	6	453
0	1	27553	10	464
0	2	27560	8	466
1	0	27562	9	464
1	1	27561	10	453
1	2	27564	7	433
1	3	27572	5	430
1	4	27577	2	411
2	0	27564	3	415
2	1	27580	4	400
2	2	27562	4	576
2	3	27567	3	576
2	4	27585	4	576
2	5	27567	9	576
3	0	27565	3	576
3	1	27555	7	576
3	2	27567	10	576
9	0	27567	8	576
9	1	27566	6	576
9	2	27561	5	424
9	3	27580	6	409
9	4	27562	7	469
9	5	27565	7	436
9	6	27559	5	459

Table 5-8 WAAS Ionospheric Mask Message Rates (Type 18) – AMR

Band	On Time	Late	Max Late Length (seconds)
0	35474	1	470
1	35475	2	469
2	35440	2	462
3	35418	3	410
9	35433	3	345

Table 5-9 WAAS Fast Correction and Degradation Message Rates – CRW

Message Type	On Time	Late	Max Late Length (seconds)
1	101443	4	174
2	1324753	55	120
3	1324740	53	120
4	1324692	65	120
7	94901	9	190
9	93113	2	163
10	94800	8	173
17	31145	5	534

Table 5-10 WAAS Long Correction Message Rates (Type 24 and 25) - CRW

SV	On Time	Late	Max Late Length (seconds)
2	48127	3	152
3	51186	2	258
4	49028	1	179
5	49366	0	0
6	51799	1	178
7	48344	1	186
8	47420	1	180
9	50359	3	258
10	51433	0	0
11	52523	4	168
12	49746	1	145
13	48110	1	166
14	48644	2	134
15	50397	5	180
16	48799	1	168
17	48252	4	256
18	48108	1	258
19	51453	2	187
20	51488	1	152
21	47844	1	178
22	49220	2	186
23	47951	1	162
24	51796	3	258
25	51872	0	0
26	50240	4	168
27	23426	1	145
28	49533	3	265
29	48493	0	0
30	19386	0	0
31	49467	0	0
32	48959	1	135

Table 5-11 WAAS Ephemeris Covariance Message Rates (Type 28) – CRW

SV	On Time	Late	Max Late Length (seconds)
2	39514	0	0
3	42059	3	208
4	40287	0	0
5	40479	0	0
6	42534	1	192
7	39640	4	208
8	38953	2	210
9	41377	3	210
10	42249	4	208
11	43162	4	206
12	40894	0	0
13	39550	2	209
14	39976	0	0
15	41374	2	206
16	40096	2	173
17	39624	2	210
18	39473	1	312
19	42241	2	204
20	42221	0	0
21	39293	0	0
22	40416	3	312
23	39400	0	0
24	42586	4	204
25	42588	1	123
26	41269	5	210
27	19243	0	0
28	40665	3	206
29	39875	0	0
30	15928	0	0
31	40555	1	128
32	40180	1	155
135	76105	3	208
138	76299	3	210

Table 5-12 WAAS Ionospheric Correction Message Rates (Type 26) – CRW

Band	Block	On Time	Late	Max Late Length (seconds)
0	0	27589	3	576
0	1	27561	6	581
0	2	27564	2	576
1	0	27567	5	576
1	1	27581	5	576
1	2	27562	5	576
1	3	27560	4	576
1	4	27576	3	576
2	0	27559	4	445
2	1	27566	5	440
2	2	27585	4	433
2	3	27567	5	446
2	4	27559	7	575
2	5	27571	5	445
3	0	27571	6	575
3	1	27583	4	304
3	2	27572	3	576
9	0	27568	2	575
9	1	27575	5	319
9	2	27566	9	540
9	3	27570	3	551
9	4	27568	3	307
9	5	27560	5	577
9	6	27562	4	576

Table 5-13 WAAS Ionospheric Mask Message Rates (Type 18) - CRW

Band	On Time	Late	Max Late Length (seconds)
0	35313	2	431
1	35349	3	461
2	35293	1	303
3	35349	1	451
9	35300	3	458

Table 5-14 WAAS Fast Correction and Degradation Message Rates – CRE

Message Type	On Time	Late	Max Late Length (seconds)
1	105473	3	227
2	1324771	48	120
3	1324746	49	120
4	1324723	52	120
7	98355	14	149
9	93106	4	174
10	98306	7	180
17	31520	4	539

Table 5-15 WAAS Long Correction Message Rates (Type 24 and 25) – CRE

SV	On Time	Late	Max Late Length (seconds)
2	48129	1	139
3	51189	1	270
4	49033	0	0
5	49367	0	0
6	51798	1	181
7	48348	1	186
8	47421	2	180
9	50358	4	258
10	51437	0	0
11	52534	2	168
12	49751	1	138
13	48122	0	0
14	48650	0	0
15	50401	7	180
16	48808	0	0
17	48255	3	256
18	48102	1	270
19	51460	1	187
20	51462	0	0
21	47856	1	181
22	49221	2	186
23	47962	1	157
24	51805	3	258
25	51880	0	0
26	50274	2	168
27	23430	1	138
28	49536	1	266
29	48494	0	0
30	19397	0	0
31	49471	0	0
32	48951	0	0

Table 5-16 WAAS Ephemeris Covariance Message Rates (Type 28) – CRE

SV	On Time	Late	Max Late Length (seconds)
2	39509	0	0
3	42066	2	208
4	40283	1	178
5	40471	0	0
6	42544	1	200
7	39650	4	210
8	38942	2	210
9	41373	2	210
10	42250	2	182
11	43162	1	206
12	40879	1	209
13	39576	0	0
14	39970	1	209
15	41351	4	210
16	40109	0	0
17	39625	1	210
18	39475	1	312
19	42266	1	208
20	42217	0	0
21	39299	0	0
22	40430	2	312
23	39396	0	0
24	42558	2	211
25	42575	2	122
26	41272	1	210
27	19253	0	0
28	40691	2	206
29	39869	0	0
30	15947	0	0
31	40577	1	122
32	40175	1	122
135	76045	3	208
138	76339	4	204

Table 5-17 WAAS Ionospheric Correction Message Rates (Type 26) – CRE

Band	Block	On Time	Late	Max Late Length (seconds)
0	0	27584	4	432
0	1	27565	6	421
0	2	27570	5	433
1	0	27562	8	493
1	1	27568	6	501
1	2	27576	3	493
1	3	27559	6	499
1	4	27562	7	493
2	0	27564	5	495
2	1	27564	5	476
2	2	27570	4	576
2	3	27576	3	576
2	4	27569	5	576
2	5	27572	5	576
3	0	27555	10	576
3	1	27561	5	576
3	2	27575	5	576
9	0	27566	7	576
9	1	27575	6	576
9	2	27564	7	576
9	3	27570	6	456
9	4	27569	8	463
9	5	27552	4	432
9	6	27566	5	408

Table 5-18 WAAS Ionospheric Mask Message Rates (Type 18) – CRE

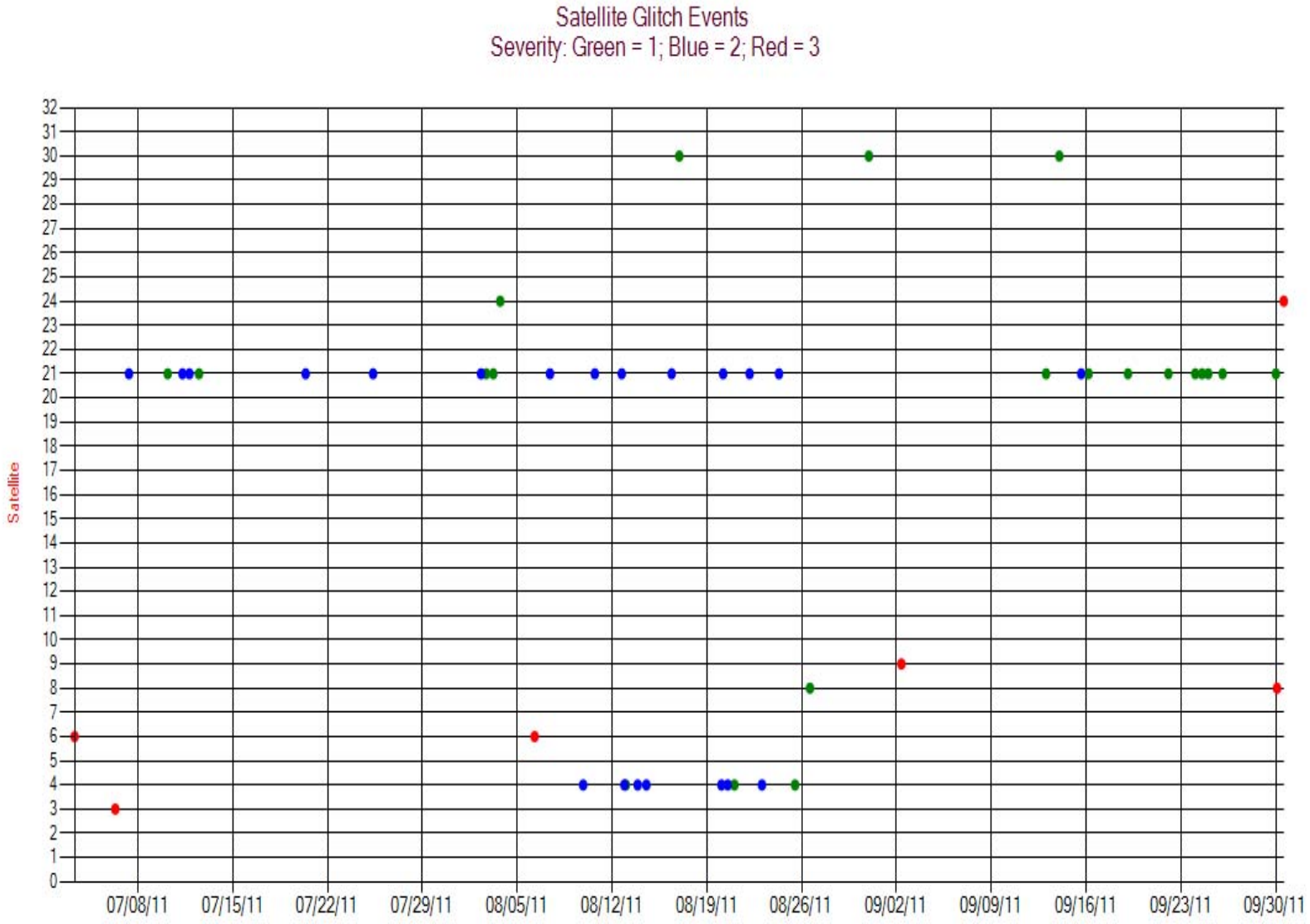
Band	On Time	Late	Max Late Length (seconds)
0	35809	1	402
1	35814	2	461
2	35802	3	463
3	35835	3	456
9	35812	4	394

5.4 Satellite Glitches

The GPS satellites occasionally have periods of signal carrier stability 'glitches' of varying magnitude. These are short degradations in the signal that in severe cases cause WAAS to lose track or cycle slip for some or all of the WAAS receivers. The more severe glitches will cause the WAAS reported UDRE spike to 'Not Monitor' and result in an alert.

Figure 5.2 shows the satellite glitches visible to WAAS for the quarter. Glitches are categorized into three severity levels. Severity one glitches cause a significant number of the receivers to simultaneously have bad subframe parity, but not all receivers. Severity two glitches cause all of the receivers to report bad subframe parity data and some receivers to also have cycle slips and or lose tracking of L2 and or L1. Severity three glitches cause all of the receivers to lose track of both L1 and L2 data.

Figure 5-2 SV Glitch Trend



6.0 SV RANGE ACCURACY

Range accuracy evaluation computes the probability that the WAAS User Differential Range Error (UDRE) and Grid Ionospheric Vertical Error (GIVE) statistically bound 99.9% of the range residuals for each satellite tracked by the receiver. A UDRE is broadcast by the WAAS for each satellite that is monitored by the system and the 99.9% bound (3.29 sigma) of the residual error on a pseudorange after application of fast and long-term corrections is checked. The pseudorange residual error is determined by taking the difference between the raw pseudorange and a calculated reference range. The reference range is equal to the true range between the corrected satellite position and surveyed user antenna plus all corrections (WAAS Fast Clock, WAAS Long-Term Clock, WAAS Ionospheric delay, Tropospheric delay, Receiver Clock Bias, and Multipath). Since the true ionospheric delay and multipath error are not precisely known, the estimated variance in these error sources are added to the UDRE before the comparing it to the residual error.

GPS satellite range residual errors were calculated for twelve WAAS receivers during the quarter. Table 6.1 and 6.2 show the range error 95% index and 99.9% (3.29 sigma) bounding statistics for each SV at the selected locations. Figures 6.1 and 6.2 show the range error for each SV as measured by the WAAS receivers at the Washington DC reference station.

A GIVE is broadcast by the WAAS for each IGP that is monitored by the system and the 99.9% (3.29 sigma) bound of the ionospheric error is checked. The WAAS broadcasts the ionospheric model using IGP's at predefined geographic locations. Each IGP contains the vertical ionospheric delay and the error in that delay in the form of the GIVE. The ionospheric error is determined by taking the difference between the WAAS vertical ionospheric delay interpolated from the IGP's and GPS dual frequency measurement at that GPS satellite.

GPS satellite ionospheric errors were calculated for twelve WAAS receivers during the quarter. Table 6.3 and 6.4 show the ionospheric error 95% index and 99.9% (3.29 sigma) bounding statistics for each SV at the selected locations. Figures 6.3 and 6.4 show the ionospheric error for each SV as measured by the WAAS receiver at the Washington DC reference station.

For this reporting period, all satellites range errors were bounded 99.9% of the time by the UDRE except for PRN 2 and PRN 10 at Minneapolis and Kansas City which were bounded 99.8%. The unbounded range errors at both location occurred during LPV service outages caused by high ionospheric activity during geomagnetic storms.

Table 6-1 Range Error 95% index and 3.29 Sigma Bounding

Site →	Billings		Albuquerque		Boston		Washington DC		Houston		Kansas City	
SV ↓	95% Range Error	3.29 Sigma Bounding(%)	95% Range Error	3.29 Sigma Bounding(%)	95% Range Error	3.29 Sigma Bounding(%)	95% Range Error	3.29 Sigma Bounding(%)	95% Range Error	3.29 Sigma Bounding(%)	95% Range Error	3.29 Sigma Bounding(%)
1	-	-	-	-	-	-	-	-	-	-	-	-
2	1.655	100	1.806	100	1.668	100	1.572	100	2.629	100	2.324	99.81109
3	1.542	100	1.246	100	1.634	100	1.303	100	1.35	100	1.155	100
4	1.775	100	1.6	100	1.722	99.98985	1.366	100	1.315	100	2.205	100
5	1.514	100	1.311	100	1.377	100	1.428	100	1	100	1.288	99.92968
6	1.343	100	1.137	100	1.585	100	1.194	100	1.111	100	1.251	100
7	1.175	100	1.091	100	1.258	100	1.194	100	0.928	100	1.076	100
8	0.844	100	0.919	100	1.157	100	0.96	100	1.052	100	1.113	100
9	1.044	100	0.99	100	1.134	100	0.92	100	0.961	100	1.019	100
10	0.947	100	1.243	100	1.096	100	1.075	100	1.707	100	1.277	99.87965
11	0.805	100	1.13	100	1.003	100	1.108	100	1.963	100	0.869	100
12	1.316	100	1.044	100	1.237	100	1.14	100	0.93	100	1.187	99.93999
13	1.3	100	1.352	100	1.323	100	1.613	100	1.074	100	1.065	100
14	1.133	100	0.806	100	1.451	100	0.84	100	1.823	100	1.423	100
15	1.355	100	1.107	100	1.357	100	1.443	100	1.097	100	1.422	100
16	0.851	100	1.636	100	1.214	100	1.082	100	1.357	100	1.435	100
17	1.34	100	1.304	100	1.392	99.96666	0.941	100	1.514	100	0.833	100
18	1.087	100	1.147	100	1.334	100	1.158	100	1.703	100	1.226	100
19	2.511	100	2.369	100	2.329	100	2.234	100	2.719	100	2.539	100
20	0.979	100	1.28	100	1.238	99.97215	1.315	100	1.489	100	1.218	100
21	1.528	100	1.524	100	1.087	100	1.572	100	1.614	100	1.263	100
22	2.137	100	2.24	100	2.242	100	2.226	100	2.543	100	2.085	100
23	1.421	100	1.935	100	2.004	100	1.711	100	2.364	100	1.494	100
24	1.692	100	1.655	100	1.669	100	1.515	100	2.019	100	1.272	100
25	2.478	99.96171	1.914	100	2.011	100	2.226	100	3.101	100	2.082	100
26	1.724	100	1.562	100	1.364	100	1.417	100	1.305	100	1.23	100
27	1.142	100	0.97	100	1.221	100	0.958	100	1.527	100	0.965	100
28	1.121	100	1.088	100	1.124	100	1.216	100	1.429	100	1.067	100
29	1.797	100	1.373	100	1.363	100	1.817	100	0.958	100	1.277	100
30	1.007	100	1.673	100	0.974	100	0.883	100	1.118	100	1.104	100
31	1.984	100	1.258	100	1.106	100	1.055	100	0.987	100	1.277	100
32	1.019	100	1.193	100	1.205	100	1.104	100	1.038	100	0.984	100
135	2.317	100	1.807	100	2.706	100	1.766	100	1.819	100	1.56	100
138	1.641	100	1.265	100	1.294	100	1.606	100	1.521	100	1.695	100

Table 6-2 Range Error 95% index and 3.29 Sigma Bounding

Site →	Los Angeles		Salt Lake City		Miami		Minneapolis		Atlanta		Juneau	
SV ↓	95% Range Error	3.29 Sigma Bounding(%)	95% Range Error	3.29 Sigma Bounding(%)	95% Range Error	3.29 Sigma Bounding(%)	95% Range Error	3.29 Sigma Bounding(%)	95% Range Error	3.29 Sigma Bounding(%)	95% Range Error	3.29 Sigma Bounding(%)
1	-	-	-	-	-	-	-	-	-	-	-	-
2	2.169	100	1.916	100	1.966	100	1.878	99.76635	1.713	100	1.559	100
3	1.089	100	0.871	100	1.654	100	2.119	100	1.086	100	0.981	100
4	1.082	100	1.287	100	2.188	100	1.322	99.93015	1.561	99.9891	1.498	100
5	1.075	100	1.59	100	1.572	100	1.652	100	1.511	100	1.463	100
6	0.918	100	1.301	100	1.339	100	1.087	100	1.351	100	1.793	100
7	0.984	100	0.874	100	1.291	100	1.04	100	1.156	100	1.291	100
8	0.986	100	0.728	100	0.935	100	1.022	100	0.853	100	0.974	100
9	1.526	100	0.981	100	1.034	100	2.468	100	1.166	100	0.833	100
10	1.457	100	1.244	100	1.237	100	1.117	99.86302	1.214	100	0.986	100
11	1.565	100	1.038	100	1.765	100	1.053	100	0.901	100	1.209	100
12	1.007	100	0.897	100	1.324	100	1.018	100	1.49	100	1.208	100
13	0.903	100	1.716	100	1.442	100	0.992	100	1.122	100	1.21	100
14	1.534	100	1.015	100	1.471	100	0.751	100	0.949	100	0.813	100
15	1.073	100	1.11	100	1.293	100	1.33	100	1.436	100	1.336	100
16	1.771	100	1.129	100	1.074	100	1.336	100	0.9	100	0.844	100
17	0.988	100	1.069	100	1.163	100	0.852	99.99771	1.057	99.98706	1.139	100
18	1.707	100	2.033	100	1.423	100	1.148	100	1.384	100	1.273	100
19	2.405	100	2.4	100	2.014	100	2.163	100	2.24	100	2.15	100
20	1.665	100	1.584	100	1.473	100	1.16	100	1.222	100	1.021	100
21	1.731	100	1.482	100	1.787	100	1.245	100	1.428	100	1.11	100
22	2.707	100	2.376	100	2.908	100	2.441	100	2.194	100	2.221	100
23	2.301	100	1.829	100	1.677	100	1.521	100	1.659	100	1.64	100
24	1.182	100	2.595	100	1.737	100	1.23	100	1.87	100	1.975	100
25	1.676	100	1.584	100	2.474	100	1.93	99.99916	2.271	100	2.07	100
26	0.921	100	1.247	100	1.264	100	1.651	100	1.376	100	1.158	100
27	1.051	100	0.913	100	1.16	100	1.135	100	1.16	100	1.03	100
28	1.659	100	1.119	100	1.835	100	1.261	99.99956	1.15	100	0.997	100
29	1.066	100	1.652	100	1.961	100	1.248	100	1.277	100	1.466	100
30	1.501	100	0.97	100	1.443	100	0.905	100	0.984	100	0.851	100
31	1.143	100	1.019	100	1.643	100	0.901	100	1.094	100	1.049	100
32	1.135	100	1.075	100	1.368	100	0.922	100	1.075	100	0.887	100
135	2.089	100	1.416	100	1.619	100	1.901	100	1.914	100	1.419	100
138	2.798	100	1.404	100	1.771	100	1.716	100	1.438	100	1.501	100

Table 6-3 Ionospheric Error 95% index and 3.29 Sigma Bounding

Site →	Billings		Albuquerque		Boston		Washington DC		Houston		Kansas City	
SV ↓	95% Iono Error	3.29 Sigma Bounding(%)	95% Iono Error	3.29 Sigma Bounding(%)	95% Iono Error	3.29 Sigma Bounding(%)	95% Iono Error	3.29 Sigma Bounding(%)	95% Iono Error	3.29 Sigma Bounding(%)	95% Iono Error	3.29 Sigma Bounding(%)
1	-	-	-	-	-	-	-	-	-	-	-	-
2	0.922	100	1.053	100	1.111	100	0.959	100	1.349	100	1.146	100
3	0.620	100	0.601	100	0.456	100	0.439	100	0.716	100	0.540	100
4	1.252	100	1.229	100	1.180	100	1.251	100	1.427	100	1.899	100
5	0.940	100	0.985	100	0.681	100	0.935	100	1.100	100	0.900	100
6	0.626	100	0.530	100	0.594	100	0.343	100	0.705	100	0.532	100
7	0.679	100	0.616	100	0.479	100	0.610	100	0.514	100	0.602	100
8	0.421	100	0.362	100	0.440	100	0.469	100	0.445	100	0.469	100
9	0.530	100	0.531	100	0.477	100	0.445	100	0.511	100	0.464	100
10	0.441	100	0.478	100	0.520	100	0.430	100	0.851	100	0.545	100
11	0.577	100	0.505	100	0.467	100	0.425	100	0.827	100	0.444	100
12	0.610	100	0.585	100	0.620	100	0.694	100	0.566	100	0.517	100
13	0.564	100	0.683	100	0.508	100	0.625	100	0.690	100	0.477	100
14	0.472	100	0.491	100	0.709	100	0.335	100	1.097	100	0.714	100
15	0.631	100	0.713	100	0.615	100	0.938	100	0.642	100	0.901	100
16	0.486	100	0.931	100	0.636	100	0.529	100	0.611	100	0.653	100
17	0.959	100	0.834	100	0.810	100	0.726	100	0.920	100	0.522	100
18	0.880	100	0.612	100	0.985	100	0.662	100	0.812	100	0.670	100
19	1.570	100	1.597	100	1.685	100	1.567	100	1.890	100	1.763	100
20	0.676	100	0.717	100	0.683	100	0.596	100	0.765	100	0.613	100
21	1.037	100	0.907	100	0.881	100	1.073	100	0.935	100	0.817	100
22	1.845	100	1.638	100	2.037	100	1.702	100	1.710	100	1.602	100
23	1.078	100	1.467	100	1.718	100	1.347	100	1.679	100	1.127	100
24	0.741	100	0.844	100	0.734	100	0.704	100	1.017	100	0.659	100
25	1.351	100	1.199	100	1.078	100	1.175	100	1.693	100	1.105	100
26	0.817	100	0.780	100	0.626	100	0.778	100	0.706	100	0.657	100
27	0.569	100	0.522	100	0.509	100	0.407	100	0.660	100	0.454	100
28	0.609	100	0.665	100	0.655	100	0.646	100	0.819	100	0.588	100
29	0.980	100	0.913	100	0.795	100	0.971	100	0.909	100	0.848	100
30	0.412	100	0.664	100	0.429	100	0.392	100	0.504	100	0.398	100
31	1.236	100	0.691	100	0.332	100	0.568	100	0.691	100	0.749	100
32	0.577	100	0.613	100	0.426	100	0.390	100	0.352	100	0.400	100

Table 6-4 Ionospheric Error 95% index and 3.29 Sigma Bounding

Site →	Los Angeles		Salt Lake City		Miami		Minneapolis		Atlanta		Juneau	
SV ↓	95% Iono Error	3.29 Sigma Bounding(%)	95% Iono Error	3.29 Sigma Bounding(%)	95% Iono Error	3.29 Sigma Bounding(%)	95% Iono Error	3.29 Sigma Bounding(%)	95% Iono Error	3.29 Sigma Bounding(%)	95% Iono Error	3.29 Sigma Bounding(%)
1	-	-	-	-	-	-	-	-	-	-	-	-
2	1.120	100	1.076	100	1.056	100	1.005	100	0.998	100	1.091	100
3	0.455	100	0.432	100	0.743	100	0.661	100	0.428	100	0.541	100
4	0.846	100	0.922	100	1.659	100	1.039	100	1.017	100	0.940	100
5	0.790	100	0.930	100	1.378	100	0.917	100	0.920	100	0.950	100
6	0.505	100	0.651	100	0.682	100	0.450	100	0.616	100	0.950	100
7	0.743	100	0.499	100	0.771	100	0.528	100	0.620	100	0.685	100
8	0.465	100	0.440	100	0.639	100	0.564	100	0.440	100	0.467	100
9	0.609	100	0.482	100	0.572	100	0.929	100	0.514	100	0.521	100
10	0.596	100	0.638	100	0.509	100	0.488	100	0.518	100	0.495	100
11	0.688	100	0.463	100	0.627	100	0.501	100	0.514	100	0.548	100
12	0.597	100	0.566	100	0.830	100	0.491	100	0.714	100	0.661	100
13	0.565	100	0.814	100	0.988	100	0.552	100	0.454	100	0.574	100
14	0.520	100	0.541	100	0.607	100	0.400	100	0.503	100	0.449	100
15	0.626	100	0.583	100	0.960	100	0.778	100	0.798	100	0.739	100
16	0.906	100	0.493	100	0.583	100	0.849	100	0.574	100	0.519	100
17	0.639	100	0.661	100	0.877	100	0.534	100	0.579	100	0.693	100
18	0.767	100	1.132	100	0.712	100	0.798	100	0.865	100	1.065	100
19	1.494	100	1.630	100	1.372	100	1.619	100	1.614	100	1.498	100
20	0.673	100	0.637	100	0.797	100	0.637	100	0.760	100	0.768	100
21	0.754	100	0.877	100	1.108	100	0.971	100	0.932	100	1.029	100
22	1.664	100	1.762	100	2.005	100	1.943	100	1.745	100	1.951	100
23	1.281	100	1.355	100	1.112	100	1.223	100	1.376	100	1.322	100
24	0.743	100	1.036	100	0.901	100	0.697	100	0.866	100	0.867	100
25	1.190	100	1.049	100	1.544	100	1.177	100	1.214	100	1.314	100
26	0.547	100	0.660	100	0.760	100	1.000	100	0.763	100	0.614	100
27	0.564	100	0.466	100	0.708	100	0.619	100	0.573	100	0.552	100
28	0.798	100	0.605	100	1.130	100	0.610	100	0.805	100	0.684	100
29	0.682	100	0.945	100	1.253	100	0.763	100	0.865	100	0.846	100
30	0.521	100	0.436	100	0.647	100	0.374	100	0.568	100	0.447	100
31	0.603	100	0.653	100	0.911	100	0.446	100	0.525	100	0.477	100
32	0.417	100	0.457	100	0.749	100	0.458	100	0.428	100	0.448	100

Figure 6-1 95% Range Error (PRN 1 - PRN 16) - Washington DC

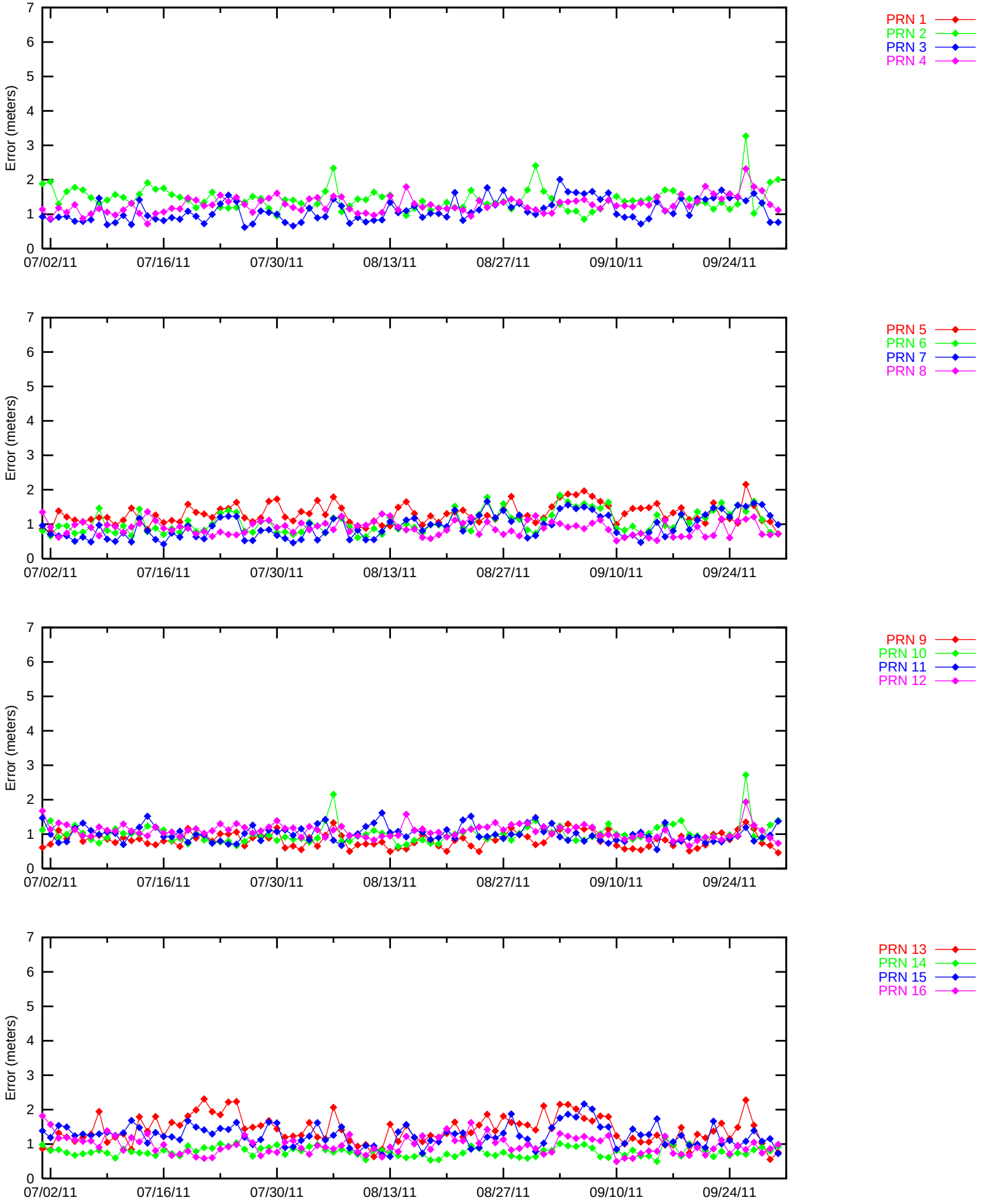


Figure 6-2 95% Range Error (PRN 17 - PRN 32) - Washington DC

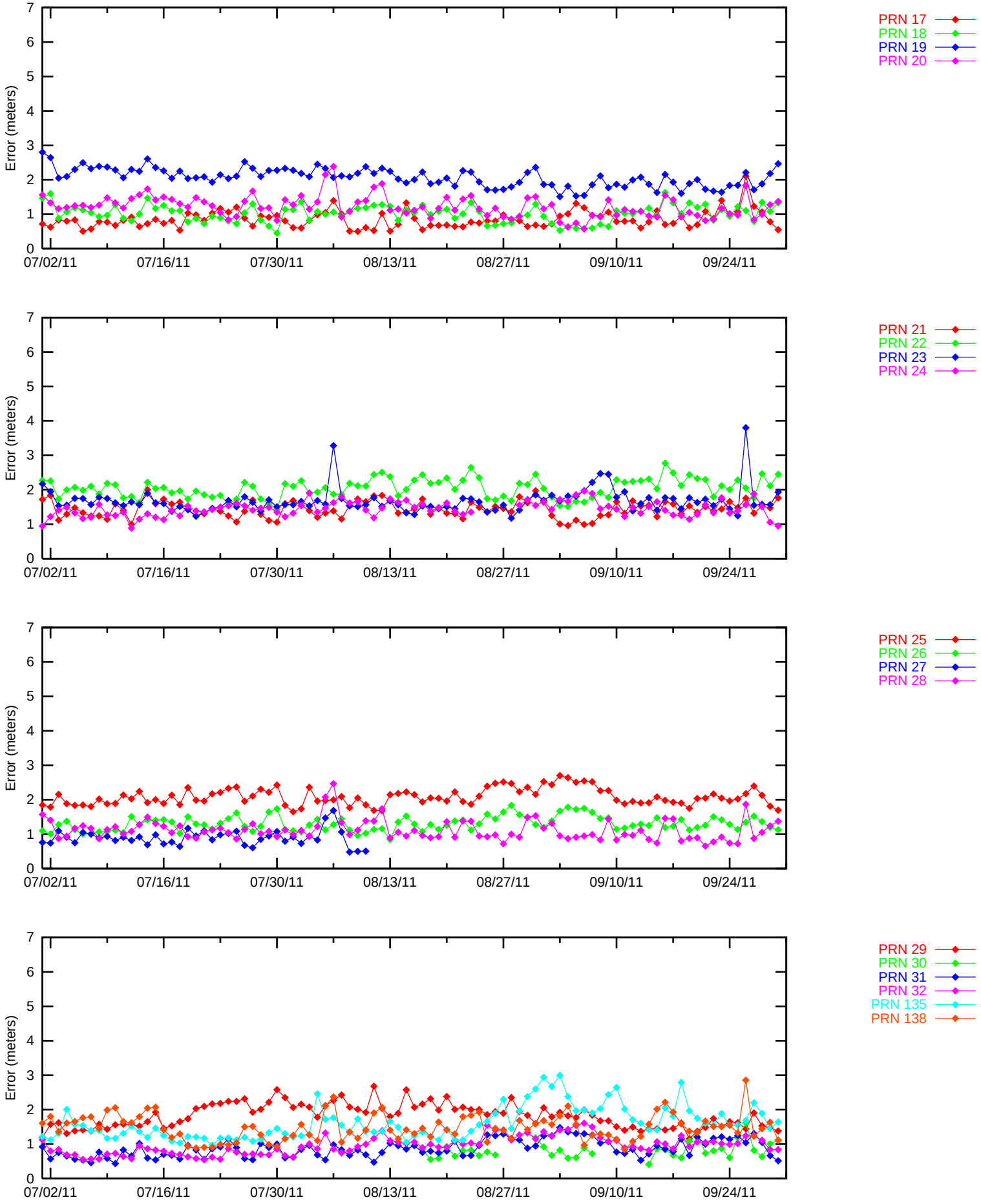


Figure 6-3 95% Ionospheric (PRN 1 - PRN 16) - Washington DC

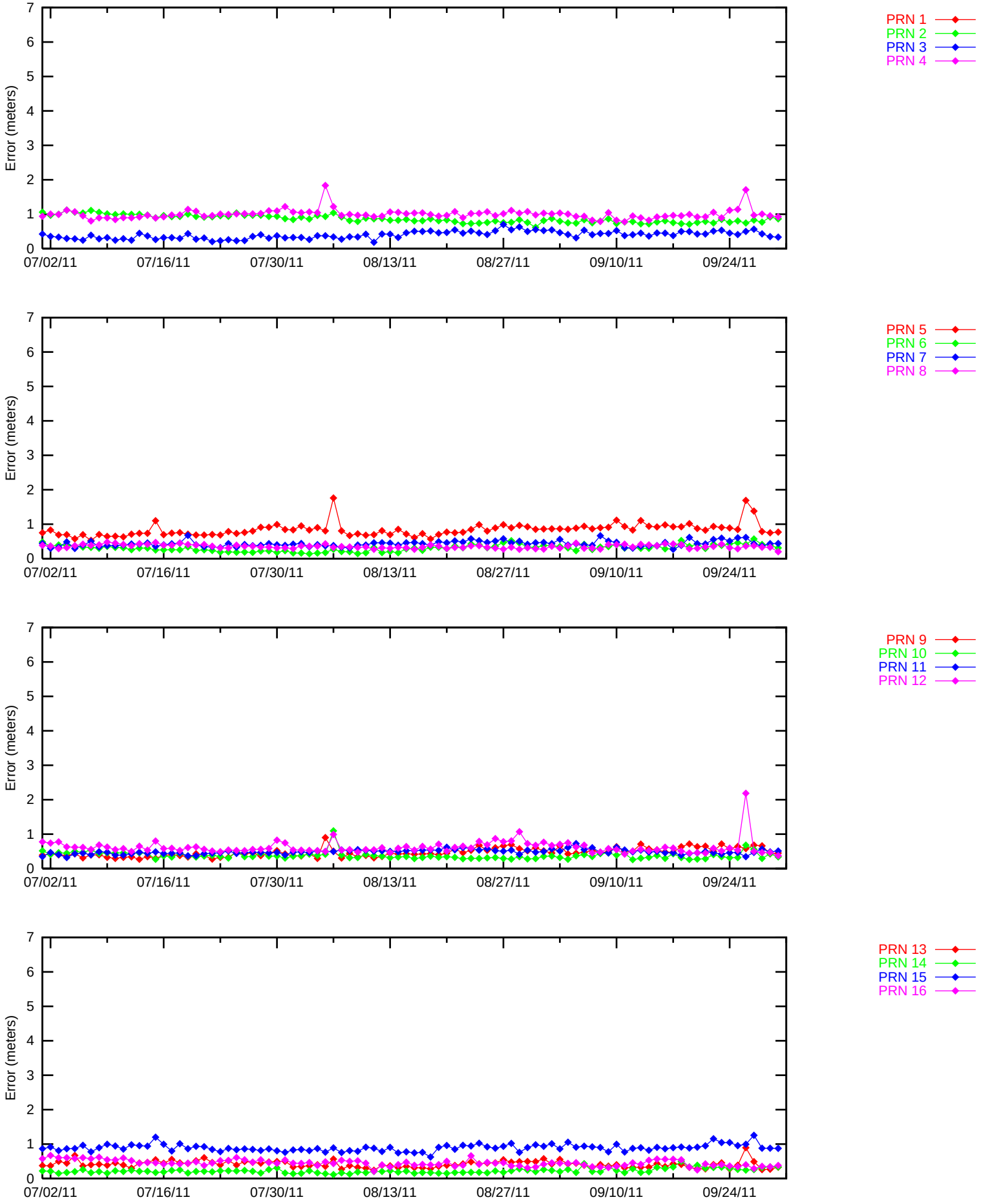
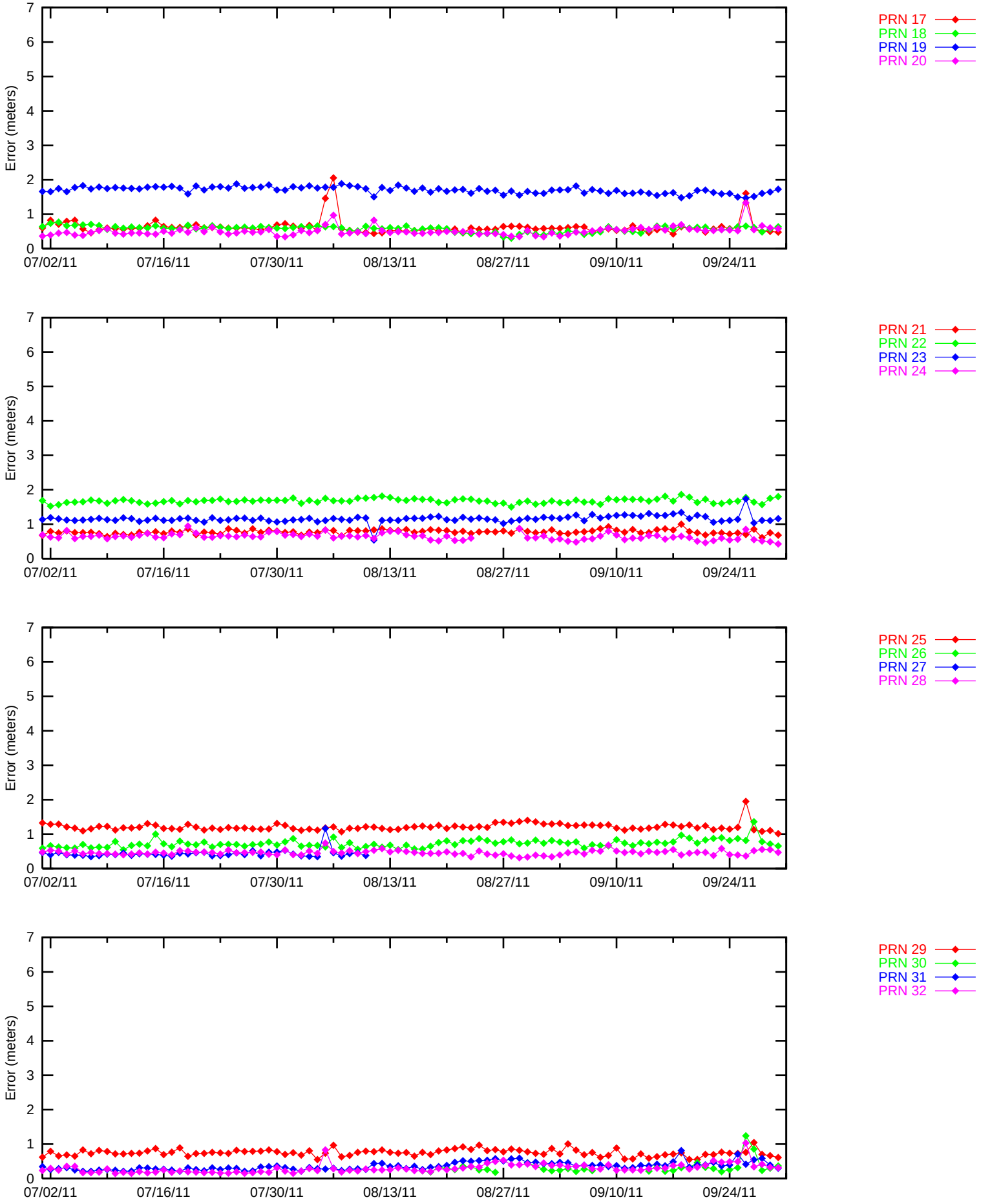


Figure 6-4 95% Ionospheric (PRN 17 - PRN 32) - Washington DC



7.0 GEO RANGING PERFORMANCE

The WAAS GEO navigation messages provide corrections and UDRE values for each satellite. The GEO ranging availability from each GEO navigation message source was evaluated separately to determine the quality of service provided.

Table 7.1 shows the GEO-Ranging performance. Figure 7.1 shows the trend of CRW GEO PA Ranging Availability and Figure 7.2 shows the trend of CRE GEO PA Ranging Availability.

Table 7-1 GEO Ranging Availability

GEO Source	GEO	PA (%)	NPA (%)	Not Monitored (%)	Do Not Use (%)
CRW 135	CRW	97.96	1.578	0.394	0.045
CRW 135	CRE	99.27	0.53	0.18	0.00
CRE 138	CRW	97.86	1.58	0.50	0.05
CRE 138	CRE	99.26	0.53	0.19	0.00
AMR 133	CRW	97.61	1.58	0.74	0.05
AMR 133	CRE	99.19	0.53	0.26	0.00

Figure 7-1 Daily PA CRW GEO Ranging Availability Trend

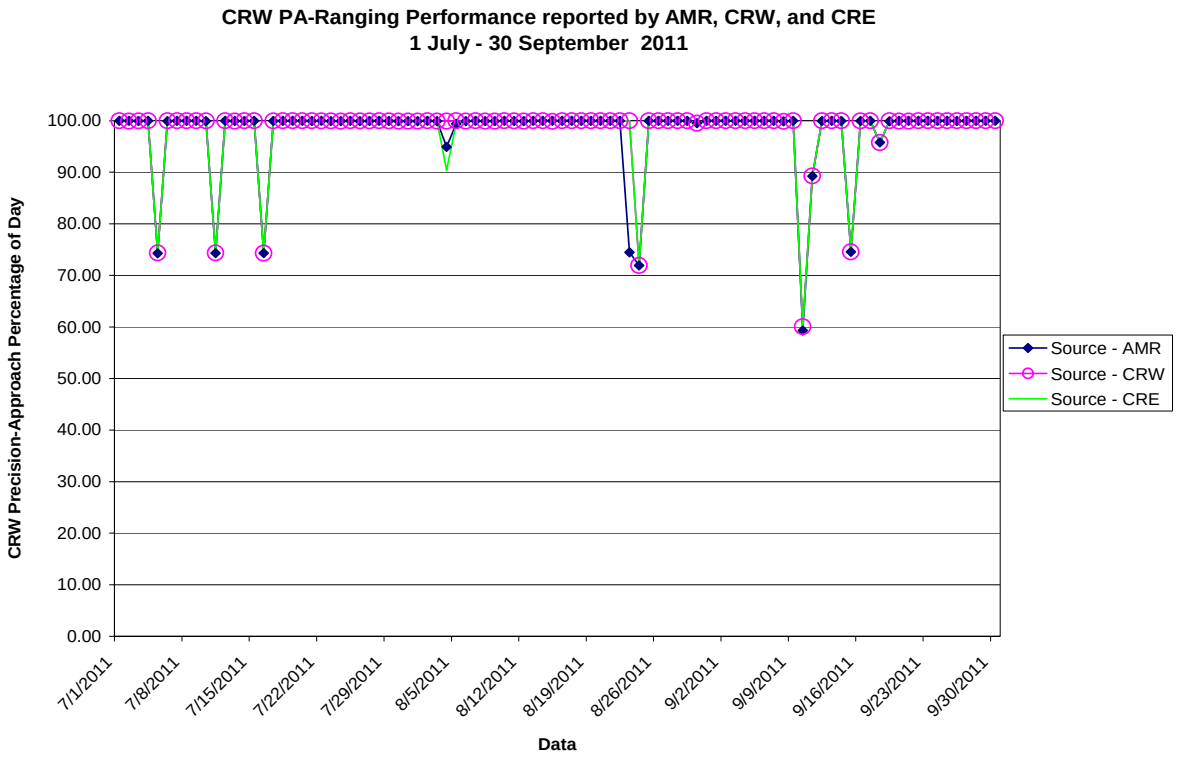
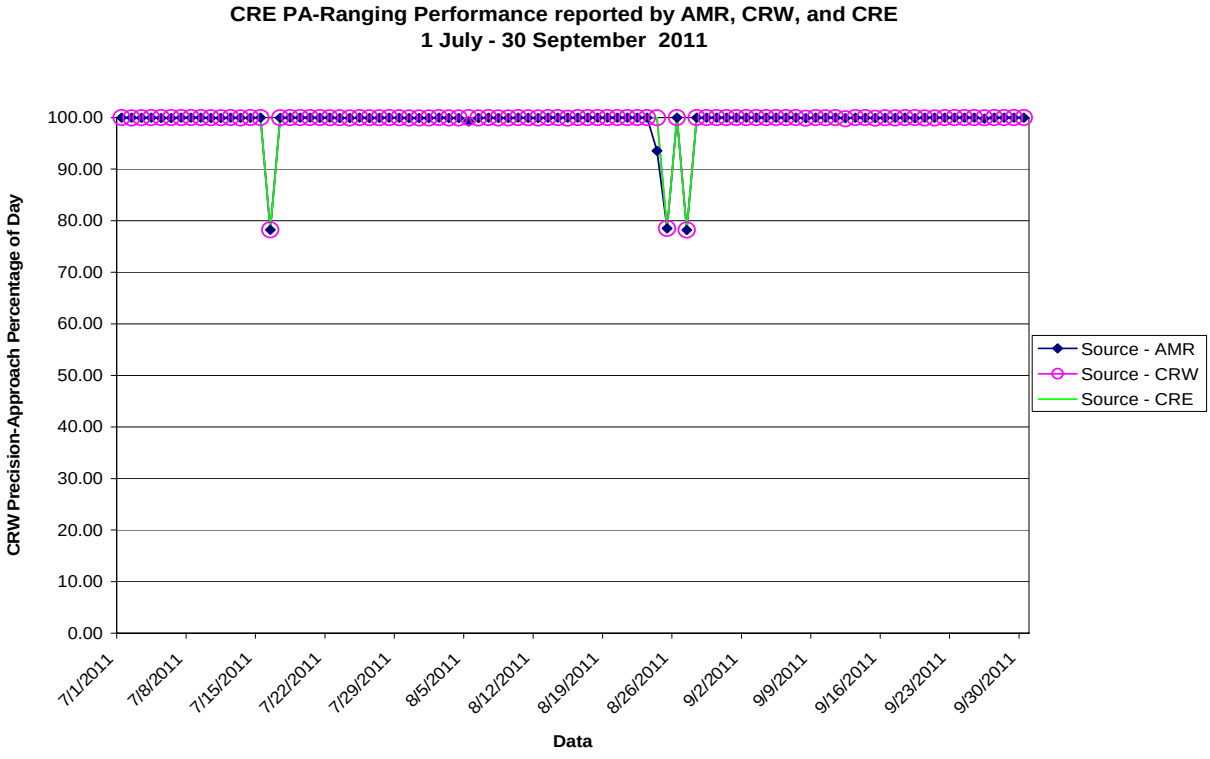


Figure 7-2 Daily PA CRE GEO Ranging Availability Trend



8.0 WAAS AIRPORT AVAILABILITY

The WAAS airport availability evaluation determines the number and length LPV service outages at selected airports from the transmitted WAAS navigation message. The navigation messages transmitted from all GEO satellites are processed simultaneously, and WAAS protection levels (VPL and HPL) are computed at each airport once a second in accordance with the RTCA DO-229D. Once the protection levels have been produced at each airport an LPV service evaluation is conducted to identify outages in service (i.e. when protection levels exceed alert limits). WAAS LPV service is available for a user when the vertical protection level (VPL) is less than or equal to vertical alert limit (VAL) of 50 meters and the horizontal protection level (HPL) is less than or equal to horizontal alert limit (HAL) of 40 meters. If both conditions are met at a specified airport location then WAAS LPV service is available at that airport. If either one of the conditions are not met at a specified airport location then WAAS LPV service at that airport is unavailable and an outage in LPV service is recorded with its duration. When the LPV service becomes unavailable it is not considered available again until protection levels are below or equal to alert limits for at least 15 minutes. Although this will reduce LPV service availability minimally, it substantially reduces the number of service outages and prevents excessive switching in and out of service availability. When computing LPV service availability, an extra two minutes of outage time was prefixed to each outage. The number of WAAS LPV service outages and the availability at selected airports for this evaluation period of WAAS operation is presented in Table 8-1. Figure 8-1 to 8-4 provide the graphical representation of the LPV and LPV 200 availability and outage counts at all airports, including many that do not have published approaches. These results are depicted geographically on an interactive web page at http://www.nstb.tc.faa.gov/AirportOutages/ .

The interactive web page can be accessed by entering the web address into an Internet browser and selecting 2nd Quarter 2011 from the drop-down menu on the upper left corner and clicking "Submit Request". The WAAS LPV airport layer will appear providing color coded availability results as shown in Figure 8.1 and 8.2. Rolling over any airport with the cursor displays the LPV availability and number of LPV outages for the reporting period. The "WAAS Layer" menu in the upper right of the display allows the user to select WAAS LPV 200 availability and the number of outage results as shown in Figure 8.3 and 8.4. The user can review WAAS availability performance for US airports with GPS RNAV instrument approach procedures by selecting "Show all Airports", or limit airports displayed to those with approved LPV approaches as provided in Table 8.1.

Table 8-1 WAAS LPV Outages and Availability

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
BET	BETHEL	AK	LPV	2	0.999347	13	0.998479
9A3	CHUATHBALUK	AK	LPV	3	0.999094	5	0.998724
CLP	CLARKS POINT	AK	LPV	2	0.999509	12	0.999132
CDB	COLD BAY	AK	LPV	6	0.999215	469	0.920577
SCC	DEADHORSE	AK	LPV	2	0.999211	16	0.996781
GAL	EDWARD G. PITKA SR	AK	LPV	3	0.998841	6	0.998475
ELI	ELIM	AK	LPV	3	0.998826	8	0.998007
ENM	EMMONAK	AK	LPV	3	0.998819	16	0.997535
FAI	FAIRBANKS INTL	AK	LPV200	4	0.998902	7	0.998105
GKN	GULKANA	AK	LPV	4	0.999317	7	0.998147
HOM	HOMER	AK	LPV	2	0.999468	5	0.999041
HLA	HUSLIA	AK	LPV	3	0.998936	10	0.998362
ILI	ILIAMNA	AK	LPV	2	0.999415	5	0.999173
KAL	KALTAG	AK	LPV	3	0.998841	6	0.998392
ENA	KENAI MUNI	AK	LPV	2	0.99934	6	0.998781
KTN	KETCHIKAN INTL	AK	LPV	5	0.997252	3	0.996694
AKN	KING SALMON	AK	LPV	2	0.999472	6	0.99903
KYU	KOYUKUK	AK	LPV	3	0.998841	6	0.998438
KWT	KWETHLUK	AK	LPV	3	0.999343	11	0.998487
WNA	NAPAKIAK	AK	LPV	2	0.999347	14	0.998581
AQH	QUINHAGAK	AK	LPV	2	0.999453	31	0.998234

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
OTZ	RALPH WIEN MEMORIAL	AK	LPV200	15	0.997909	185	0.986051
D76	ROBERT/BOB/CURTIS MEMORIAL	AK	LPV	13	0.998294	142	0.98987
RBY	RUBY	AK	LPV	3	0.999007	7	0.998483
WLK	SELAWIK	AK	LPV	3	0.99866	11	0.998019
SHX	SHAGELUK	AK	LPV	3	0.998909	5	0.998615
2C7	SHAKTOOLIK	AK	LPV	3	0.998841	6	0.998245
KSM	ST MARY'S	AK	LPV	3	0.99897	13	0.998087
SMK	ST MICHAEL	AK	LPV	3	0.998841	8	0.998173
ANC	TED STEVENS ANCHORAGE INTL	AK	LPV	2	0.999241	6	0.998615
BRW	WILEY POST-WILL ROGERS MEMORIA	AK	LPV	18	0.997475	317	0.965248
YAK	YAKUTAT	AK	LPV200	5	0.998947	5	0.997777
8A0	ALBERTVILLE RGNL-THOMAS J BRUM	AL	LPV	0	1	1	0.999947
ANB	ANNISTON METROPOLITAN	AL	LPV	0	1	1	0.999951
AUO	AUBURN UNIVERSITY RGNL	AL	LPV	0	1	1	0.999951
EKY	BESSEMER	AL	LPV	0	1	1	0.999921
BHM	BIRMINGHAM-SHUTTLESWORTH INTL	AL	LPV200	0	1	1	0.999925
12J	BREWTON MUNI	AL	LPV	0	1	1	0.999958
OZR	CAIRNS AAF (FORT RUCKER)	AL	LPV	0	1	1	0.999955
SEM	CRAIG FIELD	AL	LPV	0	1	1	0.999936
DHN	DOTHAN RGNL	AL	LPV	0	1	1	0.999958
EDN	ENTERPRISE MUNI	AL	LPV	0	1	1	0.999951
5R4	FOLEY MUNI	AL	LPV	0	1	1	0.99997
3A1	FOLSOM FIELD	AL	LPV	0	1	1	0.999932
4R4	H L SONNY CALLAHAN	AL	LPV	0	1	1	0.99997
HSV	HUNTSVILLE INTL-CARL T JONES F	AL	LPV200	0	1	2	0.999928
4A9	ISBELL FIELD	AL	LPV	0	1	1	0.999958
JKA	JACK EDWARDS	AL	LPV	0	1	1	0.999974
MDQ	MADISON COUNTY EXECUTIVE/TOM S	AL	LPV	0	1	2	0.999932
HAB	MARION COUNTY-RANKIN FITE	AL	LPV	0	1	1	0.999913
SCD	MERKEL FIELD SYLACAUGA MUNI	AL	LPV	0	1	1	0.999936
BFM	MOBILE DOWNTOWN	AL	LPV200	0	1	2	0.999966
MOB	MOBILE RGNL	AL	LPV	0	1	2	0.999958
MGM	MONTGOMERY RGNL (DANNELLY FIEL	AL	LPV	0	1	1	0.999928
GAD	NORTHEAST ALABAMA RGNL	AL	LPV	0	1	1	0.999947
MSL	NORTHWEST ALABAMA RGNL	AL	LPV200	0	1	2	0.999913
DCU	PRYOR FIELD RGNL	AL	LPV200	0	1	2	0.999928
EET	SHELBY COUNTY	AL	LPV	0	1	1	0.999925
79J	SOUTH ALABAMA RGNL AT BILL BEN	AL	LPV	0	1	1	0.999951
PLR	ST CLAIR COUNTY	AL	LPV	0	1	1	0.99994
2R5	ST ELMO	AL	LPV	0	1	2	0.999958
ASN	TALLADEGA MUNI	AL	LPV	0	1	1	0.999943
TOI	TROY MUNI	AL	LPV	0	1	1	0.99994
TCL	TUSCALOOSA RGNL	AL	LPV	0	1	1	0.999928
LIT	ADAMS FIELD	AR	LPV200	0	1	1	0.999962
BYH	ARKANSAS INTL	AR	LPV200	2	0.99977	4	0.999475
BVX	BATESVILLE RGNL	AR	LPV	2	0.999823	2	0.999589
HRO	BOONE COUNTY	AR	LPV	2	0.999468	2	0.999373
4M3	CARLISLE MUNI	AR	LPV	0	1	1	0.99997
FSM	FORT SMITH RGNL	AR	LPV200	0	1	2	0.999657
JBR	JONESBORO MUNI	AR	LPV	2	0.999766	4	0.999551
M19	NEWPORT MUNI	AR	LPV	2	0.999868	2	0.999607
ORK	NORTH LITTLE ROCK MUNI	AR	LPV	0	1	1	0.999958

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
XNA	NORTHWEST ARKANSAS RGNL	AR	LPV	2	0.999385	2	0.999279
BPK	OZARK RGNL	AR	LPV	2	0.999475	2	0.999392
ROG	ROGERS MUNI-CARTER FIELD	AR	LPV	2	0.99937	2	0.999283
RUE	RUSSELLVILLE RGNL	AR	LPV	0	1	2	0.999645
SUZ	SALINE COUNTY RGNL	AR	LPV	0	1	1	0.999958
SRC	SEARCY MUNI	AR	LPV	0	1	2	0.99966
SLG	SMITH FIELD	AR	LPV	2	0.999555	2	0.999411
ELD	SOUTH ARKANSAS RGNL AT GOODWIN	AR	LPV	0	1	1	0.999996
ASG	SPRINGDALE MUNI	AR	LPV	2	0.999536	2	0.999415
SGT	STUTTGART MUNI	AR	LPV	0	1	2	0.999977
TXK	TEXARKANA RGNL-WEBB FIELD	AR	LPV	0	1	1	0.999992
AWM	WEST MEMPHIS MUNI	AR	LPV200	0	1	4	0.999649
P33	COCHISE COUNTY	AZ	LPV	0	1	62	0.998109
PRC	ERNEST A. LOVE FIELD	AZ	LPV	0	1	0	1
FLG	FLAGSTAFF PULLIAM	AZ	LPV	0	1	0	1
GEU	GLENDALE MUNI	AZ	LPV	0	1	21	0.999574
IGM	KINGMAN	AZ	LPV	0	1	2	0.999819
HII	LAKE HAVASU CITY	AZ	LPV	0	1	4	0.999645
IFP	LAUGHLIN/BULLHEAD INTL	AZ	LPV	0	1	3	0.999694
PGA	PAGE MUNI	AZ	LPV	0	1	0	1
DVT	PHOENIX DEER VALLEY	AZ	LPV	0	1	16	0.999653
PHX	PHOENIX SKY HARBOR INTL	AZ	LPV	0	1	49	0.998407
IWA	PHOENIX-MESA GATEWAY	AZ	LPV	0	1	72	0.996324
SAD	SAFFORD RGNL	AZ	LPV	0	1	51	0.999072
SOW	SHOW LOW RGNL	AZ	LPV	0	1	16	0.999826
TUS	TUCSON INTL	AZ	LPV	0	1	72	0.996014
APV	APPLE VALLEY	CA	LPV	1	0.999921	9	0.999019
ACV	ARCATA	CA	LPV	1	0.998475	113	0.98245
AUN	AUBURN MUNI	CA	LPV	2	0.998781	81	0.994127
DAG	BARSTOW-DAGGETT	CA	LPV	1	0.99997	7	0.999256
C83	BYRON	CA	LPV	2	0.998641	100	0.988149
CMA	CAMARILLO	CA	LPV	2	0.999532	73	0.996671
MER	CASTLE	CA	LPV200	2	0.998875	74	0.995263
STS	CHARLES M. SCHULZ - SONOMA COU	CA	LPV	4	0.998539	112	0.98316
CIC	CHICO MUNI	CA	LPV	2	0.998811	99	0.991119
CNO	CHINO	CA	LPV	1	0.999736	8	0.998513
FAT	FRESNO YOSEMITE INTL	CA	LPV	2	0.998939	30	0.997936
WJF	GENERAL WM J FOX AIRFIELD	CA	LPV	2	0.999626	8	0.998075
HAF	HALF MOON BAY	CA	LPV	16	0.998487	124	0.983405
HWD	HAYWARD EXECUTIVE	CA	LPV	3	0.998554	107	0.98556
CVH	HOLLISTER MUNI	CA	LPV	2	0.998649	97	0.988768
CEC	JACK MC NAMARA FIELD	CA	LPV	2	0.998622	113	0.986658
SNA	JOHN WAYNE AIRPORT-ORANGE COUN	CA	LPV	1	0.999736	14	0.998211
LHM	LINCOLN RGNL/KARL HARDER FIELD	CA	LPV200	2	0.998788	91	0.991569
LVK	LIVERMORE MUNI	CA	LPV	2	0.998562	104	0.987047
LGB	LONG BEACH /DAUGHERTY FIELD/	CA	LPV	1	0.999736	15	0.997985
LAX	LOS ANGELES INTL	CA	LPV	1	0.999668	23	0.997886
LSN	LOS BANOS MUNI	CA	LPV	2	0.998807	80	0.992176
MAE	MADERA MUNI	CA	LPV	3	0.998936	45	0.997437
CRQ	MC CLELLAN-PALOMAR	CA	LPV	1	0.999736	12	0.99857
BFL	MEADOWS FIELD	CA	LPV200	2	0.998966	16	0.998007
MCE	MERCED RGNL//MACREADY FIELD	CA	LPV	2	0.998879	70	0.995626

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
OAK	METROPOLITAN OAKLAND INTL	CA	LPV	5	0.998539	109	0.985092
MOD	MODESTO CITY-CO-HARRY SHAM FLD	CA	LPV	2	0.99877	77	0.992418
MRY	MONTEREY PENINSULA	CA	LPV	14	0.998562	133	0.985579
MYF	MONTGOMERY FIELD	CA	LPV200	1	0.999592	14	0.998577
APC	NAPA COUNTY	CA	LPV	2	0.998592	107	0.985085
O02	NERVINO	CA	LPV	2	0.998879	32	0.99812
SJC	NORMAN Y. MINETA SAN JOSE INTL	CA	LPV	3	0.998558	111	0.986345
VCB	NUT TREE	CA	LPV	2	0.9986	103	0.986756
ONT	ONTARIO INTL	CA	LPV	1	0.999736	9	0.99857
OXR	OXNARD	CA	LPV	2	0.999532	81	0.996343
28J	PALATKA MUNI - LT. KAY LARKIN	CA	LPV	0	1	0	1
PRB	PASO ROBLES MUNI	CA	LPV200	2	0.998879	93	0.991606
RBL	RED BLUFF MUNI	CA	LPV	2	0.998721	105	0.990259
RDD	REDDING MUNI	CA	LPV	2	0.998664	99	0.991735
RHV	REID-HILLVIEW OF SANTA CLARA C	CA	LPV	2	0.998641	108	0.986866
RAL	RIVERSIDE MUNI	CA	LPV	1	0.999736	9	0.998796
SAC	SACRAMENTO EXECUTIVE	CA	LPV200	1	0.99866	99	0.989693
SMF	SACRAMENTO INTL	CA	LPV	1	0.998592	100	0.989274
MHR	SACRAMENTO MATHER	CA	LPV	1	0.998664	86	0.991293
SNS	SALINAS MUNI	CA	LPV200	4	0.998792	124	0.987341
SFO	SAN FRANCISCO INTL	CA	LPV	12	0.99849	117	0.984303
SBA	SANTA BARBARA MUNI	CA	LPV	2	0.999026	98	0.993331
MIT	SHAFTER-MINTER FIELD	CA	LPV	2	0.998966	20	0.997954
VCV	SOUTHERN CALIFORNIA LOGISTICS	CA	LPV	1	0.999917	8	0.998796
SCK	STOCKTON METROPOLITAN	CA	LPV	2	0.998649	87	0.990678
TCY	TRACY MUNI	CA	LPV	2	0.998649	94	0.989123
DWA	YOLO COUNTY	CA	LPV	1	0.998626	102	0.987598
MYV	YUBA COUNTY	CA	LPV200	2	0.998747	101	0.990629
APA	CENTENNIAL	CO	LPV	2	0.999796	7	0.998743
COS	CITY OF COLORADO SPRINGS MUNI	CO	LPV200	2	0.999955	5	0.99883
CEZ	CORTEZ MUNI	CO	LPV	0	1	0	1
DEN	DENVER INTL	CO	LPV200	3	0.999698	7	0.998683
DRO	DURANGO-LA PLATA COUNTY	CO	LPV200	0	1	3	0.999785
FNL	FORT COLLINS-LOVELAND MUNI	CO	LPV200	1	0.999747	5	0.998604
FTG	FRONT RANGE	CO	LPV	4	0.999547	7	0.998698
RIL	GARFIELD COUNTY RGNL	CO	LPV	0	1	2	0.999857
GJT	GRAND JUNCTION REGIONAL	CO	LPV200	0	1	2	0.999966
GXY	GREELEY-WELD COUNTY	CO	LPV	2	0.9994	5	0.998592
ITR	KIT CARSON COUNTY	CO	LPV	3	0.999302	6	0.998728
LHX	LA JUNTA MUNI	CO	LPV	2	0.999781	3	0.998887
LAA	LAMAR MUNI	CO	LPV	3	0.999683	3	0.998834
MTJ	MONTROSE RGNL	CO	LPV	0	1	2	0.999943
PUB	PUEBLO MEMORIAL	CO	LPV200	1	0.999955	3	0.998875
BJC	ROCKY MOUNTAIN METROPOLITAN	CO	LPV200	1	0.999796	3	0.998804
ALS	SAN LUIS VALLEY RGNL/BERGMAN F	CO	LPV200	0	1	3	0.999487
HDN	YAMPA VALLEY	CO	LPV	1	0.999853	7	0.999136
BDL	BRADLEY INTL	CT	LPV200	3	0.996705	5	0.996022
GON	GROTON-NEW LONDON	CT	LPV	3	0.996671	4	0.996222
HVN	TWEED-NEW HAVEN	CT	LPV	3	0.996705	4	0.996105
OXC	WATERBURY-OXFORD	CT	LPV	3	0.996705	4	0.99612
DCA	RONALD REAGAN WASHINGTON NATIO	DC	LPV	5	0.99763	5	0.997034
ILG	NEW CASTLE	DE	LPV	4	0.997396	4	0.997007

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
EVY	SUMMIT	DE	LPV	4	0.997369	4	0.99692
GED	SUSSEX COUNTY	DE	LPV	4	0.997479	4	0.997143
AAF	APALACHICOLA REGIONAL	FL	LPV	0	1	0	1
AVO	AVON PARK EXECUTIVE	FL	LPV	0	1	0	1
BOW	BARTOW MUNI	FL	LPV	0	1	0	1
CEW	BOB SIKES	FL	LPV	0	1	1	0.999962
BCT	BOCA RATON	FL	LPV	0	1	1	0.999996
VQQ	CECIL FIELD	FL	LPV	0	1	0	1
PGD	CHARLOTTE COUNTY	FL	LPV	0	1	2	0.999985
CRG	CRAIG MUNI	FL	LPV200	0	1	0	1
CTY	CROSS CITY	FL	LPV	0	1	0	1
DAB	DAYTONA BEACH INTL	FL	LPV	0	1	0	1
DED	DELAND MUNI-SIDNEY H TAYLOR FI	FL	LPV	0	1	0	1
FHB	FERNANDINA BEACH MUNI	FL	LPV	0	1	0	1
XFL	FLAGLER COUNTY	FL	LPV	0	1	0	1
FXE	FORT LAUDERDALE EXECUTIVE	FL	LPV200	0	1	4	0.999977
FLL	FORT LAUDERDALE/HOLLYWOOD INTL	FL	LPV	0	1	3	0.999966
GNV	GAINESVILLE RGNL	FL	LPV	0	1	0	1
BKV	HERNANDO COUNTY	FL	LPV	0	1	0	1
IMM	IMMOKALEE RGNL	FL	LPV	0	1	3	0.999977
JAX	JACKSONVILLE INTL	FL	LPV	0	1	0	1
TMB	KENDALL-TAMIAMI EXECUTIVE	FL	LPV200	0	1	5	0.999947
EYW	KEY WEST INTL	FL	LPV	0	1	60	0.999132
ISM	KISSIMMEE GATEWAY	FL	LPV200	0	1	0	1
X14	LA BELLE MUNI	FL	LPV	0	1	1	0.999989
LCQ	LAKE CITY MUNI	FL	LPV	0	1	0	1
LAL	LAKELAND LINDER RGNL	FL	LPV200	0	1	0	1
LEE	LEESBURG INTL	FL	LPV	0	1	0	1
MKY	MARCO ISLAND	FL	LPV	0	1	13	0.999909
MLB	MELBOURNE INTL	FL	LPV	0	1	0	1
COI	MERRITT ISLAND	FL	LPV	0	1	0	1
MIA	MIAMI INTL	FL	LPV	0	1	4	0.999955
APF	NAPLES MUNI	FL	LPV	0	1	11	0.999913
EVB	NEW SMYRNA BEACH MUNI	FL	LPV	0	1	0	1
F45	NORTH PALM BEACH COUNTY GENERA	FL	LPV	0	1	0	1
ECP	NORTHWEST FLORIDA BEACHES INTL	FL	LPV200	0	1	1	0.999985
OCF	OCALA INTL-JIM TAYLOR FIELD	FL	LPV200	0	1	0	1
OBE	OKEECHOBEE COUNTY	FL	LPV	0	1	0	1
MCO	ORLANDO INTL	FL	LPV200	0	1	0	1
SFB	ORLANDO SANFORD INTL	FL	LPV200	0	1	0	1
PHK	PALM BEACH CO GLADES	FL	LPV	0	1	0	1
PBI	PALM BEACH INTL	FL	LPV	0	1	0	1
PNS	PENSACOLA GULF COAST RGNL	FL	LPV	0	1	1	0.99997
40J	PERRY-FOLEY	FL	LPV	0	1	0	1
TPF	PETER O KNIGHT	FL	LP	0	1	0	1
PMP	POMPANO BEACH AIRPARK	FL	LPV	0	1	3	0.999985
SRQ	SARASOTA/BRADENTON INTL	FL	LPV200	0	1	0	1
SEF	SEBRING RGNL	FL	LPV	0	1	0	1
RSW	SOUTHWEST FLORIDA INTL	FL	LPV	0	1	9	0.999947
TIX	SPACE COAST RGNL	FL	LPV200	0	1	0	1
SGJ	ST AUGUSTINE	FL	LPV	0	1	0	1
FPR	ST LUCIE COUNTY INTL	FL	LPV	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
PIE	ST PETERSBURG-CLEARWATER INTL	FL	LPV200	0	1	0	1
TLH	TALLAHASSEE RGNL	FL	LPV	0	1	0	1
VDF	TAMPA EXECUTIVE	FL	LPV	0	1	0	1
TPA	TAMPA INTL	FL	LPV200	0	1	0	1
MTH	THE FLORIDA KEYS MARATHON	FL	LPV	0	1	17	0.999634
VRB	VERO BEACH MUNI	FL	LPV	0	1	0	1
GIF	WINTER HAVEN'S GILBERT	FL	LPV	0	1	0	1
SUA	WITHAM FIELD	FL	LPV	0	1	0	1
ZPH	ZEPHYRHILLS MUNI	FL	LPV	0	1	0	1
AHN	ATHENS/BEN EPPS	GA	LPV	0	1	1	0.999932
FFC	ATLANTA RGNL FALCON FIELD	GA	LPV200	0	1	1	0.99997
AGS	AUGUSTA RGNL AT BUSH FIELD	GA	LPV	0	1	2	0.999902
MLJ	BALDWIN COUNTY	GA	LPV	0	1	2	0.999974
WDR	BARROW COUNTY	GA	LPV	0	1	2	0.999936
BQK	BRUNSWICK GOLDEN ISLES	GA	LPV200	0	1	0	1
VPC	CARTERSVILLE	GA	LPV	0	1	2	0.999962
47A	CHEROKEE COUNTY	GA	LPV	0	1	2	0.999932
CWV	CLAXTON-EVANS COUNTY	GA	LPV	0	1	1	0.999977
RYY	COBB COUNTY-MC COLLUM FIELD	GA	LPV200	0	1	2	0.999958
48A	COCHRAN	GA	LPV	0	1	1	0.999992
CSG	COLUMBUS METROPOLITAN	GA	LPV	0	1	1	0.999958
15J	COOK COUNTY	GA	LPV	0	1	1	0.999992
9A1	COVINGTON MUNI	GA	LPV	0	1	2	0.999962
CKF	CRISP COUNTY-CORDELE	GA	LPV	0	1	1	0.999981
DNN	DALTON MUNI	GA	LPV	0	1	3	0.999902
BGE	DECATUR COUNTY INDUSTRIAL AIR	GA	LPV200	0	1	1	0.999981
BIJ	EARLY COUNTY	GA	LPV	0	1	1	0.999962
SBO	EMANUEL COUNTY	GA	LPV	0	1	1	0.999977
18A	FRANKLIN COUNTY	GA	LPV	0	1	1	0.999902
FTY	FULTON COUNTY AIRPORT-BROWN FI	GA	LPV	0	1	2	0.99997
3J7	GREENE COUNTY RGNL	GA	LPV	0	1	1	0.999947
PIM	HARRIS COUNTY	GA	LPV	0	1	1	0.999962
ATL	HARTSFIELD - JACKSON ATLANTA I	GA	LPV200	0	1	2	0.999974
EZM	HEART OF GEORGIA RGNL	GA	LPV	0	1	1	0.999992
TMA	HENRY TIFT MYERS	GA	LPV	0	1	1	0.999981
HOE	HOMERVILLE	GA	LPV	0	1	0	1
19A	JACKSON COUNTY	GA	LPV	0	1	2	0.999925
JES	JESUP-WAYNE COUNTY	GA	LPV	0	1	0	1
LGC	LAGRANGE-CALLAWAY	GA	LPV200	0	1	1	0.999958
GVL	LEE GILMER MEMORIAL	GA	LPV	0	1	2	0.999921
MCN	MIDDLE GEORGIA RGNL	GA	LPV	0	1	1	0.999989
2J5	MILLEN	GA	LPV	0	1	2	0.999936
MGR	MOULTRIE MUNI	GA	LPV	0	1	1	0.999989
CCO	NEWNAN COWETA COUNTY	GA	LPV	0	1	1	0.99997
PUJ	PAULDING NORTHWEST ATLANTA	GA	LPV200	0	1	1	0.99997
PXE	PERRY-HOUSTON COUNTY	GA	LPV	0	1	1	0.999985
JZP	PICKENS COUNTY	GA	LPV	0	1	3	0.999917
JYL	PLANTATION ARPK	GA	LPV	0	1	2	0.999853
RMG	RICHARD B RUSSELL	GA	LPV	0	1	2	0.999962
SAV	SAVANNAH/HILTON HEAD INTL	GA	LPV200	0	1	1	0.999853
ABY	SOUTHWEST GEORGIA RGNL	GA	LPV200	0	1	1	0.999966
4J6	ST MARYS	GA	LPV	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
TBR	STATESBORO-BULLOCH COUNTY	GA	LPV	0	1	1	0.999958
MQW	TELFAIR-WHEELER	GA	LPV	0	1	1	0.999996
OPN	THOMASTON-UPSON COUNTY	GA	LPV200	0	1	1	0.999977
TVI	THOMASVILLE RGNL	GA	LPV	0	1	1	0.999996
TOC	TOCCOA RG LETOURNEAU FIELD	GA	LPV	0	1	2	0.999883
VLD	VALDOSTA RGNL	GA	LPV	0	1	0	1
VDI	VIDALIA RGNL	GA	LPV	0	1	1	0.999996
IIY	WASHINGTON-WILKES COUNTY	GA	LPV	0	1	1	0.999928
AYS	WAYCROSS-WARE COUNTY	GA	LPV	0	1	0	1
CTJ	WEST GEORGIA RGNL - O V GRAY F	GA	LPV	0	1	1	0.999966
AMW	AMES MUNI	IA	LPV	3	0.996683	4	0.99626
IKV	ANKENY RGNL	IA	LPV	3	0.99672	4	0.996275
TVK	CENTERVILLE MUNI	IA	LPV	6	0.998143	6	0.997056
CKP	CHEROKEE COUNTY RGNL	IA	LPV	3	0.99663	3	0.996339
CWI	CLINTON MUNI	IA	LPV200	4	0.996683	5	0.995947
CBF	COUNCIL BLUFFS MUNI	IA	LPV200	5	0.997445	3	0.996539
DVN	DAVENPORT MUNI	IA	LPV200	4	0.996675	6	0.996101
DNS	DENISON MUNI	IA	LPV	3	0.996698	3	0.996354
DSM	DES MOINES INTL	IA	LPV	5	0.997117	4	0.996388
DBQ	DUBUQUE RGNL	IA	LPV200	3	0.996441	5	0.995954
EST	ESTHERVILLE MUNI	IA	LPV	3	0.996418	3	0.996124
FFL	FAIRFIELD MUNI	IA	LPV	6	0.997845	6	0.99666
FXY	FOREST CITY MUNI	IA	LPV	3	0.996358	4	0.996109
FOD	FORT DODGE RGNL	IA	LPV200	3	0.996599	4	0.996245
GGI	GRINNELL RGNL	IA	LPV	3	0.996675	4	0.996279
IOW	IOWA CITY MUNI	IA	LPV	5	0.996845	5	0.996124
EFW	JEFFERSON MUNI	IA	LPV	3	0.996637	3	0.996301
EOK	KEOKUK MUNI	IA	LPV	6	0.998271	6	0.997158
OXV	KNOXVILLE MUNI	IA	LPV	5	0.997611	5	0.996637
LRJ	LE MARS MUNI	IA	LPV	3	0.996641	3	0.996339
MPZ	MOUNT PLEASANT MUNI	IA	LPV	6	0.997754	7	0.996811
MUT	MUSCATINE MUNI	IA	LPV	7	0.9974	5	0.996282
TNU	NEWTON MUNI	IA	LPV	3	0.996686	4	0.996347
OOA	OSKALOOSA MUNI	IA	LPV	7	0.997766	5	0.996637
OTM	OTTUMWA RGNL	IA	LPV	6	0.997811	5	0.99669
PEA	PELLA MUNI	IA	LPV	7	0.997418	4	0.996384
PRO	PERRY MUNI	IA	LPV	3	0.996667	4	0.996309
ICL	SCHENCK FIELD	IA	LPV	5	0.998253	5	0.99706
SDA	SHENANDOAH MUNI	IA	LPV	5	0.99826	5	0.997049
SUX	SIOUX GATEWAY/COL. BUD DAY FIE	IA	LPV200	3	0.996716	3	0.996415
BRL	SOUTHEAST IOWA RGNL	IA	LPV200	6	0.99797	7	0.996841
SPW	SPENCER MUNI	IA	LPV200	3	0.996482	3	0.996226
SLB	STORM LAKE MUNI	IA	LPV	3	0.996622	3	0.996343
CID	THE EASTERN IOWA	IA	LPV200	3	0.996599	5	0.996011
VTI	VINTON VETERANS MEMORIAL ARPK	IA	LPV	3	0.996539	5	0.996007
AWG	WASHINGTON MUNI	IA	LPV200	7	0.9976	6	0.996494
ALO	WATERLOO RGNL	IA	LPV	3	0.996513	5	0.996041
EBS	WEBSTER CITY MUNI	IA	LPV	3	0.996626	4	0.996241
BOI	BOISE AIR TERMINAL/GOWEN FLD	ID	LPV	4	0.999068	4	0.997973
EUL	CALDWELL INDUSTRIAL	ID	LPV	4	0.998977	4	0.998037
COE	COEUR D'ALENE - PAPPY BOYINGTO	ID	LPV200	2	0.997717	3	0.997147
GNG	GOODING MUNI	ID	LPV	3	0.999151	4	0.998173

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
IDA	IDAHO FALLS RGNL	ID	LPV200	3	0.998328	3	0.998147
JER	JEROME COUNTY	ID	LPV	3	0.999162	4	0.998181
TWF	JOSLIN FIELD - MAGIC VALLEY RG	ID	LPV200	3	0.999204	4	0.998204
LWS	LEWISTON-NEZ PERCE COUNTY	ID	LPV200	3	0.997868	4	0.997222
MYL	MC CALL MUNI	ID	LPV	3	0.998415	2	0.997294
U76	MOUNTAIN HOME MUNI	ID	LPV	4	0.999143	4	0.998034
MAN	NAMPA MUNI	ID	LPV	4	0.998992	4	0.998166
PIH	POCATELLO RGNL	ID	LPV200	4	0.998755	3	0.998222
SPI	ABRAHAM LINCOLN CAPITAL	IL	LPV	4	0.998653	7	0.997698
FEP	ALBERTUS	IL	LPV	3	0.996449	5	0.995916
ARR	AURORA MUNI	IL	LPV	4	0.996796	5	0.99589
BMI	CENTRAL IL RGNL ARPT AT BLOOMI	IL	LPV	5	0.997913	7	0.997135
MDW	CHICAGO MIDWAY INTL	IL	LPV	4	0.996739	4	0.995947
ORD	CHICAGO O'HARE INTL	IL	LPV200	3	0.996539	4	0.995864
RFD	CHICAGO/ROCKFORD INTL	IL	LPV200	3	0.996467	5	0.995901
MTO	COLES COUNTY MEMORIAL	IL	LPV	3	0.998536	5	0.998019
RSV	CRAWFORD CO	IL	LPV	3	0.998566	5	0.998
DKB	DE KALB TAYLOR MUNI	IL	LPV	4	0.996743	5	0.995882
DEC	DECATUR	IL	LPV	3	0.998505	6	0.99769
C73	DIXON MUNI-CHARLES R. WALGREEN	IL	LPV	3	0.996524	5	0.995913
DPA	DUPAGE	IL	LPV200	3	0.996611	4	0.995807
PIA	GENERAL DOWNING - PEORIA INTL	IL	LPV	7	0.997883	8	0.997011
IKK	GREATER KANKAKEE	IL	LPV	5	0.997449	6	0.996316
HSB	HARRISBURG-RALEIGH	IL	LPV	2	0.99906	4	0.998547
IGQ	LANSING MUNI	IL	LPV	6	0.997018	5	0.996067
LOT	LEWIS UNIVERSITY	IL	LPV200	6	0.997083	4	0.995882
3LF	LITCHFIELD MUNI	IL	LPV	3	0.998781	6	0.998219
AJG	MOUNT CARMEL MUNI	IL	LPV	3	0.998671	5	0.998049
3MY	MOUNT HAWLEY AUXILIARY	IL	LPV	6	0.997671	7	0.996826
I63	MOUNT STERLING MUNI	IL	LPV	3	0.998732	8	0.997811
MVN	MOUNT VERNON	IL	LPV	3	0.998815	3	0.998271
C15	PEKIN MUNI	IL	LPV	7	0.998034	7	0.997177
PNT	PONTIAC MUNI	IL	LPV	5	0.997569	9	0.996833
MLI	QUAD CITY INTL	IL	LPV	6	0.997215	5	0.996215
UIN	QUINCY RGNL-BALDWIN FIELD	IL	LPV200	3	0.998781	8	0.997894
BLV	SCOTT AFB/MIDAMERICA	IL	LPV200	2	0.998834	5	0.998449
ALN	ST LOUIS RGNL	IL	LPV	3	0.998807	5	0.998385
CMI	UNIVERSITY OF ILLINOIS-WILLARD	IL	LPV200	4	0.998324	6	0.997415
DNV	VERMILION REGIONAL	IL	LPV	5	0.998102	6	0.997328
UGN	WAUKEGAN RGNL	IL	LPV	3	0.996418	4	0.99586
SQI	WHITESIDE CO ARPT-JOS H BITTOR	IL	LPV	5	0.996818	5	0.995916
MWA	WILLIAMSON COUNTY RGNL	IL	LPV	2	0.998977	3	0.998645
AID	ANDERSON MUNI-DARLINGTON FIELD	IN	LPV	4	0.997758	5	0.997241
BAK	COLUMBUS MUNI	IN	LPV	2	0.998287	4	0.9976
GWB	DE KALB COUNTY	IN	LPV	5	0.997026	7	0.996324
MIE	DELAWARE COUNTY RGNL	IN	LPV	4	0.997426	5	0.996924
EYE	EAGLE CREEK AIRPARK	IN	LPV	3	0.997917	5	0.997437
EKM	ELKHART MUNI	IN	LPV	6	0.996988	4	0.99592
EVV	EVANSVILLE RGNL	IN	LPV200	2	0.998868	3	0.998226
FWA	FORT WAYNE INTL	IN	LPV200	6	0.997252	7	0.996441
SER	FREEMAN MUNI	IN	LPV	2	0.998328	4	0.997619
FRH	FRENCH LICK MUNI	IN	LPV	2	0.998422	5	0.99786

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
RCR	FULTON COUNTY	IN	LPV	6	0.997301	7	0.996467
GSH	GOSHEN MUNI	IN	LPV	5	0.997037	6	0.996154
HFY	GREENWOOD MUNI	IN	LPV	3	0.997917	5	0.997468
HNB	HUNTINGBURG	IN	LPV	3	0.998592	5	0.998094
TYQ	INDIANAPOLIS EXECUTIVE	IN	LPV	3	0.99789	5	0.997294
IND	INDIANAPOLIS INTL	IN	LPV	3	0.997932	5	0.99746
OKK	KOKOMO MUNI	IN	LPV	5	0.997385	7	0.996905
GGP	LOGANSPORT/CASS COUNTY	IN	LPV	5	0.997358	7	0.996588
IMS	MADISON MUNI	IN	LPV	2	0.998339	4	0.997569
MZZ	MARION MUNI	IN	LPV	5	0.997332	7	0.996849
CEV	METTEL FIELD	IN	LPV	3	0.997732	5	0.997301
BMG	MONROE COUNTY	IN	LPV200	2	0.998347	4	0.997694
MQJ	MOUNT COMFORT	IN	LPV	3	0.997841	5	0.997381
OVO	NORTH VERNON	IN	LPV	2	0.998321	4	0.997577
VPZ	PORTER COUNTY MUNI	IN	LPV	6	0.997283	6	0.996192
LAF	PURDUE UNIVERSITY	IN	LPV	5	0.997573	7	0.997026
4I7	PUTNAM COUNTY	IN	LPV	3	0.998158	5	0.997577
I22	RANDOLPH COUNTY	IN	LPV	5	0.997547	5	0.996924
RID	RICHMOND MUNI	IN	LPV200	3	0.997717	5	0.997275
GEZ	SHELBYVILLE MUNI	IN	LPV	3	0.997875	5	0.997437
SMD	SMITH FIELD	IN	LPV	5	0.997215	7	0.996426
SBN	SOUTH BEND RGNL	IN	LPV	6	0.997003	5	0.996075
OXI	STARKE COUNTY	IN	LPV	6	0.997211	7	0.996328
HUF	TERRE HAUTE INTL-HULMAN FIELD	IN	LPV	2	0.998381	5	0.997864
ASW	WARSAW MUNI	IN	LPV	6	0.997226	7	0.996411
PTS	ATKINSON MUNI	KS	LPV	2	0.999147	2	0.999068
ADT	ATWOOD-RAWLINS COUNTY CITY-COU	KS	LPV	3	0.999245	7	0.998332
AAO	COLONEL JAMES JABARA	KS	LPV	2	0.999253	3	0.998887
DDC	DODGE CITY RGNL	KS	LPV	1	0.999464	3	0.998924
EHA	ELKHART-MORTON COUNTY	KS	LPV	2	0.99986	3	0.99929
EMP	EMPORIA MUNI	KS	LPV	2	0.999106	3	0.998649
FOE	FORBES FIELD	KS	LPV	3	0.998898	3	0.998694
FSK	FORT SCOTT MUNI	KS	LPV	2	0.999117	2	0.998992
GCK	GARDEN CITY RGNL	KS	LPV	1	0.999457	3	0.998864
GBD	GREAT BEND MUNI	KS	LPV200	1	0.999426	4	0.9986
HYS	HAYS RGNL	KS	LPV200	2	0.999343	3	0.998426
HQG	HUGOTON MUNI	KS	LPV	2	0.999789	3	0.999268
HUT	HUTCHINSON MUNI	KS	LPV	2	0.999317	3	0.998841
IDP	INDEPENDENCE MUNI	KS	LPV	2	0.999207	2	0.999083
OJC	JOHNSON COUNTY EXECUTIVE	KS	LPV	2	0.998947	3	0.998645
LWC	LAWRENCE MUNI	KS	LPV200	3	0.998894	3	0.998717
LBL	LIBERAL MID-AMERICA RGNL	KS	LPV	2	0.999777	4	0.999336
MHK	MANHATTAN RGNL	KS	LPV200	3	0.998853	3	0.998668
MYZ	MARYSVILLE MUNI	KS	LPV	4	0.998721	5	0.998411
MPR	MC PHERSON	KS	LPV	2	0.999268	3	0.998747
IXD	NEW CENTURY AIRCENTER	KS	LPV	2	0.998947	3	0.998634
EWK	NEWTON-CITY-COUNTY	KS	LPV	2	0.999215	3	0.998751
NRN	NORTON MUNI	KS	LPV	3	0.999117	4	0.998317
OEL	OAKLEY MUNI	KS	LPV	3	0.999309	3	0.998626
PTT	PRATT RGNL	KS	LPV	1	0.999468	4	0.998973
GLD	RENNER FLD /GOODLAND MUNI/	KS	LPV200	3	0.999309	6	0.998592
RSL	RUSSELL MUNI	KS	LPV	3	0.999219	3	0.998377

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
SLN	SALINA MUNI	KS	LPV	3	0.999189	3	0.998619
TQK	SCOTT CITY MUNI	KS	LPV	2	0.999415	3	0.9988
CBK	SHALZ FIELD	KS	LPV	2	0.999272	6	0.998502
3K3	SYRACUSE-HAMILTON COUNTY MUNI	KS	LPV	2	0.999679	3	0.998841
PPF	TRI-CITY	KS	LPV	2	0.999173	2	0.999079
ULS	ULYSSES	KS	LPV	2	0.999706	3	0.998909
EGT	WELLINGTON MUNI	KS	LPV	2	0.999324	2	0.999087
ICT	WICHITA MID-CONTINENT	KS	LPV200	2	0.999306	3	0.998932
EKX	ADDINGTON FIELD	KY	LPV	3	0.99917	4	0.997917
PAH	BARKLEY RGNL	KY	LPV	2	0.999506	4	0.998804
K22	BIG SANDY RGNL	KY	LPV	4	0.999019	4	0.997449
LEX	BLUE GRASS	KY	LPV	3	0.998879	4	0.997769
BWG	BOWLING GREEN-WARREN COUNTY RG	KY	LPV	3	0.9996	5	0.998381
LOU	BOWMAN FIELD	KY	LPV	2	0.998438	4	0.99789
HOP	CAMPBELL AAF (FORT CAMPBELL)	KY	LPV	2	0.999747	4	0.998924
CVG	CINCINNATI/NORTHERN KENTUCKY I	KY	LPV200	3	0.998192	4	0.997494
FGX	FLEMING-MASON	KY	LPV	2	0.998438	4	0.997449
27K	GEORGETOWN SCOTT COUNTY - MARS	KY	LPV200	3	0.99866	4	0.997758
GLW	GLASGOW MUNI	KY	LPV	2	0.99943	5	0.998139
EHR	HENDERSON CITY-COUNTY	KY	LPV	3	0.999072	3	0.998264
SME	LAKE CUMBERLAND RGNL	KY	LPV	2	0.999328	5	0.998283
LOZ	LONDON-CORBIN ARPT-MAGEE FLD	KY	LPV	2	0.999328	5	0.998253
SDF	LOUISVILLE INTL-STANDIFORD FIE	KY	LPV200	2	0.998464	4	0.997894
I39	MADISON	KY	LPV	3	0.999121	4	0.997902
2I0	MADISONVILLE MUNI	KY	LPV	4	0.999411	4	0.998471
M97	MOREHEAD-ROWAN COUNTY CLYDE A.	KY	LPV	3	0.998638	4	0.997637
OWB	OWENSBORO-DAVIESS COUNTY	KY	LPV200	3	0.999083	3	0.998264
BRY	SAMUELS FIELD	KY	LPV	3	0.998973	4	0.997894
DVK	STUART POWELL FIELD	KY	LPV	3	0.999223	4	0.997917
TWT	STURGIS MUNI	KY	LPV	3	0.999223	4	0.998475
TZV	TOMPKINSVILLE-MONROE COUNTY	KY	LPV	3	0.99966	5	0.99846
W38	WILLIAMSBURG-WHITLEY COUNTY	KY	LPV	2	0.999385	5	0.998381
ARA	ACADIANA RGNL	LA	LPV	0	1	1	0.999902
AEX	ALEXANDRIA INTL	LA	LPV200	0	1	2	0.999894
ACP	ALLEN PARISH	LA	LPV	0	1	2	0.999883
BTR	BATON ROUGE METROPOLITAN` RYAN	LA	LPV200	0	1	2	0.999898
CWF	CHENNAULT INTL	LA	LPV200	0	1	1	0.999891
ESF	ESLER RGNL	LA	LPV200	0	1	2	0.999887
HZR	FALSE RIVER RGNL	LA	LPV	0	1	2	0.999887
BXA	GEORGE R CARR MEMORIAL AIR FLD	LA	LPV	0	1	2	0.999902
HDC	HAMMOND NORTHSHORE RGNL	LA	LPV200	0	1	2	0.999902
3R4	HART	LA	LPV	0	1	2	0.99994
HUM	HOUMA-TERREBONNE	LA	LPV200	0	1	1	0.999906
M79	JOHN H HOOKS JR MEMORIAL	LA	LPV	0	1	2	0.999936
LFT	LAFAYETTE RGNL	LA	LPV	0	1	2	0.999898
LCH	LAKE CHARLES RGNL	LA	LPV	0	1	1	0.999894
NEW	LAKEFRONT	LA	LPV	0	1	2	0.999909
MSY	LOUIS ARMSTRONG NEW ORLEANS IN	LA	LPV200	0	1	2	0.999906
MLU	MONROE RGNL	LA	LPV200	0	1	2	0.999947
BQP	MOREHOUSE MEMORIAL	LA	LPV	0	1	2	0.999947
IER	NATCHITOCHES RGNL	LA	LPV	0	1	2	0.999943
DTN	SHREVEPORT DOWNTOWN	LA	LPV	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
SHV	SHREVEPORT RGNL	LA	LPV200	0	1	0	1
GAO	SOUTH LAFOURCHE LEONARD MILLER	LA	LPV	0	1	1	0.999909
UXL	SOUTHLAND FIELD	LA	LPV	0	1	1	0.999891
1L0	ST JOHN THE BAPTIST PARISH	LA	LPV	0	1	2	0.999902
TVR	VICKSBURG TALLULAH RGNL	LA	LPV	0	1	2	0.999902
BAF	BARNES MUNI	MA	LPV	3	0.996705	4	0.995875
HYA	BARNSTABLE MUNI-BOARDMAN/POLAN	MA	LPV200	3	0.996513	4	0.996109
BED	LAURENCE G HANSCOM FLD	MA	LPV200	3	0.996482	3	0.995867
MVY	MARTHAS VINEYARD	MA	LPV200	3	0.996558	4	0.996135
ACK	NANTUCKET MEMORIAL	MA	LPV200	3	0.996566	4	0.996169
OWD	NORWOOD MEMORIAL	MA	LPV	3	0.99646	4	0.996026
3B0	SOUTHBRIDGE MUNI	MA	LPV	3	0.996558	4	0.995943
ORH	WORCESTER RGNL	MA	LPV	3	0.996494	4	0.995973
BWI	BALTIMORE/WASHINGTON INTL THUR	MD	LPV200	4	0.99746	4	0.996958
DMW	CARROLL COUNTY RGNL/JACK B POA	MD	LPV200	4	0.997369	3	0.996664
ESN	EASTON/NEWNAM FIELD	MD	LPV	4	0.99746	4	0.997135
FDK	FREDERICK MUNI	MD	LPV	4	0.997441	4	0.996932
HGR	HAGERSTOWN RGNL-RICHARD A HENS	MD	LPV200	4	0.997249	4	0.996894
MTN	MARTIN STATE	MD	LPV	4	0.997434	4	0.996792
GAI	MONTGOMERY COUNTY AIRPARK	MD	LPV	4	0.997456	4	0.99695
OXB	OCEAN CITY MUNI	MD	LPV	3	0.997683	4	0.997117
SBY	SALISBURY-OCEAN CITY WICOMICO	MD	LPV200	3	0.997683	4	0.997218
2W6	ST. MARY'S COUNTY RGNL	MD	LPV	4	0.997886	5	0.997196
LEW	AUBURN/LEWISTON MUNI	ME	LPV200	3	0.996449	3	0.995856
AUG	AUGUSTA STATE	ME	LPV	2	0.996294	3	0.995671
BGR	BANGOR INTL	ME	LPV	2	0.996075	4	0.995713
BHB	HANCOCK COUNTY-BAR HARBOR	ME	LPV200	2	0.99609	4	0.995731
RKD	KNOX COUNTY RGNL	ME	LPV	2	0.996128	4	0.995701
FVE	NORTHERN AROOSTOOK RGNL	ME	LPV	3	0.996003	8	0.99506
PQI	NORTHERN MAINE RGNL ARPT AT PR	ME	LPV200	2	0.995867	7	0.995414
PWM	PORTLAND INTL JETPORT	ME	LPV	3	0.996464	3	0.995875
WVL	WATERVILLE ROBERT LAFLEUR	ME	LPV200	3	0.996275	3	0.995675
APN	ALPENA COUNTY RGNL	MI	LPV	3	0.996196	4	0.995897
ARB	ANN ARBOR MUNI	MI	LPV	4	0.996456	5	0.996014
ACB	ANTRIM COUNTY	MI	LPV	3	0.996252	4	0.995886
FNT	BISHOP INTL	MI	LPV200	4	0.996426	4	0.995879
OEB	BRANCH COUNTY MEMORIAL	MI	LPV	7	0.996928	4	0.995909
LAN	CAPITAL REGION INTL	MI	LPV200	4	0.996445	4	0.995886
CVX	CHARLEVOIX MUNI	MI	LPV	3	0.99612	4	0.995848
TVC	CHERRY CAPITAL	MI	LPV	3	0.996298	5	0.99589
CIU	CHIPPEWA COUNTY INTL	MI	LPV	3	0.99586	4	0.995743
DET	COLEMAN A. YOUNG MUNI	MI	LPV	4	0.996445	4	0.995882
TTF	CUSTER	MI	LPV	6	0.996739	4	0.995886
ESC	DELTA COUNTY	MI	LPV200	3	0.995916	5	0.995667
DTW	DETROIT METROPOLITAN WAYNE COU	MI	LPV	4	0.996445	4	0.995882
IMT	FORD	MI	LPV	4	0.99586	6	0.995539
FFX	FREMONT MUNI	MI	LPV	3	0.996245	4	0.995894
GRR	GERALD R. FORD INTL	MI	LPV200	3	0.996252	4	0.995916
IWD	GOGEBIC-IRON COUNTY	MI	LPV200	3	0.99552	6	0.99512
CMX	HOUGHTON COUNTY MEMORIAL	MI	LPV	3	0.995671	5	0.995162
BAX	HURON COUNTY MEMORIAL	MI	LPV	3	0.996271	3	0.996041

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
IKW	JACK BARSTOW	MI	LPV	4	0.99643	5	0.996003
JXN	JACKSON COUNTY-REYNOLDS FIELD	MI	LPV200	4	0.996479	5	0.996045
AZO	KALAMAZOO/BATTLE CREEK INTL	MI	LPV	4	0.996437	4	0.995905
IRS	KIRSCH MUNI	MI	LPV	5	0.996849	4	0.995909
ADG	LENAWEE COUNTY	MI	LPV	6	0.996837	5	0.996064
OZW	LIVINGSTON COUNTY SPENCER J. H	MI	LPV	4	0.996437	5	0.99603
ERY	LUCE COUNTY	MI	LPV	3	0.99586	4	0.995784
LDM	MASON COUNTY	MI	LPV	3	0.996184	4	0.995852
MBS	MBS INTL	MI	LPV200	4	0.996426	5	0.996011
MNM	MENOMINEE-MARINETTE TWIN COUNT	MI	LPV200	3	0.996045	5	0.995603
MOP	MOUNT PLEASANT MUNI	MI	LPV	3	0.99629	4	0.995875
MKG	MUSKEGON COUNTY	MI	LPV200	3	0.996241	4	0.995897
PTK	OAKLAND COUNTY INTL	MI	LPV200	4	0.996437	4	0.995882
OSC	OSCODA-WURTSMITH	MI	LPV200	3	0.996252	4	0.996067
RNP	OWOSSO COMMUNITY	MI	LPV	4	0.99643	5	0.996026
PLN	PELLSTON RGNL AIRPORT OF EMMET	MI	LPV200	3	0.996116	4	0.995905
HYX	SAGINAW COUNTY H.W. BROWNE	MI	LPV	4	0.996418	5	0.996003
SAW	SAWYER INTL	MI	LPV200	3	0.995814	6	0.99552
BEH	SOUTHWEST MICHIGAN RGNL	MI	LPV	5	0.996528	4	0.995928
BIV	TULIP CITY	MI	LPV	3	0.99623	4	0.995913
BTL	W K KELLOGG	MI	LPV	4	0.996441	4	0.995905
CAD	WEXFORD COUNTY	MI	LPV200	3	0.996301	4	0.995875
YIP	WILLOW RUN	MI	LPV	4	0.996445	4	0.995882
LVN	AIRLAKE	MN	LPV	3	0.996252	4	0.995841
AEL	ALBERT LEA MUNI	MN	LPV	3	0.996305	5	0.996041
ANE	ANOKA COUNTY-BLAINE ARPT(JANES	MN	LPV	4	0.996162	3	0.995747
AUM	AUSTIN MUNI	MN	LPV	3	0.99623	5	0.996026
BDE	BAUDETTE INTL	MN	LPV	4	0.995467	5	0.995056
BJI	BEMIDJI RGNL	MN	LPV200	3	0.995773	6	0.99492
BBB	BENSON MUNI	MN	LPV	3	0.996177	3	0.995822
BRD	BRAINERD LAKES RGNL	MN	LPV200	3	0.995947	5	0.995218
AXN	CHANDLER FIELD	MN	LPV	3	0.996018	4	0.995546
CKN	CROOKSTON MUNI KIRKWOOD FLD	MN	LPV	3	0.995909	5	0.995097
DTL	DETROIT LAKES-WETHING FIELD	MN	LPV	3	0.995901	5	0.995124
DLH	DULUTH INTL	MN	LPV200	3	0.99563	7	0.994962
FRM	FAIRMONT MUNI	MN	LPV	3	0.996354	4	0.99612
INL	FALLS INTL	MN	LPV	4	0.99558	6	0.994977
FFM	FERGUS FALLS MUNI-EINAR MICKEL	MN	LPV200	3	0.996026	5	0.99546
FCM	FLYING CLOUD	MN	LPV200	4	0.996218	3	0.99583
GPZ	GRAND RAPIDS/ITASCA CO-GORDON	MN	LPV	3	0.99575	7	0.994886
LJF	LITCHFIELD MUNI	MN	LPV	4	0.996275	3	0.995773
MKT	MANKATO RGNL	MN	LPV200	3	0.996362	4	0.996086
MSP	MINNEAPOLIS-ST PAUL INTL/WOLD-	MN	LPV	4	0.996199	4	0.995773
CNB	MYERS FIELD	MN	LPV	4	0.996384	5	0.996098
LYV	QUENTIN AANENSON FIELD	MN	LPV200	3	0.996449	4	0.996222
RWF	REDWOOD FALLS MUNI	MN	LPV	3	0.996343	3	0.996022
RST	ROCHESTER INTL	MN	LPV	3	0.996252	5	0.995977
ROX	ROSEAU MUNI/RUDY BILLBERG FIEL	MN	LPV	4	0.995645	6	0.995086
ROS	RUSH CITY RGNL	MN	LPV	3	0.995947	4	0.995456
MML	SOUTHWEST MINNESOTA RGNL MARSH	MN	LPV	3	0.996418	3	0.996135
STC	ST CLOUD RGNL	MN	LPV200	3	0.996067	4	0.995667
STP	ST PAUL DOWNTOWN HOLMAN FLD	MN	LPV	4	0.996188	4	0.995758

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
TVF	THIEF RIVER FALLS RGNL	MN	LPV	3	0.995931	5	0.995056
RRT	WARROAD INTL MEMORIAL	MN	LPV	4	0.99552	6	0.995071
BDH	WILLMAR MUNI-JOHN L RICE FIELD	MN	LPV	4	0.99629	3	0.99572
M17	BOLIVAR MUNI	MO	LPV	2	0.999136	2	0.998921
BBG	BRANSON	MO	LPV200	2	0.999355	2	0.999249
H21	CAMDENTON MEMORIAL	MO	LPV	2	0.99906	2	0.998879
EZZ	CAMERON MEMORIAL	MO	LPV	3	0.998773	4	0.998615
CGI	CAPE GIRARDEAU RGNL	MO	LPV	2	0.999332	4	0.998905
M05	CARUTHERSVILLE MEMORIAL	MO	LPV	2	0.999626	4	0.999434
MKC	CHARLES B. WHEELER DOWNTOWN	MO	LPV	3	0.998887	3	0.998649
CHT	CHILLICOTHE MUNI	MO	LPV	3	0.998796	6	0.998577
COU	COLUMBIA RGNL	MO	LPV	2	0.99886	5	0.998668
EIW	COUNTY MEMORIAL	MO	LPV	2	0.999524	4	0.999109
1H0	CREVE COEUR	MO	LPV	2	0.99883	5	0.998638
UBX	CUBA MUNI	MO	LPV	2	0.998936	2	0.998845
DXE	DEXTER MUNI	MO	LPV	2	0.999411	4	0.999075
FTT	ELTON HENSLEY MEMORIAL	MO	LPV	2	0.998834	5	0.998645
FAM	FARMINGTON RGNL	MO	LPV	3	0.999121	3	0.998853
K57	GOULD PETERSON MUNI	MO	LPV	4	0.998456	6	0.99783
HAE	HANNIBAL RGNL	MO	LPV	3	0.998822	9	0.998162
HIG	HIGGINSVILLE INDUSTRIAL MUNI	MO	LPV	2	0.998936	4	0.99869
JEF	JEFFERSON CITY MEMORIAL	MO	LPV	2	0.998875	5	0.998694
VER	JESSE VIERTEL MEMORIAL	MO	LPV	2	0.998849	4	0.998679
JLN	JOPLIN RGNL	MO	LPV	2	0.999166	2	0.999102
MCI	KANSAS CITY INTL	MO	LPV	3	0.99883	3	0.998641
IRK	KIRKSVILLE RGNL	MO	LPV200	5	0.998777	8	0.998139
STL	LAMBERT-ST LOUIS INTL	MO	LPV	2	0.99883	6	0.998619
LRY	LAWRENCE SMITH MEMORIAL	MO	LPV	2	0.998958	3	0.99866
AIZ	LEE C FINE MEMORIAL	MO	LPV	2	0.999053	2	0.998845
LXT	LEE'S SUMMIT MUNI	MO	LPV	2	0.998947	3	0.998656
6M6	LEWIS COUNTY RGNL	MO	LPV	4	0.998747	7	0.997694
PLK	M. GRAHAM CLARK - TANEY COUNTY	MO	LPV200	2	0.999347	2	0.999245
MAW	MALDEN RGNL	MO	LPV	2	0.999513	4	0.999113
MHL	MARSHALL MEMORIAL MUNI	MO	LPV	2	0.998947	4	0.998683
MYJ	MEXICO MEMORIAL	MO	LPV	3	0.998822	6	0.998611
GPH	MIDWEST NATIONAL AIR CENTER	MO	LPV	3	0.998834	3	0.99866
HFJ	MONETT MUNI	MO	LPV	2	0.999272	2	0.999189
EOS	NEOSHO HUGH ROBINSON	MO	LPV	2	0.999332	2	0.9992
NVD	NEVADA MUNI	MO	LPV200	2	0.999117	2	0.998864
MO8	NORTH CENTRAL MISSOURI RGNL	MO	LPV	3	0.998747	6	0.998543
EVU	NORTHWEST MISSOURI RGNL	MO	LPV	4	0.998547	6	0.997811
K02	PERRYVILLE MUNI	MO	LPV	2	0.998909	3	0.998694
POF	POPLAR BLUFF MUNI	MO	LPV	2	0.999407	4	0.999087
VIH	ROLLA NATIONAL	MO	LPV200	3	0.999049	2	0.998826
STJ	ROSECRANS MEMORIAL	MO	LPV200	3	0.998751	4	0.998573
DMO	SEDALIA MEMORIAL	MO	LPV	2	0.998966	4	0.998687
SIK	SIKESTON MEMORIAL MUNI	MO	LPV	2	0.999404	4	0.998989
RCM	SKYHAVEN	MO	LPV	2	0.998951	4	0.998675
SUS	SPIRIT OF ST LOUIS	MO	LPV200	2	0.99883	5	0.998641
SGF	SPRINGFIELD-BRANSON NATIONAL	MO	LPV	2	0.999155	2	0.998962
UUV	SULLIVAN RGNL	MO	LPV	2	0.998879	4	0.998758
8WC	WASHINGTON COUNTY	MO	LPV	2	0.998955	3	0.998841

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
FYG	WASHINGTON RGNL	MO	LPV	2	0.998841	5	0.998668
TBN	WAYNESVILLE-ST. ROBERT RGNL FO	MO	LPV	2	0.999132	2	0.998868
UNO	WEST PLAINS RGNL	MO	LPV	2	0.999302	2	0.999087
STF	GEORGE M BRYAN	MS	LPV200	0	1	2	0.999921
GTR	GOLDEN TRIANGLE RGNL	MS	LPV	0	1	1	0.999925
GWO	GREENWOOD-LEFLORE	MS	LPV	0	1	2	0.999917
GNF	GRENADA MUNI	MS	LPV	0	1	1	0.999925
GPT	GULFPORT-BILOXI INTL	MS	LPV200	0	1	2	0.999932
HEZ	HARDY-ANDERS FIELD NATCHEZ-ADA	MS	LPV	0	1	2	0.999902
HBG	HATTIESBURG BOBBY L CHAIN MUNI	MS	LPV200	0	1	2	0.999909
PIB	HATTIESBURG-LAUREL RGNL	MS	LPV200	0	1	2	0.999913
HKS	HAWKINS FIELD	MS	LPV200	0	1	2	0.999909
LUL	HESLER-NOBLE FIELD	MS	LPV	0	1	2	0.999913
IDL	INDIANOLA MUNI	MS	LPV	0	1	1	0.999943
JAN	JACKSON-EVERS INTL	MS	LPV200	0	1	2	0.999909
M16	JOHN BELL WILLIAMS	MS	LPV	0	1	2	0.999906
MEI	KEY FIELD	MS	LPV200	0	1	2	0.999921
MCB	MC COMB/PIKE COUNTY/JOHN E LEW	MS	LPV	0	1	2	0.999902
GLH	MID DELTA RGNL	MS	LPV200	0	1	1	0.99994
M40	MONROE COUNTY	MS	LPV	0	1	1	0.999917
OLV	OLIVE BRANCH	MS	LPV	0	1	3	0.999872
MPE	PHILADELPHIA MUNI	MS	LPV	0	1	2	0.999917
MJD	PICAYUNE MUNI	MS	LPV	0	1	2	0.999909
M43	PRENTISS-JEFFERSON DAVIS COUNT	MS	LPV	0	1	2	0.999909
CRX	ROSCOE TURNER	MS	LPV200	0	1	3	0.999883
HSA	STENNIS INTL	MS	LPV	0	1	2	0.999921
PQL	TRENT LOTT INTL	MS	LPV200	0	1	2	0.999951
UTA	TUNICA MUNI	MS	LPV200	0	1	1	0.999958
TUP	TUPELO RGNL	MS	LPV200	0	1	1	0.999913
UOX	UNIVERSITY-OXFORD	MS	LPV	0	1	1	0.999917
BTM	BERT MOONEY	MT	LPV	4	0.997981	2	0.996845
BIL	BILLINGS LOGAN INTL	MT	LPV	3	0.997226	3	0.996852
MLS	FRANK WILEY FIELD	MT	LPV	4	0.996966	4	0.996347
BZN	GALLATIN FIELD	MT	LPV	5	0.997985	2	0.996845
GPI	GLACIER PARK INTL	MT	LPV	2	0.997645	2	0.996879
GTF	GREAT FALLS INTL	MT	LPV	2	0.996879	2	0.996818
HVR	HAVRE CITY-COUNTY	MT	LPV	2	0.996811	2	0.99669
HLN	HELENA RGNL	MT	LPV	3	0.997456	2	0.996845
LWT	LEWISTOWN MUNI	MT	LPV	2	0.996886	3	0.996803
MSO	MISSOULA INTL	MT	LPV	2	0.99763	2	0.996879
7S0	RONAN	MT	LPV	2	0.997637	2	0.996883
SDY	SIDNEY-RICHLAND MUNI	MT	LPV	4	0.996422	4	0.995882
WYS	YELLOWSTONE	MT	LPV200	3	0.998328	5	0.997377
OAJ	ALBERT J ELLIS	NC	LPV	4	0.999574	13	0.998849
AFP	ANSON COUNTY -JEFF CLOUD FIE	NC	LPV	2	0.999751	4	0.999264
AVL	ASHEVILLE RGNL	NC	LPV	0	1	7	0.99949
BUY	BURLINGTON-ALAMANCE RGNL	NC	LPV200	3	0.99937	4	0.998049
SUT	CAPE FEAR RGNL JETPORT/HOWIE F	NC	LPV	2	0.999826	8	0.999309
EQY	CHARLOTTE-MONROE EXECUTIVE	NC	LPV	1	0.999804	3	0.999317
CLT	CHARLOTTE/DOUGLAS INTL	NC	LPV200	1	0.999811	4	0.99926
EWN	COASTAL CAROLINA REGIONAL	NC	LPV	3	0.999404	13	0.998207
JQF	CONCORD RGNL	NC	LPV	1	0.999781	4	0.999087

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
ONX	CURRITUCK COUNTY RGNL	NC	LPV	4	0.998385	38	0.996471
EYF	CURTIS L BROWN JR FIELD	NC	LPV200	2	0.999751	4	0.999313
ECG	ELIZABETH CITY CG AIR STATION/	NC	LPV	5	0.998687	36	0.99669
FAY	FAYETTEVILLE RGNL/GRANNIS FIEL	NC	LPV	2	0.999713	4	0.999192
AKH	GASTONIA MUNI	NC	LPV	1	0.999845	4	0.999302
GWW	GOLDSBORO-WAYNE MUNI	NC	LPV	4	0.999566	12	0.998358
HRJ	HARNETT RGNL JETPORT	NC	LPV	2	0.999664	5	0.99889
HNZ	HENDERSON-OXFORD	NC	LPV	3	0.999223	5	0.998019
JNX	JOHNSTON COUNTY	NC	LPV200	2	0.999657	7	0.998607
ISO	KINSTON RGNL JETPORT AT STALLI	NC	LPV	3	0.999392	13	0.998192
IPJ	LINCOLNTON-LINCOLN COUNTY RGNL	NC	LPV	1	0.99983	5	0.999056
MRH	MICHAEL J. SMITH FIELD	NC	LPV	3	0.999423	14	0.998611
MWK	MOUNT AIRY/SURRY COUNTY	NC	LPV	4	0.999083	4	0.998158
EDE	NORTHEASTERN RGNL	NC	LPV	4	0.998811	25	0.997064
TDF	PERSON COUNTY	NC	LPV200	3	0.999196	5	0.99823
GSO	PIEDMONT TRIAD INTL	NC	LPV200	3	0.999362	4	0.998034
PGV	PITT-GREENVILLE	NC	LPV	4	0.999298	14	0.997815
RDU	RALEIGH-DURHAM INTL	NC	LPV200	3	0.999528	5	0.998479
RCZ	RICHMOND COUNTY	NC	LPV	2	0.999751	3	0.999298
RWI	ROCKY MOUNT-WILSON RGNL	NC	LPV200	4	0.999124	12	0.997977
FQD	RUTHERFORD CO - MARCHMAN FIELD	NC	LPV	0	1	5	0.999306
INT	SMITH REYNOLDS	NC	LPV200	3	0.999351	4	0.99809
VUJ	STANLY COUNTY	NC	LPV200	2	0.999683	4	0.998951
SVH	STATESVILLE RGNL	NC	LPV	1	0.999774	5	0.998743
LHZ	TRIANGLE NORTH EXECUTIVE	NC	LPV	3	0.999321	6	0.997962
OCW	WARREN FIELD	NC	LPV	4	0.999313	15	0.997713
ILM	WILMINGTON INTL	NC	LPV	3	0.99974	10	0.999234
BAC	BARNES COUNTY MUNI	ND	LPV	3	0.996116	5	0.995309
BIS	BISMARCK MUNI	ND	LPV	3	0.996192	5	0.99572
D09	BOTTINEAU MUNI	ND	LPV	3	0.996237	7	0.995429
5N8	CASSELTON ROBERT MILLER RGNL	ND	LPV	3	0.996056	5	0.995229
DVL	DEVILS LAKE RGNL	ND	LPV	3	0.996116	4	0.995339
DIK	DICKINSON - THEODORE ROOSEVELT	ND	LPV200	4	0.996407	4	0.99572
GFK	GRAND FORKS INTL	ND	LPV	3	0.995909	5	0.995116
GWR	GWINNER-ROGER MELROE FIELD	ND	LPV200	3	0.996154	4	0.99563
5H4	HARVEY MUNI	ND	LPV	3	0.996154	4	0.995452
FAR	HECTOR INTL	ND	LPV200	3	0.996014	5	0.99515
GAF	HUTSON FIELD	ND	LPV	3	0.995867	5	0.995124
JMS	JAMESTOWN RGNL	ND	LPV200	3	0.99612	5	0.995445
HZE	MERCER COUNTY RGNL	ND	LPV	4	0.996369	5	0.995667
MOT	MINOT INTL	ND	LPV	3	0.99615	5	0.995467
D55	ROBERTSON FIELD	ND	LPV	3	0.995897	6	0.99518
ISN	SLOULIN FLD INTL	ND	LPV200	4	0.996384	4	0.995777
S25	WATFORD CITY MUNI	ND	LPV	4	0.996384	4	0.995663
ANW	AINSWORTH RGNL	NE	LPV200	3	0.99689	3	0.996683
BVN	ALBION MUNI	NE	LPV	4	0.997022	3	0.996645
AIA	ALLIANCE MUNI	NE	LPV200	4	0.99809	4	0.997034
4V9	ANTELOPE COUNTY	NE	LPV	3	0.996788	3	0.996456
AUH	AURORA MUNI - AL POTTER FIELD	NE	LPV	5	0.998011	5	0.997109
BIE	BEATRICE MUNI	NE	LPV	5	0.998377	4	0.998053
FNB	BRENNER FIELD	NE	LPV	4	0.998724	4	0.998317
HDE	BREWSTER FIELD	NE	LPV	5	0.998679	6	0.997977

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
BBW	BROKEN BOW MUNI	NE	LPV	4	0.997305	4	0.996905
GRI	CENTRAL NEBRASKA RGNL	NE	LPV	6	0.998053	5	0.997094
CDR	CHADRON MUNI	NE	LPV	5	0.997622	3	0.996716
OLU	COLUMBUS MUNI	NE	LPV	4	0.99706	3	0.996611
CZD	COZAD MUNI	NE	LPV	5	0.998453	5	0.997403
CEK	CRETE MUNI	NE	LPV	4	0.998034	5	0.997313
93Y	DAVID CITY MUNI	NE	LPV	6	0.99749	3	0.996637
OMA	EPPLEY AIRFIELD	NE	LPV	5	0.997215	3	0.996547
ODX	EVELYN SHARP FIELD	NE	LPV	4	0.997234	3	0.996686
FBY	FAIRBURY MUNI	NE	LPV	5	0.998445	4	0.99809
FMZ	FAIRMONT STATE AIRFIELD	NE	LPV	4	0.998151	5	0.997418
FET	FREMONT MUNI	NE	LPV	4	0.997026	3	0.996539
OKS	GARDEN COUNTY	NE	LPV	5	0.998373	8	0.996928
GRN	GORDON MUNI	NE	LPV	4	0.997607	3	0.996732
GGF	GRANT MUNI	NE	LPV	6	0.999056	8	0.997169
HSI	HASTINGS MUNI	NE	LPV	5	0.998324	6	0.997471
IML	IMPERIAL MUNI	NE	LPV	4	0.999219	9	0.997875
LXN	JIM KELLY FIELD	NE	LPV	5	0.998521	5	0.99763
EAR	KEARNEY RGNL	NE	LPV	5	0.998275	6	0.997411
IBM	KIMBALL MUNI/ROBERT E ARRAJ FI	NE	LPV	6	0.999015	4	0.997754
LNK	LINCOLN	NE	LPV	5	0.99797	5	0.99709
MCK	MC COOK BEN NELSON RGNL	NE	LPV	5	0.999109	7	0.998185
MLE	MILLARD	NE	LPV	5	0.997592	4	0.996743
VTN	MILLER FIELD	NE	LPV	3	0.99689	3	0.996649
9V5	MODISETT	NE	LPV	5	0.99763	3	0.996732
AFK	NEBRASKA CITY MUNI	NE	LPV	5	0.998321	5	0.997271
OFK	NORFOLK RGNL/KARL STEFAN MEMOR	NE	LPV	3	0.996781	3	0.996437
LBF	NORTH PLATTE RGNL AIRPORT LEE	NE	LPV	6	0.998422	4	0.997222
0V3	PIONEER VILLAGE FIELD	NE	LPV	6	0.998528	7	0.997781
PMV	PLATTSMOUTH MUNI	NE	LPV	5	0.997822	5	0.996966
RBE	ROCK COUNTY	NE	LPV	3	0.99689	3	0.996667
OGA	SEARLE FIELD	NE	LPV	6	0.99886	7	0.99712
SWT	SEWARD MUNI	NE	LPV	5	0.997981	5	0.997086
SNY	SIDNEY MUNI/LLOYD W. CARR FIEL	NE	LPV	7	0.998905	8	0.99749
ONL	THE O'NEILL MUNI-JOHN L BAKER	NE	LPV	3	0.9968	3	0.996501
TIF	THOMAS COUNTY	NE	LPV	4	0.997154	3	0.996792
AHQ	WAHOO MUNI	NE	LPV	5	0.99749	3	0.996581
LCG	WAYNE MUNI	NE	LPV	3	0.996766	3	0.996426
BFF	WESTERN NEB. RGNL/WILLIAM B. H	NE	LPV	4	0.998222	5	0.997671
JYR	YORK MUNI	NE	LPV	5	0.997996	5	0.997083
ASH	BOIRE FIELD	NH	LPV	3	0.996471	3	0.99586
CON	CONCORD MUNI	NH	LPV	3	0.996456	3	0.995822
EEN	DILLANT-HOPKINS	NH	LPV	3	0.996362	3	0.99572
LCI	LACONIA MUNI	NH	LPV	3	0.996513	3	0.995841
LEB	LEBANON MUNI	NH	LPV	3	0.996301	3	0.995671
MHT	MANCHESTER	NH	LPV200	3	0.996464	3	0.99586
HIE	MOUNT WASHINGTON RGNL	NH	LPV	3	0.996456	3	0.995739
PSM	PORTSMOUTH INTL AT PEASE	NH	LPV200	3	0.99649	3	0.995894
DAW	SKYHAVEN	NH	LPV	3	0.996509	3	0.995882
ACY	ATLANTIC CITY INTL	NJ	LPV200	4	0.997283	4	0.996894
WWD	CAPE MAY COUNTY	NJ	LPV	4	0.997411	4	0.997086
MIV	MILLVILLE MUNI	NJ	LPV	4	0.997407	4	0.996958

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
EWR	NEWARK LIBERTY INTL	NJ	LPV	4	0.996913	4	0.99635
39N	PRINCETON	NJ	LPV	4	0.997007	4	0.996528
TEB	TETERBORO	NJ	LPV	4	0.99686	4	0.996275
ABQ	ALBUQUERQUE INTL SUNPORT	NM	LPV	0	1	0	1
CVN	CLOVIS MUNI	NM	LPV	0	1	0	1
DMN	DEMING MUNI	NM	LPV	0	1	0	1
FMN	FOUR CORNERS RGNL	NM	LPV200	0	1	2	0.99986
SVC	GRANT COUNTY	NM	LPV	0	1	1	0.999989
HOB	LEA COUNTY RGNL	NM	LPV200	0	1	0	1
ROW	ROSWELL INTL AIR CENTER	NM	LPV	0	1	0	1
ONM	SOCORRO MUNI	NM	LPV	0	1	1	0.999996
LAS	MC CARRAN INTL	NV	LPV	1	0.999857	4	0.99954
RTS	RENO/STEAD	NV	LPV	2	0.998864	11	0.998558
RNO	RENO/TAHOE INTL	NV	LPV	2	0.998864	12	0.998543
WMC	WINNEMUCCA MUNI	NV	LPV	2	0.999098	1	0.998509
ALB	ALBANY INTL	NY	LPV	3	0.996603	4	0.995977
HWV	BROOKHAVEN	NY	LPV	3	0.996705	5	0.99629
BUF	BUFFALO NIAGARA INTL	NY	LPV	3	0.99649	4	0.996211
OLE	CATTARAUGUS COUNTY-OLEAN	NY	LPV	3	0.99652	4	0.996226
JHW	CHAUTAUQUA COUNTY/JAMESTOWN	NY	LPV200	3	0.99652	3	0.996267
1B1	COLUMBIA COUNTY	NY	LPV	3	0.996626	4	0.996071
POU	DUTCHESS COUNTY	NY	LPV	4	0.996822	4	0.996173
HTO	EAST HAMPTON	NY	LPV	3	0.996705	4	0.996286
GFL	FLOYD BENNETT MEMORIAL	NY	LPV	3	0.996539	3	0.995558
FOK	FRANCIS S GABRESKI	NY	LPV	3	0.996705	4	0.996298
NY0	FULTON COUNTY	NY	LPV	3	0.996581	5	0.996101
GVQ	GENESEE COUNTY	NY	LPV	3	0.996384	4	0.996165
BGM	GREATER BINGHAMTON/EDWIN A LIN	NY	LPV200	3	0.996422	5	0.996184
ROC	GREATER ROCHESTER INTL	NY	LPV200	3	0.996384	4	0.996128
RME	GRIFFISS INTL	NY	LPV200	3	0.996392	4	0.996165
VGC	HAMILTON MUNI	NY	LPV	3	0.996399	5	0.996169
ITH	ITHACA TOMPKINS RGNL	NY	LPV	3	0.996407	5	0.996116
JFK	JOHN F KENNEDY INTL	NY	LPV	4	0.99692	4	0.996354
LGA	LA GUARDIA	NY	LPV	4	0.996867	4	0.996301
ISP	LONG ISLAND MAC ARTHUR	NY	LPV200	3	0.996735	4	0.996305
MSS	MASSENA INTL-RICHARDS FIELD	NY	LPV	3	0.996105	4	0.995814
N66	ONEONTA MUNI	NY	LPV	3	0.996415	4	0.996184
MGJ	ORANGE COUNTY	NY	LPV	4	0.996837	4	0.996203
PEO	PENN YAN	NY	LPV	3	0.996403	5	0.99612
PBG	PLATTSBURGH INTL	NY	LPV	3	0.996335	4	0.995645
FRG	REPUBLIC	NY	LPV200	3	0.996754	4	0.996324
5B2	SARATOGA COUNTY	NY	LPV	3	0.996603	5	0.995928
44N	SKY ACRES	NY	LPV	3	0.996701	4	0.996169
SWF	STEWART INTL	NY	LPV200	4	0.996833	4	0.996196
MSV	SULLIVAN COUNTY INTL	NY	LPV	4	0.996788	4	0.996252
SYR	SYRACUSE HANCOCK INTL	NY	LPV200	3	0.996396	5	0.99615
4B6	TICONDEROGA MUNI	NY	LPV	3	0.996479	4	0.99566
ART	WATERTOWN INTL	NY	LPV	3	0.996369	5	0.996116
ELZ	WELLSVILLE MUNI ARPT`TARANTINE	NY	LPV	3	0.99652	4	0.996188
HPN	WESTCHESTER COUNTY	NY	LPV	3	0.996724	4	0.996226
GTB	WHEELER-SACK AAF	NY	LPV200	3	0.996384	4	0.996113
SDC	WILLIAMSON-SODUS	NY	LPV	3	0.996392	5	0.996101

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
ILN	AIRBORNE AIRPARK	OH	LPV200	3	0.997743	5	0.997222
CAK	AKRON-CANTON RGNL	OH	LPV200	6	0.99712	5	0.996467
HZY	ASHTABULA COUNTY	OH	LPV	3	0.996479	3	0.99626
TZR	BOLTON FIELD	OH	LPV200	3	0.997683	5	0.99695
HAO	BUTLER CO RGNL	OH	LPV	3	0.997909	5	0.997411
CXY	CAPITAL CITY	OH	LPV	4	0.996973	3	0.996449
PCW	CARL R KELLER FIELD	OH	LPV	5	0.996988	5	0.996339
LUK	CINCINNATI MUNI AIRPORT LUNKEN	OH	LPV	3	0.998117	4	0.99746
CLE	CLEVELAND-HOPKINS INTL	OH	LPV	5	0.996754	5	0.996275
I66	CLINTON FIELD	OH	LPV	3	0.997732	5	0.997203
MGY	DAYTON-WRIGHT BROTHERS	OH	LPV	3	0.997713	5	0.997203
DLZ	DELAWARE MUNI	OH	LPV	5	0.997392	5	0.996735
LHQ	FAIRFIELD COUNTY	OH	LPV	3	0.997769	5	0.996924
FDY	FINDLAY	OH	LPV	5	0.997192	6	0.996607
FZI	FOSTORIA METROPOLITAN	OH	LPV	5	0.997192	6	0.996566
PMH	GREATER PORTSMOUTH RGNL	OH	LPV	3	0.998173	4	0.997305
I19	GREENE COUNTY-LEWIS A. JACKSON	OH	LPV	3	0.99769	5	0.997143
I74	GRIMES FIELD	OH	LPV	5	0.997509	5	0.996818
DAY	JAMES M COX DAYTON INTL	OH	LPV200	3	0.99769	5	0.997117
1G3	KENT STATE UNIV	OH	LPV	5	0.996796	5	0.996347
CQA	LAKEFIELD	OH	LPV	5	0.9974	5	0.996769
AOH	LIMA ALLEN COUNTY	OH	LPV	5	0.997298	6	0.996683
LPR	LORAIN COUNTY RGNL	OH	LPV200	5	0.996856	5	0.99632
UYF	MADISON COUNTY	OH	LPV	3	0.997686	5	0.996992
MFD	MANSFIELD LAHM RGNL	OH	LPV200	5	0.9972	5	0.996479
MNN	MARION MUNI	OH	LPV	5	0.997222	5	0.996554
AXV	NEIL ARMSTRONG	OH	LPV	5	0.997392	5	0.996735
OSU	OHIO STATE UNIVERSITY	OH	LPV200	4	0.997645	5	0.996773
UNI	OHIO UNIVERSITY SNYDER FIELD	OH	LPV200	4	0.997936	5	0.99726
CMH	PORT COLUMBUS INTL	OH	LPV200	4	0.997717	5	0.996826
OWX	PUTNAM COUNTY	OH	LPV	5	0.997215	6	0.996633
LCK	RICKENBACKER INTL	OH	LPV200	3	0.997679	5	0.996928
16G	SENECA COUNTY	OH	LPV	5	0.997211	5	0.996471
SGH	SPRINGFIELD-BECKLEY MUNI	OH	LPV200	3	0.997668	5	0.997071
TOL	TOLEDO EXPRESS	OH	LPV200	6	0.997	7	0.996343
BJJ	WAYNE COUNTY	OH	LPV	6	0.997256	5	0.99646
LNN	WILLOUGHBY LOST NATION MUNI	OH	LPV	5	0.996728	4	0.996252
1G0	WOOD COUNTY	OH	LPV	6	0.997034	7	0.996396
YNG	YOUNGSTOWN-WARREN RGNL	OH	LPV	4	0.996626	4	0.996316
ADH	ADA MUNI	OK	LPV	0	1	1	0.999906
AXS	ALTUS/QUARTZ MOUNTAIN RGNL	OK	LPV	0	1	0	1
BVO	BARTLESVILLE MUNI	OK	LPV	2	0.999366	2	0.99917
BKN	BLACKWELL-TONKAWA MUNI	OK	LPV	1	0.999502	2	0.99923
GCM	CLAREMORE RGNL	OK	LPV	1	0.999506	2	0.999249
RCE	CLARENCE E PAGE MUNI	OK	LPV	0	1	2	0.999728
CSM	CLINTON-SHERMAN	OK	LPV200	0	1	1	0.999977
MKO	DAVIS FIELD	OK	LPV	0	1	2	0.999555
DUA	DURANT RGNL - EAKER FIELD	OK	LPV	0	1	1	0.999955
ELK	ELK CITY RGNL BUSINESS	OK	LPV	0	1	1	0.999879
WDG	ENID WOODRING RGNL	OK	LPV200	1	0.999785	2	0.999294
FDR	FREDERICK RGNL	OK	LPV200	0	1	0	1
GMJ	GROVE MUNI	OK	LPV	2	0.999358	2	0.9992

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
GOK	GUTHRIE-EDMOND RGNL	OK	LPV	1	0.999966	2	0.999581
DUC	HALLIBURTON FIELD	OK	LPV	0	1	1	0.999947
HBR	HOBART RGNL	OK	LPV	0	1	0	1
MLC	MC ALESTER RGNL	OK	LPV	0	1	1	0.999891
OKM	OKMULGEE RGNL	OK	LPV	0	1	2	0.999543
PVJ	PAULS VALLEY MUNI	OK	LPV200	0	1	1	0.999928
PNC	PONCA CITY RGNL	OK	LPV	1	0.999494	2	0.999219
RVS	RICHARD LLOYD JONES JR	OK	LPV	2	0.999815	3	0.999426
SNL	SHAWNEE RGNL	OK	LPV200	0	1	2	0.999766
SWO	STILLWATER RGNL	OK	LPV	1	0.999804	3	0.999411
TQH	TAHLEQUAH MUNI	OK	LPV	1	0.999732	2	0.999475
TUL	TULSA INTL	OK	LPV200	2	0.999638	3	0.999377
OUN	UNIVERSITY OF OKLAHOMA WESTHEI	OK	LPV	0	1	2	0.999819
WWR	WEST WOODWARD	OK	LPV	1	0.999826	1	0.99949
PWA	WILEY POST	OK	LPV200	0	1	2	0.999698
OKC	WILL ROGERS WORLD	OK	LPV200	0	1	2	0.999777
OWP	WILLIAM R. POGUE MUNI	OK	LPV	2	0.99966	3	0.999377
AST	ASTORIA RGNL	OR	LPV	2	0.997826	45	0.996365
UAO	AURORA STATE	OR	LPV	3	0.998294	49	0.996599
BDN	BEND MUNI	OR	LPV	2	0.99869	17	0.997558
CVO	CORVALLIS MUNI	OR	LPV200	3	0.998471	80	0.995252
PDT	EASTERN OREGON RGNL AT PENDLET	OR	LPV200	4	0.998075	3	0.997317
GCD	GRANT CO RGNL/OGILVIE FIELD	OR	LPV	2	0.99846	4	0.997724
LMT	KLAMATH FALLS	OR	LPV	3	0.998905	55	0.99723
LGD	LA GRANDE/UNION COUNTY	OR	LPV	3	0.99817	2	0.997392
S33	MADRAS MUNICIPAL	OR	LPV	2	0.998453	7	0.997396
EUG	MAHLON SWEET FIELD	OR	LPV200	1	0.998483	79	0.995354
MMV	MC MINNVILLE MUNI	OR	LPV	3	0.998354	65	0.996135
SLE	MCNARY FLD	OR	LPV200	3	0.99837	70	0.996045
ONO	ONTARIO MUNI	OR	LPV	2	0.998438	3	0.997702
PDX	PORTLAND INTL	OR	LPV200	3	0.998211	32	0.996909
HIO	PORTLAND-HILLSBORO	OR	LPV200	3	0.998234	39	0.996622
RDM	ROBERTS FIELD	OR	LPV200	3	0.998675	15	0.99749
AGC	ALLEGHENY COUNTY	PA	LPV	8	0.997294	6	0.996766
AOO	ALTOONA-BLAIR COUNTY	PA	LPV	4	0.996871	3	0.996449
LBE	ARNOLD PALMER RGNL	PA	LPV	7	0.997377	6	0.996796
HMZ	BEDFORD COUNTY	PA	LPV	4	0.997162	5	0.996728
BFD	BRADFORD RGNL	PA	LPV200	3	0.996528	3	0.99623
BTP	BUTLER COUNTY/K W SCHOLTER FIE	PA	LPV	5	0.996909	4	0.996354
MQS	CHESTER COUNTY G O CARLSON	PA	LPV	4	0.997166	4	0.996822
AXQ	CLARION COUNTY	PA	LPV	4	0.99672	3	0.99635
8G2	CORRY-LAWRENCE	PA	LPV	3	0.996528	3	0.996275
9D4	DECK	PA	LPV	4	0.99706	3	0.996373
DUJ	DUBOIS RGNL	PA	LPV200	4	0.996724	3	0.996347
ERI	ERIE INTL/TOM RIDGE FIELD	PA	LPV	3	0.996524	3	0.996256
WAY	GREENE COUNTY	PA	LPV	6	0.99743	5	0.996803
MDT	HARRISBURG INTL	PA	LPV	4	0.99709	3	0.996471
HZL	HAZLETON MUNI	PA	LPV	4	0.996686	4	0.996343
JST	JOHN MURTHA JOHNSTOWN-CAMBRIA	PA	LPV200	5	0.997015	5	0.996573
LNS	LANCASTER	PA	LPV	4	0.997203	3	0.996486
ABE	LEHIGH VALLEY INTL	PA	LPV	4	0.996981	4	0.996388
RVL	MIFFLIN COUNTY	PA	LPV	4	0.996833	3	0.996313

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
UCP	NEW CASTLE MUNI	PA	LPV	5	0.996766	4	0.996339
PNE	NORTHEAST PHILADELPHIA	PA	LPV	4	0.997139	5	0.99672
PHL	PHILADELPHIA INTL	PA	LPV	4	0.997271	5	0.99689
PIT	PITTSBURGH INTL	PA	LPV200	8	0.997245	6	0.996667
MPO	POCONO MOUNTAINS MUNI	PA	LPV	4	0.996871	5	0.996471
RDG	READING RGNL/CARL A SPAATZ FIE	PA	LPV	4	0.997015	4	0.996486
FWQ	ROSTRAVER	PA	LPV	7	0.997335	6	0.996766
ZER	SCHUYLKILL COUNTY /JOE ZERBEY/	PA	LPV200	4	0.996758	4	0.996301
2G9	SOMERSET COUNTY	PA	LPV	7	0.997441	7	0.996883
OYM	ST MARYS MUNI	PA	LPV	3	0.996566	3	0.996252
UNV	UNIVERSITY PARK	PA	LPV200	4	0.996769	3	0.996305
FKL	VENANGO RGNL	PA	LPV	4	0.996603	4	0.99632
AFJ	WASHINGTON COUNTY	PA	LPV	6	0.997403	5	0.996773
AVP	WILKES-BARRE/SCRANTON INTL	PA	LPV	4	0.996735	4	0.996275
LOM	WINGS FIELD	PA	LPV	4	0.997117	5	0.996671
BID	BLOCK ISLAND STATE	RI	LPV	3	0.996649	4	0.996264
OQU	QUONSET STATE	RI	LPV	3	0.996592	4	0.996113
PVD	THEODORE FRANCIS GREEN STATE	RI	LPV	3	0.996569	4	0.996109
AIK	AIKEN MUNI	SC	LPV	0	1	2	0.999619
AND	ANDERSON RGNL	SC	LPV200	0	1	3	0.9998
BNL	BARNWELL RGNL	SC	LPV	0	1	2	0.999713
ARW	BEAUFORT COUNTY	SC	LPV200	1	0.999962	2	0.999815
MKS	BERKELEY COUNTY	SC	LPV	1	0.999883	2	0.99957
CHS	CHARLESTON AFB/INTL	SC	LPV200	1	0.999898	2	0.999577
JZI	CHARLESTON EXECUTIVE	SC	LPV200	1	0.999902	2	0.999581
DCM	CHESTER CATAWBA RGNL	SC	LPV	1	0.999879	3	0.999347
CAE	COLUMBIA METROPOLITAN	SC	LPV200	1	0.999913	2	0.999536
UDG	DARLINGTON COUNTY JETPORT	SC	LPV	1	0.999826	3	0.999355
GYH	DONALDSON CENTER	SC	LPV	0	1	4	0.999672
FLO	FLORENCE RGNL	SC	LPV	1	0.999838	3	0.999373
GGE	GEORGETOWN COUNTY	SC	LPV200	1	0.999872	3	0.999517
CRE	GRAND STRAND	SC	LPV200	1	0.999853	4	0.999396
GMU	GREENVILLE DOWNTOWN	SC	LPV200	0	1	3	0.999506
GSP	GREENVILLE SPARTANBURG INTL	SC	LPV200	0	1	3	0.999487
LKR	LANCASTER COUNTY-MC WHIRTER FI	SC	LPV200	1	0.999826	3	0.999347
RBW	LOWCOUNTRY RGNL	SC	LPV200	1	0.999913	2	0.999687
BBP	MARLBORO COUNTY JETPORT - H.E.	SC	LPV	1	0.999819	3	0.999336
LRO	MT PLEASANT RGNL-FAISON FIELD	SC	LPV	1	0.999894	2	0.999577
MYR	MYRTLE BEACH INTL	SC	LPV200	1	0.999853	4	0.999423
CEU	OCONEE COUNTY RGNL	SC	LPV	0	1	4	0.999766
OGB	ORANGEBURG MUNI	SC	LPV200	1	0.999906	2	0.999574
LQK	PICKENS COUNTY	SC	LPV	0	1	4	0.999698
DYB	SUMMERVILLE	SC	LPV200	1	0.999891	2	0.999574
SMS	SUMTER	SC	LPV200	1	0.999853	3	0.999415
CDN	WOODWARD FIELD	SC	LPV	1	0.999841	3	0.999381
ABR	ABERDEEN RGNL	SD	LPV200	3	0.996199	4	0.995773
BKX	BROOKINGS RGNL	SD	LPV	3	0.996426	4	0.99615
YKN	CHAN GURNEY MUNI	SD	LPV	3	0.996735	3	0.996335
VMR	HAROLD DAVIDSON FIELD	SD	LPV	3	0.996694	3	0.996426
HON	HURON RGNL	SD	LPV200	3	0.996554	3	0.996154
MHE	MITCHELL MUNI	SD	LPV	3	0.996596	3	0.996347
PIR	PIERRE RGNL	SD	LPV	4	0.996747	3	0.996286

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
RAP	RAPID CITY RGNL	SD	LPV200	3	0.997034	3	0.996433
ATY	WATERTOWN RGNL	SD	LPV200	4	0.996384	5	0.996037
ICR	WINNER RGNL	SD	LPV	3	0.996784	3	0.996524
PVE	BEECH RIVER RGNL	TN	LPV	1	0.999928	3	0.999555
0M4	BENTON COUNTY	TN	LPV	1	0.999823	4	0.999445
SYI	BOMAR FIELD-SHELBYVILLE MUNI	TN	LPV	0	1	4	0.999672
HZD	CARROLL COUNTY	TN	LPV	2	0.999804	4	0.999306
CSV	CROSSVILLE MEMORIAL-WHITSON FI	TN	LPV200	1	0.999936	6	0.999004
LUG	ELLINGTON	TN	LPV	0	1	3	0.999683
UCY	EVERETT-STEWART RGNL	TN	LPV	2	0.999634	4	0.999238
FYM	FAYETTEVILLE MUNI	TN	LPV	0	1	3	0.999868
GKT	GATLINBURG-PIGEON FORGE	TN	LPV	0	1	5	0.998981
PHT	HENRY COUNTY	TN	LPV200	2	0.999762	4	0.999211
DKX	KNOXVILLE DOWNTOWN ISLAND	TN	LPV	1	0.999951	5	0.998958
3M7	LAFAYETTE MUNI	TN	LPV	2	0.999709	7	0.998671
M54	LEBANON MUNI	TN	LPV	1	0.999872	6	0.99906
CHA	LOVELL FIELD	TN	LPV200	0	1	4	0.999838
MRC	MAURY COUNTY	TN	LPV	0	1	3	0.999619
TYS	MC GHEE TYSON	TN	LPV	0	1	6	0.999019
MKL	MC KELLAR-SIPES RGNL	TN	LPV200	1	0.999936	3	0.99957
MMI	MCMINN COUNTY	TN	LPV	0	1	6	0.999607
MEM	MEMPHIS INTL	TN	LPV200	0	1	3	0.999838
NQA	MILLINGTON RGNL JETPORT	TN	LPV	1	0.999992	4	0.999611
MBT	MURFREESBORO MUNI	TN	LPV	1	0.999943	5	0.999392
BNA	NASHVILLE INTL	TN	LPV200	1	0.999883	5	0.999256
CKV	OUTLAW FIELD	TN	LPV	1	0.999762	4	0.999022
SZY	ROBERT SIBLEY	TN	LPV	0	1	3	0.999611
SNH	SAVANNAH-HARDIN COUNTY	TN	LPV	0	1	3	0.999747
MQY	SMYRNA	TN	LPV	1	0.999909	6	0.999328
SRB	UPPER CUMBERLAND RGNL	TN	LPV200	1	0.999906	6	0.998962
BGF	WINCHESTER MUNI	TN	LPV	0	1	3	0.999853
ABI	ABILENE RGNL	TX	LPV200	0	1	0	1
ADS	ADDISON	TX	LPV	0	1	0	1
ALI	ALICE INTL	TX	LPV	0	1	1	0.999845
E11	ANDREWS COUNTY	TX	LPV	0	1	0	1
LFK	ANGELINA COUNTY	TX	LPV	0	1	1	0.999966
RKP	ARANSAS CO	TX	LPV	0	1	1	0.999841
GKY	ARLINGTON MUNI	TX	LPV200	0	1	0	1
EDC	AUSTIN EXECUTIVE	TX	LPV200	0	1	1	0.999962
BPG	BIG SPRING MC MAHON-WRINKLE	TX	LPV	0	1	0	1
11R	BRENHAM MUNI	TX	LPV	0	1	1	0.99994
XBP	BRIDGEPORT MUNI	TX	LPV	0	1	0	1
BWD	BROWNWOOD RGNL	TX	LPV	0	1	0	1
E30	BRUCE FIELD	TX	LPV	0	1	0	1
TKI	COLLIN COUNTY RGNL AT MC KINNE	TX	LPV200	0	1	1	0.999992
CRP	CORPUS CHRISTI INTL	TX	LPV200	0	1	2	0.999834
CFD	COULTER FIELD	TX	LPV	0	1	1	0.999962
PRX	COX FIELD	TX	LPV	0	1	1	0.99997
BBD	CURTIS FIELD	TX	LPV	0	1	0	1
RBD	DALLAS EXECUTIVE	TX	LPV	0	1	0	1
DAL	DALLAS LOVE FIELD	TX	LPV	0	1	0	1
DFW	DALLAS/FORT WORTH INTL	TX	LPV200	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
DWH	DAVID WAYNE HOOKS MEMORIAL	TX	LPV	0	1	1	0.999917
LUD	DECATUR MUNI	TX	LPV	0	1	1	0.999992
DRT	DEL RIO INTL	TX	LPV	0	1	1	0.999951
DTO	DENTON MUNI	TX	LPV	0	1	1	0.999992
TPL	DRAUGHON-MILLER CENTRAL TEXAS	TX	LPV200	0	1	1	0.999996
GGG	EAST TEXAS RGNL	TX	LPV	0	1	0	1
EFD	ELLINGTON FIELD	TX	LPV	0	1	1	0.999887
FST	FORT STOCKTON-PECOS COUNTY	TX	LPV	0	1	0	1
FTW	FORT WORTH MEACHAM INTL	TX	LPV200	0	1	0	1
FWS	FORT WORTH SPINKS	TX	LPV	0	1	0	1
GNC	GAINES COUNTY	TX	LPV	0	1	0	1
GLE	GAINESVILLE MUNI	TX	LPV	0	1	1	0.999966
IAH	GEORGE BUSH INTERCONTINENTAL/H	TX	LPV	0	1	1	0.999909
GDJ	GRANBURY RGNL	TX	LPV	0	1	0	1
PVW	HALE COUNTY	TX	LPV	0	1	0	1
HRX	HEREFORD MUNI	TX	LPV200	0	1	0	1
INJ	HILLSBORO MUNI	TX	LPV	0	1	0	1
HDO	HONDO MUNI	TX	LPV	0	1	1	0.999936
TME	HOUSTON EXECUTIVE	TX	LPV	0	1	1	0.999913
AXH	HOUSTON-SOUTHWEST	TX	LPV	0	1	1	0.999887
UTS	HUNTSVILLE MUNI	TX	LPV	0	1	1	0.999955
BPT	JACK BROOKS RGNL	TX	LPV200	0	1	1	0.999887
JAS	JASPER COUNTY-BELL FIELD	TX	LPV	0	1	2	0.999925
HBV	JIM HOGG COUNTY	TX	LPV	0	1	2	0.999834
ERV	KERRVILLE MUNI/LOUIS SCHREINER	TX	LPV	0	1	1	0.999958
IKG	KLEBERG COUNTY	TX	LPV	0	1	2	0.99983
LNC	LANCASTER RGNL	TX	LPV200	0	1	0	1
LRD	LAREDO INTL	TX	LPV	0	1	1	0.999857
LLN	LEVELLAND MUNI	TX	LPV	0	1	0	1
CXO	LONE STAR EXECUTIVE	TX	LPV200	0	1	1	0.999932
LBB	LUBBOCK PRESTON SMITH INTL	TX	LPV200	0	1	0	1
GVT	MAJORS	TX	LPV	0	1	0	1
5T9	MAVERICK COUNTY MEMORIAL INTL	TX	LPV	0	1	1	0.999925
MFE	MC ALLEN MILLER INTL	TX	LPV	0	1	2	0.999691
HQZ	MESQUITE METRO	TX	LPV	0	1	0	1
JWY	MID-WAY RGNL	TX	LPV200	0	1	0	1
MAF	MIDLAND INTL	TX	LPV	0	1	0	1
DUX	MOORE COUNTY	TX	LPV200	0	1	2	0.999766
RAS	MUSTANG BEACH	TX	LPV	0	1	2	0.999826
BAZ	NEW BRAUNFELS MUNI	TX	LPV	0	1	1	0.99994
ODO	ODESSA-SCHLEMEYER FIELD	TX	LPV200	0	1	0	1
ORG	ORANGE COUNTY	TX	LPV	0	1	1	0.999887
PIL	PORT ISABEL-CAMERON COUNTY	TX	LPV	0	1	2	0.999668
AMA	RICK HUSBAND AMARILLO INTL	TX	LPV200	0	1	0	1
GRK	ROBERT GRAY AAF	TX	LPV200	0	1	1	0.999996
SJT	SAN ANGELO RGNL/MATHIS FIELD	TX	LPV	0	1	0	1
SAT	SAN ANTONIO INTL	TX	LPV200	0	1	1	0.999936
GLS	SCHOLES INTL AT GALVESTON	TX	LPV	0	1	1	0.99986
EBG	SOUTH TEXAS INTL AT EDINBURG	TX	LPV	0	1	2	0.999728
SGR	SUGAR LAND RGNL	TX	LPV	0	1	1	0.999898
TFP	T P MC CAMPBELL	TX	LPV	0	1	1	0.999838
TRL	TERRELL MUNI	TX	LPV	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
LBX	TEXAS GULF COAST RGNL	TX	LPV	0	1	1	0.999864
TYR	TYLER POUNDS RGNL	TX	LPV	0	1	0	1
VCT	VICTORIA RGNL	TX	LPV	0	1	1	0.999879
ACT	WACO RGNL	TX	LPV200	0	1	0	1
ARM	WHARTON RGNL	TX	LPV	0	1	1	0.999887
F05	WILBARGER COUNTY	TX	LPV	0	1	0	1
HOU	WILLIAM P HOBBY	TX	LPV	0	1	1	0.999891
BCE	BRYCE CANYON	UT	LPV	0	1	2	0.999804
FOM	FILLMORE MUNI	UT	LPV	1	0.99983	2	0.999434
LGU	LOGAN-CACHE	UT	LPV	6	0.999487	4	0.998487
OGD	OGDEN-HINCKLEY	UT	LPV	3	0.999766	5	0.998879
PVU	PROVO MUNI	UT	LPV	2	0.999906	4	0.999623
DXZ	ST GEORGE MUNI	UT	LPV	1	0.999966	3	0.999623
MFV	ACCOMACK COUNTY	VA	LPV	3	0.997868	6	0.997351
MTV	BLUE RIDGE	VA	LPV	3	0.999128	4	0.998037
CHO	CHARLOTTESVILLE-ALBEMARLE	VA	LPV	5	0.998528	7	0.997064
FCI	CHESTERFIELD COUNTY	VA	LPV	3	0.998687	9	0.997385
CJR	CULPEPER RGNL	VA	LPV	6	0.997977	7	0.997003
DAN	DANVILLE RGNL	VA	LPV200	3	0.999166	4	0.997951
PTB	DINWIDDIE COUNTY	VA	LPV	2	0.998713	8	0.99746
FVX	FARMVILLE RGNL	VA	LPV	2	0.998868	6	0.997611
OFP	HANOVER COUNTY MUNI	VA	LPV	4	0.998479	9	0.997211
HSP	INGALLS FIELD	VA	LPV	4	0.998547	5	0.99763
0VG	LEE COUNTY	VA	LPV	2	0.999411	5	0.998419
JYO	LEESBURG EXECUTIVE	VA	LPV	5	0.997498	6	0.997011
LNP	LONESOME PINE	VA	LPV	2	0.999302	5	0.998166
LKU	LOUISA COUNTY/FREEMAN FIELD	VA	LPV	5	0.998554	7	0.99706
LYH	LYNCHBURG RGNL/PRESTON GLENN F	VA	LPV	2	0.99883	5	0.997879
HEF	MANASSAS RGNL/HARRY P. DAVIS F	VA	LPV	5	0.997683	7	0.997026
AVC	MECKLENBURG-BRUNSWICK RGNL	VA	LPV	2	0.998849	7	0.997686
FYJ	MIDDLE PENINSULA RGNL	VA	LPV	5	0.998177	18	0.997177
MKJ	MOUNTAIN EMPIRE	VA	LPV	3	0.998936	5	0.997973
PSK	NEW RIVER VALLEY	VA	LPV	3	0.998826	5	0.997947
PHF	NEWPORT NEWS/WILLIAMSBURG INTL	VA	LPV200	5	0.998343	23	0.997041
RIC	RICHMOND INTL	VA	LPV200	4	0.998502	10	0.997339
SHD	SHENANDOAH VALLEY RGNL	VA	LPV200	4	0.998396	7	0.997181
RMN	STAFFORD RGNL	VA	LPV	5	0.997902	7	0.997052
XSA	TAPPAHANNOCK-ESSEX COUNTY	VA	LPV	4	0.99803	9	0.997215
VJI	VIRGINIA HIGHLANDS	VA	LPV	3	0.999302	5	0.998226
BCB	VIRGINIA TECH/MONTGOMERY EXECU	VA	LPV	3	0.99883	5	0.997951
IAD	WASHINGTON DULLES INTL	VA	LPV200	5	0.997626	6	0.997041
W78	WILLIAM M TUCK	VA	LPV	2	0.999026	5	0.998
OKV	WINCHESTER RGNL	VA	LPV200	6	0.997709	7	0.996996
MPV	EDWARD F KNAPP STATE	VT	LPV	3	0.996358	4	0.995765
FSO	FRANKLIN COUNTY STATE	VT	LPV	3	0.99632	4	0.995618
BLI	BELLINGHAM INTL	WA	LPV	2	0.997622	2	0.997245
HQM	BOWERMAN	WA	LPV200	2	0.997607	31	0.996901
PWT	BREMERTON NATIONAL	WA	LPV	2	0.997751	6	0.997339
DEW	DEER PARK	WA	LPV	2	0.997717	3	0.997162
TDO	ED CARLSON MEMORIAL FIELD - SO	WA	LPV	2	0.99792	15	0.997234
EPH	EPHRATA MUNI	WA	LPV	2	0.997751	3	0.99732
FHR	FRIDAY HARBOR	WA	LPV	2	0.997611	2	0.997377

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
MWH	GRANT CO INTL	WA	LPV200	2	0.997751	5	0.997305
OLM	OLYMPIA RGNL	WA	LPV	2	0.997732	10	0.997268
PUW	PULLMAN/MOSCOW RGNL	WA	LPV	2	0.997751	4	0.997169
RNT	RENTON MUNI	WA	LPV	2	0.997826	5	0.99732
RLD	RICHLAND	WA	LPV	2	0.997751	3	0.997305
SEA	SEATTLE-TACOMA INTL	WA	LPV200	2	0.997826	6	0.997317
BVS	SKAGIT RGNL	WA	LPV	2	0.997652	2	0.997354
PAE	SNOHOMISH COUNTY (PAINE FLD)	WA	LPV	2	0.997683	3	0.997354
OTH	SOUTHWEST OREGON RGNL	WA	LPV	2	0.998622	90	0.993524
GEG	SPOKANE INTL	WA	LPV200	2	0.997751	3	0.997158
TIW	TACOMA NARROWS	WA	LPV	2	0.997747	7	0.997286
PSC	TRI-CITIES	WA	LPV200	2	0.997751	3	0.997317
ALW	WALLA WALLA RGNL	WA	LPV	3	0.997894	3	0.997188
CLM	WILLIAM R FAIRCHILD INTL	WA	LPV	2	0.997611	3	0.997418
YKM	YAKIMA AIR TERMINAL/MCALLISTER	WA	LPV	2	0.997769	3	0.997347
GRB	AUSTIN STRAUBEL INTL	WI	LPV200	4	0.996184	5	0.995713
DLL	BARABOO WISCONSIN DELLS	WI	LPV	3	0.996199	5	0.995894
OVS	BOSCOBEL	WI	LPV	3	0.99626	5	0.995916
EAU	CHIPPEWA VALLEY RGNL	WI	LPV200	3	0.996079	4	0.995713
CLI	CLINTONVILLE MUNI	WI	LPV	4	0.996154	5	0.995694
UNU	DODGE COUNTY	WI	LPV	3	0.996286	5	0.995845
SUE	DOOR COUNTY CHERRYLAND	WI	LPV	3	0.996173	5	0.995656
EGV	EAGLE RIVER UNION	WI	LPV	5	0.995886	5	0.995207
FLD	FOND DU LAC COUNTY	WI	LPV	3	0.996294	5	0.99583
MKE	GENERAL MITCHELL INTL	WI	LPV200	3	0.996335	4	0.995833
ASX	JOHN F KENNEDY MEMORIAL	WI	LPV	4	0.995524	7	0.995086
RAC	JOHN H BATTEN	WI	LPV	3	0.996373	4	0.995845
ENW	KENOSHA RGNL	WI	LPV200	3	0.996411	4	0.995852
LSE	LA CROSSE MUNI	WI	LPV	3	0.996181	5	0.995909
ARV	LAKELAND/NOBLE F. LEE MEMORIAL	WI	LPV	4	0.99592	5	0.995229
MTW	MANITOWOC COUNTY	WI	LPV200	3	0.996267	5	0.995671
MFI	MARSHFIELD MUNI	WI	LPV	3	0.996101	4	0.995731
LUM	MENOMONIE MUNI-SCORE FIELD	WI	LPV	3	0.99609	4	0.995709
RRL	MERRILL MUNI	WI	LPV	4	0.996007	5	0.995554
C29	MIDDLETON MUNI - MOREY FIELD	WI	LPV	3	0.99623	5	0.995897
ATW	OUTAGAMIE COUNTY RGNL	WI	LPV200	3	0.996192	4	0.995735
PVB	PLATTEVILLE MUNI	WI	LPV	3	0.996392	5	0.995943
PBH	PRICE COUNTY	WI	LPV	4	0.995977	6	0.99538
RHI	RHINELANDER-ONEIDA COUNTY	WI	LPV200	4	0.995981	6	0.995422
RPD	RICE LAKE RGNL - CARL'S FIELD	WI	LPV	3	0.996037	5	0.995531
HYR	SAWYER COUNTY	WI	LPV	3	0.995833	6	0.995271
SBM	SHEBOYGAN COUNTY MEMORIAL	WI	LPV	3	0.996309	4	0.995694
JVL	SOUTHERN WISCONSIN RGNL	WI	LPV200	3	0.996388	5	0.995886
STE	STEVENS POINT MUNI	WI	LPV200	3	0.996105	4	0.995788
MDZ	TAYLOR COUNTY	WI	LPV	3	0.996018	5	0.995577
TKV	TOMAHAWK RGNL	WI	LPV	4	0.995981	5	0.995475
LNR	TRI-COUNTY RGNL	WI	LPV	3	0.996248	5	0.995905
UES	WAUKESHA COUNTY	WI	LPV200	3	0.99632	5	0.995905
ETB	WEST BEND MUNI	WI	LPV	3	0.996316	4	0.995739
OSH	WITTMAN RGNL	WI	LPV	3	0.996192	5	0.995845
MRB	EASTERN WV RGNL/SHEPHERD FLD	WV	LPV	5	0.997471	6	0.997
LWB	GREENBRIER VALLEY	WV	LPV	4	0.998558	5	0.997652

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
3I2	MASON COUNTY	WV	LPV	4	0.998162	4	0.997283
BLF	MERCER COUNTY	WV	LPV	3	0.99886	5	0.997834
PKB	MID-OHIO VALLEY RGNL	WV	LPV	4	0.99789	5	0.997026
MGW	MORGANTOWN MUNI-WALTER L. BILL	WV	LPV200	5	0.997603	5	0.99695
CKB	NORTH CENTRAL WEST VIRGINIA	WV	LPV200	5	0.998003	5	0.996977
BKW	RALEIGH COUNTY MEMORIAL	WV	LPV200	4	0.998653	5	0.997641
HTS	TRI-STATE/MILTON J. FERGUSON F	WV	LPV	3	0.998645	4	0.997479
HLG	WHEELING OHIO CO	WV	LPV200	6	0.997407	5	0.996701
CRW	YEAGER	WV	LPV200	4	0.998358	4	0.997411
CPR	CASPER/NATRONA COUNTY INTL	WY	LPV	2	0.998245	4	0.997264
CYS	CHEYENNE RGNL/JERRY OLSON FIEL	WY	LPV	6	0.999087	4	0.997966
DGW	CONVERSE COUNTY	WY	LPV200	2	0.998241	4	0.997271
EVW	EVANSTON-UINTA COUNTY BURNS FI	WY	LPV	1	0.999925	5	0.998739
GCC	GILLETTE-CAMPBELL COUNTY	WY	LPV	4	0.997498	3	0.996886
JAC	JACKSON HOLE	WY	LPV	3	0.998468	2	0.997819
LAR	LARAMIE RGNL	WY	LPV	4	0.999053	5	0.998037
RWL	RAWLINS MUNI/HARVEY FIELD	WY	LPV	3	0.998543	4	0.998094
RIW	RIVERTON RGNL	WY	LPV200	2	0.998211	4	0.997792
RKS	ROCK SPRINGS-SWEETWATER COUNTY	WY	LPV200	4	0.999453	3	0.998279
SHR	SHERIDAN COUNTY	WY	LPV	5	0.997615	3	0.997
COD	YELLOWSTONE RGNL	WY	LPV	4	0.99806	4	0.997056

Figure 8-1 WAAS LPV Availability at US Airports with GPS RNAV Instrument Approach Procedures

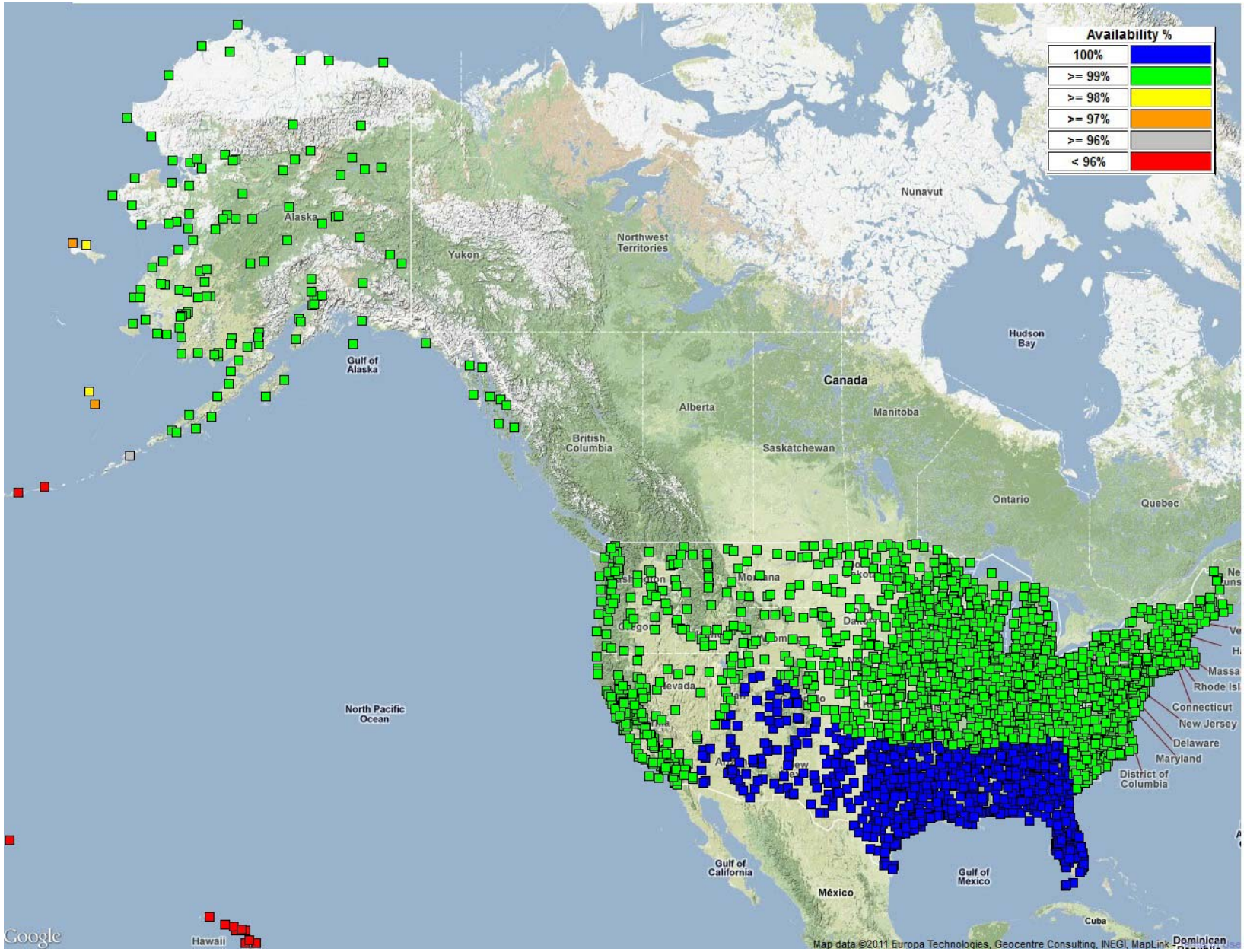


Figure 8-2 WAAS LPV Outages at US Airports with GPS RNAV Instrument Approach Procedures

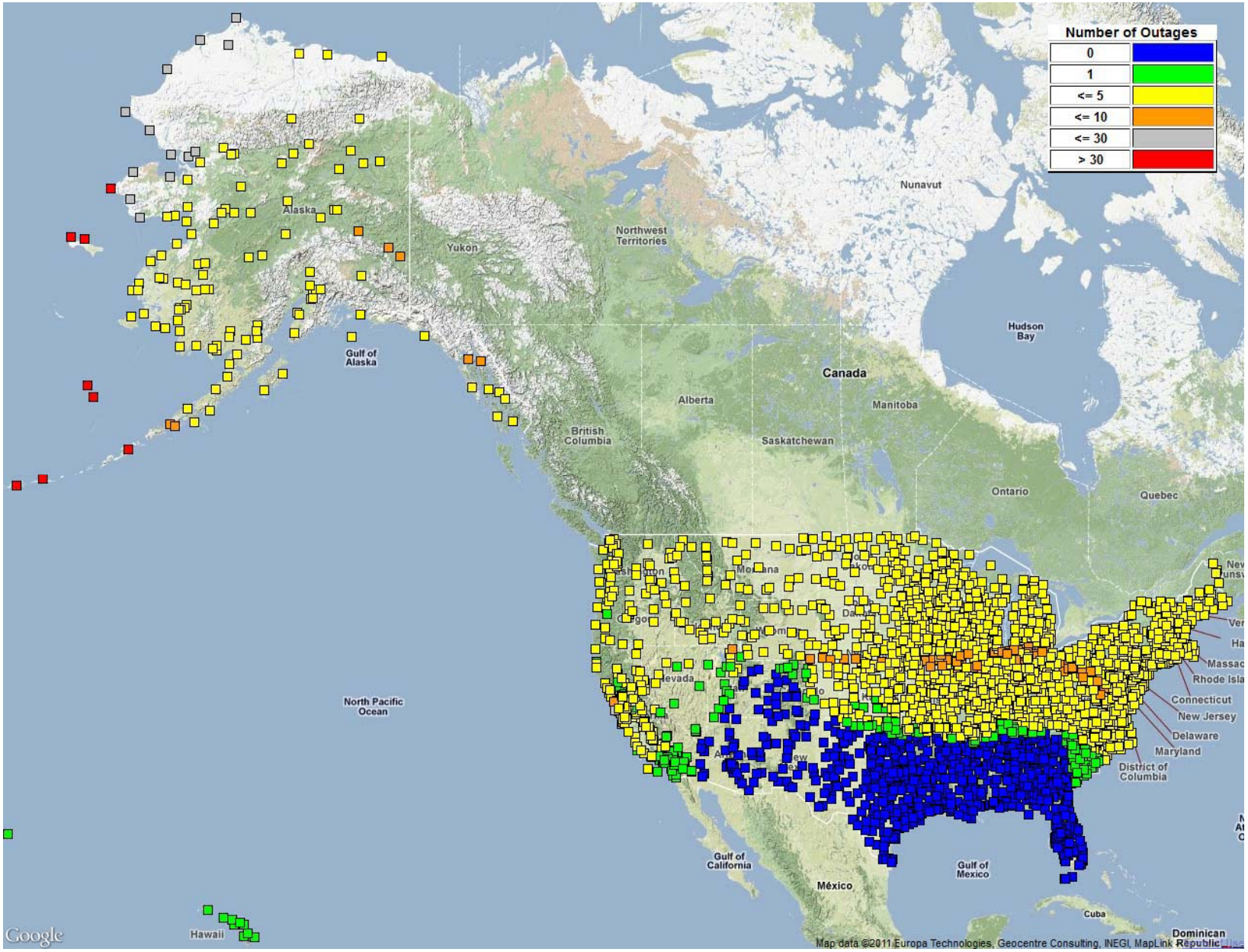


Figure 8-3 WAAS LPV 200 Availability at US Airports with GPS RNAV Instrument Approach Procedures

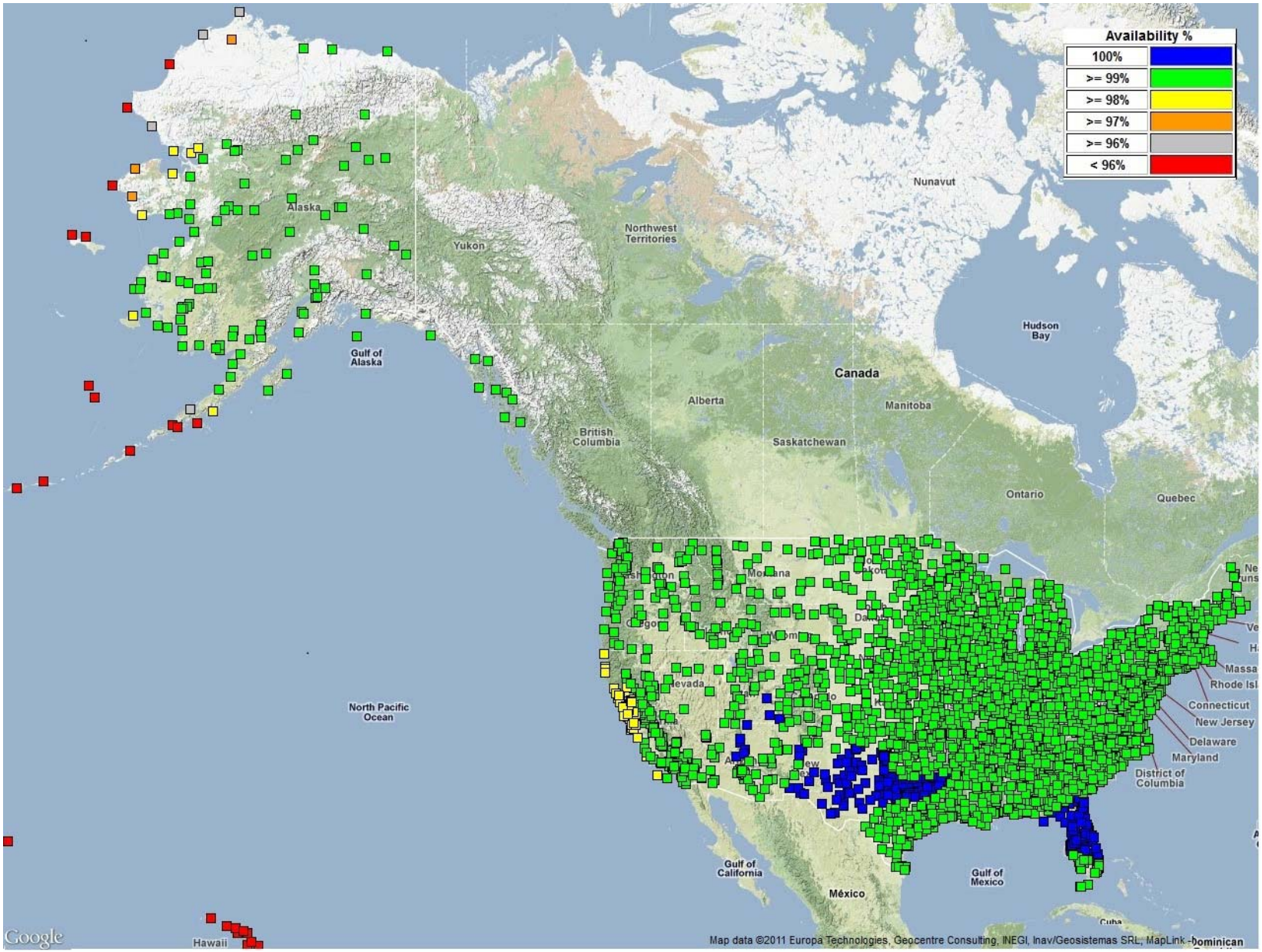
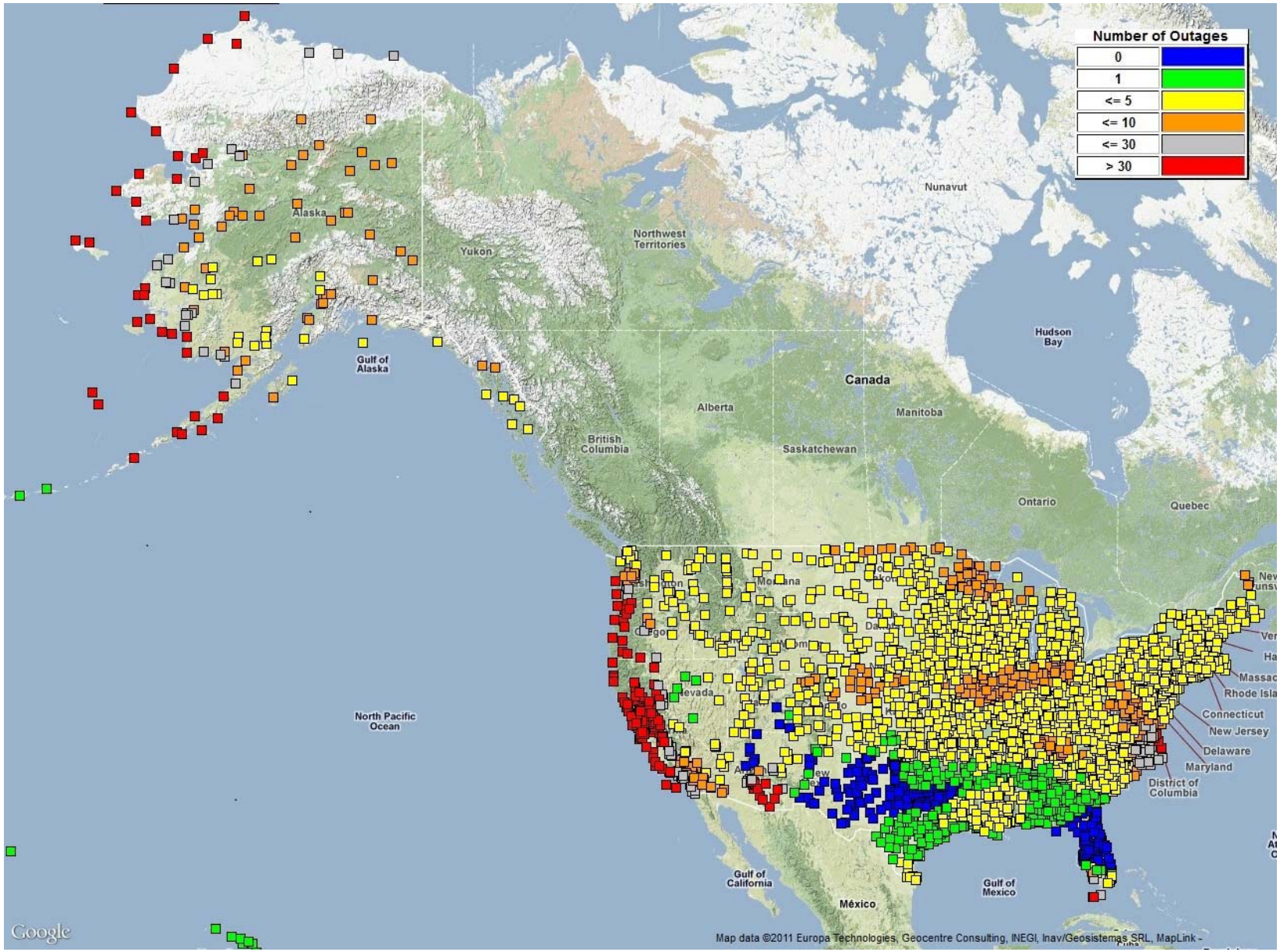


Figure 8-4 WAAS LPV 200 Outages at US Airports with GPS RNAV Instrument Approach Procedures



9.0 WAAS DETERMINISTIC CODE NOISE AND MULTIPATH (CNMP) BOUNDING ANALYSIS

WAAS utilizes a deterministic model to estimate the residual CNMP noise after the application of standard dual frequency carrier smoothing techniques to minimize the effects of multipath and code noise. This analysis performs an assessment of how well that deterministic model bounds the actual errors. This analysis is periodically performed as part of the WAAS Test Team's off-line monitoring to ensure that there are no drastic detrimental changes to the multipath environment at the WAAS Reference Stations (WRSs). This analysis also ensures that WAAS system is not indefinitely exposed to conspiring receiver failure symptoms that would invalidate the CNMP bounding estimate in a manner that would exceed the assumption that no more than one reference station is conspiring to deceive the WAAS monitors at any time by underestimating the residual measurement noise the safety monitors. Although some failures mechanisms that cause CNMP bounding issues are occasionally seen, no "conspiring" errors have ever been detected. That is, data has caused the safety monitors to trip unnecessarily versus missing a necessary trip.

The analysis post processes measurement data to estimate the pseudorange code to carrier ambiguity for each entire arc of measurements for each satellite pass. The ambiguity estimate is then used to level the carrier measurement. The leveled carrier is then used as a multipath free truth estimate. The WAAS real time deterministic CNMP smoothing algorithm is then applied to the original measurements. The difference between the smoothed measurements and the leveled truth measurements is compared to the deterministic noise estimates. Only arcs with continuous carrier phase greater in length than 7200 seconds are utilized for this analysis to minimize the impacts of non-zero mean multipath biasing the truth estimates. The WAAS dual frequency cycle slip detector algorithm is used to detect any discontinuities in the carrier phase.

Statistics are calculated on how well the 0.1 multiples of the deterministically estimated standard deviation bounds the difference between the leveled truth and the real time smoothed measurements. Those statistics are then compared to a theoretical Gaussian distribution and an extensive set of plots are generated and manually reviewed. Table 9.1 recaps the results of that manual analysis.

Table 9-1 CNMP Bounding Statistics

WAAS Site	WRE	Oct 10	Nov 10	Dec 10	Jan 11	Feb 11	Mar 11	Apr 11	May 11	Jun 11	Jul 11	Aug 11	Sep 11
Albuquerque	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Anchorage	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Atlanta	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Barrow	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Bethel	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Billings	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Boston	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Chicago	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Cleveland	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Cold Bay	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Dallas	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Denver	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Fairbanks	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Gander	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Goose Bay	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Honolulu	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Houston	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Iqaluit	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Jacksonville	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●

● **Excellent** - 3.29σ bounded 100%
● **Good** - 4σ bounded 100%
● **Fair** - 4σ bounded 100% with one worst satellite excluded (Requires manual review if symptoms repeat from month to month)
● **Poor** – Requires manual review
– No data available

WAAS Site	WRE	Oct 10	Nov 10	Dec 10	Jan 11	Feb 11	Mar 11	Apr 11	May 11	Jun 11	Jul 11	Aug 11	Sep 11
Juneau	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Kansas City	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Kotzebue	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Los Angeles	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Memphis	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Merida	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Mexico City	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Miami	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Minneapolis	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
New York	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Oakland	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Puerto Vallarta	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Salt Lake City	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
San Jose Del Cabo	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
San Juan	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Seattle	A	●	●	●	●	●	●	●	●	●	●	–	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Tapachula	A	–	–	●	●	●	●	●	●	–	–	–	–
	B	–	–	●	●	●	●	●	●	–	–	–	–
	C	–	–	–	–	–	●	●	●	–	–	–	–
Washington, DC	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●
Winnipeg	A	●	●	●	●	●	●	●	●	●	●	●	●
	B	●	●	●	●	●	●	●	●	●	●	●	●
	C	●	●	●	●	●	●	●	●	●	●	●	●

● **Excellent** - 3.29σ bounded 100%
● **Good** - 4σ bounded 100%
● **Fair** - 4σ bounded 100% with one worst satellite excluded (Requires manual review if symptoms repeat from month to month)
● **Poor** – Requires manual review
– No data available

10.0 WAAS REFERENCE STATION SURVEY VALIDATION

Antenna L1 phase center position surveys were performed for the WAAS antennas using a 25 hour set of data from 23:00 on 10/3/11 to 23:59:30 on 10/4/11 for all of the WAAS receivers with the following exceptions. ZSU used 9/17/11 data because ZSU has been turned off to support reconstruction of the San Juan facility's roof. ZSU will need a completely new survey and an update to the WAAS software before it is reintroduced into WAAS when the construction is completed. MMX3 used 9/21/11 data because it was off line awaiting repair when the 10/3/11 data set was composed. HNL1 used 10/21/11 data because OPUS was returning extremely high overall RMS metrics (thousands of meters) for the 10/3/11 even though the position was accurate, matched CSRS, and had very good ECEF standard deviations. MTP used 10/26/11 data because it was not returned to service until after 10/3/11. MTP had been out of service due to lightning damage to the communications equipment. ZFW used 10/29/11 data because OPUS was indicating high overall RMS metrics (greater than 3 cm) for the 10/3/11 data. ZHU2 used 11/4/11 data because a less than 3 cm overall RMS metric was not achieved for the OPUS IRTF00 solution even though OPUS IGS08 solution was good. For ZHU2, debugging efforts found that OPUS was not selecting the same reference sites. When the problem reference site was identified and manually excluded, the problem was resolved.

Surveys were performed using the National Geodetic Survey (NGS) Online Positioning User Service (OPUS) and the Canadian Spatial Reference System (CSRS) Precise Point Positioning (PPP) service. OPUS is in the process of revising the national reference frame from IRTF00 to IGS08. Until that update is complete, OPUS is providing the opportunity to select either reference frame. When the update is complete, the ITRF00 frame will no longer be supported. For this PAN report OPUS solutions were performed in both frames using the same input files. The average difference in ECEF position between the ITRF00 and IGS08 solutions was 3.3 cm and the maximum difference was 6.1 cm for JNU1. The overall RMS quality metrics reported by OPUS were all less than or equal to 2.5 cm for both the ITRF00 and IGS08 solutions. The overall RMS metrics for the OPUS ITRF00 and IGS08 reference frame solutions agreed with an average difference of 0.1 mm and maximum difference of 0.4 mm. The CSRS surveys' RSSs of the reported ECEF sigmas were all less than equal to 1.2 cm with the exception of MMX3 which was 2.6 cm. MMX3 being an outlier is not unexpected because the receiver quality was slightly degraded prior to its failure. The OPUS IGS08 and CSRS surveys agreed to an average of 1.4 cm with a maximum at 4 cm for MSD2. The southern sites (Mexico, San Juan, and Miami) were slight (1 to 2 cm) outliers between OPUS and CSRS for both the ITRF00 and IGS08 OPUS solutions.

The OPUS IGS08 positions were compared to the positions in the current WAAS software build 6.097 that was fielded in October 2011.

The OPUS IGS08 surveys agree with the build 6.097 positions to better or equal 8.2 cm with the expected exception of Mexico City which is 18 cm because build 6.097 anticipates subsidence at MMX that has yet to occur. The "take action" threshold established by the WAAS Integrity Performance Panel (WIPP) is 25 cm for Mexico City and 10 cm for the remaining sites.

Table 10.1 lists the WAAS antenna L1 phase center positions as of 10/3/11. The positions are the OPUS IGS08 estimated positions.

Figure 10.1 to 10.3 show the RSS of the ECEF differences between the 10/3/11 OPUS survey antenna phase center locations and the locations in the WAAS build 6.097 software which was fielded during October 2011. Each reference station has three independent strings of WAAS receiving equipment (WRE). A surveyed antenna phase center location is required for each WRE. All three strings of a reference station are shown in the three figures. For example, BET1 identifies the RSS delta for the Bethel WRE string 1(A). The next two bars in the chart are Bethel string 2(B) and Bethel string 3(C). Figure 10.4 to 10.6 show the OPUS overall RMS quality indications.

Figure 10.7 to 10.9 show the RSS of the ECEF difference between the positions obtained from OPUS and the positions obtained from the Canadian Spatial Reference System (CSRS). Note that that OPUS positions are in ITRF-2000 and the CSRS positions are in ITRF-2008. Figures 10.10 to 10.12 show the RSS of the ECEF sigmas reported by CSRS.

Table 10-1 WAAS Antenna Positions (OPUS IGS08) as of 10/3/11

WRE	X(m)	Y(m)	Z(m)	Latitude	Longitude	H(m)
BET1	-2965385.014	-972576.616	5543892.939	60.7879159027778	-161.8417248944440	52.203
BET2	-2965385.785	-972580.337	5543891.887	60.7878964722222	-161.8416643916670	52.208
BET3	-2965388.357	-972577.470	5543891.021	60.7878805333333	-161.8417291222220	52.209
BIL1	-1416445.851	-4223577.019	4550862.185	45.8037071000000	-108.5397227055560	1112.262
BIL2	-1416449.920	-4223574.879	4550862.904	45.8037163500000	-108.5397810750000	1112.265
BIL3	-1416441.546	-4223574.281	4550866.037	45.8037568277778	-108.5396814083330	1112.260
BRW1	-1886758.885	-809058.662	6018494.500	71.2827652916667	-156.7899243805560	15.583
BRW2	-1886756.299	-809055.918	6018495.682	71.2827980444444	-156.7899663222220	15.592
BRW3	-1886755.206	-809059.698	6018495.501	71.2827934055556	-156.7898573388890	15.577
CDB1	-3484099.016	-1084748.792	5213678.671	55.1923745916667	-162.7064043722220	49.713
CDB2	-3484105.662	-1084741.585	5213675.719	55.1923284555556	-162.7065434388890	49.688
CDB3	-3484111.926	-1084734.826	5213672.973	55.1922850833333	-162.7066740055560	49.701
FAI1	-2304741.775	-1448715.272	5748843.711	64.8096303861111	-147.8473405944440	149.944
FAI2	-2304741.294	-1448706.461	5748846.094	64.8096808444444	-147.8474922138890	149.931
FAI3	-2304732.765	-1448707.399	5748849.251	64.8097474527778	-147.8473799666670	149.927
HNL1	-5508637.108	-2234493.372	2303722.183	21.3129900916667	-157.9208269861110	24.694
HNL2	-5508656.266	-2234483.691	2303686.932	21.3126471583333	-157.9209828611110	25.031
HNL3	-5508647.692	-2234497.628	2303694.036	21.3127158166667	-157.9208273194440	25.091
JNU1	-2354254.862	-2388549.652	5407043.139	58.3625748833333	-134.5857066277780	16.111
JNU2	-2354252.781	-2388565.761	5407036.967	58.3624692888889	-134.5854881194440	16.108
JNU3	-2354239.563	-2388568.619	5407041.426	58.3625456527778	-134.5852930166670	16.105
MMD1	35070.434	-5959686.689	2264365.777	20.9319092777778	-89.6628405555556	29.144
MMD2	35065.509	-5959687.055	2264364.991	20.9319015583333	-89.6628879222222	29.177
MMD3	35065.171	-5959685.269	2264369.647	20.9319466055556	-89.6628910694445	29.171
MMX1	-948701.110	-5943935.758	2109212.762	19.4316535527778	-99.0683895277778	2235.757
MMX2	-948696.695	-5943935.594	2109215.190	19.4316768083333	-99.0683482722222	2235.756
MMX3	-948705.552	-5943935.962	2109210.341	19.4316302277778	-99.0684309750000	2235.802
MPR1	-1570142.215	-5759530.633	2238184.771	20.6790033666667	-105.2492030861110	11.008
MPR2	-1570139.386	-5759530.137	2238188.819	20.6790414750000	-105.2491781416670	11.294
MPR3	-1570143.496	-5759528.006	2238190.588	20.6790595333333	-105.2492215805560	11.006
MSD1	-1979519.700	-5523223.070	2493106.791	23.1604468750000	-109.7176478111110	104.293
MSD2	-1979521.263	-5523225.397	2493100.389	23.1603840750000	-109.7176545111110	104.274
MSD3	-1979525.720	-5523222.144	2493104.069	23.1604201583333	-109.7177062027780	104.289
MTP1	-254854.341	-6162909.174	1617805.112	14.7913663861111	-92.3679990638889	54.961
MTP2	-254850.720	-6162910.220	1617801.688	14.7913344000000	-92.3679650555555	54.953
MTP3	-254855.484	-6162910.326	1617800.161	14.7913203583333	-92.3680092305555	54.855
OTZ1	-2396055.993	-750356.164	5843502.552	66.8873325055556	-162.6113726666670	10.909
OTZ2	-2396052.823	-750354.333	5843504.082	66.8873673527778	-162.6113909222220	10.914
OTZ3	-2396052.801	-750358.275	5843503.593	66.8873560888889	-162.6113049277780	10.918
YFB1	1035381.485	-2634289.651	5696539.533	63.7314903055556	-68.5431827944444	10.031
YFB2	1035372.277	-2634296.060	5696538.182	63.7314640527778	-68.5434037250000	9.969
YFB3	1035366.200	-2634306.811	5696534.411	63.7313864722222	-68.5435978222222	10.032

WRE	X(m)	Y(m)	Z(m)	Latitude	Longitude	H(m)
YQX1	2430424.663	-3419640.396	4788223.840	48.9664899194444	-54.5976318694444	146.897
YQX2	2430432.622	-3419639.049	4788220.783	48.9664480472222	-54.5975326138889	146.898
YQX3	2430440.532	-3419637.681	4788217.779	48.9664067944444	-54.5974337361111	146.908
YWG1	-520164.336	-4083475.890	4855843.006	49.9005745222222	-97.2593971583333	222.039
YWG2	-520150.469	-4083468.834	4855850.392	49.9006774777778	-97.2592181027778	222.052
YWG3	-520152.330	-4083477.954	4855842.572	49.9005683611111	-97.2592277583333	222.049
YYR1	1885341.455	-3321428.358	5091171.648	53.3086469666667	-60.4194678805556	37.848
YYR2	1885344.409	-3321419.877	5091176.067	53.3087133277778	-60.4193665333333	37.856
YYR3	1885340.130	-3321413.063	5091182.073	53.3088034861111	-60.4193718972222	37.869
ZAB1	-1488636.822	-5003946.565	3654557.729	35.1735754527778	-106.5673494777780	1620.153
ZAB2	-1488631.482	-5003948.240	3654557.704	35.1735748388889	-106.5672880638890	1620.206
ZAB3	-1488632.259	-5003950.824	3654553.847	35.1735324194444	-106.5672881527780	1620.190
ZAN1	-2659536.614	-1549114.793	5567750.791	61.2292020722222	-149.7802502277780	80.716
ZAN2	-2659548.361	-1549110.839	5567746.289	61.2291184361111	-149.7804238972220	80.698
ZAN3	-2659541.312	-1549106.707	5567750.760	61.2292020194444	-149.7804243194440	80.684
ZAU1	138704.144	-4761244.150	4227763.941	41.7826580611111	-88.3313363527778	195.901
ZAU2	138704.408	-4761248.774	4227758.786	41.7825956805556	-88.3313347972222	195.919
ZAU3	138711.111	-4761248.514	4227758.865	41.7825965972222	-88.3312541138889	195.923
ZBW1	1490299.247	-4448983.179	4306010.501	42.7357204333333	-71.4804255833333	39.130
ZBW2	1490304.359	-4448981.165	4306010.842	42.7357244333333	-71.4803585777778	39.151
ZBW3	1490306.071	-4448984.796	4306006.541	42.7356716416667	-71.4803528388889	39.161
ZDC1	1069125.778	-4839598.987	4001126.509	39.1015958916667	-77.5427463611111	80.067
ZDC2	1069128.188	-4839603.630	4001120.313	39.1015238722222	-77.5427307361111	80.081
ZDC3	1069124.084	-4839602.720	4001122.508	39.1015492916667	-77.5427747916667	80.089
ZDV1	-1273628.590	-4711375.594	4094890.139	40.1873033861111	-105.1272240472220	1541.384
ZDV2	-1273622.889	-4711377.098	4094890.153	40.1873036916667	-105.1271548305560	1541.365
ZDV3	-1273624.896	-4711380.302	4094885.864	40.1872531777778	-105.1271677583330	1541.361
ZFW1	-659983.177	-5324060.796	3438276.485	32.8306497500000	-97.0664715333333	155.640
ZFW2	-659988.448	-5324063.354	3438271.488	32.8305963083333	-97.0665240388889	155.609
ZFW3	-659983.464	-5324063.874	3438271.706	32.8305984361111	-97.0664705305555	155.645
ZHU1	-513864.452	-5506451.735	3166720.512	29.9618965333333	-95.3314260444444	10.893
ZHU2	-513867.105	-5506455.131	3166714.338	29.9618319361111	-95.3314501416667	10.952
ZHU3	-513873.380	-5506457.778	3166708.740	29.9617736833333	-95.3315123222222	10.945
ZJX1	772646.468	-5434462.226	3237231.772	30.6988596972222	-81.9081849138889	2.186
ZJX2	772649.797	-5434463.758	3237228.353	30.6988240361111	-81.9081527638889	2.147
ZJX3	772645.736	-5434466.194	3237225.243	30.6987914416667	-81.9081983083333	2.142
ZKC1	-415247.478	-4954556.405	3982161.130	38.8801594361111	-94.7908333694444	305.917
ZKC2	-415231.099	-4954557.727	3982161.192	38.8801601583333	-94.7906440083333	305.916
ZKC3	-415237.218	-4954561.083	3982156.000	38.8801019527778	-94.7907110472222	305.658
ZLA1	-2474409.899	-4637294.689	3602183.540	34.6035182583333	-118.0838948166670	763.530
ZLA2	-2474404.625	-4637297.486	3602183.548	34.6035183944444	-118.0838297416670	763.522
ZLA3	-2474411.234	-4637297.179	3602179.576	34.6034743888889	-118.0838948777780	763.604

WRE	X(m)	Y(m)	Z(m)	Latitude	Longitude	H(m)
ZLC1	-1808273.208	-4486410.838	4145303.045	40.7860433972222	-111.9521774194440	1287.458
ZLC2	-1808274.594	-4486414.428	4145298.543	40.7859900777778	-111.9521767500000	1287.431
ZLC3	-1808270.376	-4486416.141	4145298.541	40.7859899944444	-111.9521228250000	1287.439
ZMA1	966042.329	-5662999.853	2761581.512	25.8246121666667	-80.3191895638889	-7.551
ZMA2	966029.354	-5662999.142	2761585.993	25.8246599083333	-80.3193159333333	-8.194
ZMA3	966037.428	-5662997.981	2761586.343	25.8246619138889	-80.3192346083333	-7.849
ZME1	4070.922	-5226189.313	3644028.443	35.0673941777778	-89.9553696611111	68.628
ZME2	4070.953	-5226186.760	3644032.552	35.0674377111111	-89.9553693000000	68.899
ZME3	4064.755	-5226186.636	3644032.709	35.0674395361111	-89.9554372472222	68.884
ZMP1	-249978.347	-4539297.516	4458955.068	44.6374632777778	-93.1520850388889	262.676
ZMP2	-249972.551	-4539297.864	4458955.062	44.6374630583333	-93.1520118611111	262.692
ZMP3	-249973.642	-4539302.135	4458950.592	44.6374070944444	-93.1520226305556	262.629
ZNY1	1406144.666	-4627343.997	4144322.064	40.7843285027778	-73.0971653805556	6.470
ZNY2	1406146.463	-4627347.027	4144317.280	40.7842757583333	-73.0971554472222	5.936
ZNY3	1406140.909	-4627348.689	4144317.320	40.7842761750000	-73.0972241305555	5.944
ZOA1	-2684436.831	-4293337.463	3865351.841	37.5430535722222	-122.0159470527780	-3.493
ZOA2	-2684433.831	-4293341.530	3865349.422	37.5430260888889	-122.0158938694440	-3.494
ZOA3	-2684438.196	-4293342.415	3865345.570	37.5429817444444	-122.0159304416670	-3.411
ZOB1	650770.217	-4754715.688	4187420.771	41.2971544694444	-82.2064443638889	223.710
ZOB2	650777.894	-4754714.860	4187422.787	41.2971667972222	-82.2063522138889	225.207
ZOB3	650776.222	-4754719.675	4187414.984	41.2970870111111	-82.2063797861111	223.471
ZSE1	-2308930.253	-3668169.681	4663526.512	47.2869935055556	-122.1883725972220	82.121
ZSE2	-2308934.649	-3668175.240	4663520.100	47.2869078166667	-122.1883826305560	82.190
ZSE3	-2308935.706	-3668179.511	4663516.156	47.2868561444444	-122.1883643805560	82.126
ZSU1	2462589.390	-5529371.537	2003724.624	18.4313386305556	-65.9934749361111	-28.575
ZSU2	2462587.306	-5529377.300	2003711.635	18.4312146833333	-65.9935151500000	-28.492
ZSU3	2462593.940	-5529375.092	2003709.581	18.4311951305556	-65.9934492833333	-28.494
ZTL1	529840.436	-5305248.827	3489342.860	33.3796885666667	-84.2967256750000	261.157
ZTL2	529846.809	-5305247.970	3489343.143	33.3796917861111	-84.2966566138889	261.130
ZTL3	529847.495	-5305251.419	3489337.908	33.3796350111111	-84.2966529611111	261.172

Figure 10-1 WAAS Build 6.097 Software Antenna Positions Deltas from 10/3/11 OPUS Survey

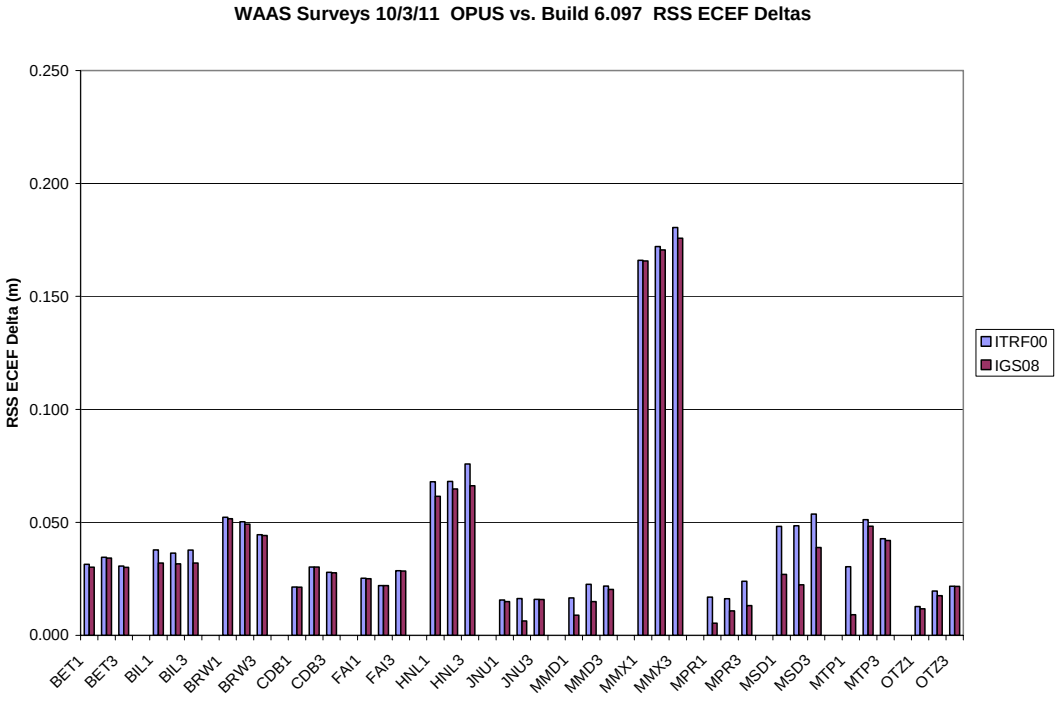


Figure 10-2 WAAS Build 6.097 Software Antenna Positions Deltas from 10/3/11 OPUS Survey

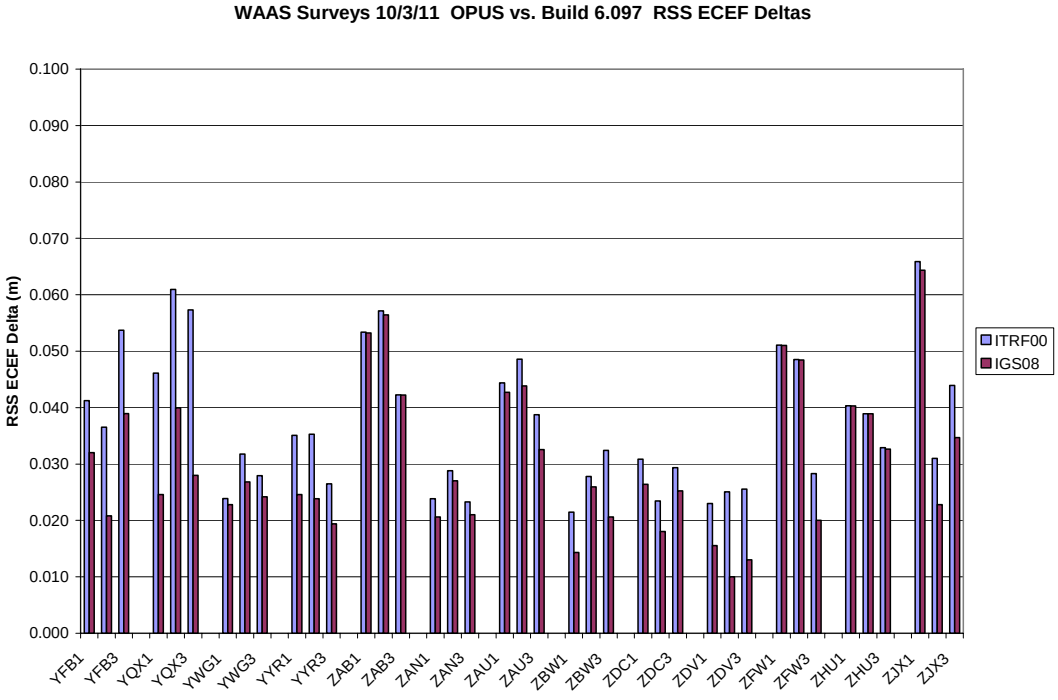


Figure 10-3 WAAS Build 6.097 Software Antenna Positions Deltas from 10/3/11 OPUS Survey

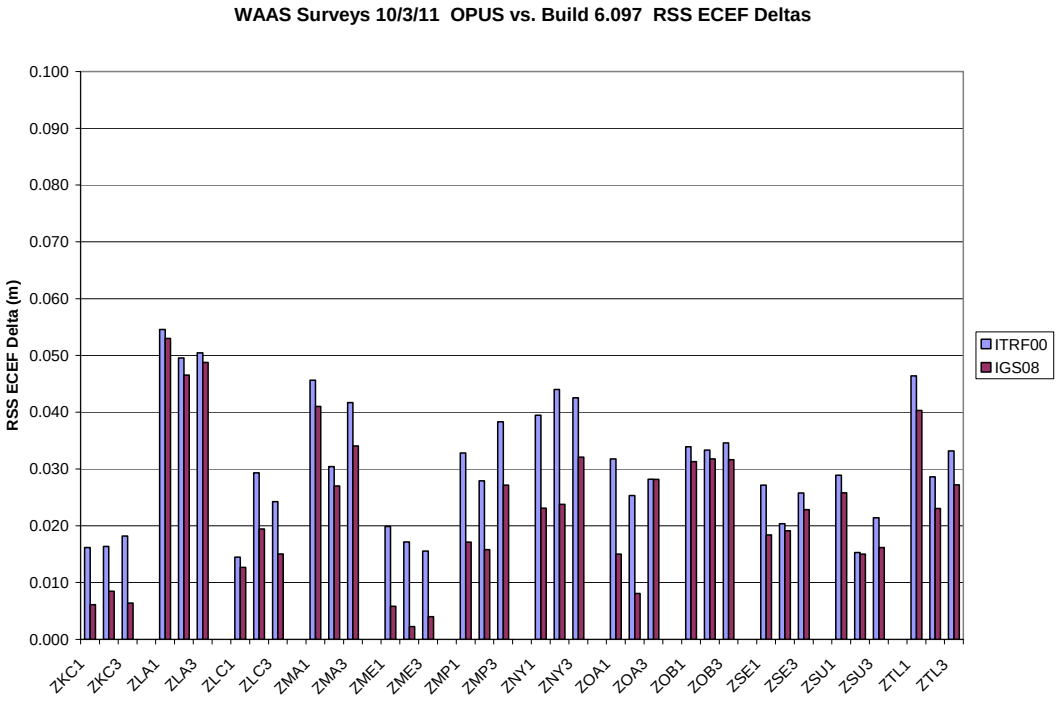


Figure 10-4 10/3/11 OPUS Survey Overall RMS Qualities

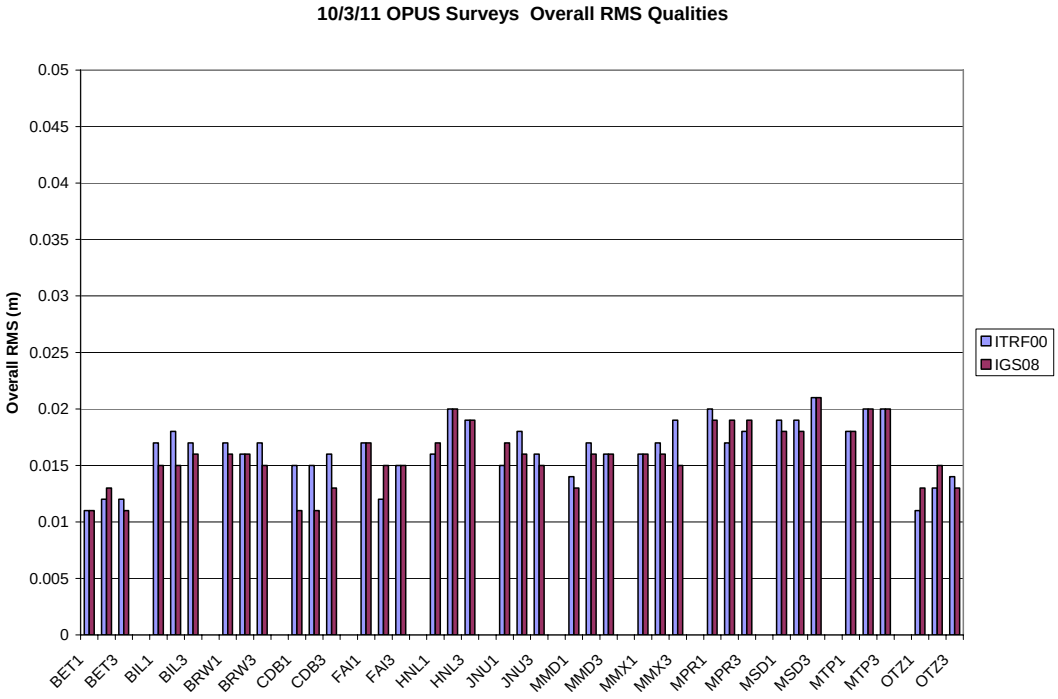


Figure 10-5 10/3/11 OPUS Survey Overall RMS Qualities

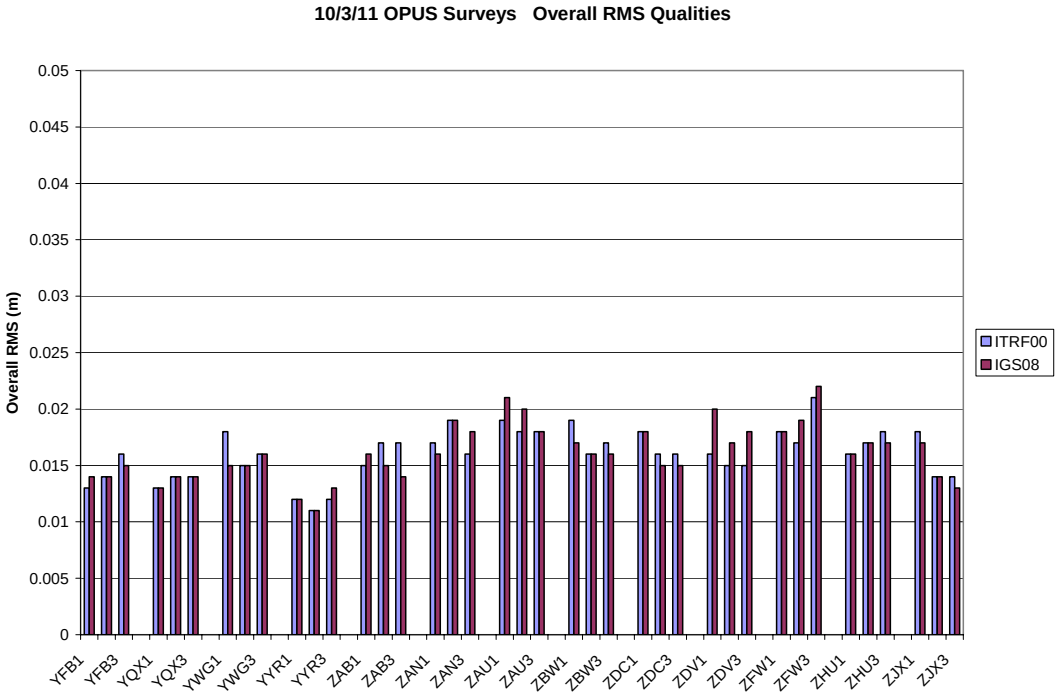


Figure 10-6 10/3/11 OPUS Survey Overall RMS Qualities

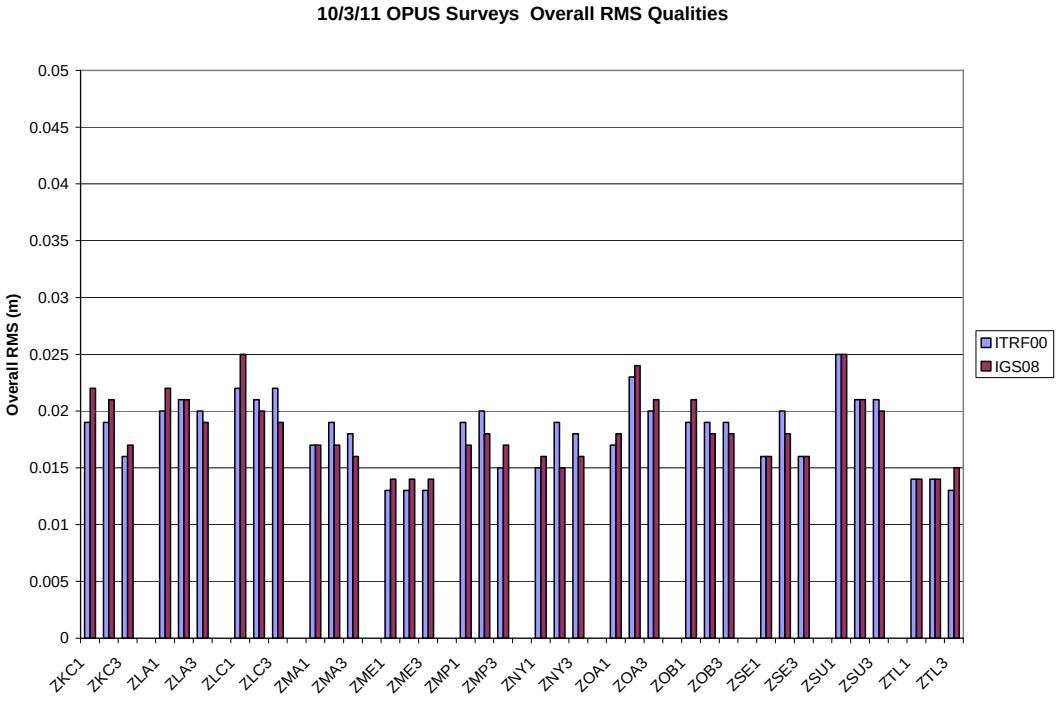


Figure 10-7 OPUS vs. CSRS RSS ECEF Deltas

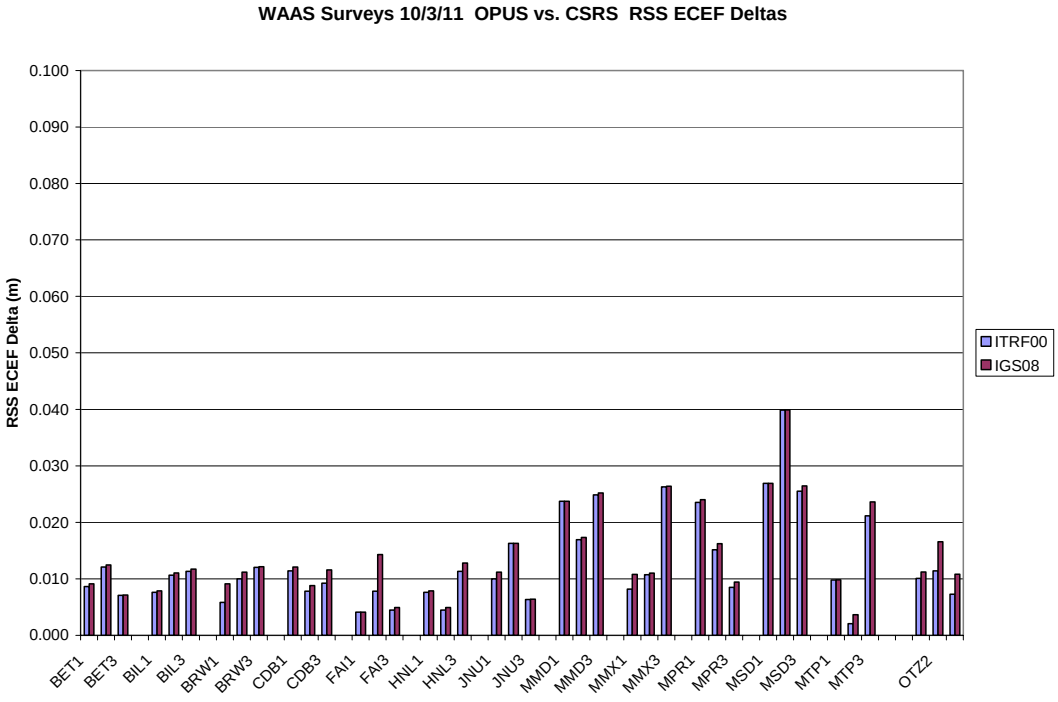


Figure 10-8 10/3/11 OPUS vs. CSRS RSS ECEF Deltas

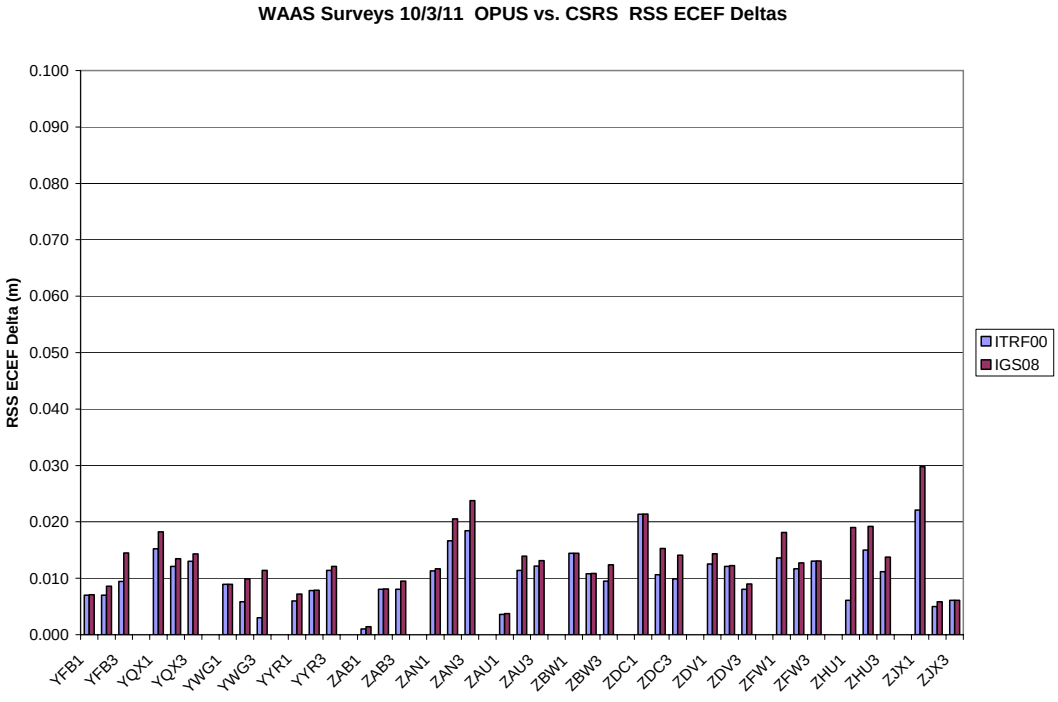


Figure 10-9 10/3/11 OPUS vs. CSRS RSS ECEF Deltas

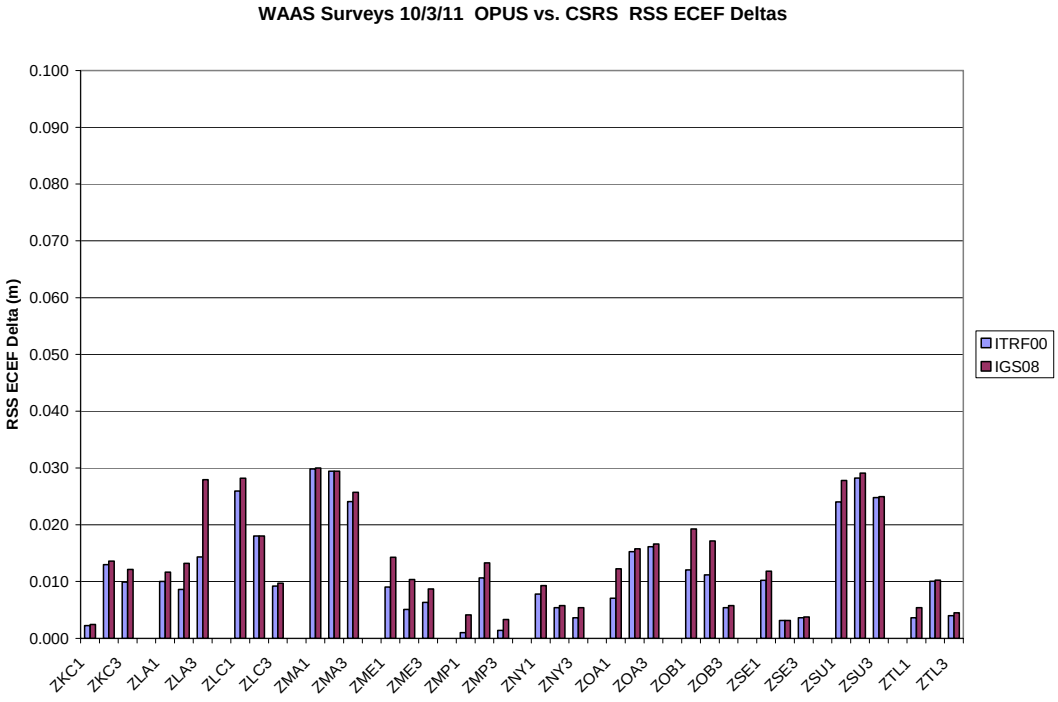


Figure 10-10 10/3/11 CSRS Survey Qualities

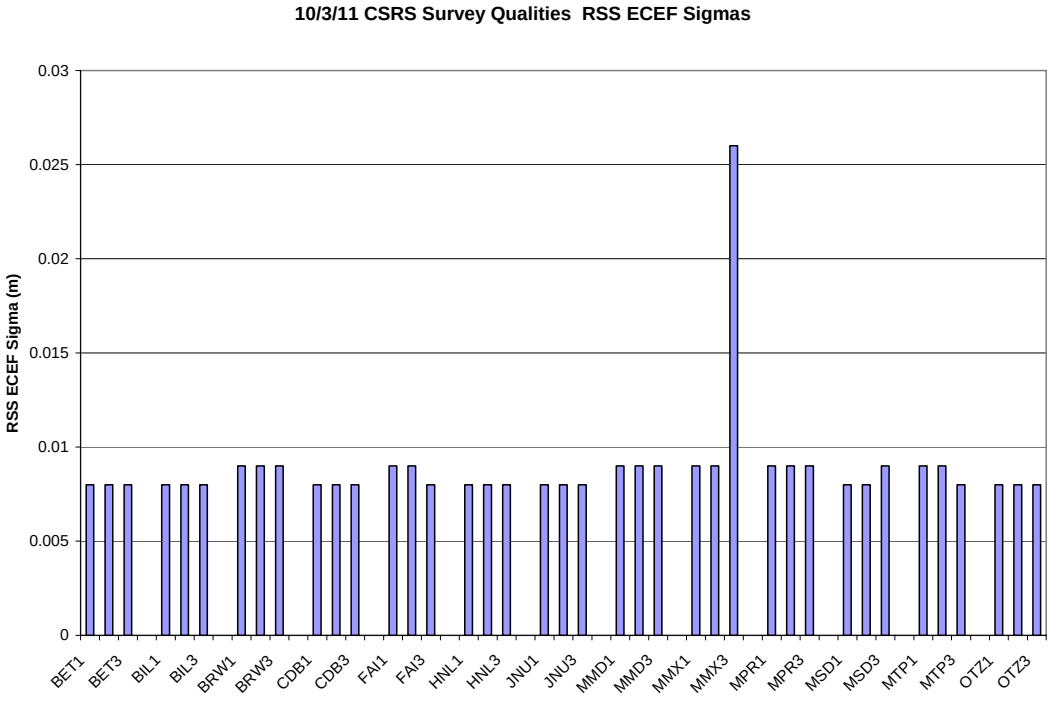


Figure 10-11 10/3/11 CSRS Survey Qualities

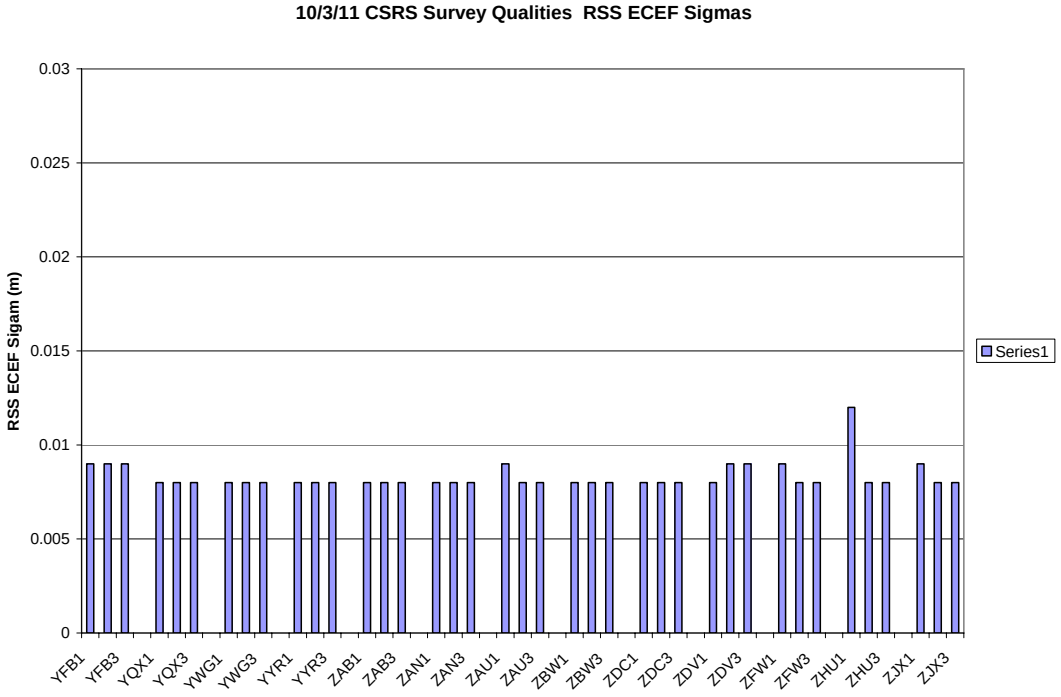
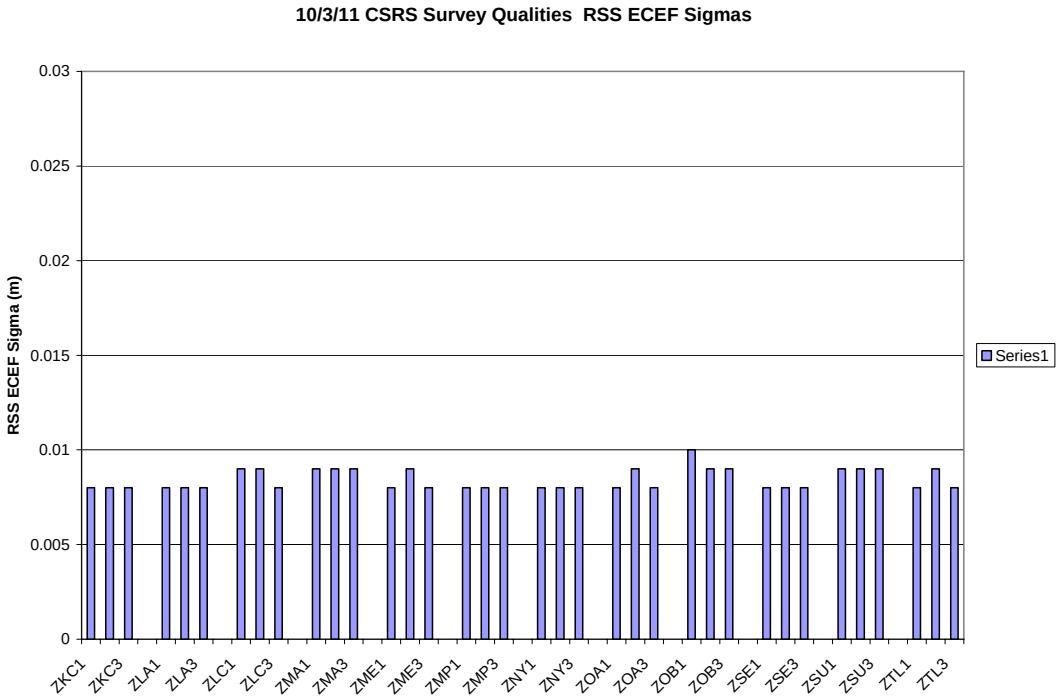


Figure 10-12 10/3/11 CSRS Survey Qualities



11.0 SIGNAL QUALITY MONITOR (SQM)

The Signal Quality Monitor (SQM) is designed to detect signal deformations that originate in the GPS or GEO satellites and ensures that the UDRE values are sufficiently inflated to protect given the monitor's current observations. SQM processes various correlator spacing measurements produced by the reference station receivers to form four detection metrics for each receiver and calculates statistics based on the observed performance against "ideal" signal correlation peaks. This results in an estimate of the overall deformation per satellite. The deformation level calculated is then compared against threshold values, which includes the acceptable error levels per UDRE value. If the estimated deformation exceeds threshold, the monitor trips for the given satellite and the UDRE value is set to 'Don't Use'. The monitor depends on the entire ground network in order to ensure that the satellite is the source of any problem detected rather than a localized affect. Currently all 114 receivers are being used in the SQM computations.

WAAS SQM offline monitoring effort includes the monitoring of the PRN type biases, trips, and the estimated deformation for each satellite that will be referred to as PRN bias in this report.

11.1 Alpha Metrics

The alpha metrics values are pre-determined by offline integrity analysis and are defined as constants in the SQM algorithm. These values remained unchanged for this reporting period and are listed in Table 11.1. Currently there are 4 sets of alpha metrics in the WAAS SQM algorithm that form four detection metrics for each receiver channel. For this report, the four detection metrics will be referred to as: DM1, DM2, DM3, and DM4.

Table 11-1 Alpha Metrics

Correlator Spacing	DM1	DM2	DM3	DM4
-0.1	0	0.43407318	0	-0.36110353
-0.075	0	0.48570652	-0.0058771682	-0.74860302
-0.05	-0.4071265	-0.69931105	-0.011382325	0.23726003
-0.025	1	-0.010099034	0.00037033029	-0.0076011735
0	0	0	0	0
0.025	-0.25	0.13317879	0.99991788	-0.062414070
0.05	1.008525	-0.22851782	0	0.25177272
0.075	0	0.10209042	0	0.42875623
0.1	0	0.078436452	0	0.41602138

11.2 Type Bias

PRN Type biases are evaluated as part of the WAAS SQM offline monitoring effort. Depending on the PRN number of any given satellite, it can be classified into three categories of correlation function shapes: skinny (Type 0), nominal (Type 1), and broad (Type 2). Wideband geostationary satellites are considered a different type (Type 3). PRN-type estimates are computed at each epoch and daily averages are computed for each type, for four detection metrics.

For this reporting period, geostationary satellites type biases are not evaluated. Table11.3 shows the rollup average for the quarter. Table 11.4 shows the rollup average since January 1, 2008. Figure 11.1 shows the daily average for the four detection metrics for the quarter.

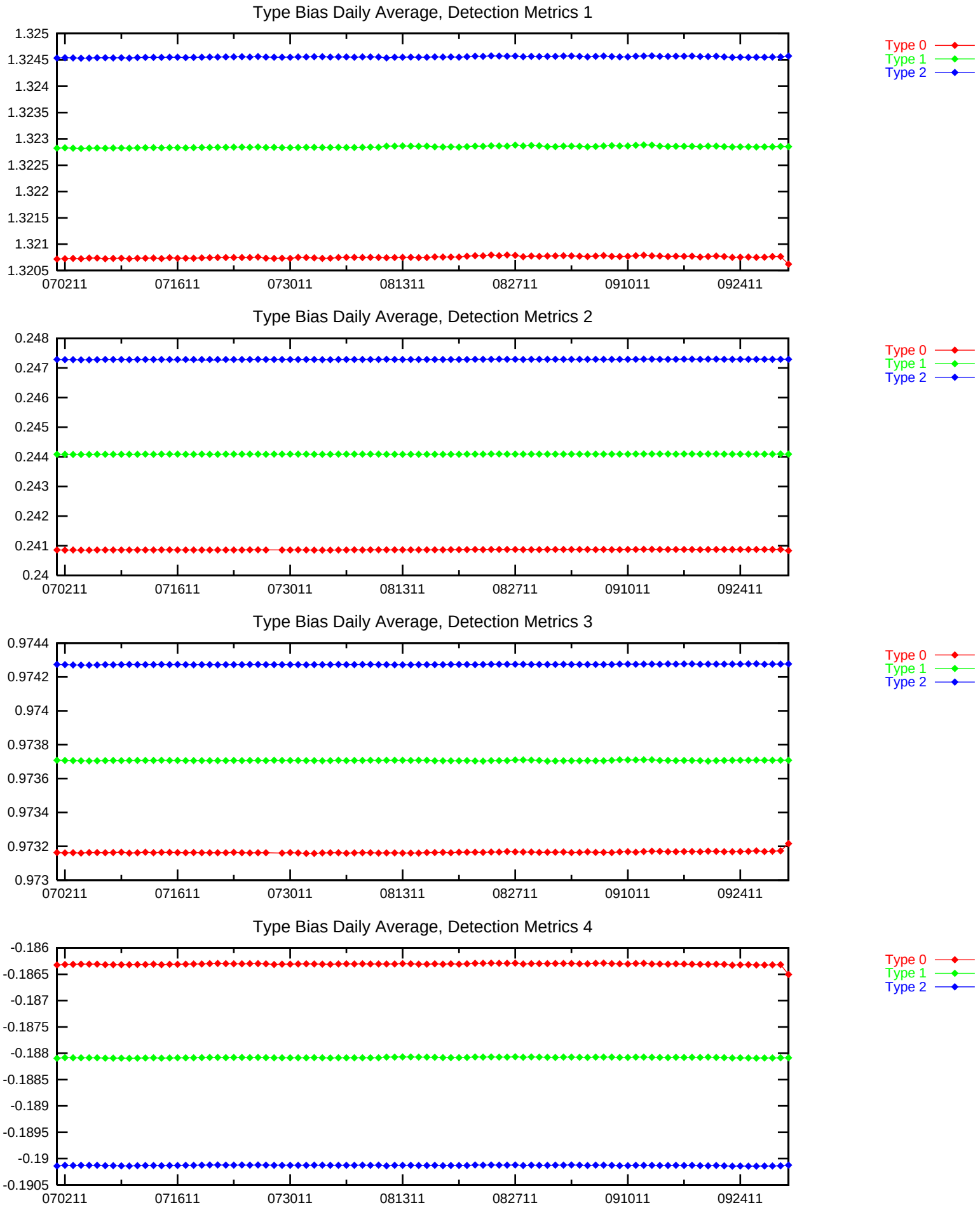
Table 11-2 Type Bias Average for the Quarter

Detection Metric	Type 0	Type 1	Type 2
DM 1	1.32075	1.32285	1.32456
DM 2	0.240865	0.24409	0.247288
DM 3	0.973165	0.973707	0.974274
DM 4	-0.186308	-0.188081	-0.190129

Table 11-3 Type Bias Average Since January 1, 2008

Detection Metric	Type 0	Type 1	Type 2
DM 1	1.32099	1.32291	1.32461
DM 2	0.240844	0.244107	0.247285
DM 3	0.973176	0.973713	0.974276
DM 4	-0.186163	-0.188057	-0.190091

Figure 11-1 PRN Type Bias Average Trend



11.3 PRN Bias

PRN biases are evaluated as part of the WAAS SQM offline monitoring effort. PRN bias is the overall estimated deformation per satellite across receivers. Detection metrics are adjusted for inter-receiver bias, corrected for PRN type bias, and combined across receivers for each satellite. Relying on the assertion that the majority of the SV signals are healthy and normal, detection metrics are normalized over all the satellites on orbit resulting in an overall PRN bias for each satellite. PRN biases are collected at each epoch and daily averages are computed for each satellite, for four detection metrics.

Table 11.4 and Figure 11.2 show the rollup PRN bias average for the quarter. Figure 11.3 to 11.10 show the PRN bias average trend for each SV. The maximum average for DM1 for this quarter is PRN 23 at 0.0010177. The maximum average for DM2 is PRN 25 at 0.0002497. The maximum average for DM3 is PRN 10 at 0.0002812 and the maximum average for DM4 is PRN 23 at 0.0004422.

For this reporting period, geostationary satellite biases are not evaluated. Please refer to Table 1.5 for events that may have an impact on PRN bias statistics. The small spikes in PRN bias daily average are due to satellite outages. PRN 27 (SVN 27) was decommissioned on 8/10/11. PRN 30 (SVN 35) was set to usable on 8/16/2011.

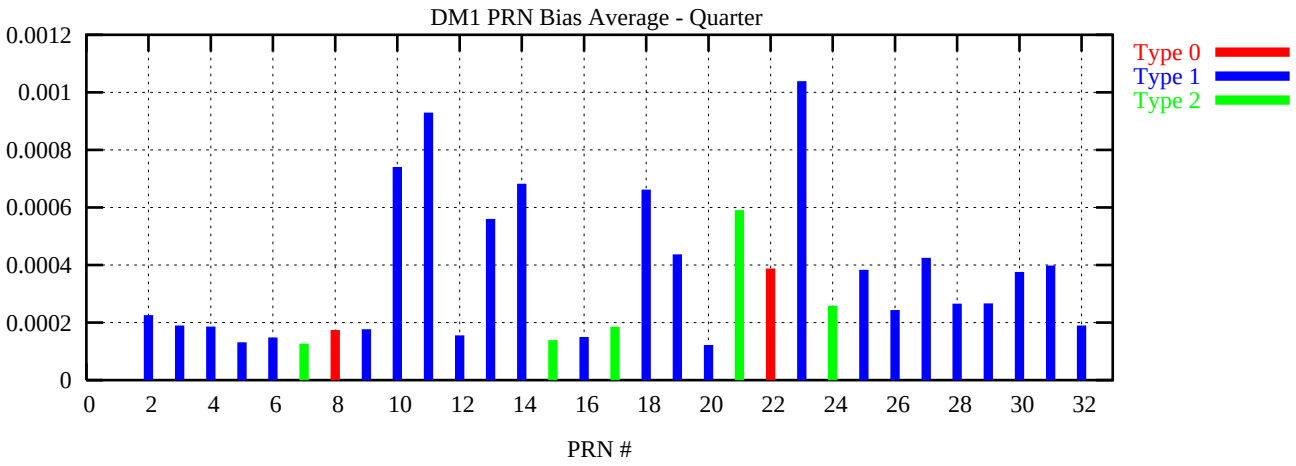
Table 11-4 PRN Bias Average for the Quarter

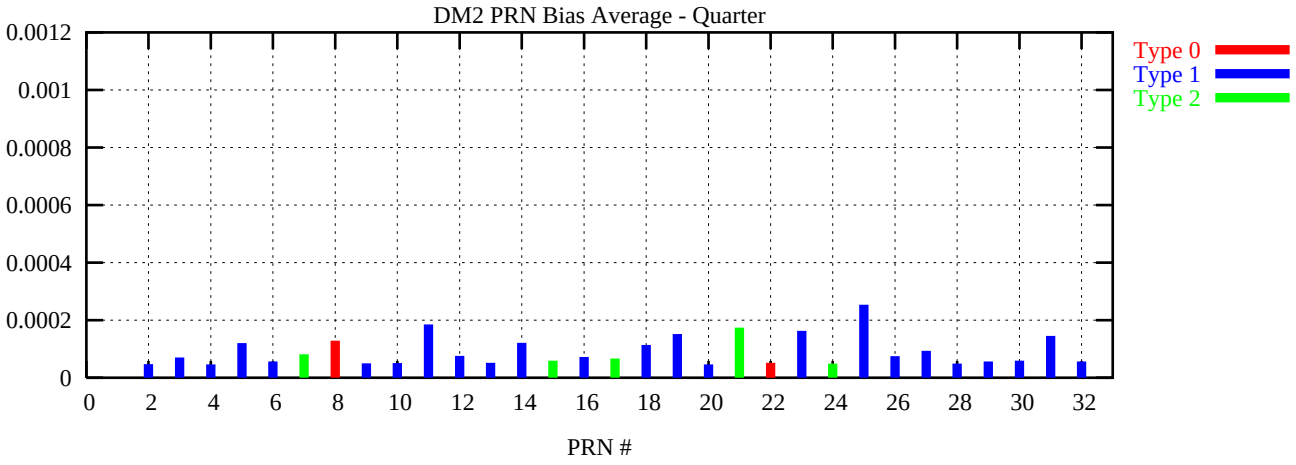
PRN	SVN	DM1	DM2	DM3	DM4
2	61	0.0002258	0.0000471	0.0000282	0.0000957
3	33	0.0001899	0.0000706	0.0000997	0.0003537
4	34	0.0001858	0.0000466	0.0000653	0.000125
5	50	0.0001319	0.0001207	0.0000586	0.000101
6	36	0.0001484	0.0000568	0.0000522	0.0001449
7	34	0.0001267	0.0000818	0.0000351	0.0001288
8	38	0.0001741	0.0001283	0.000047	0.0000977
9	39	0.0001764	0.0000499	0.0000687	0.0001037
10	40	0.0007411	0.000051	0.000289	0.000106
11	46	0.0009294	0.0001848	0.000049	0.0002599
12	58	0.000156	0.0000758	0.0000936	0.0000787
13	43	0.0005602	0.0000523	0.0000736	0.0001656
14	41	0.0006821	0.000121	0.000114	0.0001353
15	55	0.0001387	0.0000588	0.0000272	0.0001376
16	56	0.0001497	0.0000725	0.0001171	0.0003372
17	53	0.0001851	0.0000671	0.0000436	0.0001416
18	54	0.0006621	0.0001138	0.0000441	0.0002208
19	59	0.0004368	0.0001515	0.0000392	0.0000873
20	51	0.0001221	0.0000467	0.0000316	0.0001461
21	45	0.0005911	0.0001742	0.000194	0.000094
22	47	0.0003883	0.000052	0.0000826	0.0003438
23	60	0.001039	0.0001629	0.000038	0.0004503
24	24	0.0002583	0.0000494	0.0000345	0.0001104
25	62	0.0003832	0.0002534	0.0000589	0.0001266
26	26	0.0002435	0.0000752	0.0001472	0.0000932
27	27	0.000425	0.0000933	0.0000579	0.0003163
28	44	0.0002658	0.0000491	0.0000333	0.000094
29	57	0.0002665	0.0000568	0.0000971	0.0002893
30	30	0.0003764	0.0000593	0.0001215	0.0001355
31	52	0.0003979	0.0001456	0.0000375	0.0002457
32	23	0.0001901	0.0000567	0.0001023	0.0000825

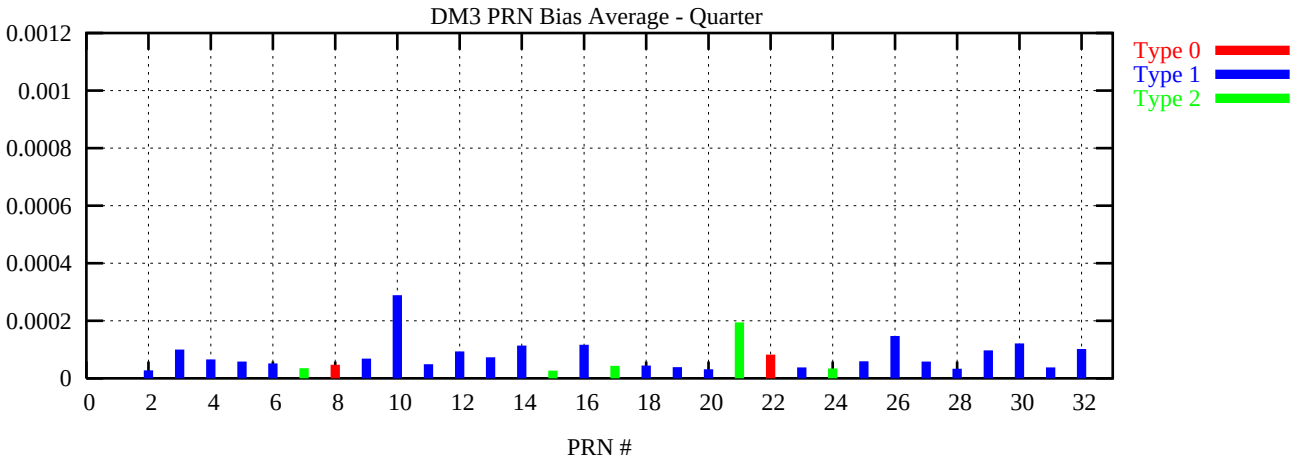
Table 11-5 PRN Bias Average Since January 1, 2008

PRN	SVN	DM1	DM2	DM3	DM4
1	32	0.0001379	0.0000434	0.0000735	0.0000799
2	61	0.0001908	0.0000561	0.0000241	0.0000936
3	33	0.0002152	0.0000578	0.0000912	0.0003543
4	34	0.0002306	0.0000449	0.0000723	0.0001315
5	35	0.0004283	0.0001093	0.0000811	0.0001179
5	50	0.0001462	0.0001093	0.0000811	0.0001179
6	36	0.0001580	0.0000568	0.0000472	0.0001280
7	34	0.0001329	0.0000894	0.0000353	0.0001231
8	38	0.0001651	0.0001260	0.0000443	0.0001015
9	39	0.0002131	0.0000532	0.0000675	0.0001106
10	40	0.0006729	0.0000651	0.0002695	0.0000963
11	46	0.0009044	0.0001833	0.0000563	0.0002396
12	58	0.0002206	0.0000858	0.0001035	0.0000806
13	43	0.0005180	0.0000550	0.0000624	0.0001574
14	41	0.0006514	0.0001199	0.0001128	0.0001244
15	55	0.0001244	0.0000672	0.0000276	0.0001337
16	56	0.0001634	0.0000739	0.0001112	0.0003426
17	53	0.0001385	0.0000755	0.0000361	0.0001245
18	54	0.0006183	0.0001043	0.0000417	0.0002157
19	59	0.0003871	0.0001373	0.0000363	0.0000846
20	51	0.0001557	0.0000480	0.0000387	0.0001363
21	45	0.0006117	0.0001840	0.0002011	0.0000910
22	47	0.0002109	0.0000847	0.0000980	0.0001643
23	60	0.0009648	0.0001466	0.0000355	0.0004241
24	24	0.0002973	0.0000492	0.0000356	0.0001077
25	25	0.0001583	0.0001524	0.0000795	0.0002357
25	62	0.0003659	0.0001524	0.0000795	0.0002357
26	26	0.0002676	0.0000876	0.0001510	0.0000899
27	27	0.0004754	0.0000833	0.0000638	0.0003298
28	44	0.0002485	0.0000537	0.0000333	0.0000916
29	57	0.0002301	0.0000653	0.0001044	0.0002885
30	30	0.0003024	0.0000935	0.0000305	0.0001167
31	52	0.0004584	0.0001557	0.0000383	0.0002548
32	23	0.0002782	0.0000499	0.0001088	0.0000973

Figure 11-2 PRN Bias Average for the Quarter







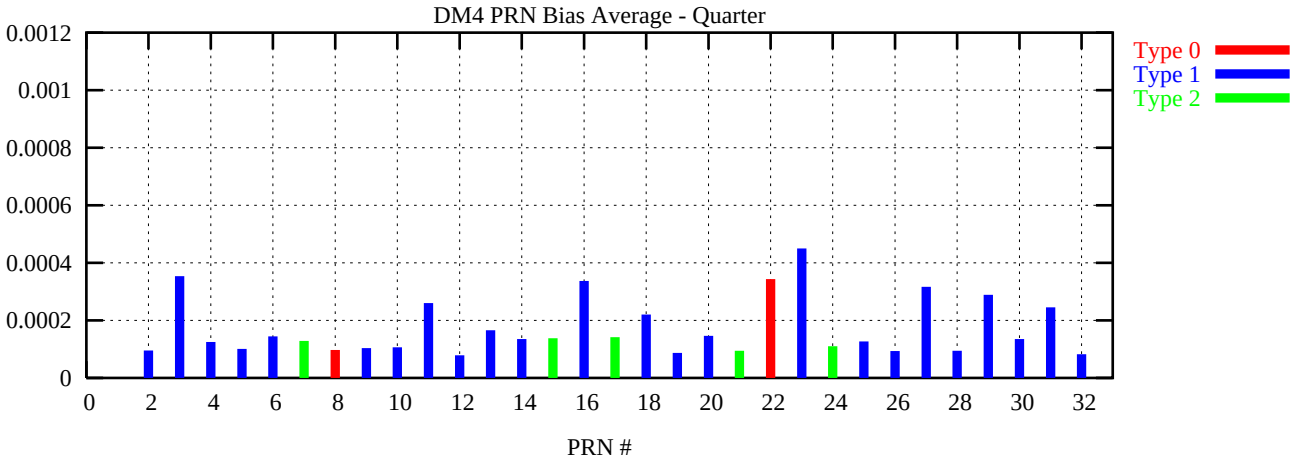


Figure 11-3 PRN Bias Average Trend (PRN 1 - PRN 4)

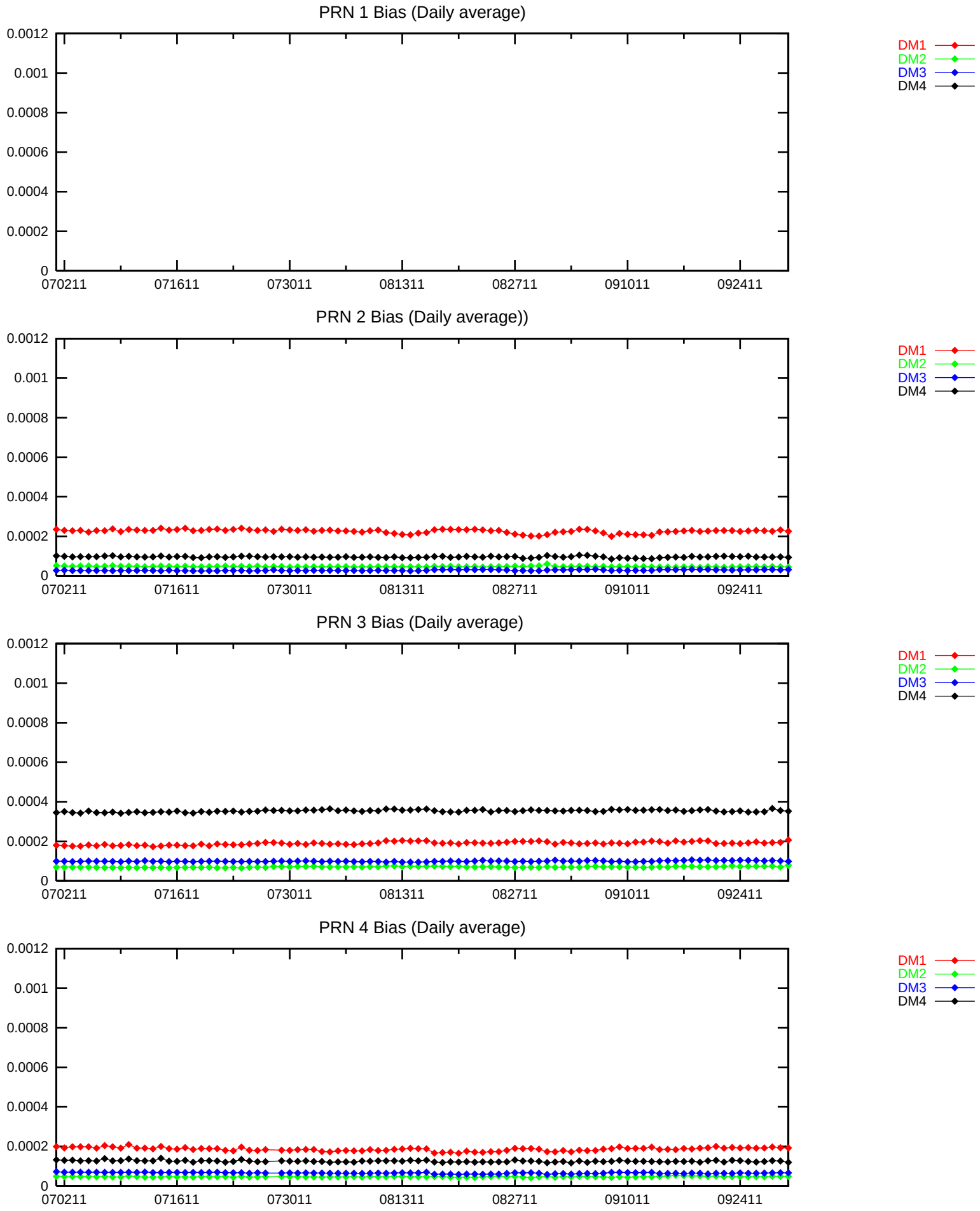


Figure 11-4 PRN Bias Average Trend (PRN 5 - PRN 8)

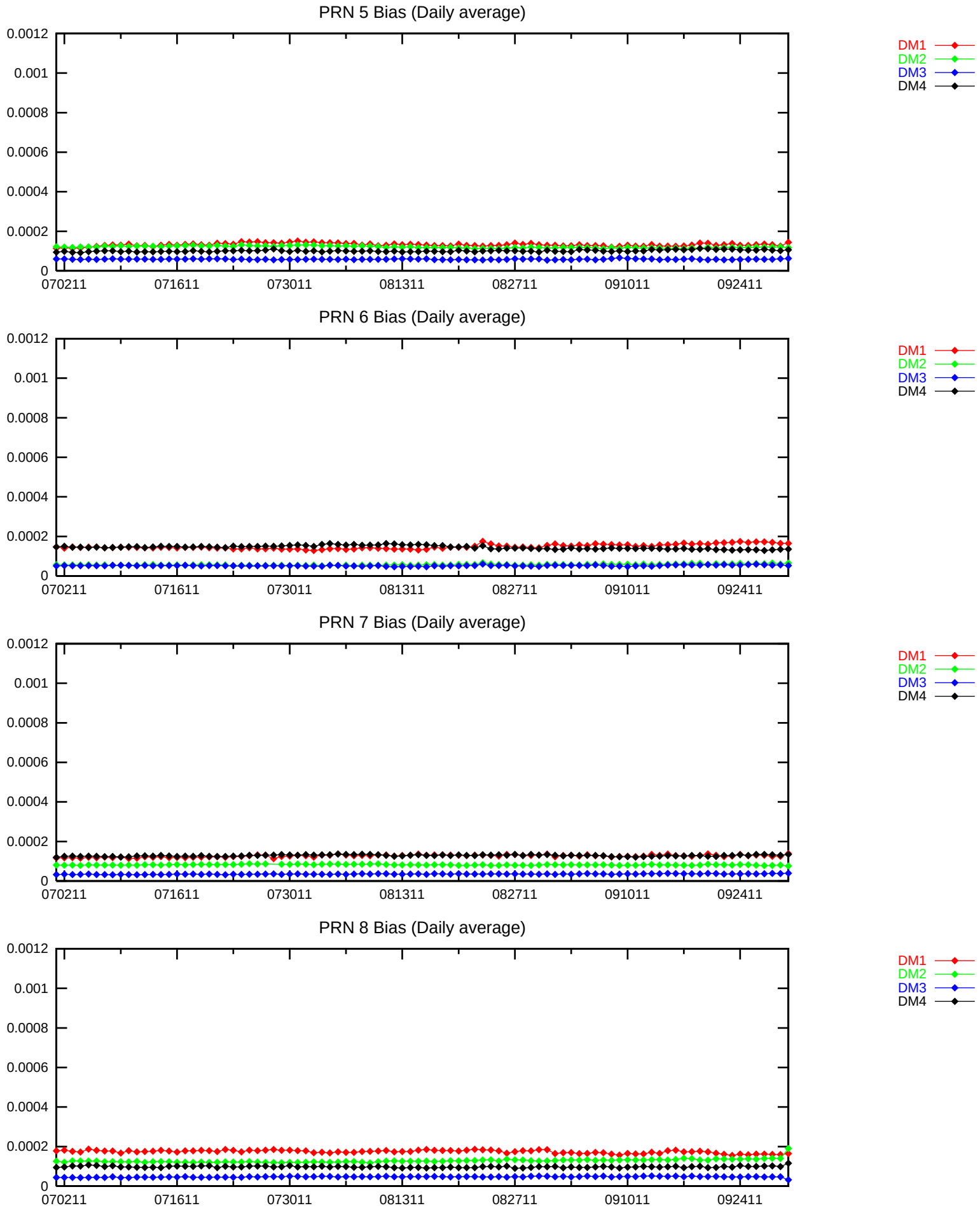


Figure 11-5 PRN Bias Average Trend (PRN 9 - PRN 12)

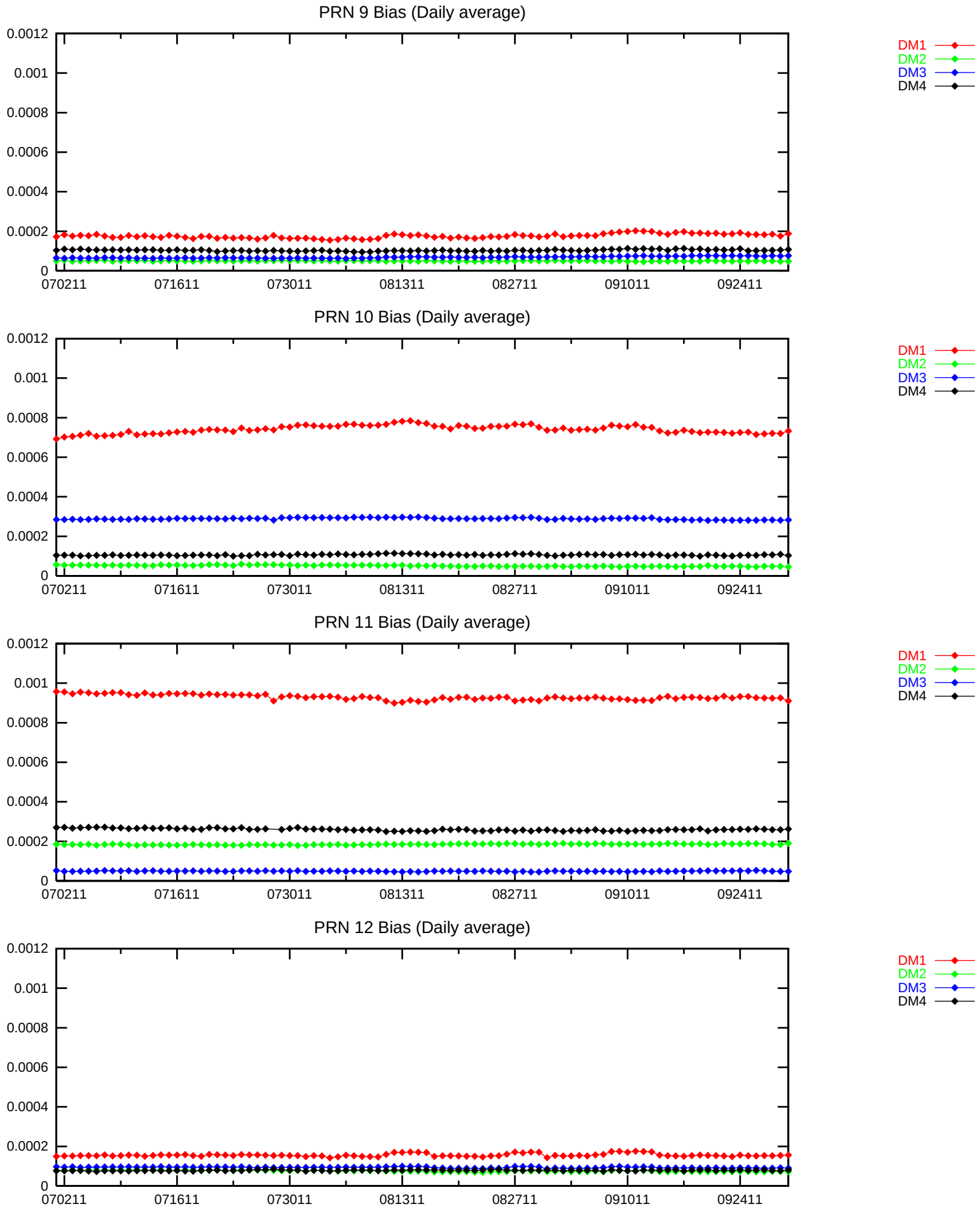


Figure 11-6 PRN Bias Average Trend (PRN 13 - PRN 16)

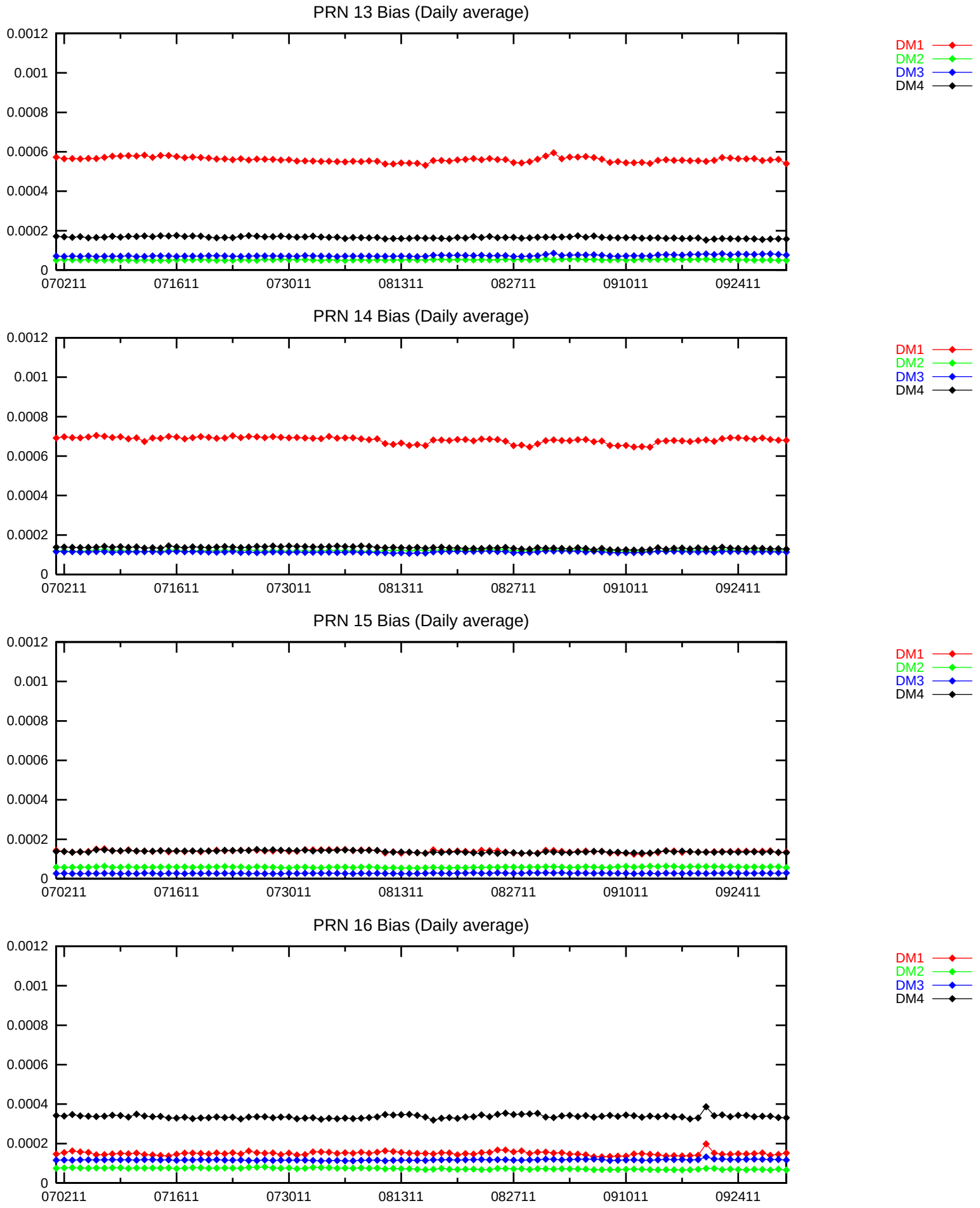


Figure 11-7 PRN Bias Average Trend (PRN 17 - PRN 20)

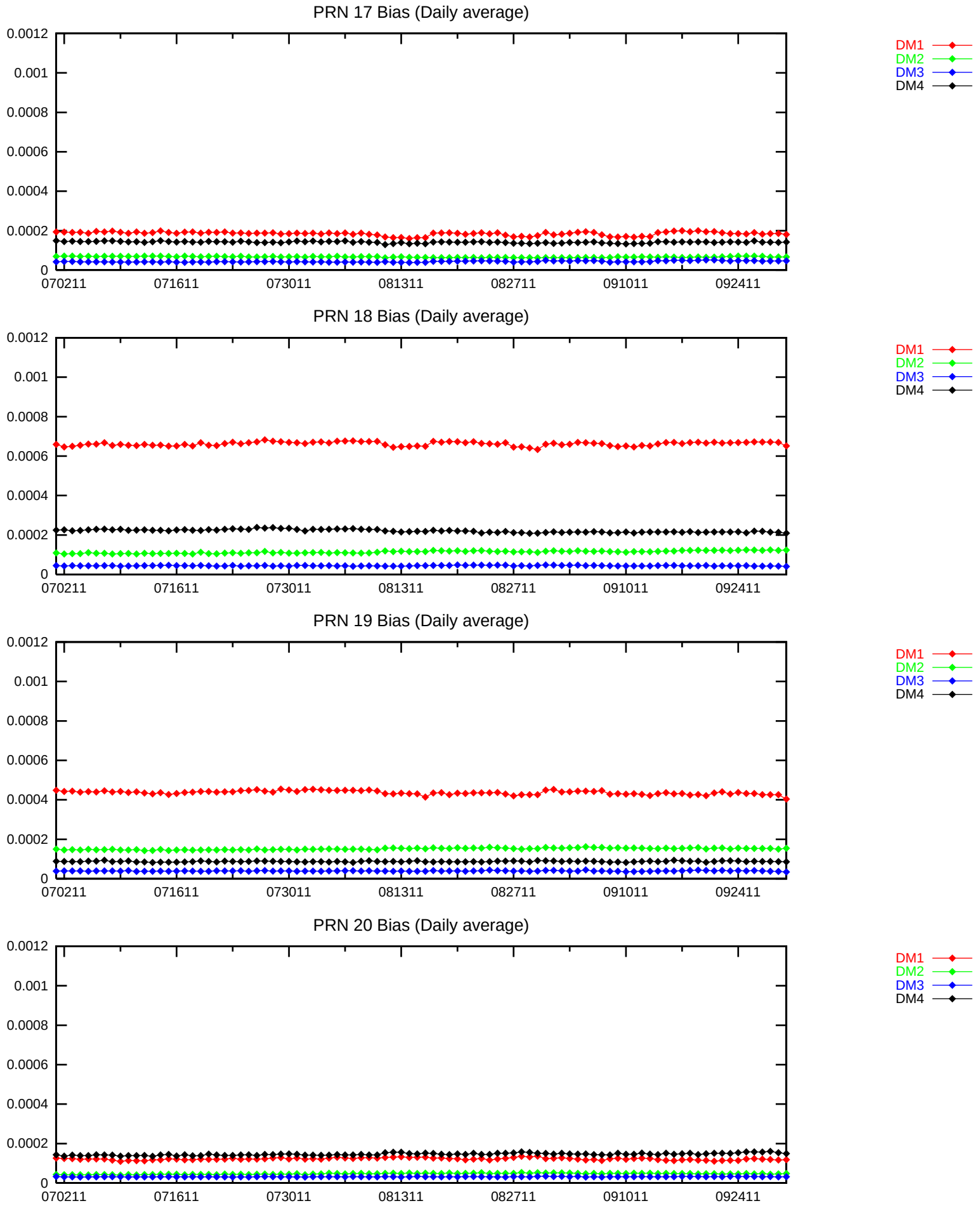


Figure 11-8 PRN Bias Average Trend (PRN 21 - PRN 24)

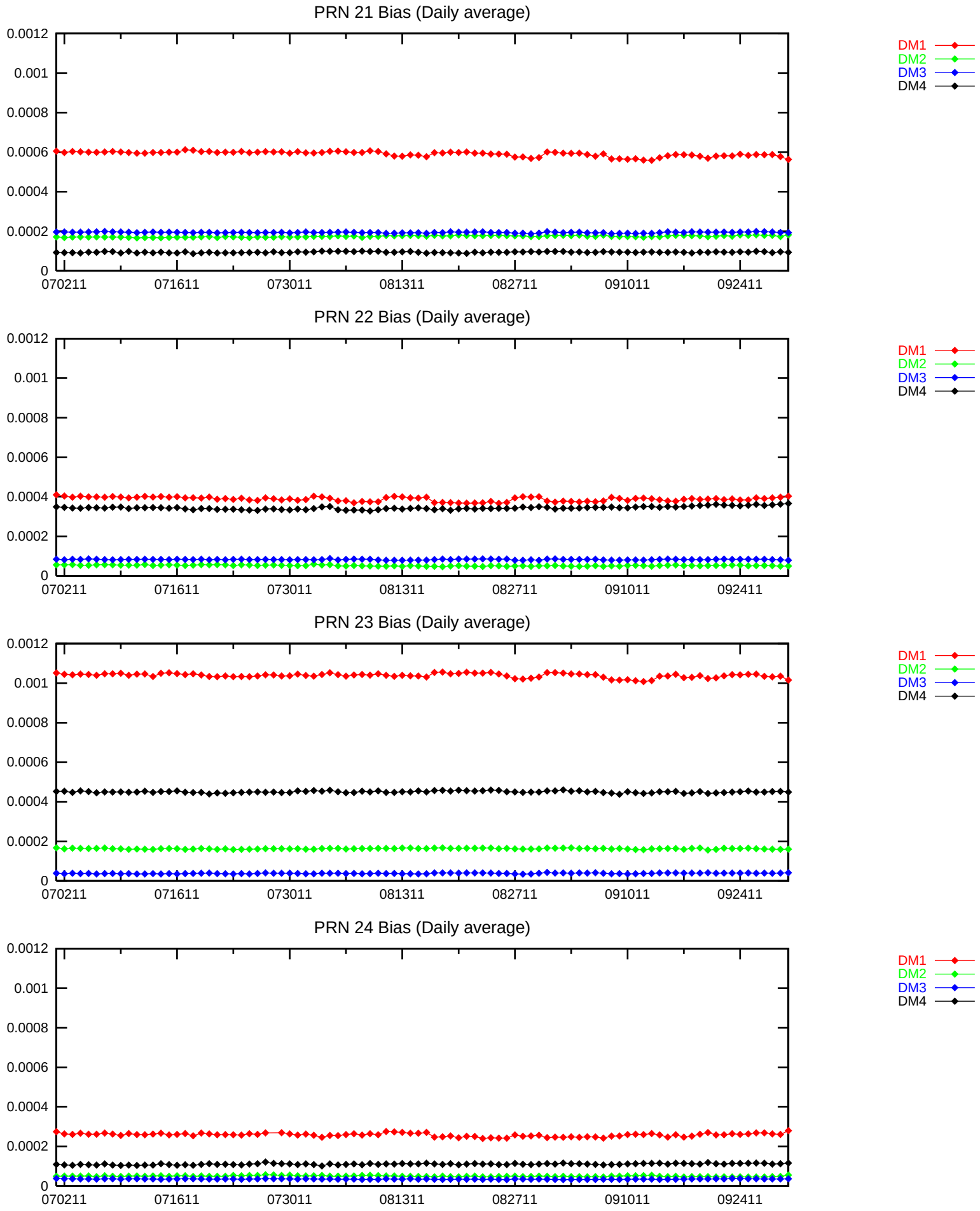


Figure 11-9 PRN Bias Average Trend (PRN 25 - PRN 28)

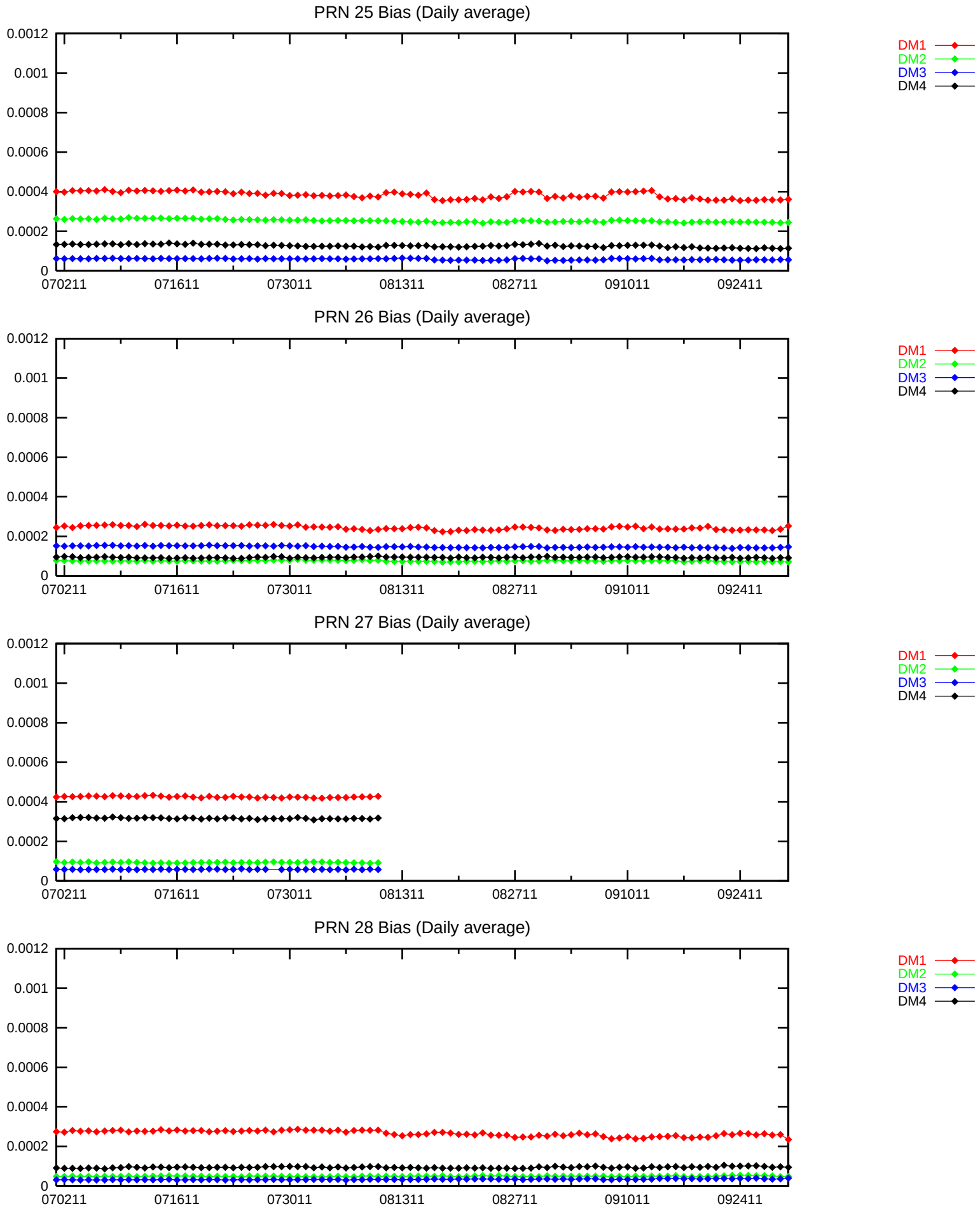
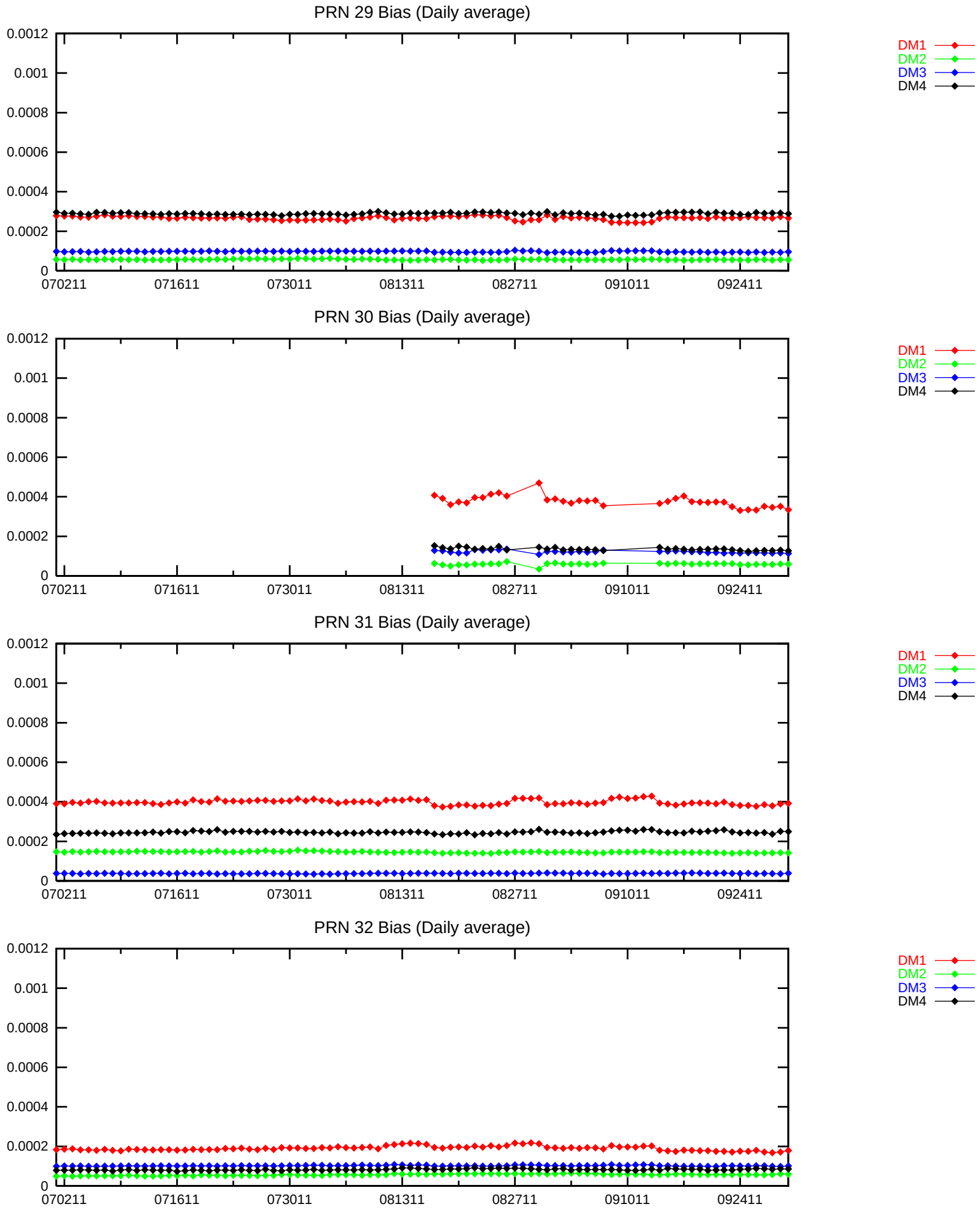


Figure 11-10 PRN Bias Average Trend (PRN 29 - PRN 32)



11.4 SQM Trips

SQM trip occurs when the estimated deformation exceeds threshold. There are no SQM trips for this quarter.

Appendix A: Glossary

General Terms and Definitions

Alert. An alert is an indication provided by the GPS/WAAS equipment to inform the user when the positioning performance achieved by the equipment does not meet the integrity requirements.

Availability. The availability of a navigation system is the ability of the system to provide the required function and performance at the initiation of the intended operation. Availability is an indication of the ability of the system to provide usable service within the specified coverage area.

C&V. The Correction and Verification Subsystem.

CONUS. Continental United States.

Continuity. The continuity of a system is the ability of the total system (comprising all elements necessary to maintain aircraft position within the defined airspace) to perform its function without interruption during the intended operation. More specifically, continuity is the probability that the specified system performance will be maintained for the duration of a phase of operation, presuming that the system was available at the beginning of that phase of operation.

Coverage. The coverage provided by a radio navigation system is that surface area or space volume in which the signals are adequate to permit the user to determine position to a specified level of accuracy. Coverage is influenced by system geometry, signal power levels, receiver sensitivity, atmospheric noise conditions, and other factors that affect signal availability.

Dilution of Precision (DOP). The magnifying effect on GPS position error induced by mapping GPS ranging errors into position through the position solution. The DOP may be represented in any user local coordinate desired. Examples are HDOP for local horizontal, VDOP for local vertical, PDOP for all three coordinates, and TDOP for time.

DR. Discrepancy Report

Fault Detection and Exclusion (FDE). Fault detection and exclusion is a receiver processing scheme that autonomously provides integrity monitoring for the position solution, using redundant range measurements. The FDE consists of two distinct parts: fault detection and fault exclusion. The fault detection part detects the presence of an unacceptably large position error for a given mode of flight. Upon the detection, fault exclusion follows and excludes the source of the unacceptably large position error, thereby allowing navigation to return to normal performance without an interruption in service.

GEO. Geostationary Satellite.

Global Positioning System (GPS). A space-based positioning, velocity, and time system composed of space, control, and user segments. The space segment, when fully operational, will be composed of 24 satellites in six orbital planes. The control segment consists of five monitor stations, three ground antennas, and a master control station. The user segment consists of antennas and receiver-processors that provide positioning, velocity, and precise timing to the user.

Grid Ionospheric Vertical Error (GIVE). GIVEs indicate the accuracy of ionospheric vertical delay correction at a geographically defined ionospheric grid point (IGP). WAAS transmits one GIVE for each IGP in the mask.

Hazardous Misleading Information (HMI). Hazardous misleading information is any position data, that is output, that has an error larger than the current protection level (HPL/VPL), without any indication of the error (e.g., alert message sequence).

Horizontal Alert Limit (HAL). The Horizontal Alert Limit (HAL) is the radius of a circle in the horizontal plane (the local plane tangent to the WGS-84 ellipsoid), with its center being at the true position, which describes the region that is

required to contain the indicated horizontal position with a probability of $1\text{-}10^{-7}$ per flight hour, for a particular navigation mode, assuming the probability of a GPS satellite integrity failure being included in the position solution is less than or equal to 10^{-4} per hour.

Horizontal Protection Level (HPL). The Horizontal Protection Level is the radius of a circle in the horizontal plane (the plane tangent to the WGS-84 ellipsoid), with its center being at the true position, which describes the region that is assured to contain the indicated horizontal position. It is based upon the error estimates provided by WAAS.

IGS. International GPS Service.

Ionospheric Grid Point (IGP). IGP is a geographically defined point for which the WAAS provides the vertical ionospheric delay.

LNAV. Lateral Navigation.

LP. Localizer Performance. LP is a WAAS operational service level with a HAL equal to 40 meters.

LPV. Localizer Performance with Vertical Guidance. LPV is a WAAS operational service level with a HAL equal to 40 meters and a VAL equal to 50 meters.

LPV 200. Localizer Precision with Vertical Guidance to 200 ft decision height. LPV 200 is a WAAS operational service level with a HAL equal to 40 meters and a VAL equal to 35 meters.

MOPS. Minimum Operational Performance Standards.

Navigation Message. Message structure designed to carry navigation data.

Non-Precision Approach (NPA) Navigation Mode. The Non-Precision Approach navigation mode refers to the navigation solution operating with a minimum of four satellites with fast and long term WAAS corrections (no WAAS ionospheric corrections) available.

Position Solution. The use of ranging signal measurements and navigation data from at least four satellites to solve for three position coordinates and a time offset.

Precision Approach (PA) Navigation Mode. The Precision Approach navigation mode refers to the navigation solution operating with a minimum of four satellites with all WAAS corrections (fast, long term, and ionospheric) available.

Selective Availability. Protection technique employed by the DOD to deny full system accuracy to unauthorized users.

S**ignal Quality Monitor (SQM)**. SQM monitors correlator measurements to detect signal deformations that originate in the GPS or GEO satellites and ensures that the UDREs are sufficiently inflated to protect given the monitor's current observations.

Standard Positioning Service (SPS). Three-dimensional position and time determination capability provided to a user equipped with a minimum capability GPS SPS receiver in accordance with GPS national policy and the performance specifications.

SV. Space Vehicle.

User Differential Range Error (UDRE). UDRE's indicate the accuracy of combined fast and slow error corrections. WAAS transmits one UDRE for each satellite in the mask.

Vertical Alert Limit (VAL). The Vertical Alert Limit is half the length of a segment on the vertical axis (perpendicular to the horizontal plane of WGS-84 ellipsoid), with its center being at the true position, which describes the region that is

required to contain the indicated vertical position with a probability of $1\text{-}10^{-7}$ per flight hour, for a particular navigation mode, assuming the probability of a GPS satellite integrity failure being included in the position solution is less than or equal to 10^{-4} per hour.

Vertical Protection Level (VPL). The Vertical Protection Level is half the length of a segment on the vertical axis (perpendicular to the horizontal plane of WGS-84 ellipsoid), with its center being at the true position, which describes the region that is assured to contain the indicated vertical position. It is based upon the error estimates provided by WAAS.

VNAV. Vertical Navigation.

Wide Area Augmentation System (WAAS). The WAAS is made up of an integrity reference monitoring network, processing facilities, geostationary satellites, and control facilities. Wide area reference stations and integrity monitors are widely dispersed data collection sites that contain GPS/WAAS ranging receivers that monitor all signals from the GPS, as well as the WAAS geostationary satellites. The reference stations collect measurements from the GPS and WAAS satellites so that differential corrections, ionospheric delay information, GPS/WAAS accuracy, WAAS network time, GPS time, and UTC can be determined. The wide area reference station and integrity monitor data are forwarded to the central data processing sites. These sites process the data in order to determine differential corrections, ionospheric delay information, and GPS/WAAS accuracy, as well as verify residual error bounds for each monitored satellite. The central data processing sites also generate navigation messages for the geostationary satellites and WAAS messages. This information is modulated on the GPS-like signal and broadcast to the users from geostationary satellites.

Appendix B: Additional Coverage Plots

This section includes coverage plots with 99% LPV 200 availability contour, 98% LPV availability contours, and 98% LP availability contours for the quarter. Figure B-1 shows CONUS coverage with 98% LP availability contour. Figure B-2 shows Alaska coverage with 98% LP availability contour. .Figure B-3 shows CONUS coverage with 98% LPV availability contour. Figure B-4 shows Alaska coverage with 98% LPV availability contour. Figure B-5 shows CONUS coverage with 99% LPV 200 availability contour. Figure B-6 shows Alaska coverage with 99% LPV 200 availability contour.

Figure B-1 98% CONUS LP Availability Contour for the Quarter

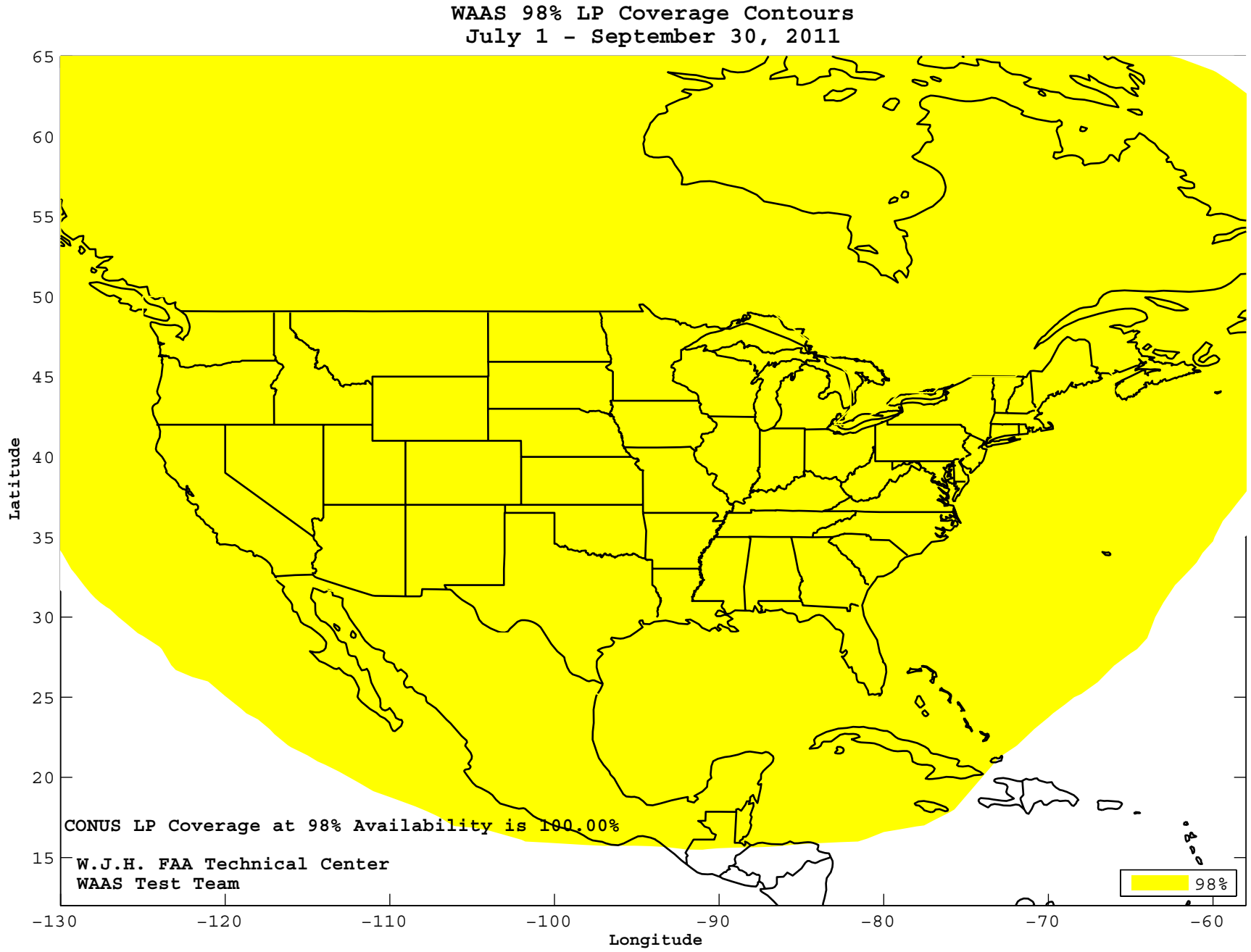


Figure B-2 98% Alaska LP Availability Contour for the Quarter

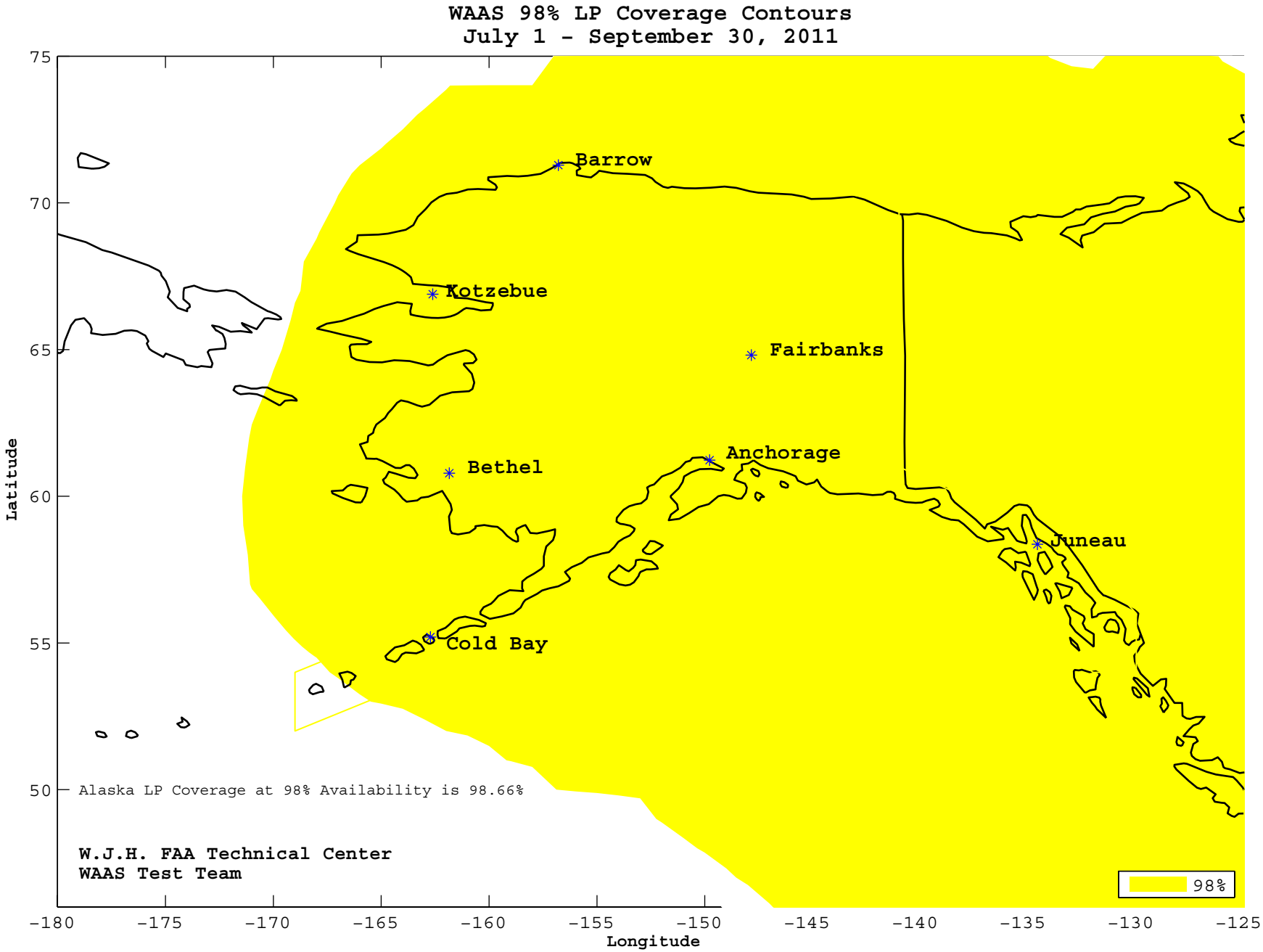


Figure B-3 98% CONUS LPV Availability Contour for the Quarter

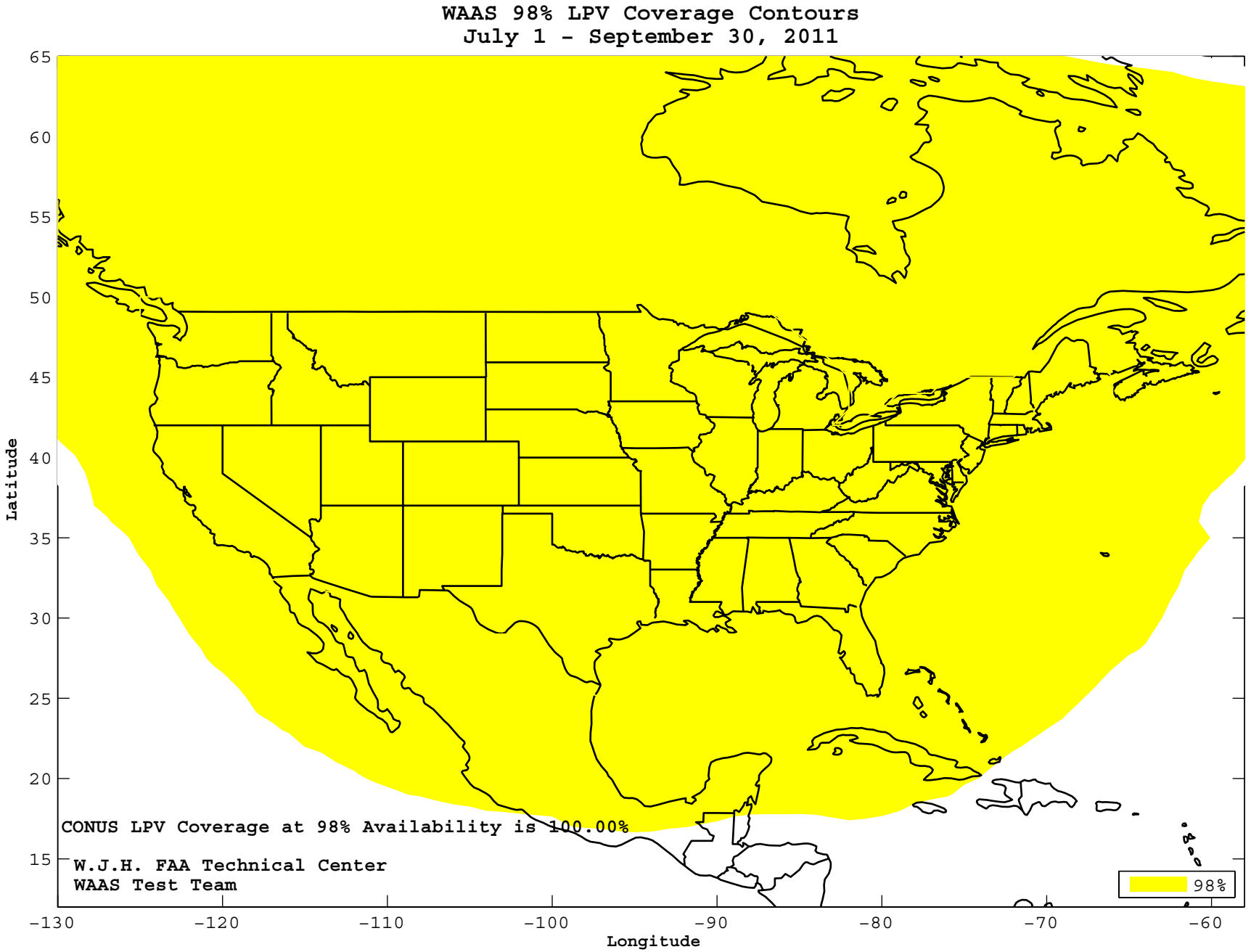


Figure B-4 98% Alaska LPV Availability Contour for the Quarter

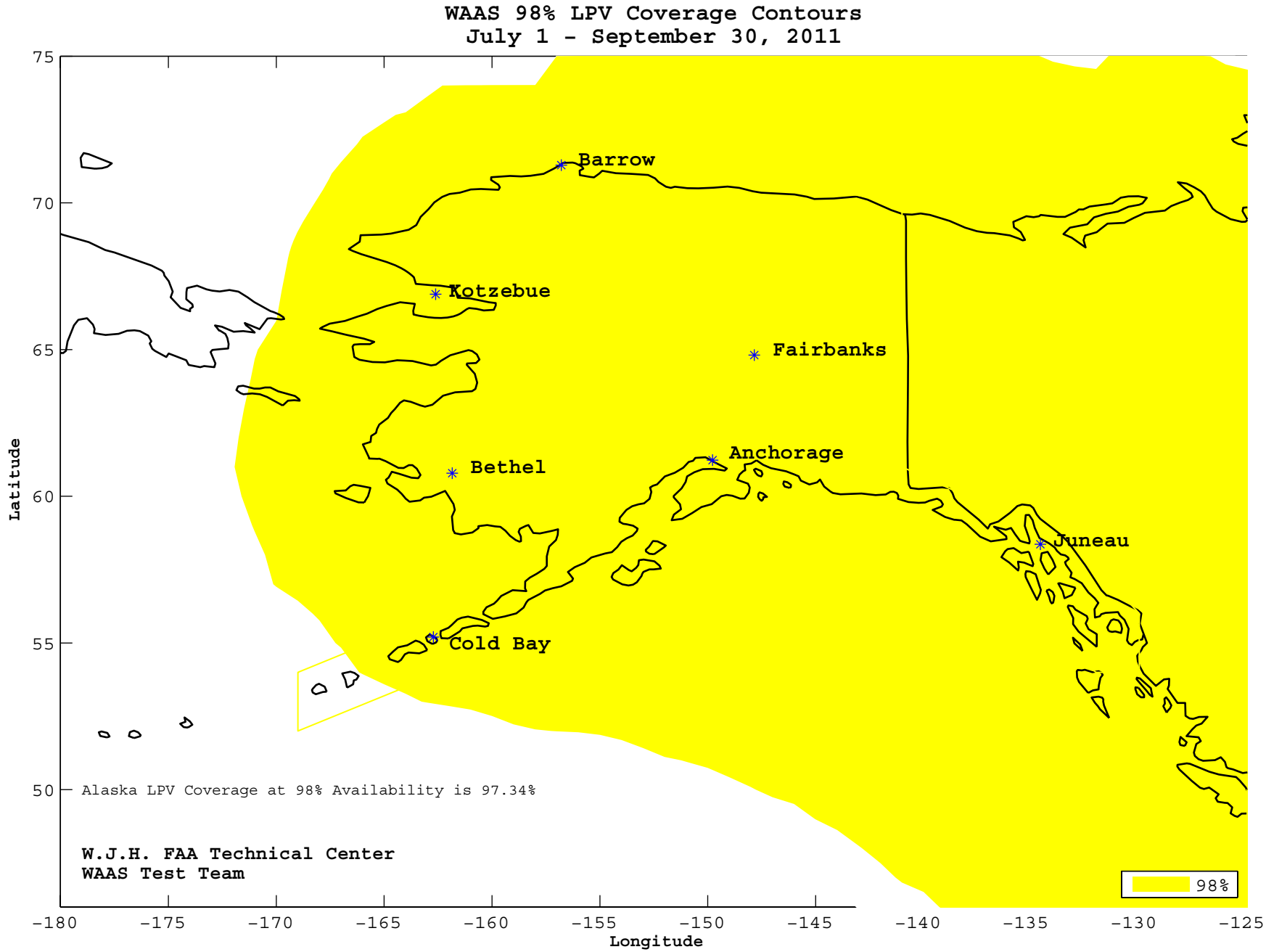


Figure B-5 99% CONUS LPV 200 Availability Contour for the Quarter

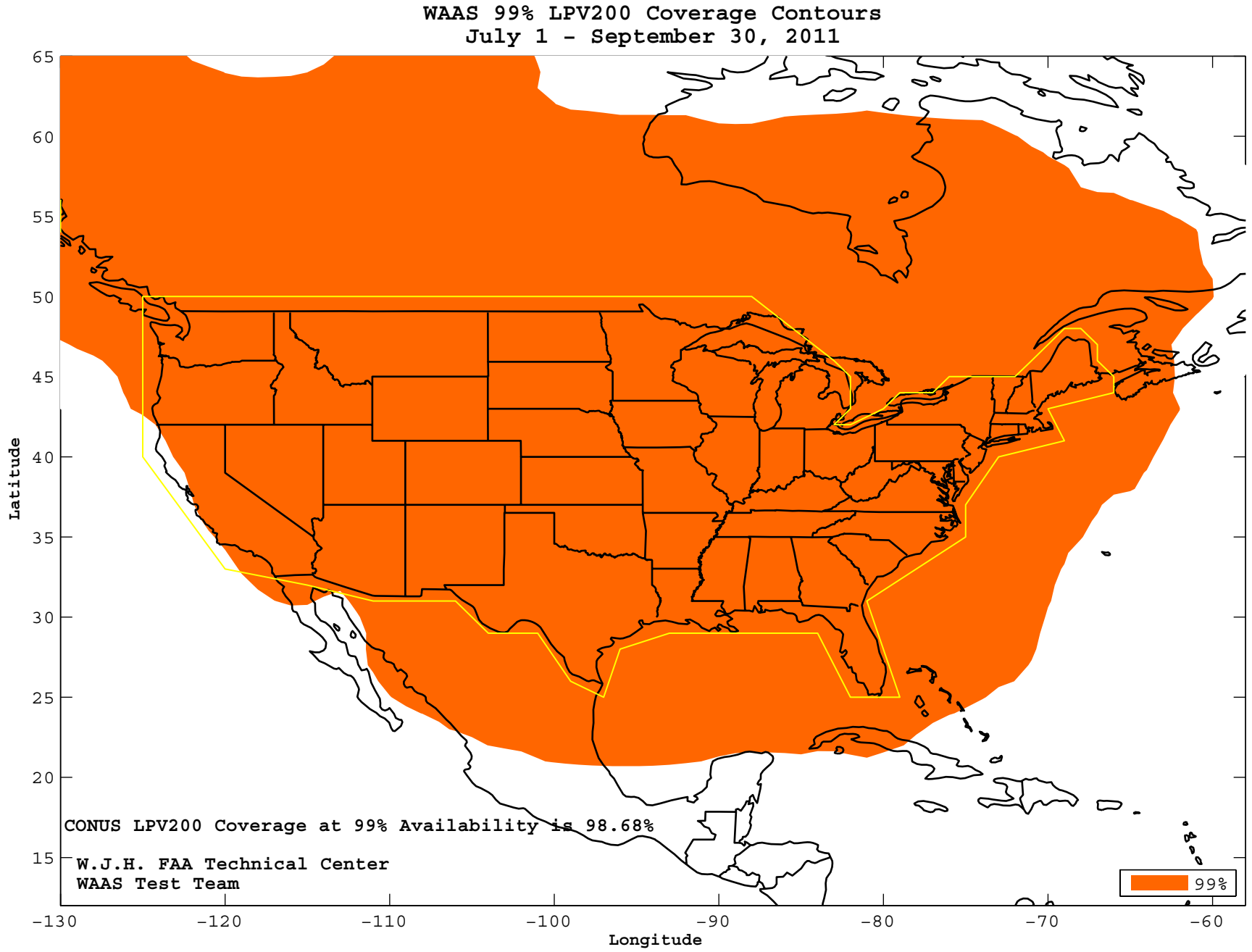


Figure B-6 99% Alaska LPV 200 Availability Contour for the Quarter