WIDE-AREA AUGMENTATION SYSTEM PERFORMANCE ANALYSIS REPORT

Report #37

Reporting Period: April 1 to June 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-seventh such WAAS quarterly report. This report covers WAAS performance during the period from April 1, 2011 to June 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. Please note that the results in the table below are valid when the Localizer Precision with Vertical Guidance (LPV) service is available. LPV service is available when the calculated Horizontal Protection Level (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.

Parameter	CONUS Site/Maximum	CONUS Site/Minimum	Alaska Site/Maximum	Alaska Site/Minimum
95% Horizontal Accuracy	Grand Forks 1.797 meters	Denver 0.527 meters	Barrow 0.612 meters	Juneau .708 meters
95% Vertical Accuracy	Grand Forks 2.2069 meters	Billings 0.822 meters	Kotzebue 1.45 meters	Juneau 1.094 meters
LPV Availability (HPL <= 40 meters & VPL <= 50 meters)	Salt Lake City 100%	Grand Forks 99.87%	Bethel 99.95%	Barrow 99.86%
LPV 200 Availability (HPL <= 40 meters & VPL < =35 meters)	Memphis 100%	Arcata 98.64%	Anchorage 99.91%	Cold Bay 93.49%
95% HPL	Oakland 15.22 meters	Memphis 10.176 meters	Cold Bay 26.137 meters	Fairbanks 12.937 meters
95% VPL	Oakland 27.127 meters	Memphis 17.663 meters	Cold Bay 34.859 meters	Juneau 21.302 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	85	7363472
Grand Forks	84	7284452
Oklahoma City	80	6941159
WAAS:		
Albuquerque	91	7861955
Anchorage	91	7861510
Atlanta	91	7862197
Barrow	91	7843815
Bethel	91	7847215
Billings	91	7861717
Boston	91	7862201
Chicago	91	7862166
Cleveland	91	7862043
Cold Bay	91	7852255
Dallas	91	7861064
Denver	91	7861721
Fairbanks	91	7850357
Gander	91	7845852
Goose Bay	91	7840419
Houston	91	7861840
Iqaluit	91	7846013
Jacksonville	91	7862184
Juneau	91	7843783
Kansas City	91	7861775
Kotzebue	91	7851252
Los Angeles	91	7861572
Memphis	91	7862185
Merida	91	7849961
Mexico City	91	7855960
Miami	91	7862104
Minneapolis	91	7862089
New York	91	7862051
Oakland	91	7859239
Puerto Vallarta	91	7842294
Salt Lake City	91	7861596
San Jose Del Cabo	91	7851496
Seattle	91	7861035
Tapachula	52	4493172
Washington DC	91	7862013
Winnipeg	91	7853378

Table 1-3 NPA Sites

Location	Number of Days Evaluated	Number of Samples
Albuquerque	91	7858787
Anchorage	91	7858895
Atlanta	91	7859061
Barrow	91	7848279
Bethel	91	7851396
Billings	91	7858901
Boston	91	7859048
Cleveland	91	7859063
Cold Bay	91	7852475
Fairbanks	89	7686460
Gander	91	7849935
Honolulu	91	7858752
Houston	91	7859025
Iqaluit	91	7843852
Juneau	91	7837223
Kansas City	91	7858729
Kotzebue	91	7854002
Los Angeles	91	7858966
Merida	91	7843720
Miami	91	7857172
Minneapolis	91	7858945
Oakland	91	7857244
Salt Lake City	91	7858967
San Jose Del Cabo	91	7850340
San Juan	91	7858991
Seattle	91	7853866
Tapachula	55	4754453
Washington DC	91	7857630

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 WAASsystem. 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
04/02/11	04/03/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	LPV_CONUS, LPV_Alaska, LPV_Canada, LPV200_CONUS, LPV200_Alaska, LPV200_Canada	High Kp activity in upper & mid latitudes caused GIVE monitor trips affecting LPV and LPV200 coverage in CONUS, Alaska and Canada.
04/05/11	04/05/11	PRN18	LPV_CONUS, LPV_Alaska, LPV_Canada, LPV200_CONUS, LPV200_Alaska, LPV200_Canada	Satellite Maneuver. NANU 2011028
04/06/11	04/06/11	Washington D.C. (CnV), Los	CONUS, Alaska, Canada	Kp activity

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
		Angeles (CnV), Atlanta (CnV)		
04/10/11	04/12/11	PRN26	CONUS, Alaska, Canada, Mexico	NANU 2011030
04/12/11	04/12/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	Alaska	Elevated GIVE values caused reduced Alaska coverage.
04/12/11	04/12/11	GEO135, Littleton (APA)	Alaska	GUS switchover, LTN faulted, TOW 255165-255178
04/12/11	04/12/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	Alaska	Raytheon WAAS Shadow improved Alaska coverage. LPV 99% availability was increased from 3.8% to 97.8%. LPV200 99% availability was increased from 0.6 % to 70.1%.
04/13/11	04/13/11	PRN135	LPV200_Alaska	TOW 335159-339026 (14-15).
04/20/11	04/20/11	Miami (ZMA1), Miami (ZMA2), Miami (ZMA3)	LPV_CONUS, LPV200_CONUS	There were unexpected LPV and LPV200 outages in Miami. The outage occurred from 324146 (18:02:11) to 324729 (18:11:54) for LPV and from 324010 (17:59:55) to 325437 (18:23:42) for LPV200 due to elevated UDREs on PRN12 (52% avail) and PRN25 (51% avail). Higher than usual IGP GIVE values. Max Kp index was 5.
04/21/11	04/21/11	PRN29	LPV_Alaska, LPV200_Alaska	NANU 2011033
04/25/11	04/25/11	GEO135, NAPA (APC)	Alaska	GUS switchover, Napa faulted TOW 154721-154733.
04/29/11	04/29/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	LPV200_Alaska	Elevated GIVE values in most of Alaska degraded Alaska LPV200 coverage.
04/30/11	04/30/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	LPV200_CONUS	LPV200 outage in southern Florida. Kp index of 5.
04/30/11	04/30/11	GEO138, Brewster (BRE-B)	LPV200_Alaska	GUS manual switchover, Brewster to Woodbine TOW 547241-547245.
05/01/11	05/01/11	GEO138, Woodbine (QWE)	LPV200_Alaska	M&C crash, manual GUS switchover QWE to BRE TOW 72077-72081.
05/02/11	05/02/11	Fairbanks (FAI1), Fairbanks (FAI2), Fairbanks (FAI3), Kotzebue (OTZ1), Kotzebue (OTZ2), Kotzebue (OTZ3)	Local	Ionospheric scintillation reduced number of satellites tracked causing high HPE. Receivers lost 4 to 5 satellites.
05/03/11	05/03/11	GEO138, Brewster (BRE-B)	LPV200_Alaska	Manual GUS switchover, Brewster to Woodbine. TOW 201637-201641.

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
05/05/11	05/05/11	PRN23	LPV_Alaska, LPV200_Alaska	NANU 2011038
05/07/11	05/10/11	PRN10	LPV_CONUS, LPV_Alaska, LPV200_CONUS, LPV200_Alaska	NANU 2011041
05/08/11	05/08/11	GEO135, Littleton (APA)	Alaska	GUS manual switchover, Littleton to Napa TOW 28909-28913.
05/13/11	08/16/11	PRN30	None	SVN30/PRN30 was set UNUSUFN and eventually decommissioned. SVN35/PRN30 was set to usable on August 16 2011. The following NANUs reference this event: 2011042, 2011055, 2011057, 2011061, 2011062
05/22/11	05/23/11	GEO135, NAPA (APC)	Alaska	GUS manual switchover, Napa to Littleton TOW 28820-28824. Rolled over to next day.
05/25/11		Tapachula	Local	Tapachula reference station went out of service on 5/25/11 due to a lightning strike that damaged communication equipment. As of the end of the quarter Tapachula is still out of service.
05/26/11	05/26/11	GEO135, Littleton (APA)	Alaska, LPV200_CONUS	GUS switchover - Littleton faulted TOW 414592-414606. Unexpected LPV200 outage on East Coast from 21:47 GMT to around 21:59 GMT. At that time VDOP was above 3 due to PRN30 outage (NANU 2011042) and PRN135 not in PA mode due to GUS switchover. This resulted in elevation of VPL.
05/28/11	05/29/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	Alaska, Canada	Geomagnetic activity with Kp of 6 affected Alaska and Canada.
05/31/11	05/31/11		LPV200_Alaska	Elevated GIVE values caused an increase in protection levels and a decrease in LPV200 coverage in Alaska to 80% at 99% availability.
06/05/11	06/05/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV)	CONUS, Canada	Geomagnetic activity with Kp of 6 affected CONUS and Canada. See DR 102 WAAS Reaction to Iono Activity June 5 2011.
06/11/11	06/11/11	GEO135, NAPA (APC)	Alaska	GUS switchover, Napa faulted. TOW 582368-582381.

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
06/13/11	06/13/11	GEO135, Littleton (APA)	Alaska, LPV200_CONUS	GUS switchover, Littleton faulted, TOW 129542-129558.
06/13/11	06/13/11	PRN138	LPV200_CONUS	TOW 122896-137377 (14-15),
06/15/11	06/15/11	Atlanta (CnV), PRN135, PRN138	LPV200_CONUS	PRN135 and PRN138 suffered 2 SV alerts bumping their UDREis from 10 to 11 for 1 second followed by GUS switchover causing a drop in coverage.
06/24/11	06/24/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV), PRN21	LPV_Mexico, LPV200_CONUS, LPV200_Mexico	SV Glitches on PRN 21 elevated UDREi to 12 causing an increased in protection level.
06/28/11	06/28/11	GEO135	Alaska, LPV200_CONUS	Com upgrades at Napa. GUS manual switchover, Napa to Littleton TOW 201621-201625.
06/29/11	06/29/11	GEO138, Brewster (BRE-B)	Canada, LPV200_Alaska	GUS manual switchover, Brewster to Woodbine. Com upgrades. TOW 302460-302464.
06/29/11	06/29/11	Washington D.C. (CnV), Los Angeles (CnV), Atlanta (CnV), PRN32	LPV200_CONUS, LPV200_Mexico	SV Alert on PRN 32. Affected LPV200 at Oakland and Mexico sites.

Table 1-6 WAAS Upgrades

Start Date	End Date	Event Description
6/15/11	6/15/11	Software upgrade at ZTL, ZDC and ZLA C&Vs to Release 6.077L

Table 1-7 GUS Switchovers

Start Date	End Date	GUS Switch	Location/ Satellite	Service Affected	Even Description
04/12/11	04/12/11	Faulted	GEO135, Littleton (APA)	Alaska	Gus switchover, LTN faulted TOW 255165-255178
04/13/11	04/13/11	Faulted	GEO133, Santa Paula (SZP)	None	GUS switchover, SZP faulted AMR Faulted TOW 333678-333694
04/13/11	04/13/11	Manual	GEO133, Pamalu (HDH)	None	Manual GUS switchover, HDH to SZP To put Santa Paula back into Primary and prepare for configuration testing the following day. TOW 340248-340263.

Start Date	End Date	GUS Switch	Location/ Satellite	Service Affected	Even Description
04/14/11	04/14/11	Manual	GEO133, Santa Paula (SZP)	None	Manual GUS switchover - SZP to HDH AMR Testing TOW 347663-347668.
04/14/11	04/14/11	Manual	GEO133, Pamalu (HDH)	None	Manual GUS switchover - HDH to SZP AMR Testing to bring Santa Paula back to Primary. TOW 352531-352536
04/25/11	04/25/11	Faulted	GEO135, NAPA (APC)	Alaska	GUS switchover, Napa faulted TOW 154721-154733
04/30/11	04/30/11	Manual	GEO138, Brewster (BRE-B)	LPV200_ Alaska	GUS manual switchover, Brewster to Woodbine TOW 547241-547245
05/01/11	05/01/11	Manual	GEO138, Woodbine (QWE)	LPV200_ Alaska	M&C crash, manual GUS switchover QWE to BRE TOW 72077-72081
05/03/11	05/03/11	Manual	GEO138, Brewster (BRE-B)	LPV200_ Alaska	Manual GUS switchover, Brewster to Woodbine. TOW 201637-201641
05/08/11	05/08/11	Manual	GEO135, Littleton (APA)	Alaska	GUS manual switchover, Littleton to Napa TOW 28909-28913
05/17/11	05/17/11	Manual	GEO138, Woodbine (QWE)	None	TOW 201644-201648
05/19/11	05/19/11	Manual	GEO133, Santa Paula (SZP)	None	GUS switchover, SZP faulted. TOW 391675-391691
05/22/11	05/23/11	Manual	GEO135, NAPA (APC)	Alaska	GUS manual switchover, Napa to Littleton TOW 28820-28824. Rolled over to day 1
05/26/11	05/26/11	Faulted	GEO135, Littleton (APA)	Alaska, LPV200_ CONUS	GUS switchover - Littleton faulted TOW 414592-414606 Unexpected LPV200 outage on East Coast from 21:47 GMT to around 21:59 GMT. At that time VDOP was above 3 due to PRN30 out (NANU 2011042), and PRN135 was not in PA mode due to GUS switchover. All that caused slight elevation of VPL.
06/11/11	06/11/11	Faulted	GEO135, NAPA (APC)	Alaska	GUS switchover, Napa faulted. TOW 582368-582381
06/13/11	06/13/11	Manual	GEO133, Pamalu (HDH)	None	GUS Manual switchover, HDH to SZP TOW 115214-115219
06/13/11	06/13/11	Faulted	GEO135, Littleton (APA)	Alaska, LPV200_ CONUS	GUS switchover, Littleton faulted TOW 129542-129558
06/16/11	06/16/11	Faulted	GEO133, Pamalu (HDH)	None	GUS switchover, HDH faulted. HDH - RFU Equipment Uplink Fault. TOW 394111-394127
06/16/11	06/16/11	Faulted	GEO133, Pamalu (HDH)	None	GUS switchover, HDH faulted (RFU fault) TOW 427871-427887

Start Date	End Date	GUS Switch	Location/ Satellite	Service Affected	Even Description
06/16/11	06/16/11	Manual	GEO133, Santa Paula (SZP)	None	SZP Low L1 and L5 C/N0. After C&V missed 8 messages, it commanded SZP to backup and HDH to primary. GUS manual switchover, SZP to HDH TOW 387103-387122
06/19/11	06/19/11	Manual	GEO138, Brewster (BRE-B)	None	GUS manual switchover, Brewster to Woodbine TOW 28735-28739
06/21/11	06/21/11	Manual	GEO138, Woodbine (QWE)	None	GUS manual switchover, Woodbine to Brewster TOW 201694-201698
06/28/11	06/28/11	Manual	GEO135	Alaska, LPV200_ CONUS	Comm upgrades at Napa. GUS manual switchover, Napa to Littleton TOW 201621-201625
06/29/11	06/29/11	Manual	GEO138, Brewster (BRE-B)	Canada, LPV200_ Alaska	GUS manual switchover, Brewster to Woodbine. Comm upgrades. TOW 302460-302464

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 summarizes WAAS anomalies and problems identified during the reporting period, which adversely affect WAAS performance described in Table 1.3.

Section 9 provides WAAS LPV availability and outages at selected airports.

Section 10 provides the assessment of WAAS CNMP bounding for the 114 WAAS receivers.

Section 11 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 12 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 three operational service levels: 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)
LPV (LOC/VNAV)	40	50
LNAV/VNAV	556	50
LPV 200	40	35

Table 2.2 shows PA horizontal and vertical position accuracy maintained for 95% of the time at 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 1.797 meters and 2.206 meters both at Grand Forks, respectively. The minimum 95% CONUS horizontal and vertical LPV errors are 0.527 meters at Denver and 0.822 meters at Billings, respectively. The maximum 95% and 99.999% NPA horizontal errors are 4.442 meters and 11.026 meters, both at Honolulu, respectively. The minimum 95% and 99.999% horizontal errors are 1.201 meters at Salt Lake City and 2.912 meters at Seattle, respectively. Grand Forks 95% LPV accuracy shows improvement beginning 4/11/11 after the reference station was reset.

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 ionopheric 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	1.291	1.291	1.824	100	*	*
Grand Forks	1.797	1.798	2.069	100	*	*
Oklahoma City	0.742	0.742	1.354	100	*	*
Albuquerque	0.599	0.599	1.258	100	2.51	3.797
Anchorage	0.639	0.640	1.277	100	*	*
Atlanta	0.591	0.591	1.167	100	2.442	3.869
Barrow	0.612	0.613	1.433	99.96957	*	*
Bethel	0.572	0.573	1.153	100	2.468	3.667
Billings	0.815	0.815	0.822	100	2.038	3.512
Boston	0.719	0.719	1.040	100	2.126	3.479
Chicago	0.811	0.812	0.914	100	*	*
Cleveland	0.642	0.642	0.955	100	1.971	3.544
Cold Bay	0.703	0.703	1.158	100	*	*
Dallas	0.587	0.587	1.488	100	*	*
Denver	0.527	0.527	0.934	100	*	*
Fairbanks	0.628	0.628	1.354	99.99842	2.781	3.521
Gander	0.842	0.844	1.309	100	*	*
Goose Bay	0.747	0.758	1.077	100	*	*
Houston	0.689	0.689	1.606	100	3.057	4.093
Iqaluit	0.824	0.835	1.448	100	*	*
Jacksonville	0.602	0.602	1.497	100	*	*
Juneau	0.708	0.708	1.094	100	*	*
Kansas City	0.605	0.605	0.870	100	2.037	3.756
Kotzebue	0.692	0.693	1.450	99.96961	2.728	3.585
Los Angeles	0.816	0.816	1.596	100	2.997	4.091
Memphis	0.573	0.573	1.102	100	*	*
Merida	0.716	0.717	1.821	100	*	*
Mexico City	0.796	0.796	2.479	99.99855	*	*
Miami	0.809	0.810	1.604	100	3.336	4.398
Minneapolis	0.700	0.701	0.849	100	1.958	3.485
New York	0.749	0.749	0.968	100	*	*
Oakland	0.740	0.740	1.600	100	2.852	4.109
Puerto Vallarta	0.925	0.925	2.520	99.99950	*	*
Salt Lake City	0.637	0.637	0.928	100	2.204	3.799
San Jose Del Cabo	0.890	0.890	2.495	100	*	*
Seattle	0.836	0.836	1.025	100	2.077	3.621
Tapachula	1.109	1.113	2.504	99.99450	*	*
Washington DC	0.679	0.679	0.974	100	2.149	3.798
Winnipeg	0.645	0.647	1.008	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	1.546	3.704	100	3.906
Anchorage	2.271	4.181	100	4.266
Atlanta	1.604	4.106	100	4.272
Barrow	2.326	3.855	99.992	3.970
Bethel	2.027	3.728	100	3.940
Billings	1.593	3.817	100	4.048
Boston	1.485	4.019	100	4.152
Cleveland	1.302	5.070	100	5.598
Cold Bay	1.580	3.444	100	3.674
Fairbanks	2.620	4.703	100	21.369
Gander	1.637	4.323	100	4.435
Honolulu	4.442	11.026	100	11.217
Houston	2.430	5.078	100	5.637
Iqaluit	1.984	4.459	100	4.662
Juneau	2.055	3.476	100	3.774
Kansas City	1.359	3.057	100	4.542
Kotzebue	2.389	4.417	99.992	4.553
Los Angeles	2.159	5.214	100	5.423
Merida	3.091	7.330	100	7.571
Miami	2.586	5.994	100	6.146
Minneapolis	1.448	5.546	100	5.711
Oakland	1.677	4.567	100	4.699
Salt Lake City	1.201	3.708	100	3.999
San Jose Del Cabo	3.352	7.652	100	7.839
San Juan	2.673	8.452	100	8.723
Seattle	1.304	2.912	100	3.135
Tapachula	3.730	9.270	100	9.539
Washington DC	1.481	3.785	100	3.971

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	3.214	0.243	0.243	7.134	0.150	0.219
Grand Forks	4.146	0.263	0.380	6.440	0.308	0.362
Oklahoma City	2.707	0.104	0.201	3.936	0.160	0.213
Albuquerque	2.337	0.061	0.175	2.758	0.135	0.179
Anchorage	2.840	0.137	0.184	5.462	0.254	0.254
Atlanta	2.071	0.243	0.243	3.829	0.180	0.225
Barrow	3.588	0.203	0.203	5.608	0.223	0.223
Bethel	2.891	0.193	0.194	4.307	0.171	0.186
Billings	1.865	0.070	0.169	5.294	0.124	0.178
Boston	1.892	0.175	0.177	2.687	0.146	0.146
Chicago	3.310	0.101	0.234	4.727	0.141	0.173
Cleveland	3.314	0.200	0.200	5.347	0.226	0.226
Cold Bay	2.668	0.147	0.148	3.295	0.094	0.145
Dallas	1.437	0.137	0.159	3.559	0.145	0.216
Denver	2.672	0.075	0.205	3.496	0.152	0.203
Fairbanks	2.861	0.184	0.184	10.906	0.271	0.271
Gander	2.683	0.132	0.135	5.109	0.148	0.148
Goose Bay	3.912	0.138	0.192	4.208	0.105	0.174
Houston	1.815	0.196	0.215	3.348	0.236	0.236
Iqaluit	3.224	0.088	0.161	7.453	0.214	0.217
Jacksonville	1.554	0.145	0.168	3.850	0.166	0.216
Juneau	2.406	0.183	0.194	3.713	0.136	0.198
Kansas City	2.523	0.094	0.167	4.088	0.082	0.190
Kotzebue	4.447	0.306	0.306	5.277	0.140	0.200
Los Angeles	1.696	0.082	0.146	3.972	0.158	0.182
Memphis	1.998	0.237	0.238	3.572	0.110	0.184
Merida	2.100	0.054	0.165	4.404	0.147	0.197
Mexico City	4.290	0.231	0.231	5.717	0.170	0.226
Miami	1.890	0.158	0.184	3.847	0.135	0.167
Minneapolis	3.893	0.119	0.238	5.155	0.197	0.202
New York	1.909	0.156	0.174	2.318	0.130	0.152
Oakland	1.943	0.189	0.189	3.831	0.136	0.183
Puerto Vallarta	3.816	0.205	0.205	5.564	0.225	0.237
Salt Lake City	2.442	0.212	0.216	2.877	0.121	0.194
San Jose Del Cabo	2.394	0.140	0.154	5.048	0.165	0.218
San Juan	5.333	0.133	0.133	10.477	0.275	0.275
Seattle	2.322	0.136	0.188	3.422	0.166	0.181
Tapachula	4.153	0.141	0.186	6.754	0.154	0.176
Washington DC	1.854	0.146	0.151	2.914	0.091	0.169
Winnipeg	3.290	0.215	0.291	3.808	0.140	0.188

Figure 2-1 LPV 95% Horizontal Accuracy

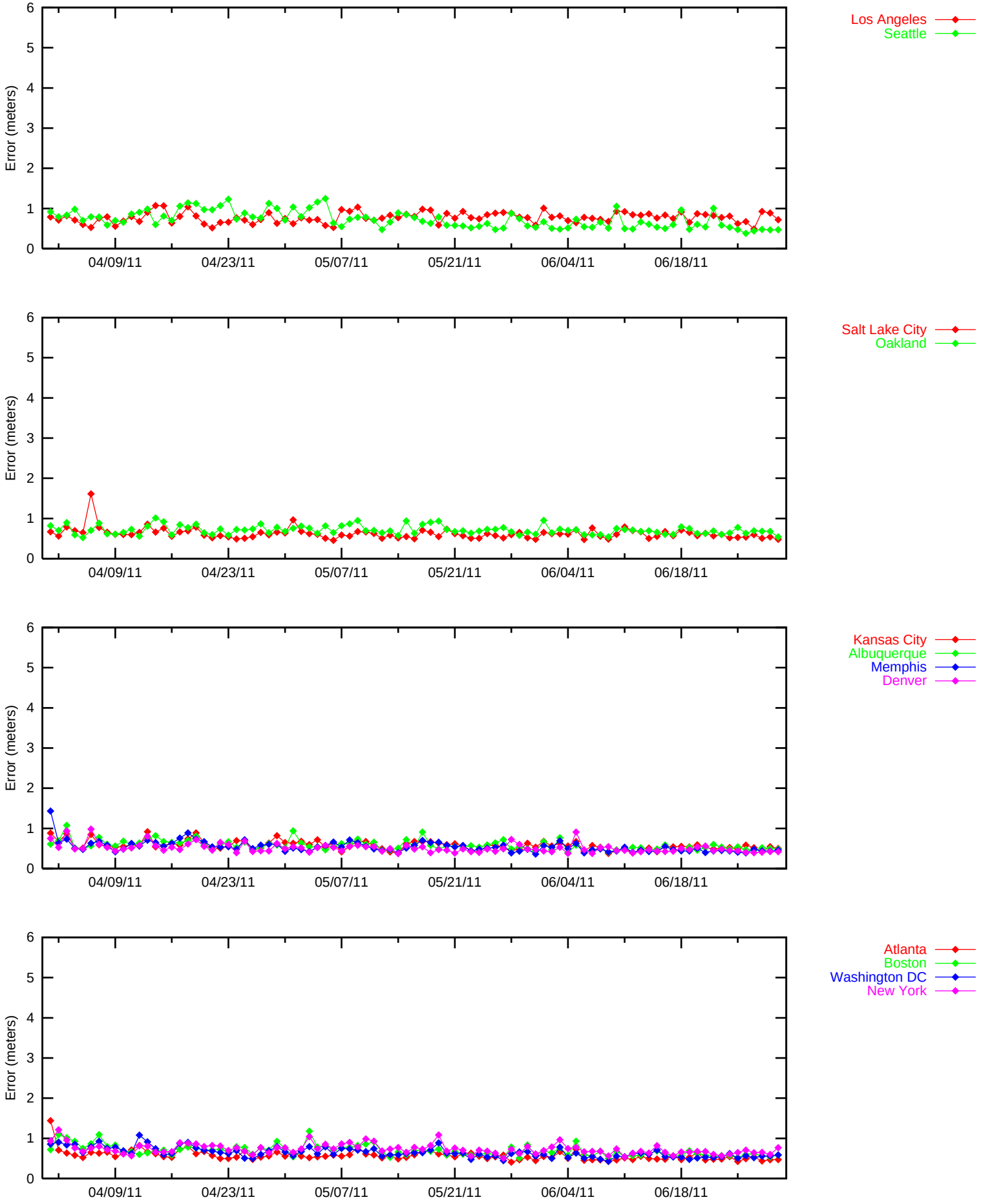


Figure 2-2 LPV 95% Horizontal Accuracy

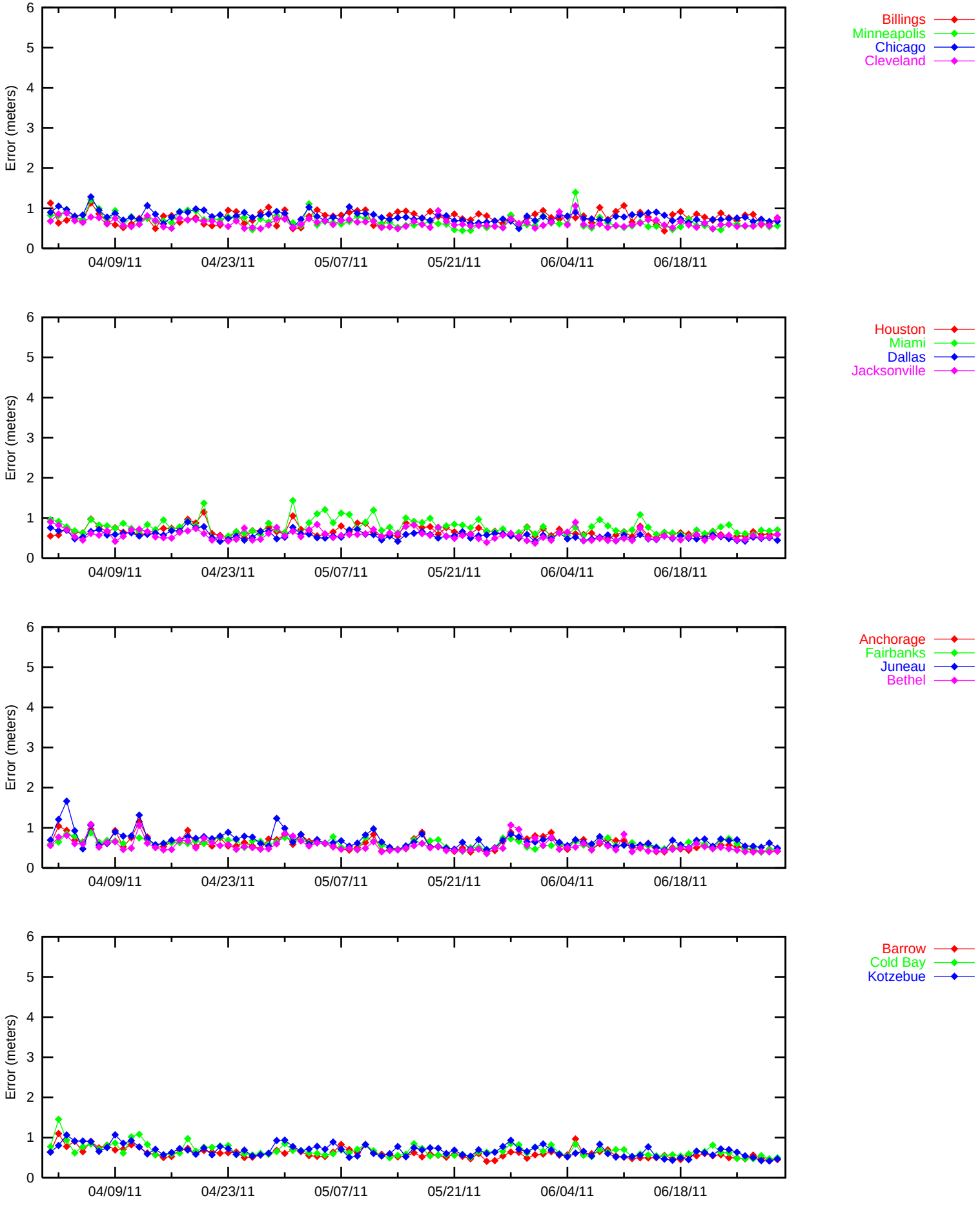


Figure 2-3 LPV 95% Horizontal Accuracy

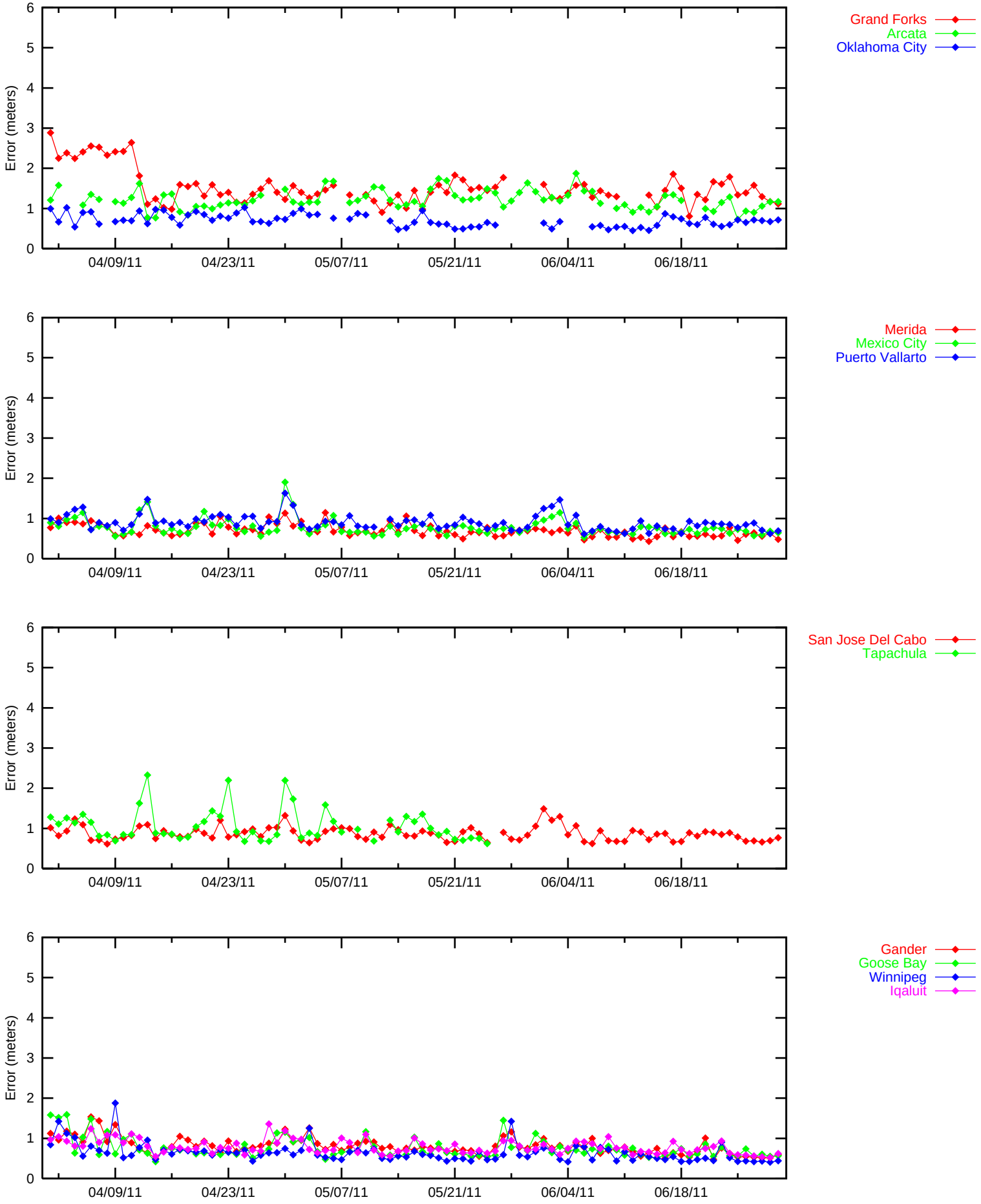


Figure 2-4 LPV 95% Vertical Accuracy

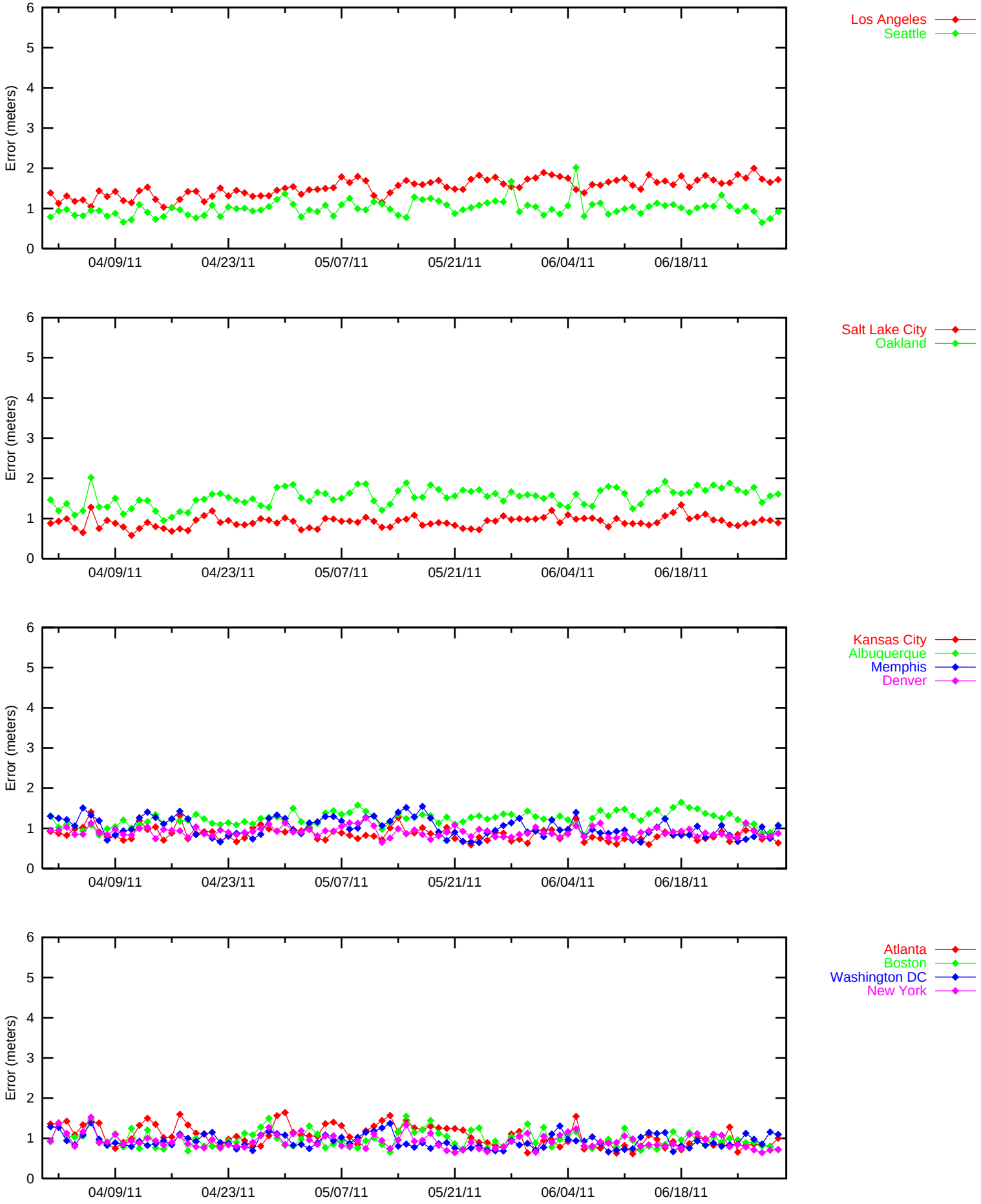


Figure 2-5 LPV 95% Vertical Accuracy

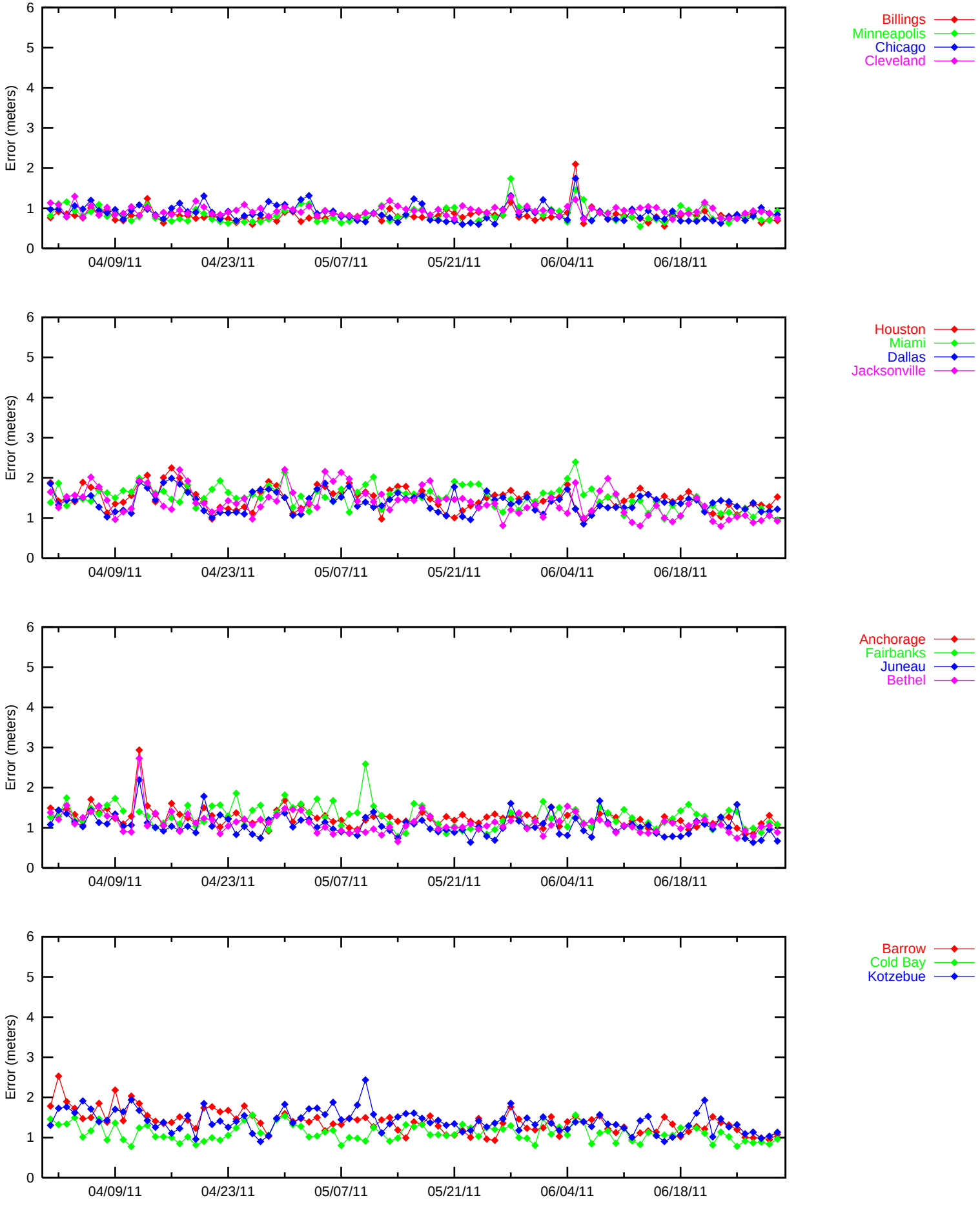


Figure 2-6 LPV 95% Vertical Accuracy

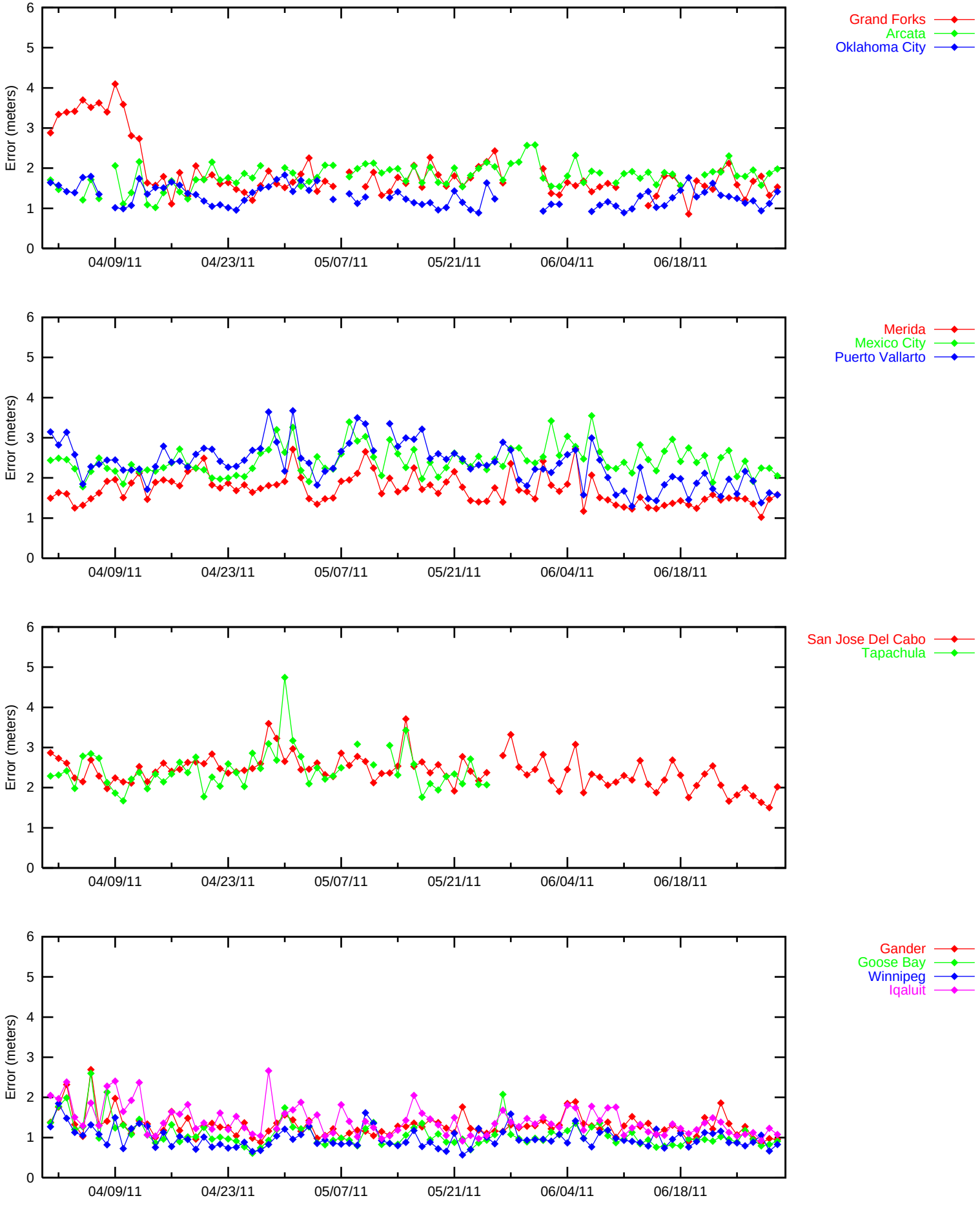


Figure 2-7 NPA 95% Horizontal Accuracy

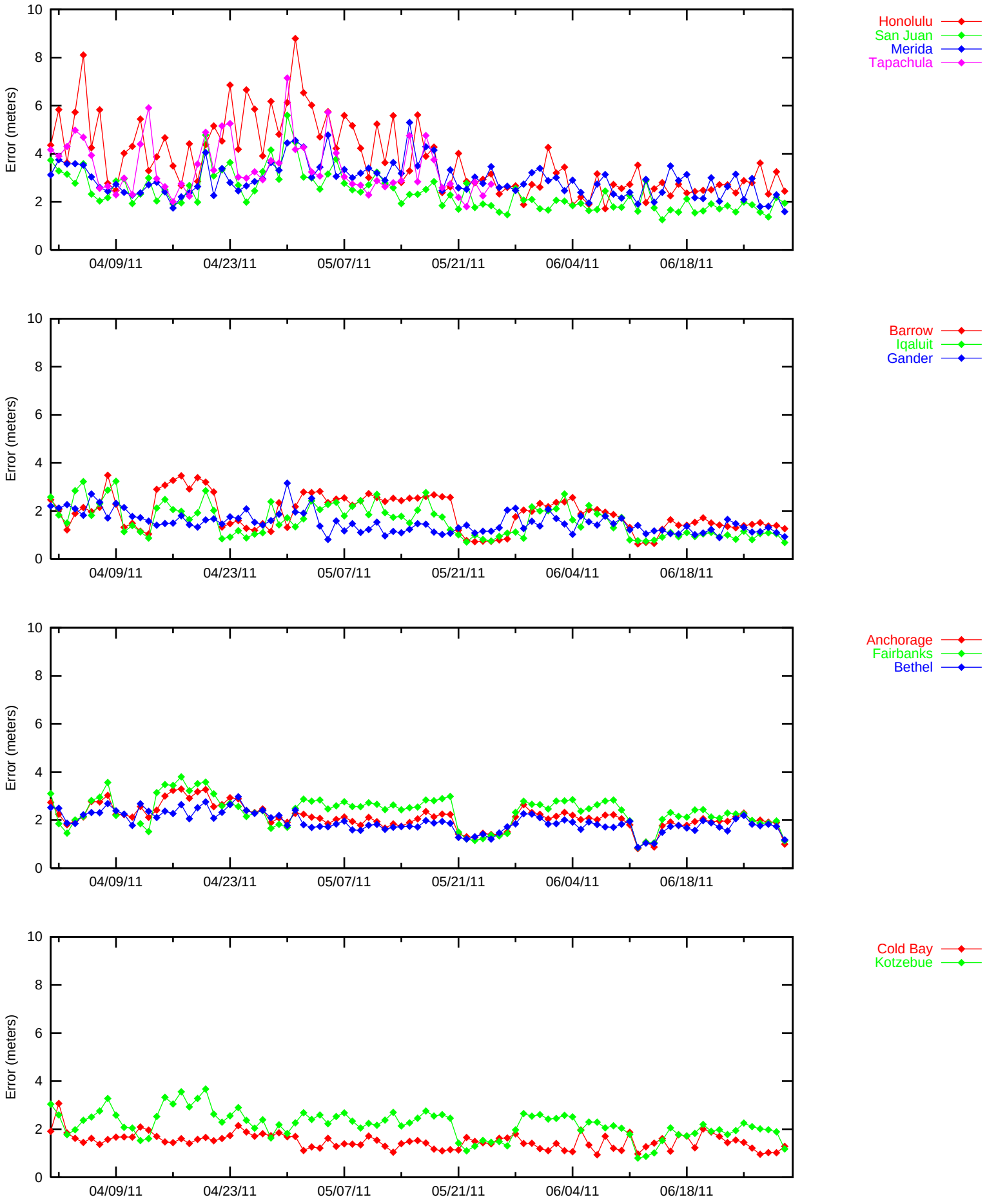


Figure 2-8 NPA 95% Horizontal Accuracy

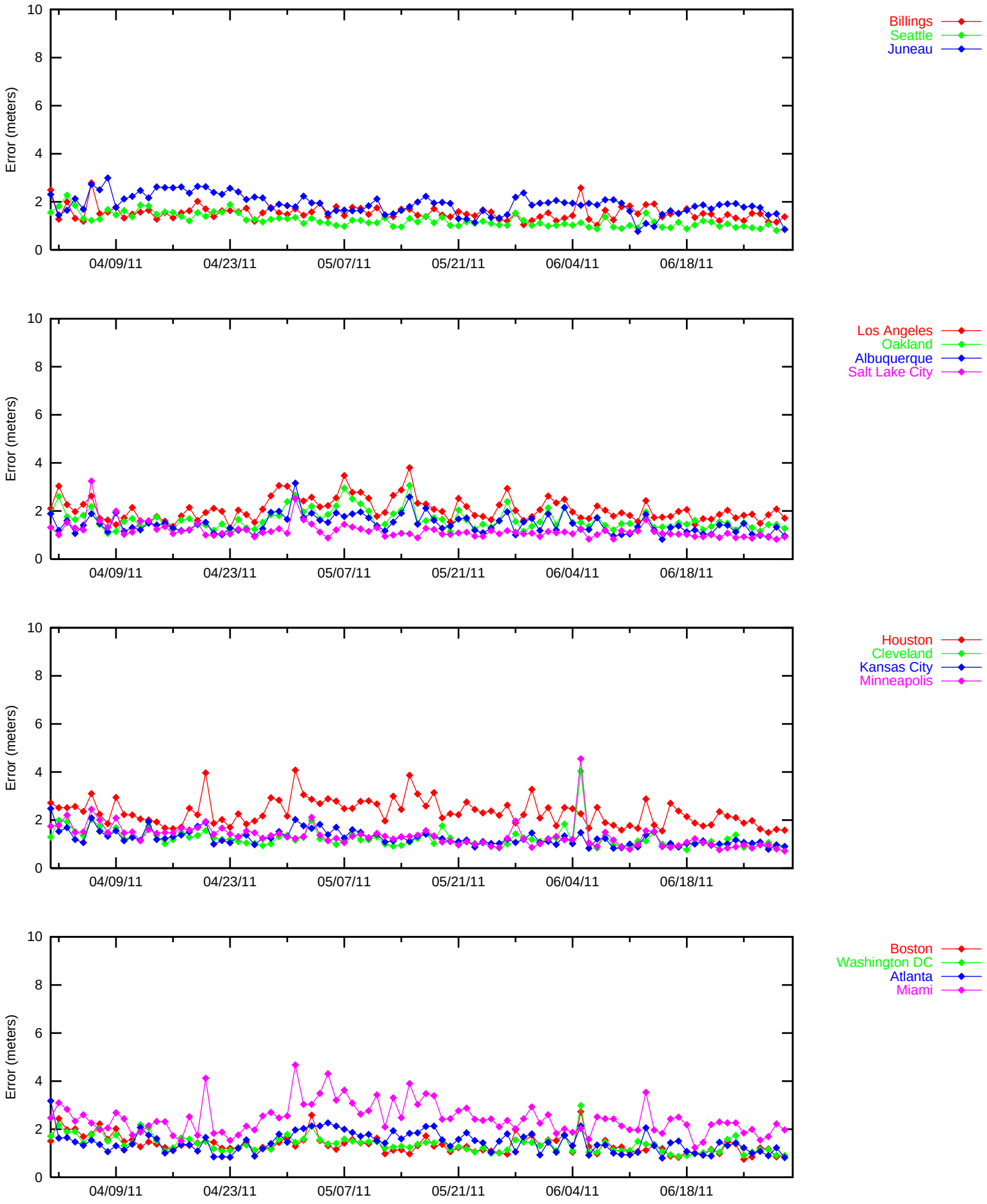


Figure 2-9 LPV Horizontal Error Bounding Triangle Chart

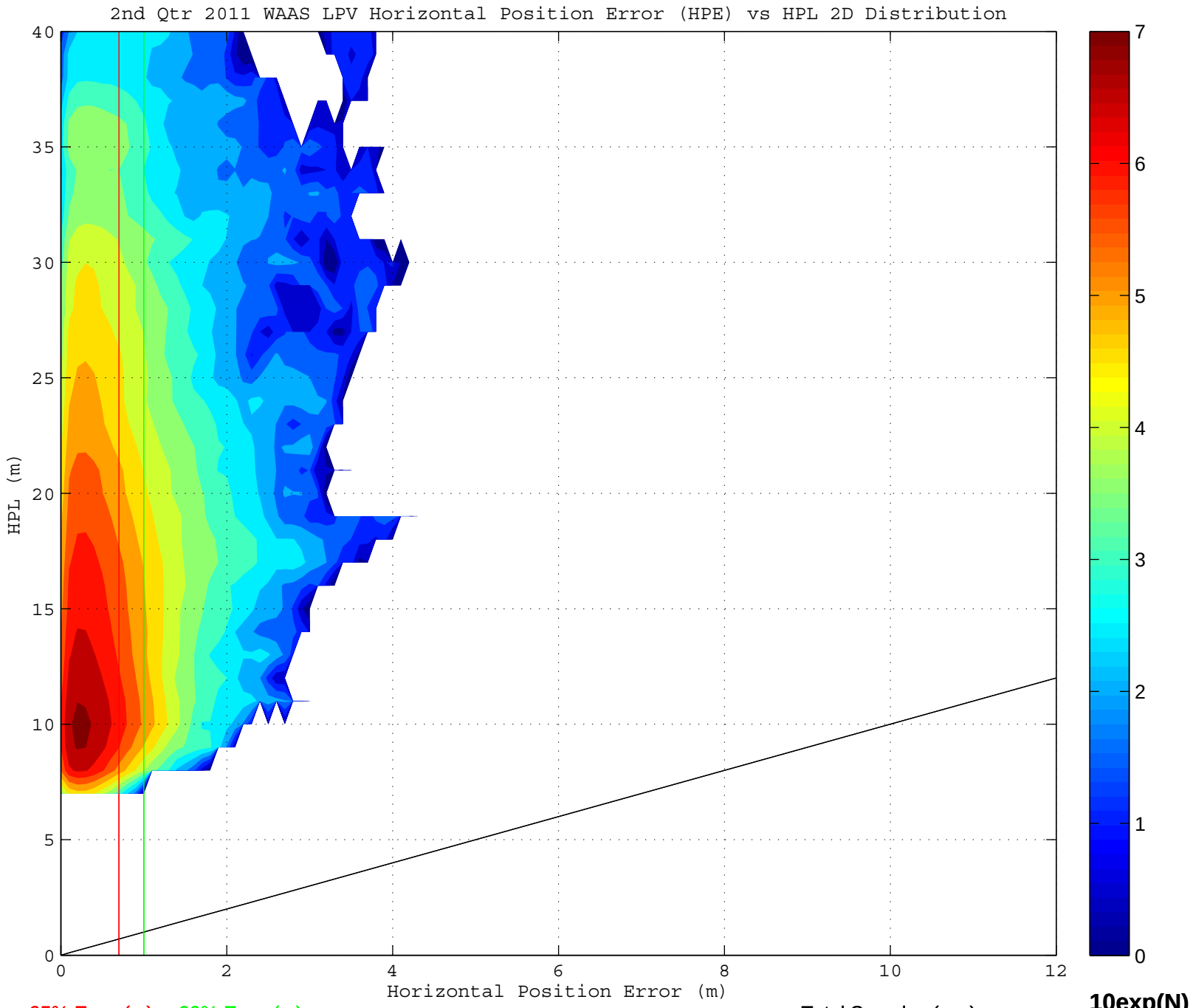


Figure 2-10 LPV Vertical Error Bounding Triangle Chart

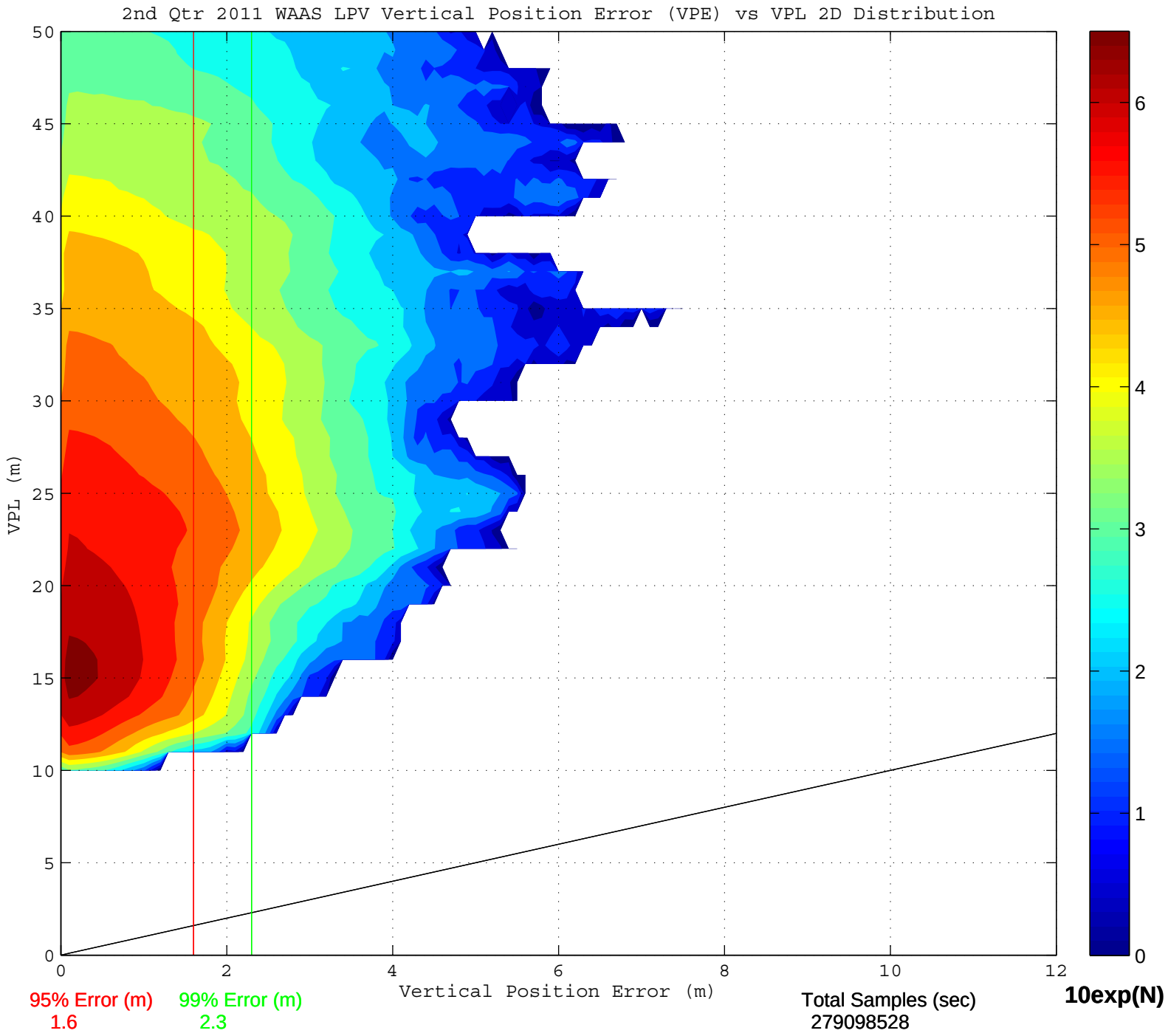


Figure 2-11 LPV 2-D Horizontal Error Distribution Histogram

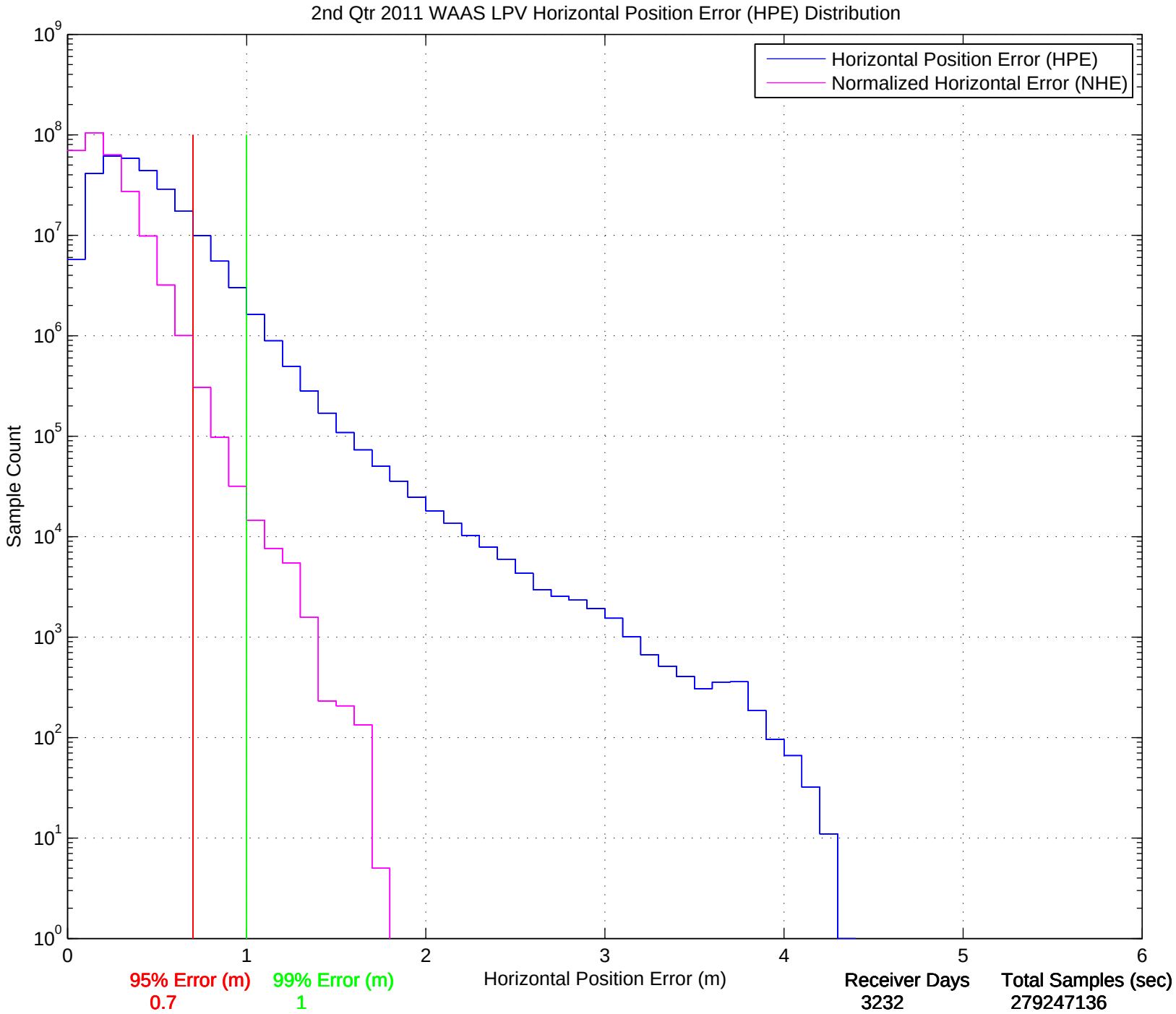
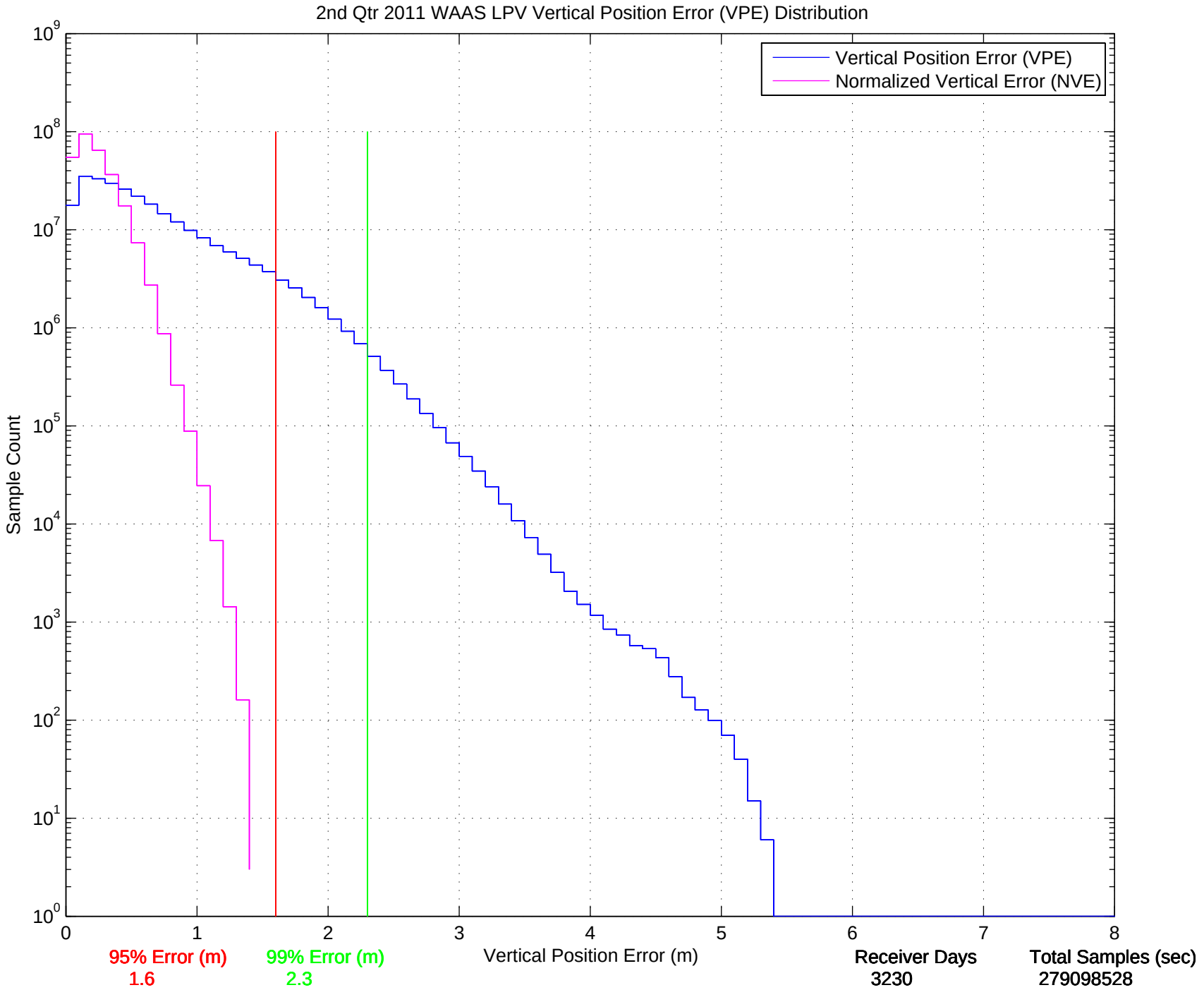


Figure 2-12 LPV 2-D Vertical Error Distribution Histogram



3.0 AVAILABILITY

The WAAS availability evaluation documents the percentage of time that the WAAS provided service for the operational service levels (LPV and LPV 200) 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 95% 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.

Availability LPV and LPV 200 service is 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 LPV and LPV 200 service is available using the fifteen-minute window criteria is presented in Table 3.2. The LPV and LPV 200 service outages and associated outage rate for the test 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.

The following table shows the maximum and minimum 95% HPL and VPL observed at the evaluated CONUS and Alaska sites this evaluation period. The international sites are excluded from this table, but can be found in Table 3.1.

Parameter	CONUS Site/Maximum	CONUS Site/Minimum	Alaska Site/Maximum	Alaska Site/Minimum
95% HPL	Oakland 15.22 meters	Memphis 10.176 meters	Cold Bay 26.137 meters	Fairbanks 12.937 meters
95% VPL	Oakland 27.127 meters	Memphis 17.663 meters	Cold Bay 34.859 meters	Juneau 21.302 meters

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.

During this evaluation period, low PA and NPA availability are mainly due to GPS satellite outages or GUS switchovers. Please refer to Table 1.5 for the events that affected availability. Geomagnetic activity on 4/6/11, 5/2/11, and 5/28/11 significantly reduced Alaska availability. Geomagnetic activity on 6/5/11 affected CONUS availability (see DR 102 WAAS Reaction to Iono Activity June 5 2011). The PRN 29 outage on 4/21/11 and the PRN 23 outage on 5/5/11 significantly impacted Alaska availability on those days. The PRN 18 outage on 4/5/11 reduced CONUS availability. Elevated GIVE values due to geomagnetic activity on 4/12/11 affected Alaska availability.

Table 3-1 95% Protection Level

Location	95% HPL (meters)	95% VPL (meters)	Percentage in PA mode
Arcata	14.712	26.858	100
Grand Forks	12.497	19.894	100
Oklahoma City	10.294	18.053	100
Albuquerque	11.382	19.517	100
Anchorage	13.730	21.683	100
Atlanta	10.909	18.364	100
Barrow	16.037	32.989	99.969570
Bethel	16.983	26.324	100
Billings	11.771	19.655	100
Boston	13.628	20.273	100
Chicago	10.655	17.765	100
Cleveland	11.388	18.491	100
Cold Bay	26.137	34.859	100
Dallas	10.372	18.448	100
Denver	10.676	19.187	100
Fairbanks	12.937	22.194	99.998420
Gander	22.609	34.350	100
Goose Bay	16.991	26.699	100
Houston	10.932	19.135	100
Iqaluit	27.818	39.377	100
Jacksonville	11.588	19.384	100
Juneau	12.996	21.302	100
Kansas City	10.427	17.912	100
Kotzebue	16.013	30.569	99.969610
Los Angeles	14.277	25.167	100
Memphis	10.176	17.663	100
Merida	16.350	27.615	100
Mexico City	19.508	32.688	99.998550
Miami	13.611	23.042	100
Minneapolis	11.361	18.848	100
New York	13.130	20.170	100
Oakland	15.222	27.127	100
Puerto Vallarta	20.325	33.859	99.999500
Salt Lake City	10.926	19.788	100
San Jose Del Cabo	18.949	32.286	100
Seattle	12.636	21.272	100
Tapachula	27.794	44.606	99.994500
Washington DC	11.737	19.169	100
Winnipeg	13.299	20.432	100

Table 3-2 Quarterly Availability Statistics

Location	LPV WAAS *With 15 minute window*	LPV 200 WAAS *With 15 minute window*
Arcata	0.9999885	0.9864230
Grand Forks	0.9987008	0.9984973
Oklahoma City	1	1
Albuquerque	1	0.9999983
Anchorage	0.9994993	0.9991698
Atlanta	1	1
Barrow	0.9986347	0.9709284
Bethel	0.9995635	0.9978717
Billings	0.9994123	0.9991044
Boston	1	1
Chicago	0.9994616	0.9993404
Cleveland	0.9997258	0.9995936
Cold Bay	0.9990191	0.9349918
Dallas	1	1
Denver	0.9997015	0.9996338
Fairbanks	0.9992531	0.9989097
Gander	0.9983038	0.9466984
Goose Bay	0.9969832	0.9957702
Houston	1	1
Iqaluit	0.9906249	0.8296762
Jacksonville	1	1
Juneau	0.9995631	0.9990387
Kansas City	0.9996450	0.9993772
Kotzebue	0.9988956	0.9879149
Los Angeles	0.9998517	0.9995855
Memphis	1	1
Merida	0.9991181	0.9976406
Mexico City	0.9999968	0.9790923
Miami	0.9997059	0.9994714
Minneapolis	0.9995971	0.9992672
New York	1	0.9999836
Oakland	0.9996809	0.9910994
Puerto Vallarta	0.9999914	0.9551962
Salt Lake City	1	0.9999835
San Jose Del Cabo	0.9996631	0.9796975
Seattle	0.9999739	0.9992674
Tapachula	0.9772140	0.6336460
Washington DC	0.9999762	0.9998948
Winnipeg	0.9986486	0.9986062

Table 3-3 NPA Availability

Location	NPA Availability (Excluding RAIM/FDE)
Albuquerque	1
Anchorage	1
Atlanta	1
Barrow	0.99992457
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	0.99992144
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
Tapachula	1
Washington DC	1

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

Location	LPV Outages	LPV Outage Rates	LPV 200 Outages	LPV 200 Outage Rates
Arcata	2	0.000041	128	0.002643
Grand Forks	1	0.000021	1	0.000021
Oklahoma City	0	0	0	0
Albuquerque	0	0	2	0.000038
Anchorage	2	0.000038	5	0.000095
Atlanta	0	0	0	0
Barrow	18	0.000345	311	0.006125
Bethel	2	0.000038	30	0.000575
Billings	1	0.000019	1	0.000019
Boston	0	0	0	0
Chicago	2	0.000038	1	0.000019
Cleveland	1	0.000019	1	0.000019
Cold Bay	6	0.000115	425	0.008683
Dallas	0	0	0	0
Denver	1	0.000019	1	0.000019
Fairbanks	3	0.000058	7	0.000135
Gander	18	0.000345	387	0.007818
Goose Bay	7	0.000134	15	0.000288
Houston	0	0	0	0
Iqaluit	144	0.002782	984	0.022695
Jacksonville	0	0	0	0
Juneau	4	0.000077	5	0.000096
Kansas City	2	0.000038	1	0.000019
Kotzebue	12	0.000230	140	0.002707
Los Angeles	2	0.000038	5	0.000095
Memphis	0	0	0	0
Merida	3	0.000057	28	0.000536
Mexico City	2	0.000038	233	0.004544
Miami	2	0.000038	9	0.000172
Minneapolis	1	0.000019	1	0.000019
New York	0	0	1	0.000019
Oakland	3	0.000057	102	0.001964
Puerto Vallarta	4	0.000077	357	0.007218
Salt Lake City	0	0	1	0.000019
San Jose Del Cabo	7	0.000135	162	0.003187
Seattle	1	0.000019	3	0.000057
Tapachula	150	0.005125	654	0.034460
Washington DC	3	0.000057	11	0.000210
Winnipeg	1	0.000019	1	0.000019

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	8	0.00015291
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	8	0.00015280
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
Tapachula	0	0
Washington DC	0	0

Figure 3-1 LPV Instantaneous Availability

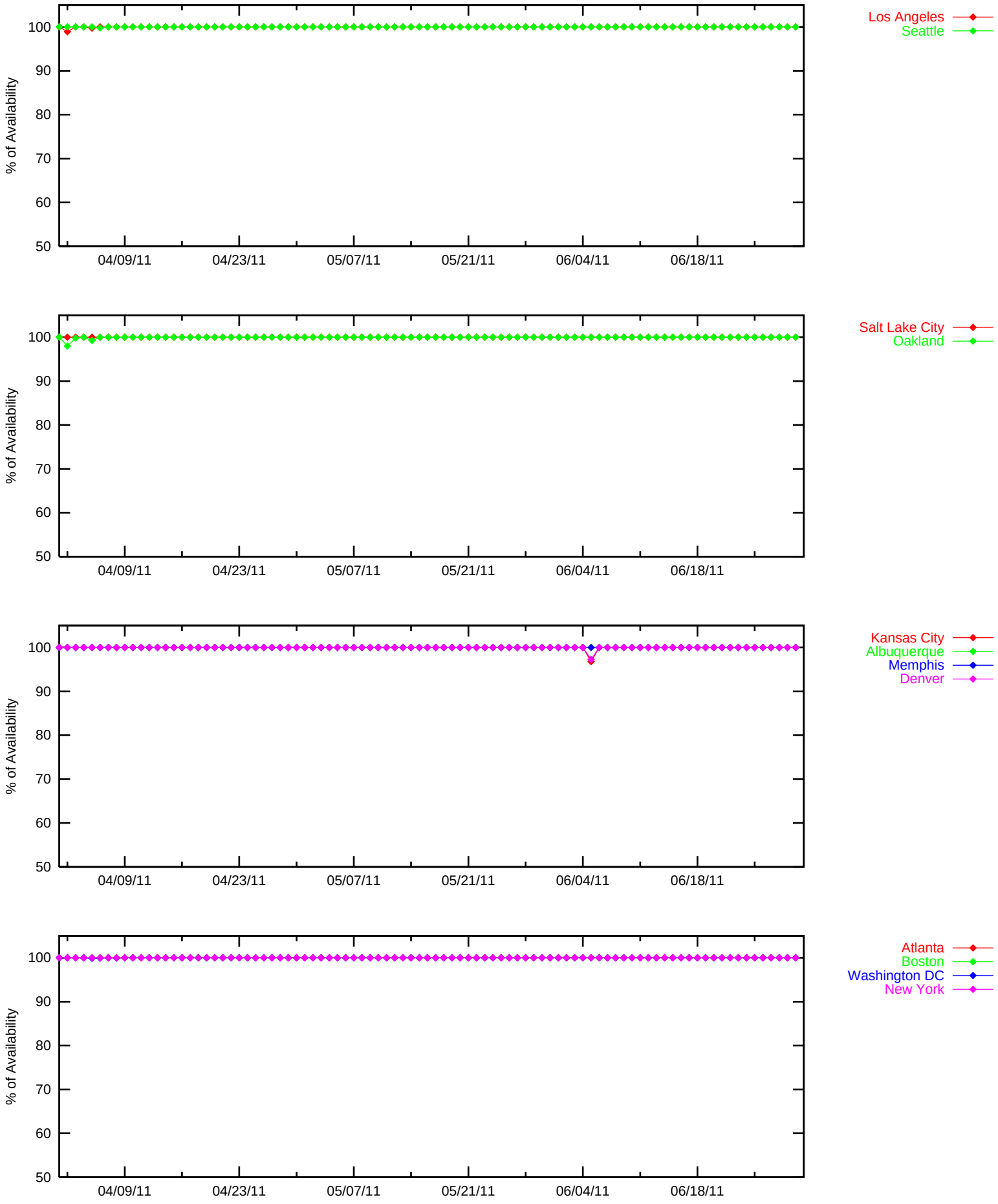


Figure 3-2 LPV Instantaneous Availability

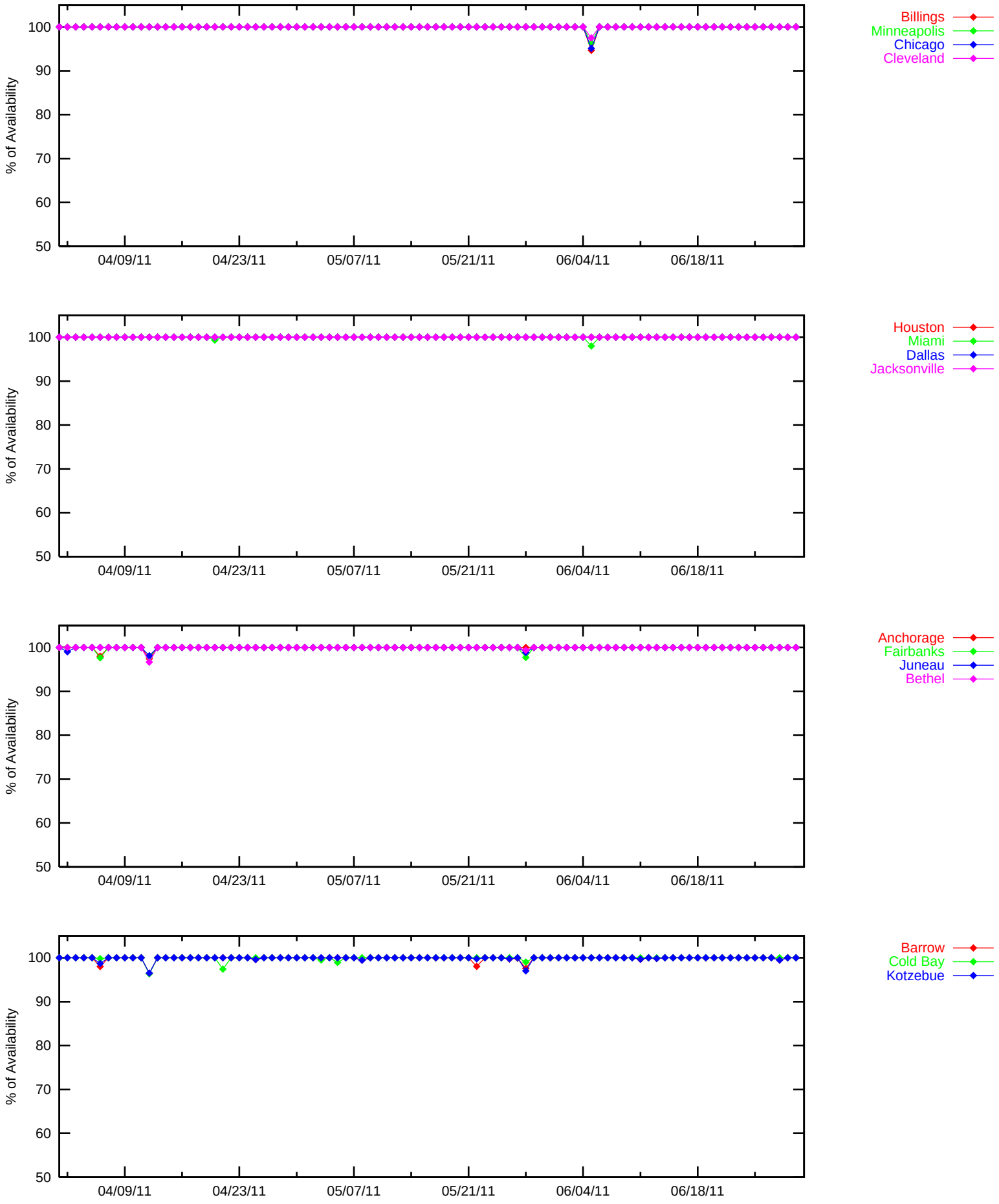


Figure 3-3 LPV Instantaneous Availability

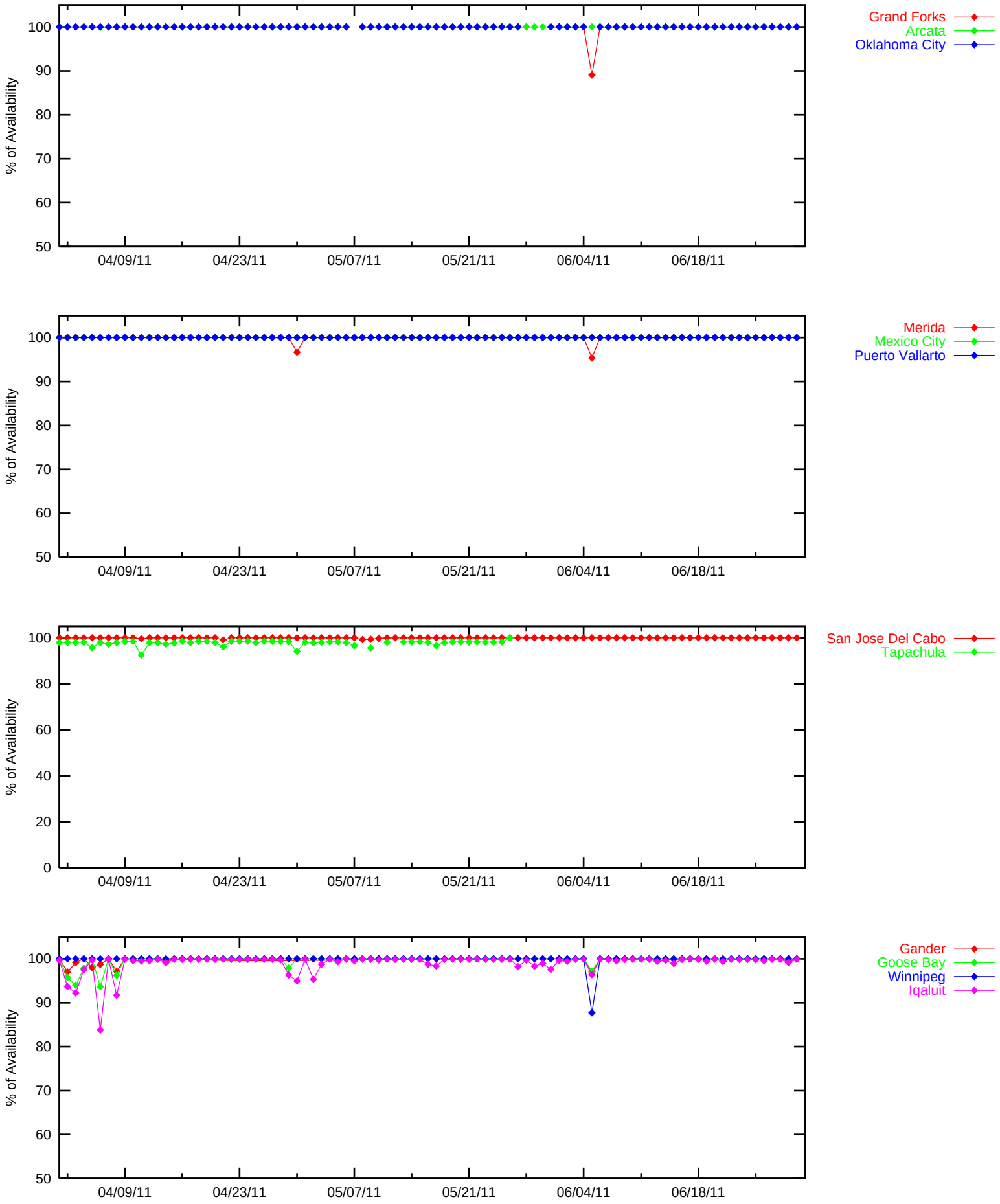


Figure 3-4 LPV 200 Instantaneous Availability

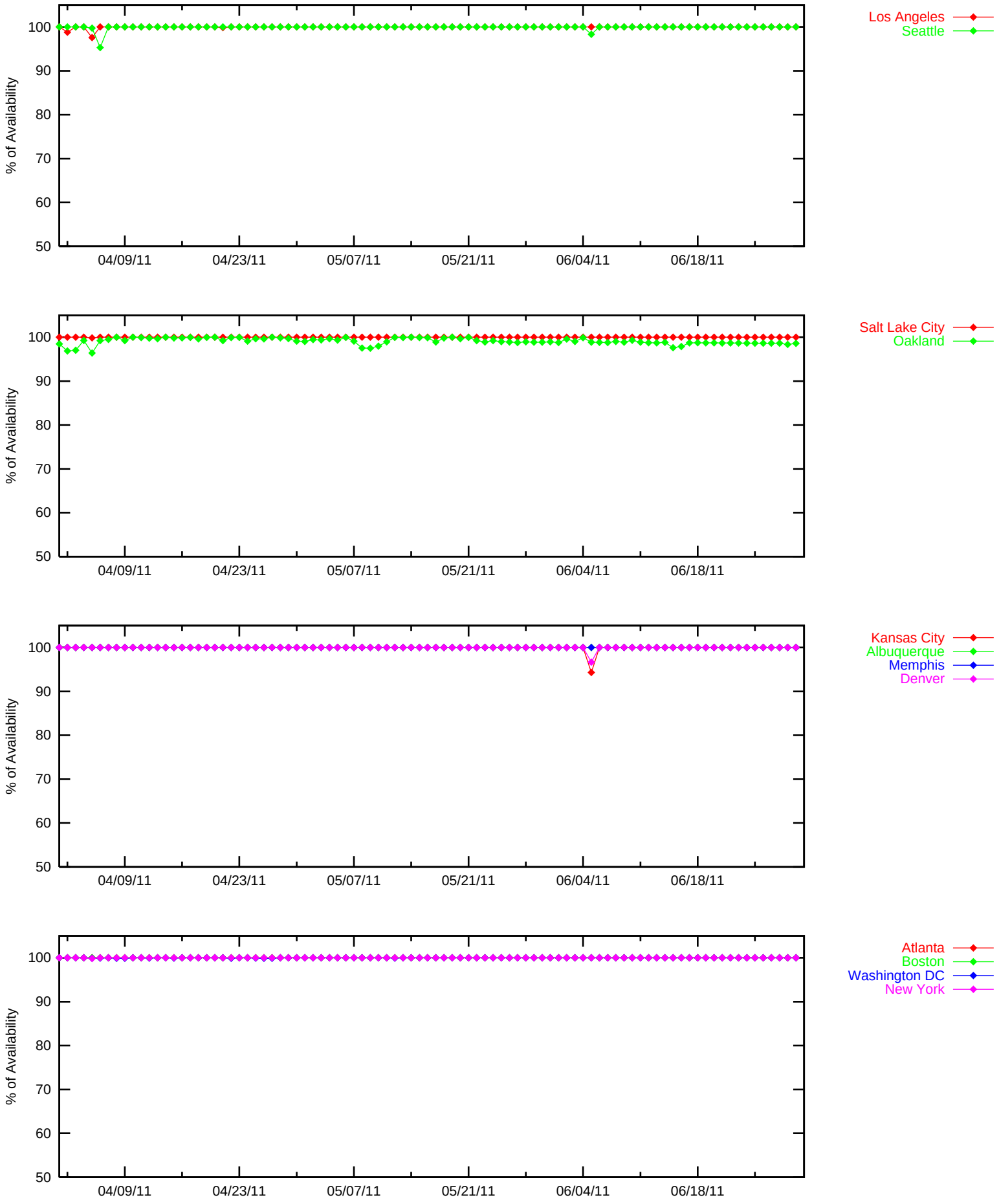


Figure 3-5 LPV 200 Instantaneous Availability

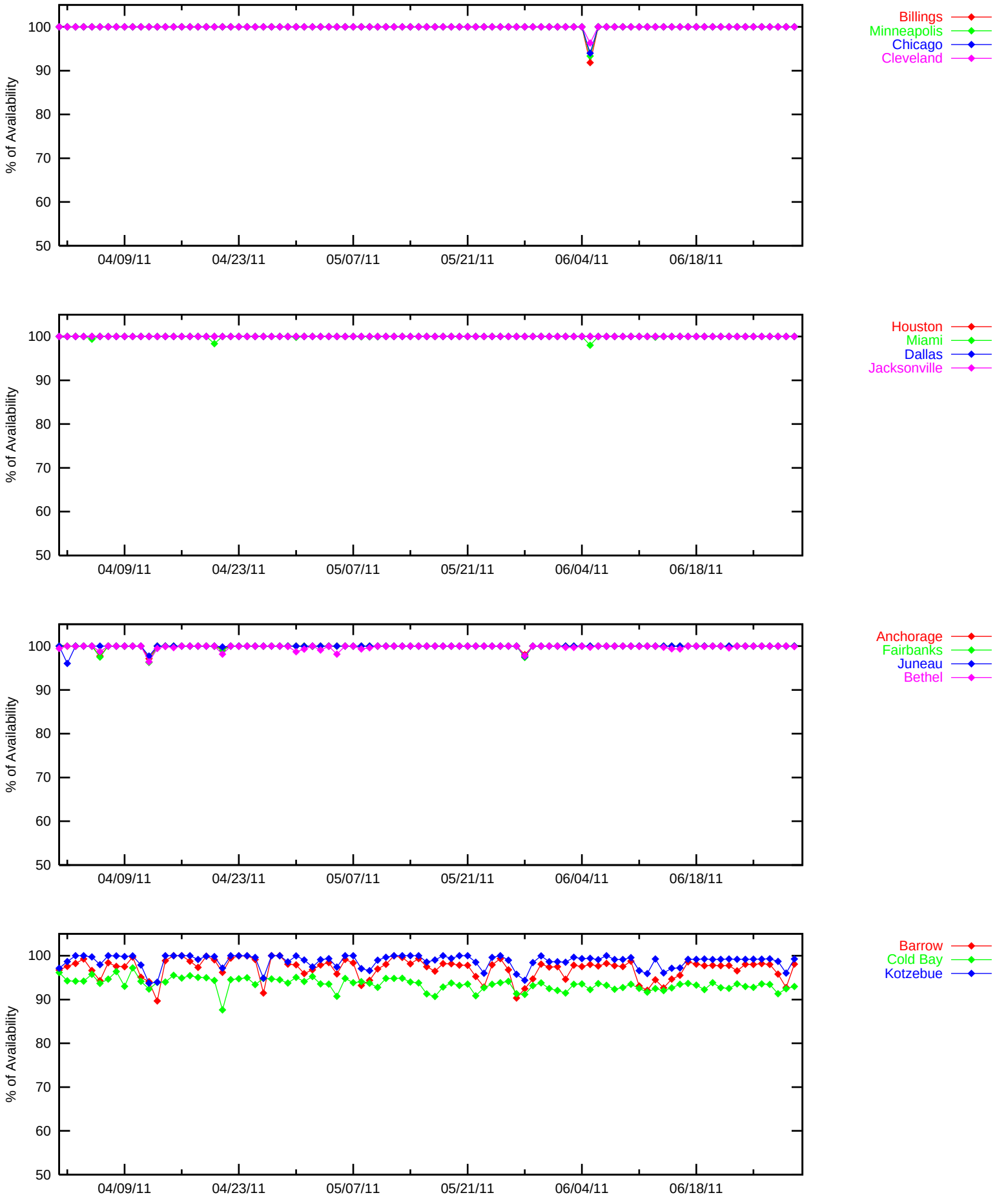


Figure 3-6 LPV 200 Instantaneous Availability

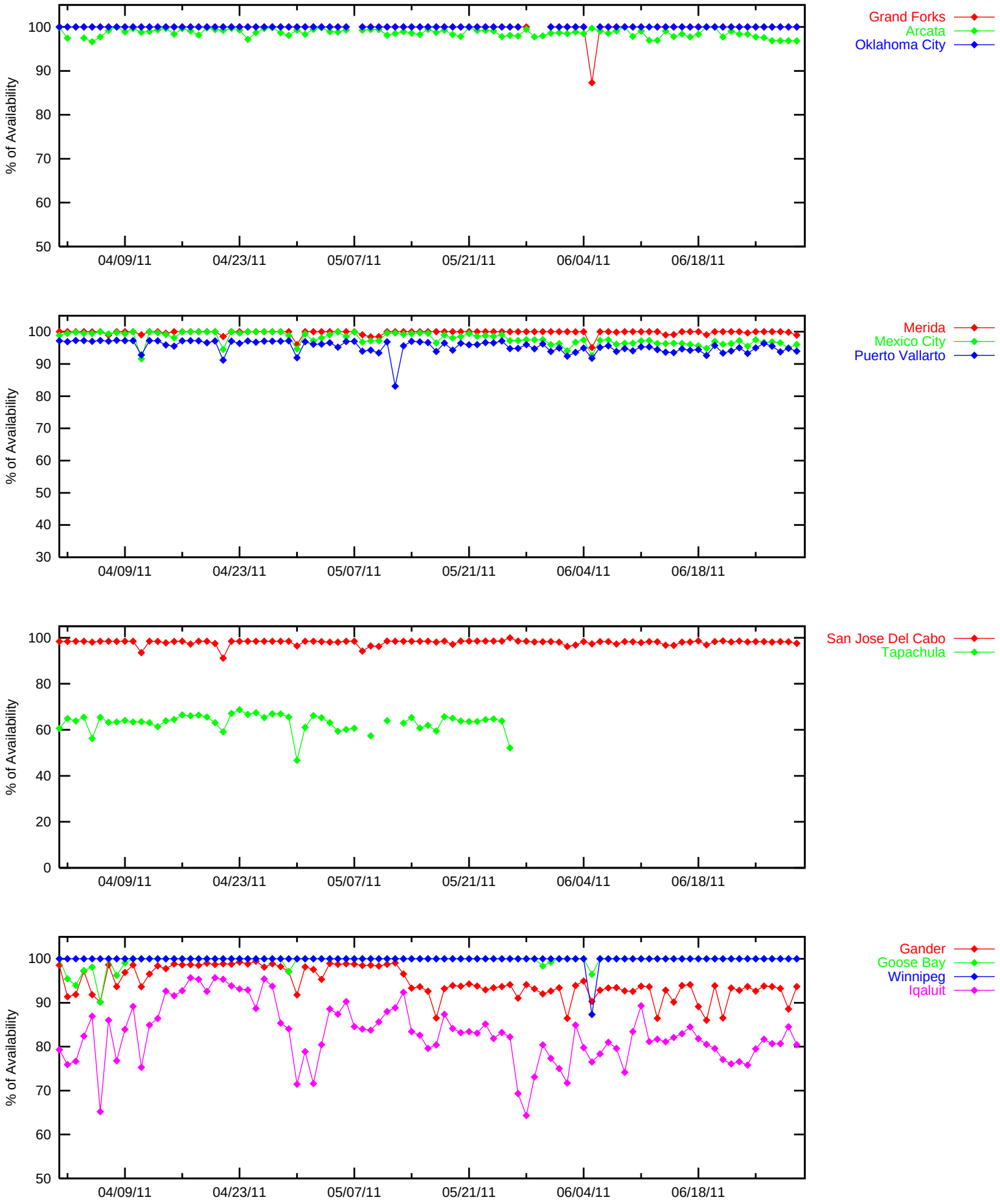


Figure 3-7 LPV Outages

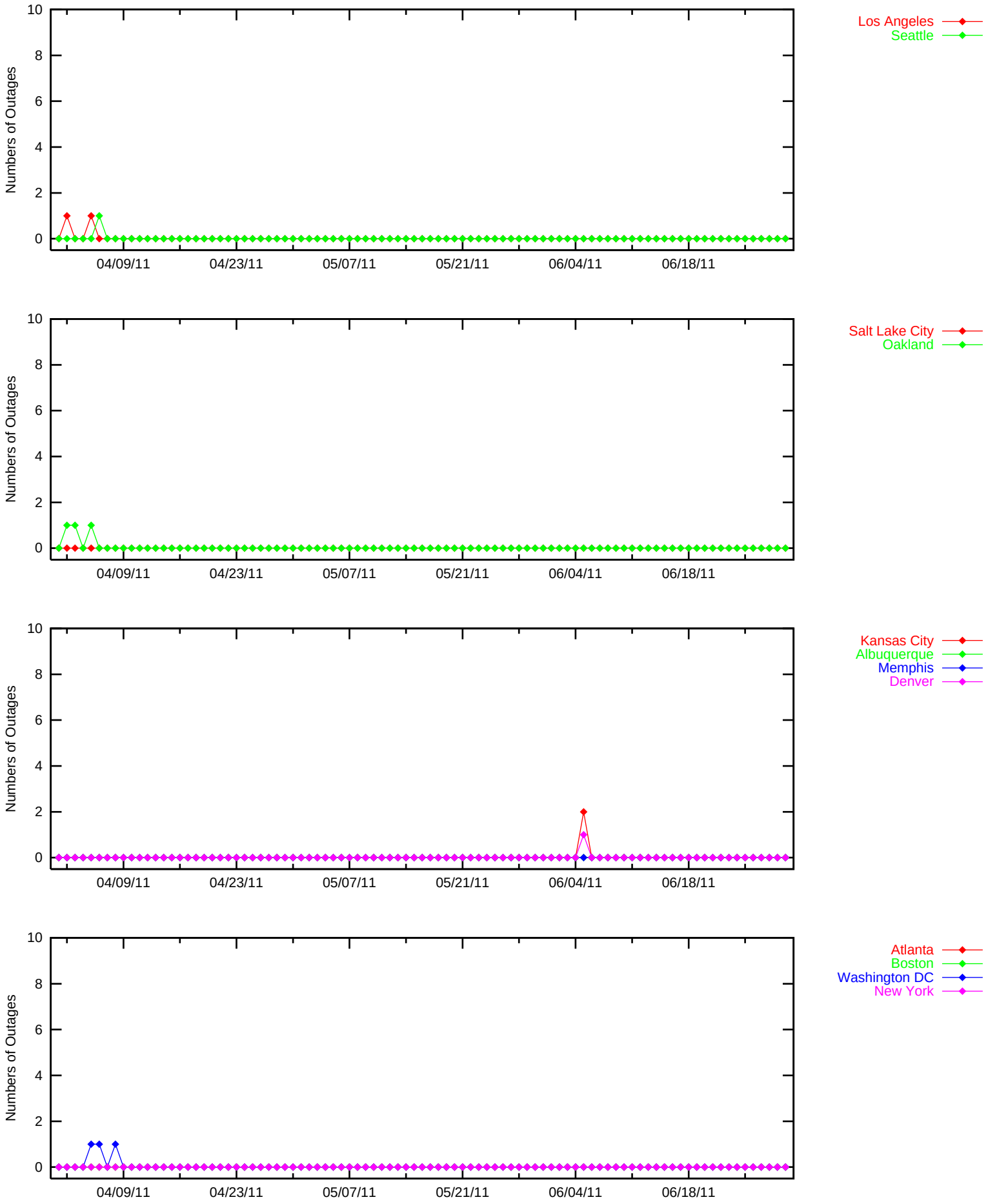


Figure 3-8 LPV Outages

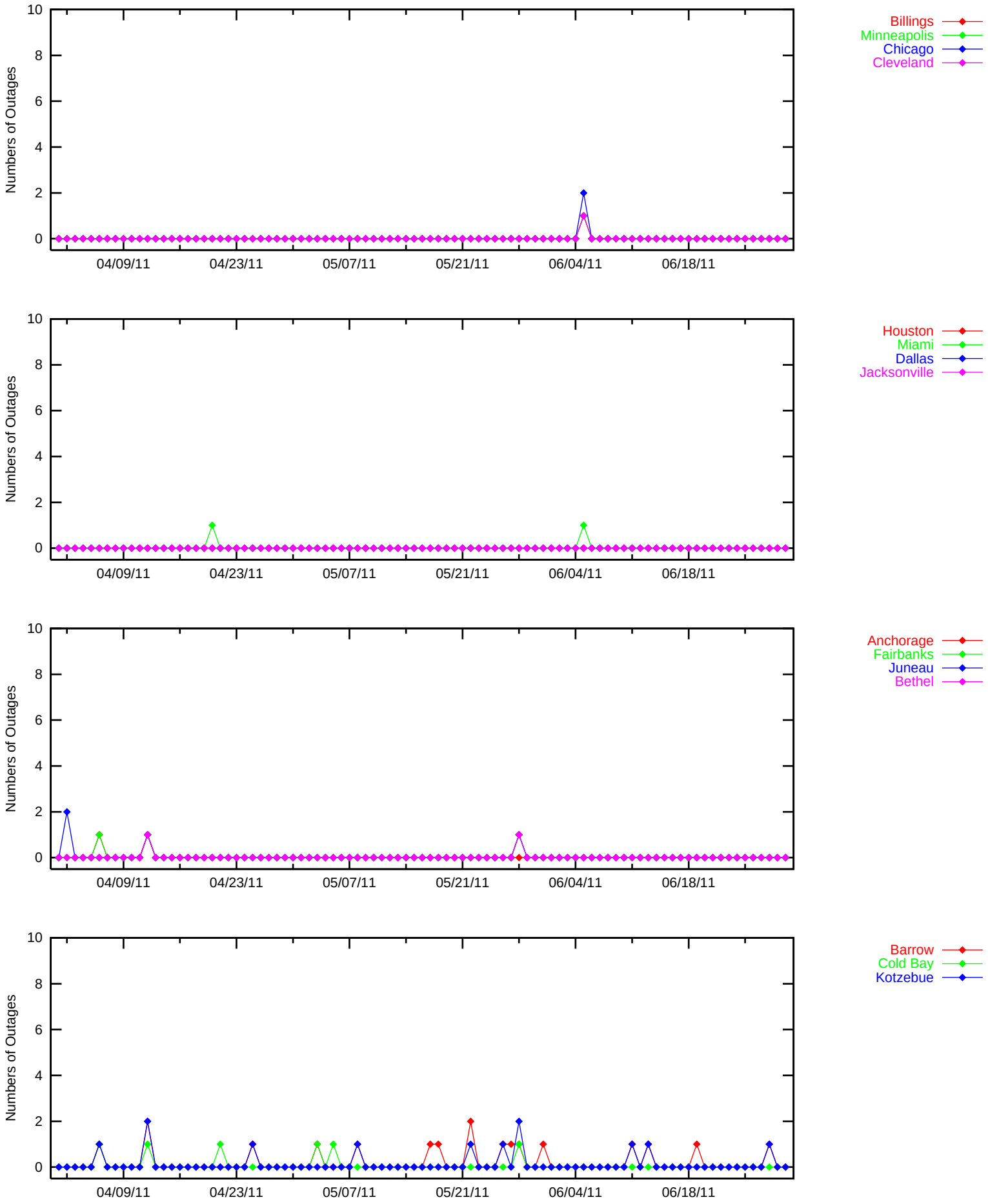


Figure 3-9 LPV Outages

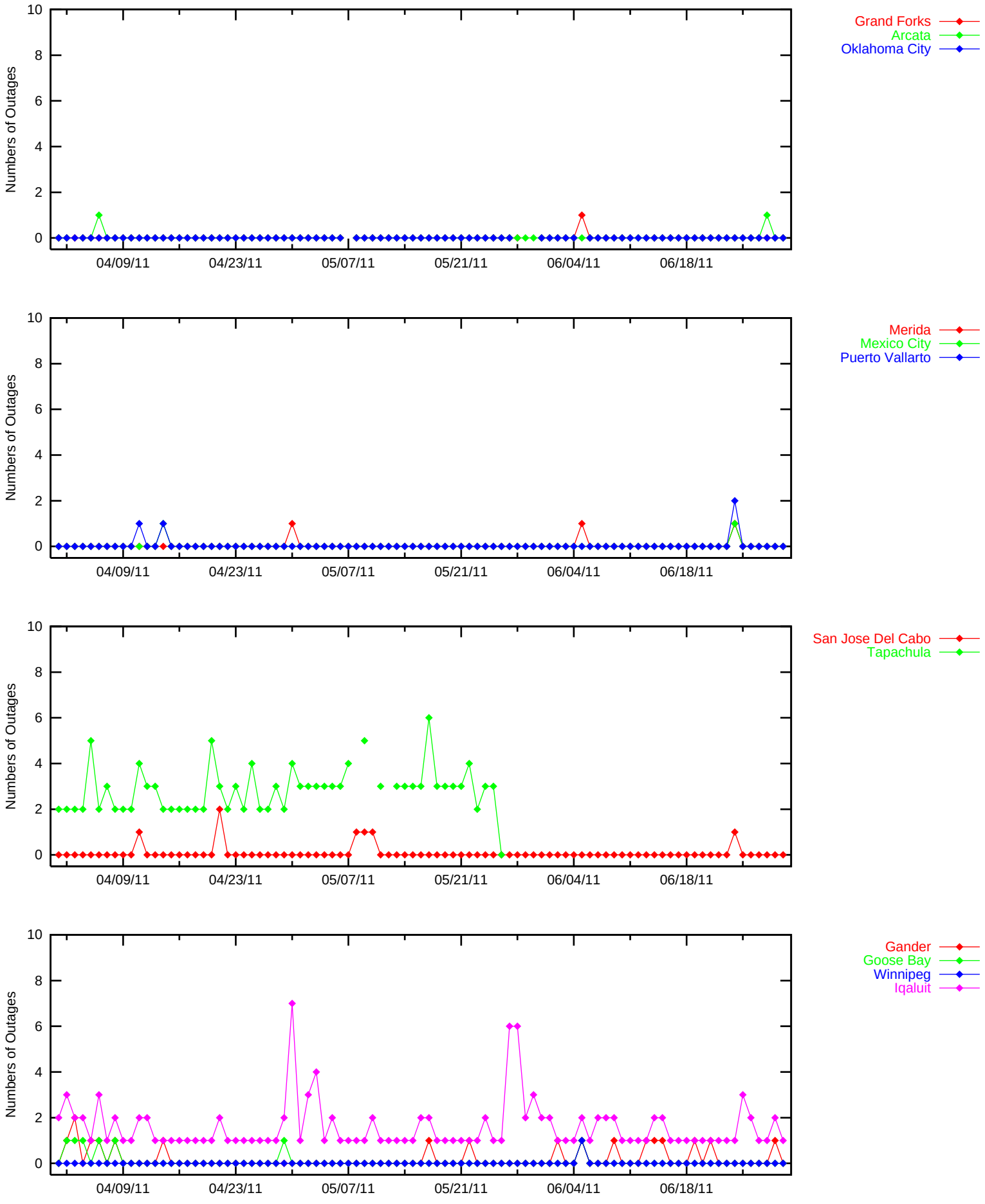


Figure 3-10 LPV 200 Outages

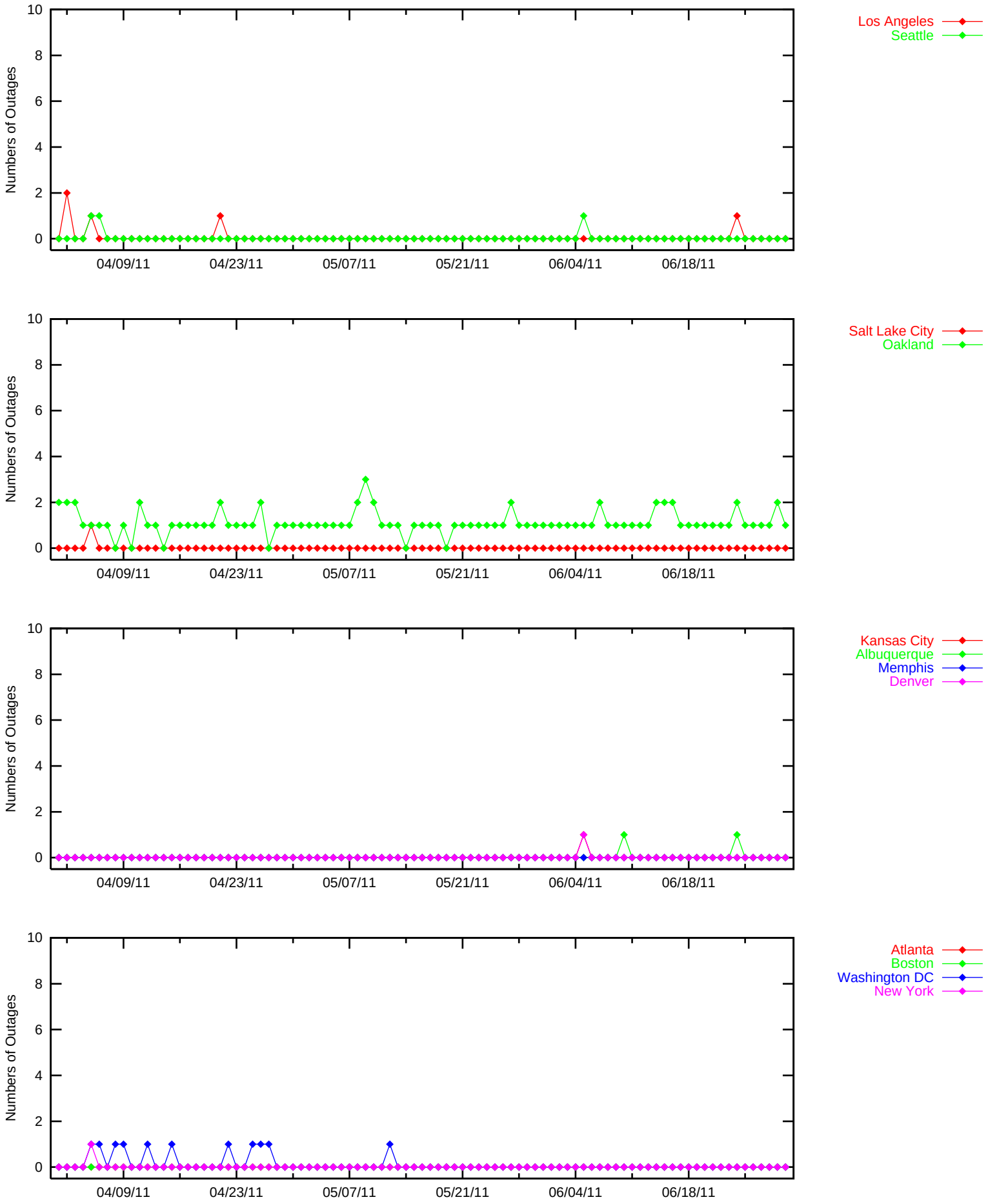


Figure 3-11 LPV 200 Outages

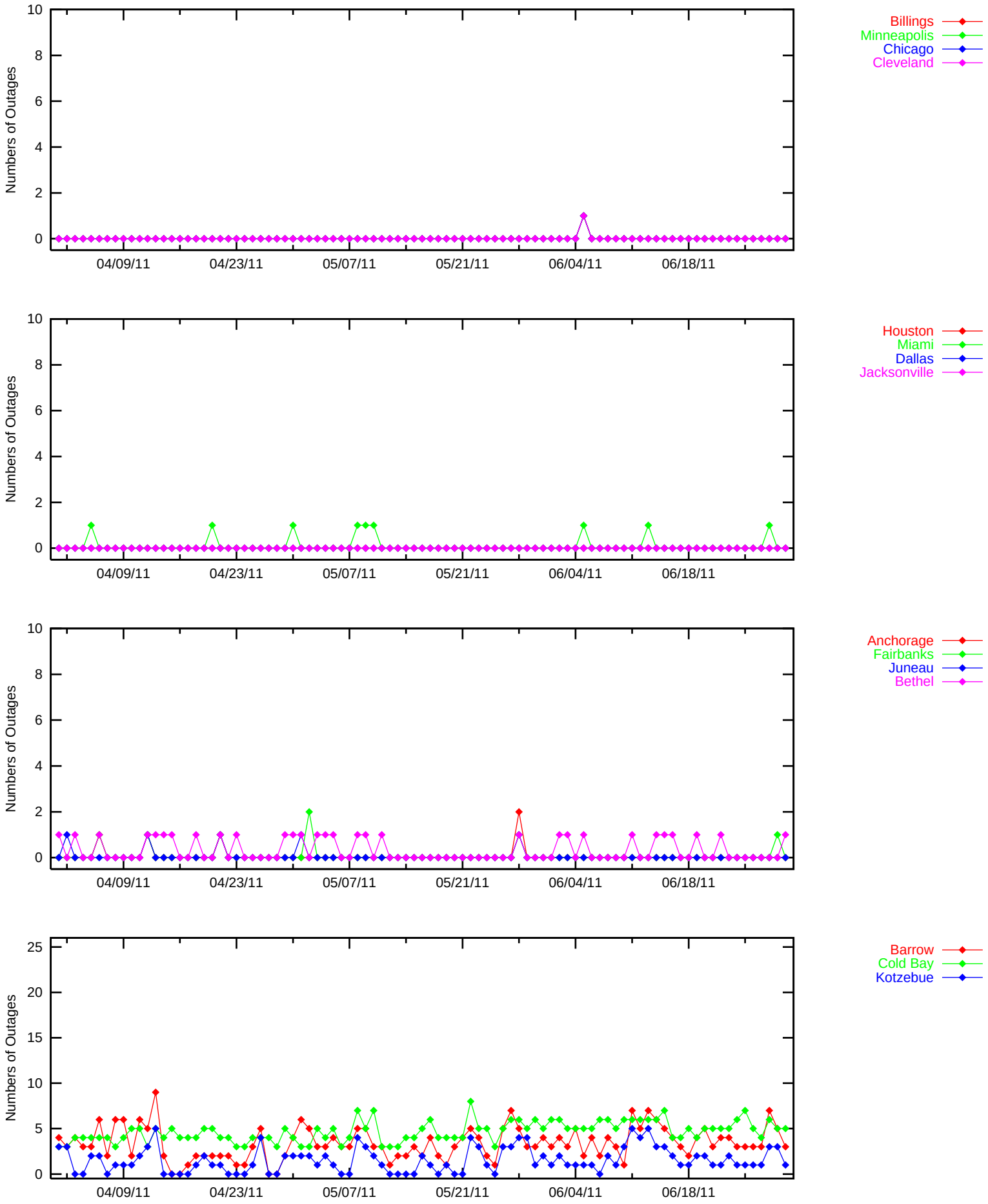
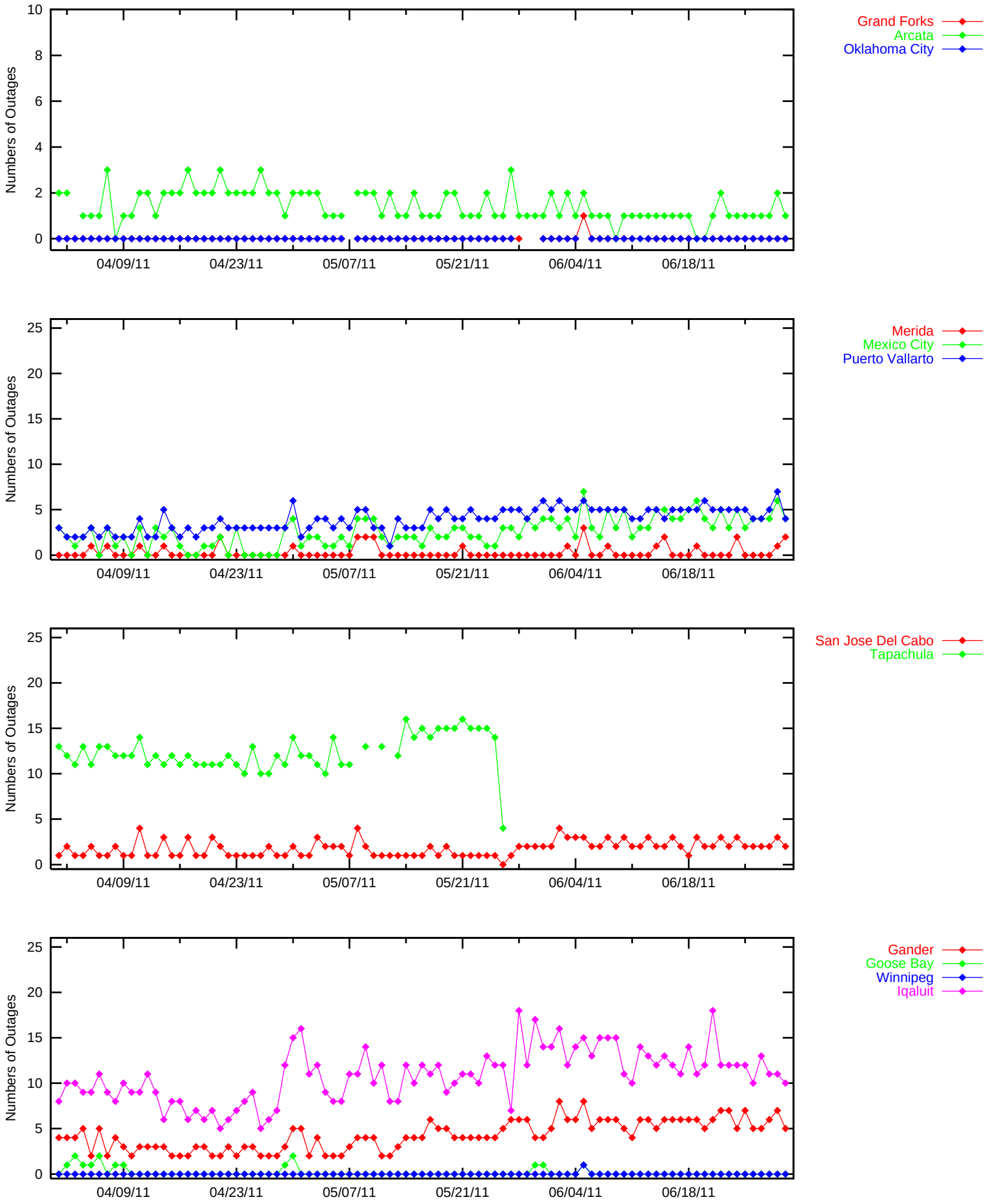


Figure 3-12 LPV 200 Outages



4.0 COVERAGE

WAAS coverage area evaluation estimates the percent of service volume where WAAS is providing 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 99% LPV 200 availability contour and 98% LPV 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 GIVEs 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 on figures 4-6, 4-7, and 4-8 for this quarter are due to GUS switchovers, geomagnetic activity, satellite outages, and elevated UDRE values. Please refer to Table 1.5 for the events that affected coverage. The slight decreases in RNP coverage shown on figure 4-8 are all due to GUS switchovers. Geomagnetic activity on 4/6/11, 5/2/11, and 5/28/11 significantly reduced Alaska coverage. Geomagnetic activity on 6/5/11 affected mainly CONUS coverage (see DR 102 WAAS Reaction to Iono Activity June 5 2011). The PRN 29 outage on 4/21/11 and the PRN 23 outage on 5/5/11 caused the decreases in Alaska coverage on those days. The PRN 18 outage on 4/5/11 caused reduced CONUS coverage. Elevated GIVE values due to geomagnetic activity on 4/12/11 affected Alaska LPV200 coverage.

Figure 4-1 LP North America Coverage for the Quarater

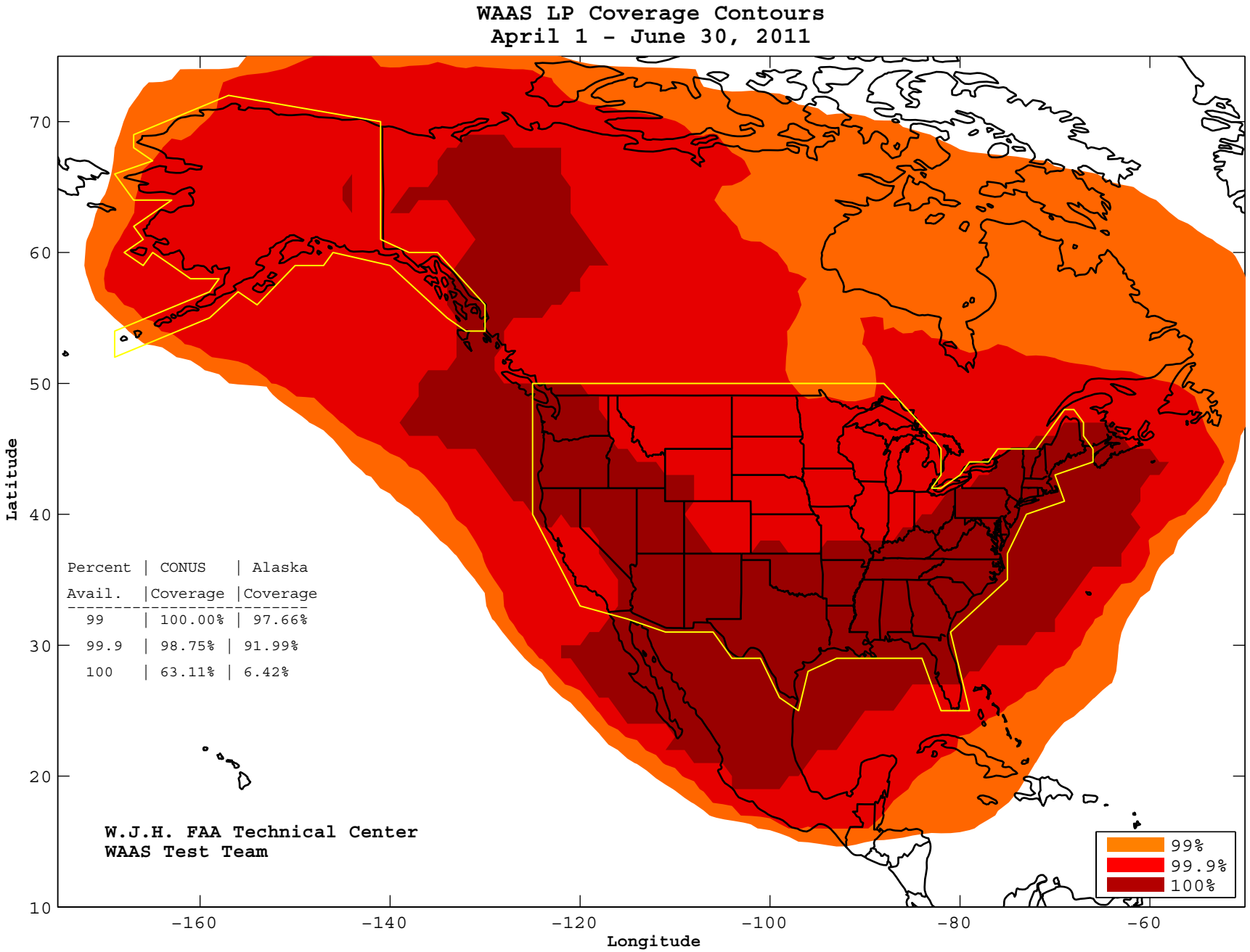


Figure 4-2 LPV North America Coverage for the Quarter

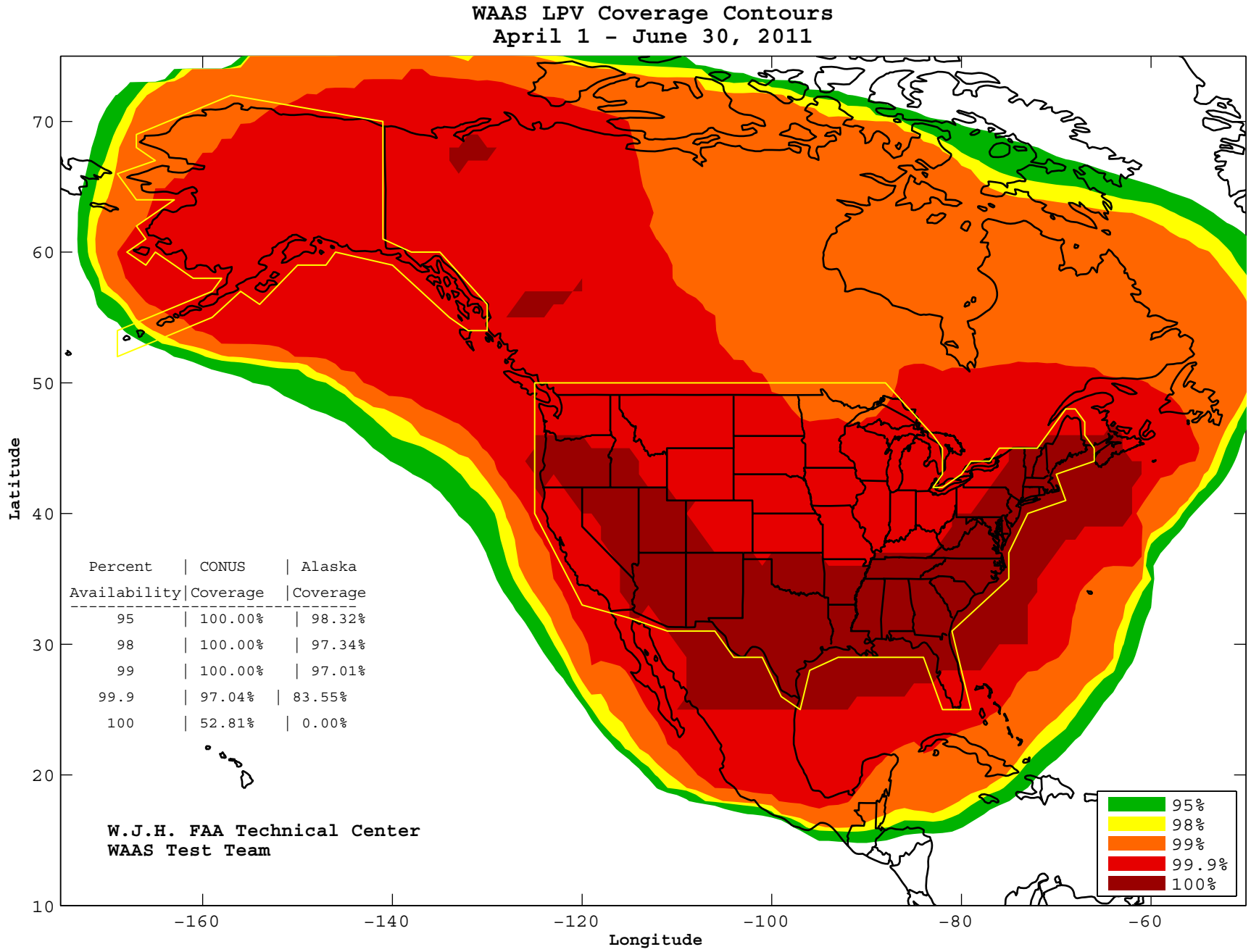


Figure 4-3 LPV 200 North America Coverage for the Quarter

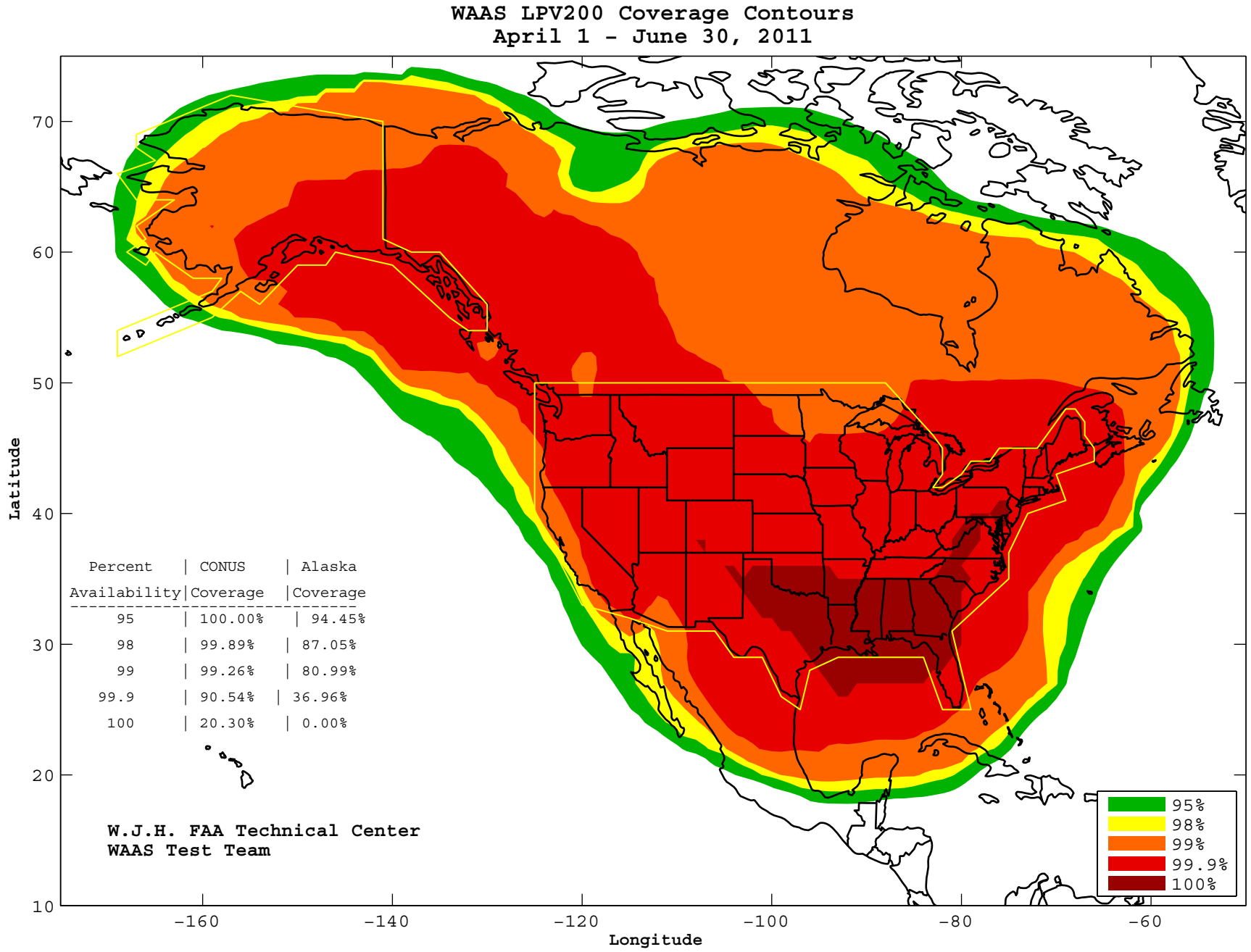


Figure 4-4 RNP 0.1 World Coverage for the Quarter

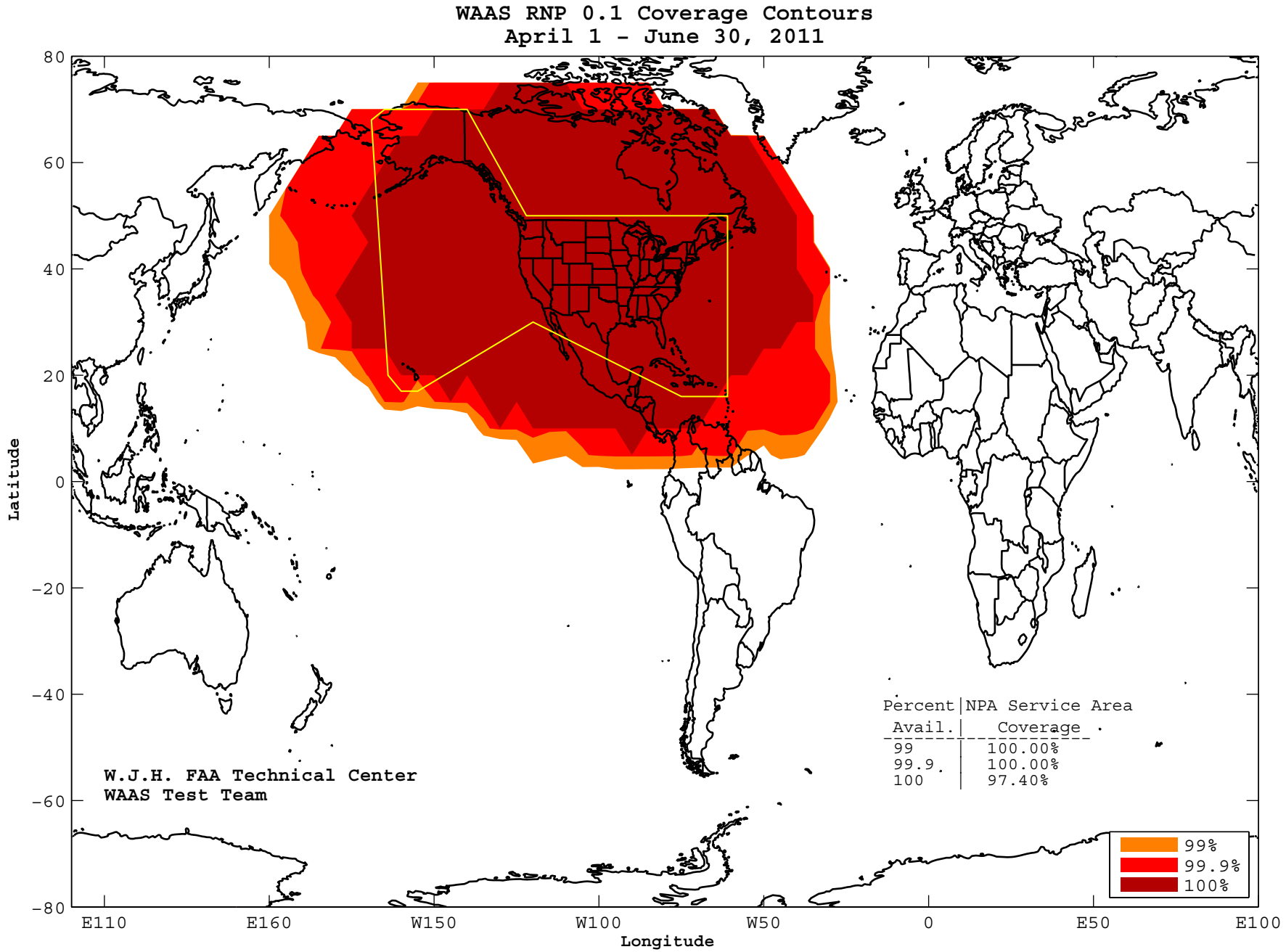


Figure 4-5 RNP 0.3 World Coverage for the Quarter

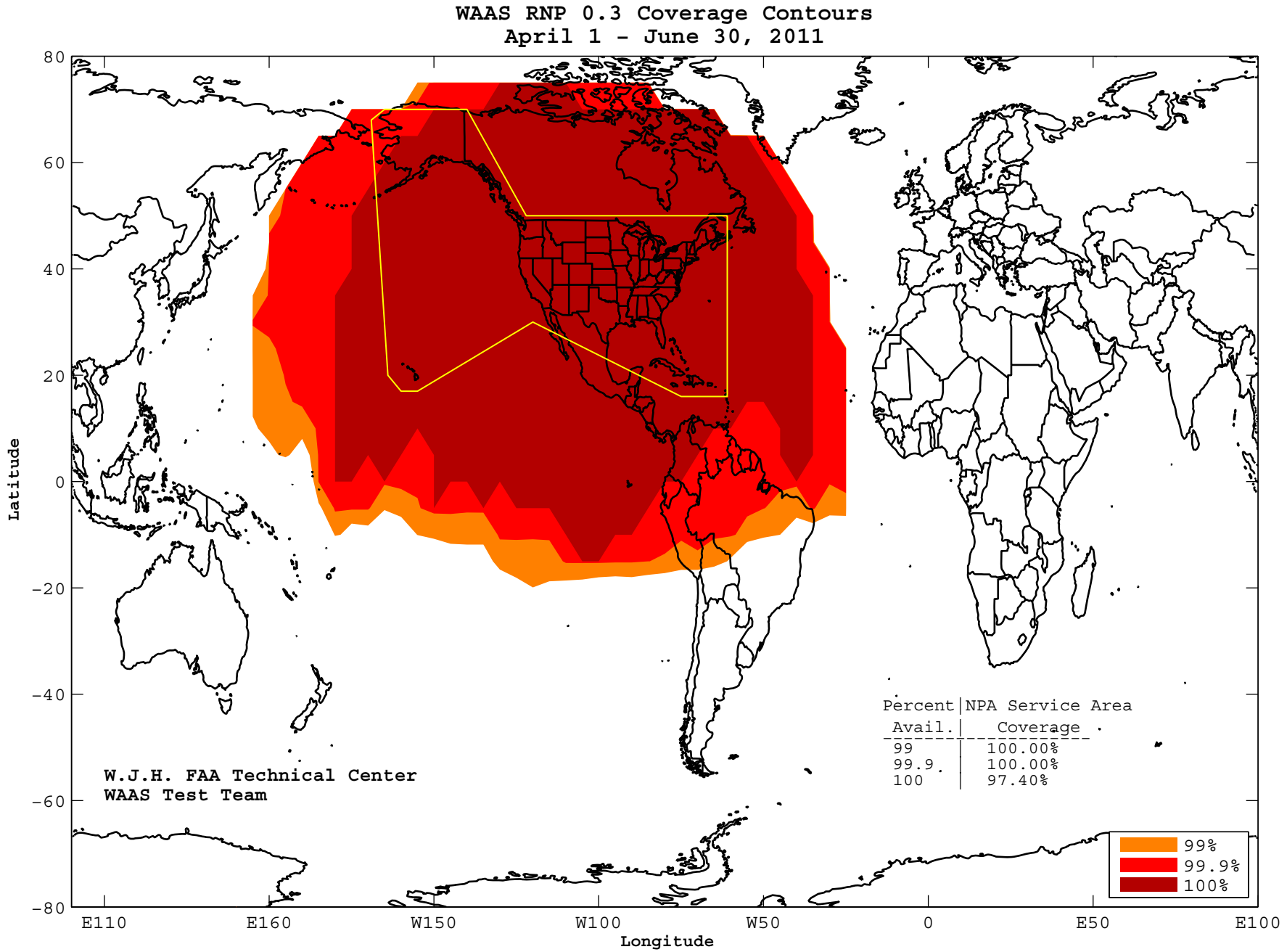


Figure 4-6 Daily LPV and LPV 200 CONUS Coverage

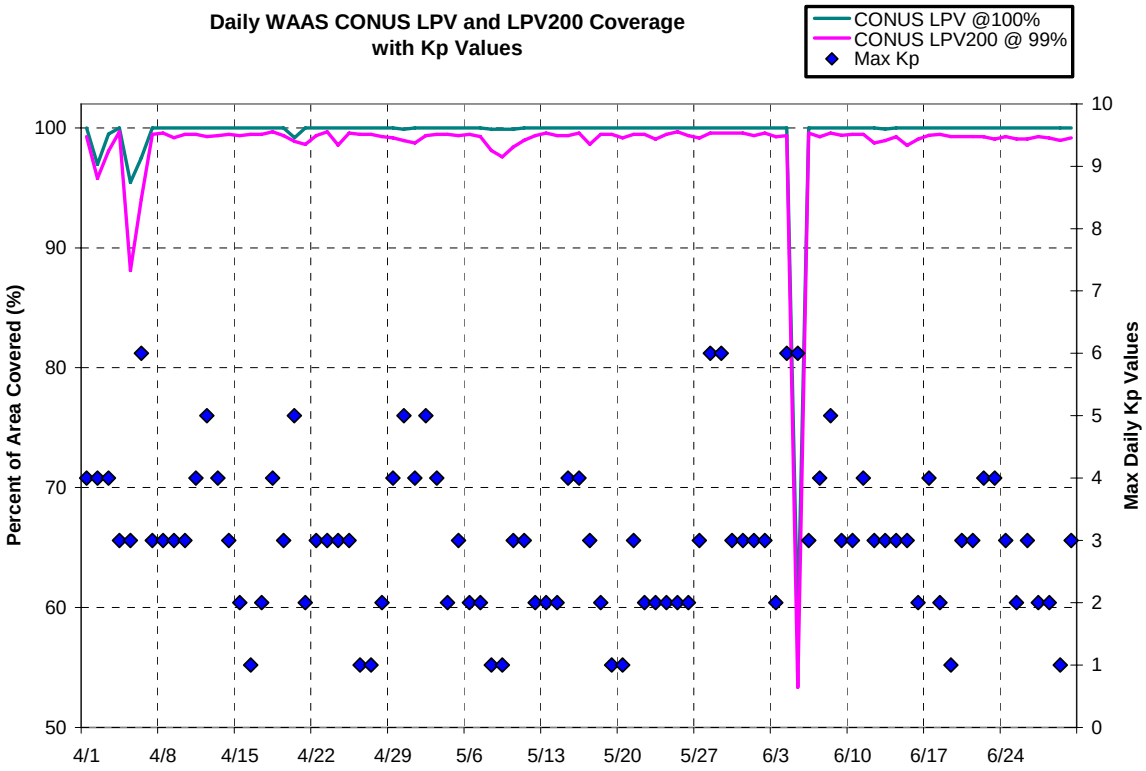


Figure 4-7 Daily LPV Alaska Coverage

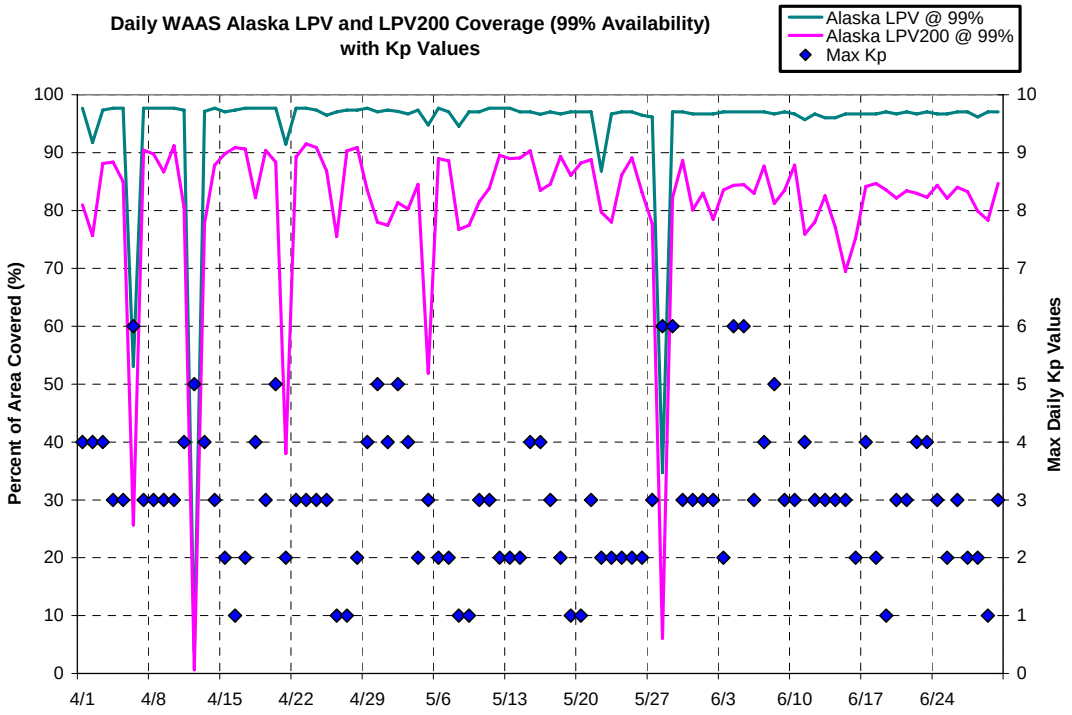
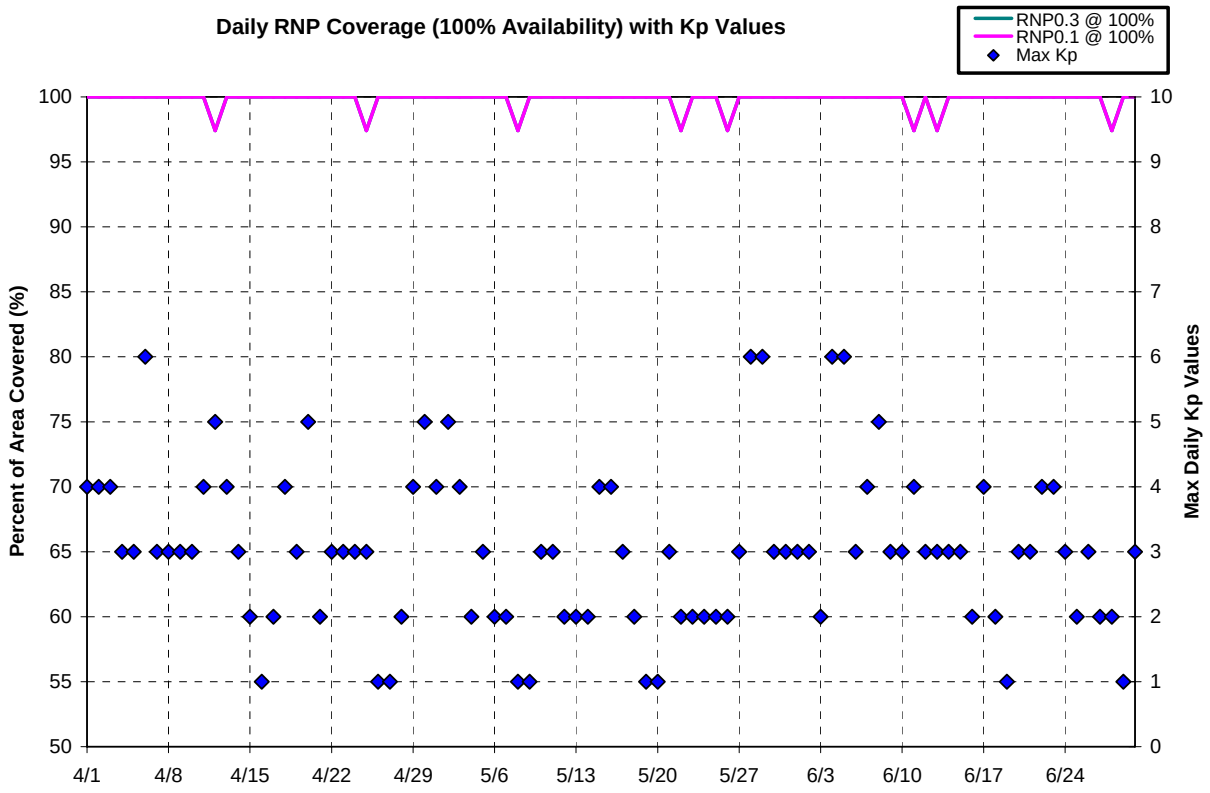


Figure 4-8 Daily RNP Coverage



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 3.24 at Grand Forks. 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	4.12	6.65	0
Grand Forks	3.80	3.24	0
Oklahoma City	9.59	6.26	0
Albuquerque	16.31	7.42	0
Anchorage	12.36	3.94	0
Atlanta	4.12	5.57	0
Barrow	4.92	4.48	0
Bethel	5.17	5.86	0
Billings	14.27	8.05	0
Boston	5.72	6.85	0
Chicago	9.91	7.09	0
Cleveland	4.99	4.42	0
Cold Bay	6.81	10.59	0
Dallas	7.29	6.90	0
Denver	13.39	6.57	0
Fairbanks	5.43	3.69	0
Gander	7.58	6.77	0
Goose Bay	7.26	9.54	0
Houston	5.09	4.24	0
Iqaluit	11.34	4.66	0
Jacksonville	6.90	6.04	0
Juneau	5.47	7.35	0
Kansas City	10.64	12.18	0
Kotzebue	3.27	7.16	0
Los Angeles	12.16	6.33	0
Memphis	4.22	9.10	0
Merida	18.61	6.80	0
Mexico City	4.32	5.89	0
Miami	6.31	7.42	0
Minneapolis	8.40	5.08	0
New York	6.42	7.70	0
Oakland	5.30	7.35	0
Puerto Vallarta	4.88	4.44	0
Salt Lake City	4.71	8.29	0
San Jose Del Cabo	7.12	6.05	0
Seattle	7.34	6.02	0
Tapachula	7.10	6.51	0
Washington DC	6.85	10.94	0
Winnipeg	4.65	7.13	0

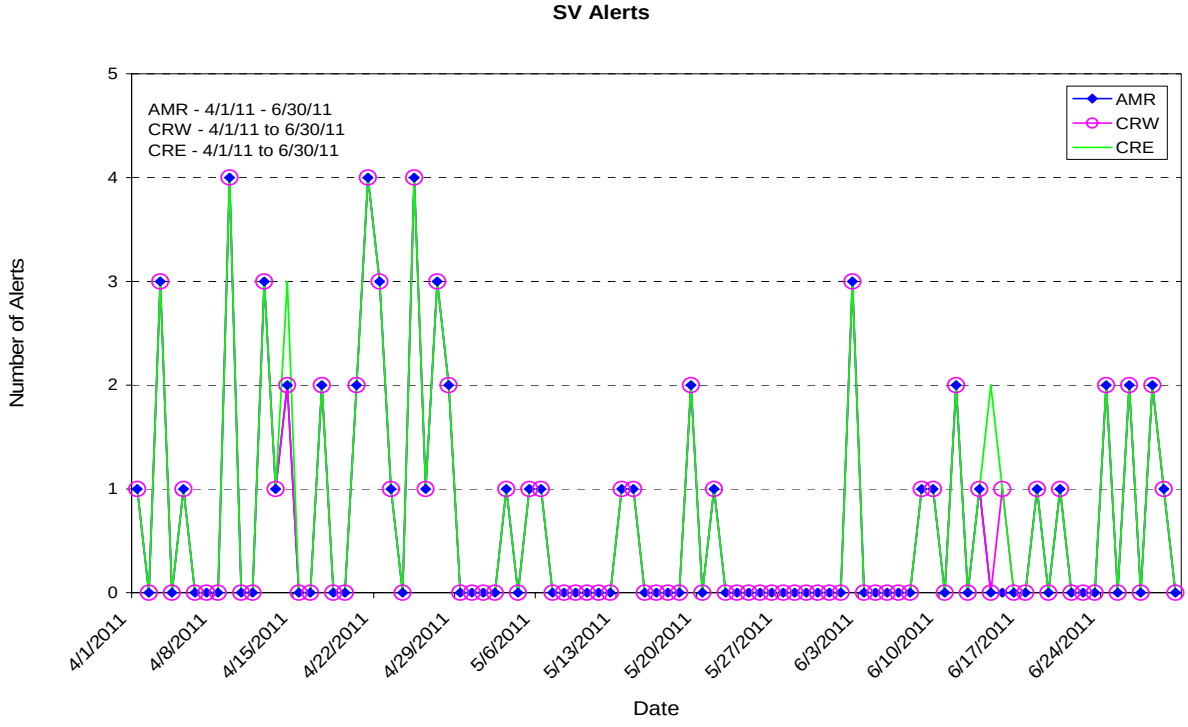
5.2 Broadcast Alerts

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	29	29	29	0.3187	0.3187	0.3187
3	16	16	16	0.1758	0.1758	0.1758
4	17	18	21	0.1868	0.1978	0.2308
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	62	63	66	0.6813	0.6923	0.7253
Days in Service	91	91	91			

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	100412	3	438
2	1310316	42	414
3	1310277	50	414
4	1310275	52	408
7	93784	10	528
9	92114	4	512
10	93700	14	532
17	30819	2	520

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

SV	On Time	Late	Max Late Length (seconds)
2	47707	2	424
3	50845	1	179
4	48372	0	0
5	48828	0	0
6	51559	1	156
7	47967	0	0
8	47548	2	415
9	49680	2	177
10	49219	0	0
11	51987	1	182
12	48934	1	182
13	47910	0	0
14	47995	0	0
15	49695	4	180
16	48997	1	184
17	47920	1	174
18	47565	1	179
19	51169	0	0
20	50846	1	180
21	47621	1	156
22	48765	0	0
23	47181	1	415
24	51656	1	162
25	51195	0	0
26	49165	0	0
27	52246	0	0
28	49054	0	0
29	47503	0	0
30	23000	0	0
31	48847	1	184
32	48304	1	174

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

SV	On Time	Late	Max Late Length (seconds)
2	39151	0	0
3	41803	9	209
4	39749	2	210
5	40058	0	0
6	42353	2	158
7	39349	1	209
8	39055	1	528
9	40814	6	207
10	40403	1	161
11	42735	4	420
12	40203	1	194
13	39344	1	122
14	39415	1	209
15	40808	0	0
16	40264	1	206
17	39361	0	0
18	39070	1	209
19	42023	4	523
20	41752	2	209
21	39116	0	0
22	40058	4	228
23	38738	3	523
24	42429	2	192
25	42020	1	194
26	40401	2	144
27	42918	3	163
28	40221	5	420
29	39047	1	210
30	18848	1	124
31	40057	2	206
32	39699	0	0
135	75225	3	208
138	28462	2	528

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

Band	Block	On Time	Late	Max Late Length (seconds)
0	0	27288	6	576
0	1	27289	8	579
0	2	27283	7	590
1	0	27280	6	576
1	1	27280	6	576
1	2	27286	8	576
1	3	27293	5	864
1	4	27284	7	864
2	0	27285	13	864
2	1	27282	7	864
2	2	27285	7	864
2	3	27286	6	864
2	4	27291	8	864
2	5	27282	10	864
3	0	27278	4	864
3	1	27276	6	864
3	2	27285	5	576
9	0	27294	8	576
9	1	27292	6	576
9	2	27290	7	576
9	3	27279	7	576
9	4	27279	11	576
9	5	27299	3	576
9	6	27280	6	576

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

Band	On Time	Late	Max Late Length (seconds)
0	34989	1	684
1	34959	1	659
2	34990	3	673
3	34941	1	720
9	35005	2	656

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

Message Type	On Time	Late	Max Late Length (seconds)
1	101219	2	122
2	1310386	42	31
3	1310363	43	30
4	1310359	47	25
7	94338	13	126
9	92124	1	174
10	94125	17	186
17	30875	0	0

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

SV	On Time	Late	Max Late Length (seconds)
2	47712	0	0
3	50853	1	181
4	48367	0	0
5	48838	0	0
6	51574	0	0
7	47968	0	0
8	47546	1	158
9	49680	1	162
10	49232	0	0
11	51996	0	0
12	48940	0	0
13	47904	1	167
14	47992	2	179
15	49692	1	180
16	49002	1	167
17	47920	0	0
18	47572	0	0
19	51162	0	0
20	50841	0	0
21	47630	0	0
22	48747	0	0
23	47207	1	165
24	51659	2	165
25	51196	0	0
26	49178	0	0
27	52236	0	0
28	49043	1	168
29	47506	1	179
30	22992	0	0
31	48852	1	167
32	48298	1	181

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

SV	On Time	Late	Max Late Length (seconds)
2	39157	0	0
3	41803	2	185
4	39752	0	0
5	40056	0	0
6	42352	2	140
7	39354	0	0
8	39060	0	0
9	40814	11	168
10	40408	2	198
11	42737	3	161
12	40199	1	141
13	39343	3	192
14	39416	1	206
15	40811	1	208
16	40260	1	209
17	39362	1	152
18	39064	0	0
19	42016	0	0
20	41743	1	130
21	39119	0	0
22	40050	2	206
23	38741	3	210
24	42425	4	192
25	42024	1	209
26	40399	4	184
27	42926	1	151
28	40205	4	208
29	39042	1	121
30	18849	1	210
31	40055	0	0
32	39686	0	0
135	75223	1	153
138	28525	1	121

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

Band	Block	On Time	Late	Max Late Length (seconds)
0	0	27304	3	306
0	1	27289	6	305
0	2	27283	4	311
1	0	27294	5	306
1	1	27282	5	309
1	2	27281	5	382
1	3	27293	6	385
1	4	27295	3	375
2	0	27291	4	374
2	1	27284	12	583
2	2	27283	6	431
2	3	27293	4	421
2	4	27295	7	419
2	5	27276	13	426
3	0	27287	6	432
3	1	27278	7	444
3	2	27284	9	427
9	0	27282	7	419
9	1	27282	10	576
9	2	27288	9	431
9	3	27281	8	401
9	4	27289	3	401
9	5	27282	7	403
9	6	27272	5	407

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

Band	On Time	Late	Max Late Length (seconds)
0	35027	0	0
1	35054	0	0
2	35018	0	0
3	34994	3	480
9	35000	0	0

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

Message Type	On Time	Late	Max Late Length (seconds)
1	107994	1	121
2	1310402	43	23
3	1310355	53	17
4	1310383	43	17
7	99717	12	132
9	92124	1	174
10	99724	10	140
17	31436	2	511

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

SV	On Time	Late	Max Late Length (seconds)
2	47711	0	0
3	50856	1	174
4	48375	0	0
5	48835	0	0
6	51573	0	0
7	47974	0	0
8	47557	0	0
9	49681	0	0
10	49224	1	182
11	51991	1	166
12	48937	1	166
13	47904	0	0
14	48000	0	0
15	49682	1	180
16	49010	1	170
17	47918	0	0
18	47560	1	174
19	51191	0	0
20	50845	0	0
21	47626	0	0
22	48763	0	0
23	47170	0	0
24	51656	0	0
25	51197	1	182
26	49181	0	0
27	52242	0	0
28	49053	0	0
29	47505	0	0
30	22992	0	0
31	48852	1	170
32	48312	0	0

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

SV	On Time	Late	Max Late Length (seconds)
2	39146	2	210
3	41817	0	0
4	39753	1	200
5	40062	0	0
6	42370	0	0
7	39370	0	0
8	39060	0	0
9	40825	0	0
10	40417	1	210
11	42745	1	151
12	40207	1	122
13	39332	0	0
14	39411	3	158
15	40817	0	0
16	40270	0	0
17	39360	1	199
18	39062	0	0
19	42046	0	0
20	41742	2	199
21	39123	0	0
22	40066	0	0
23	38740	1	130
24	42419	0	0
25	42019	1	122
26	40394	0	0
27	42917	0	0
28	40265	0	0
29	39047	0	0
30	18843	0	0
31	40058	0	0
32	39680	2	128
135	74653	1	153
138	75334	1	135

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

Band	Block	On Time	Late	Max Late Length (seconds)
0	0	27282	9	448
0	1	27284	3	453
0	2	27264	10	466
1	0	27283	8	460
1	1	27289	5	460
1	2	27275	7	464
1	3	27280	10	458
1	4	27290	10	453
2	0	27278	9	460
2	1	27281	6	464
2	2	27278	5	466
2	3	27293	6	464
2	4	27278	6	536
2	5	27291	6	548
3	0	27282	9	555
3	1	27282	5	542
3	2	27296	9	306
9	0	27288	8	306
9	1	27274	10	306
9	2	27279	12	411
9	3	27270	9	405
9	4	27282	9	405
9	5	27291	9	394
9	6	27292	3	392

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

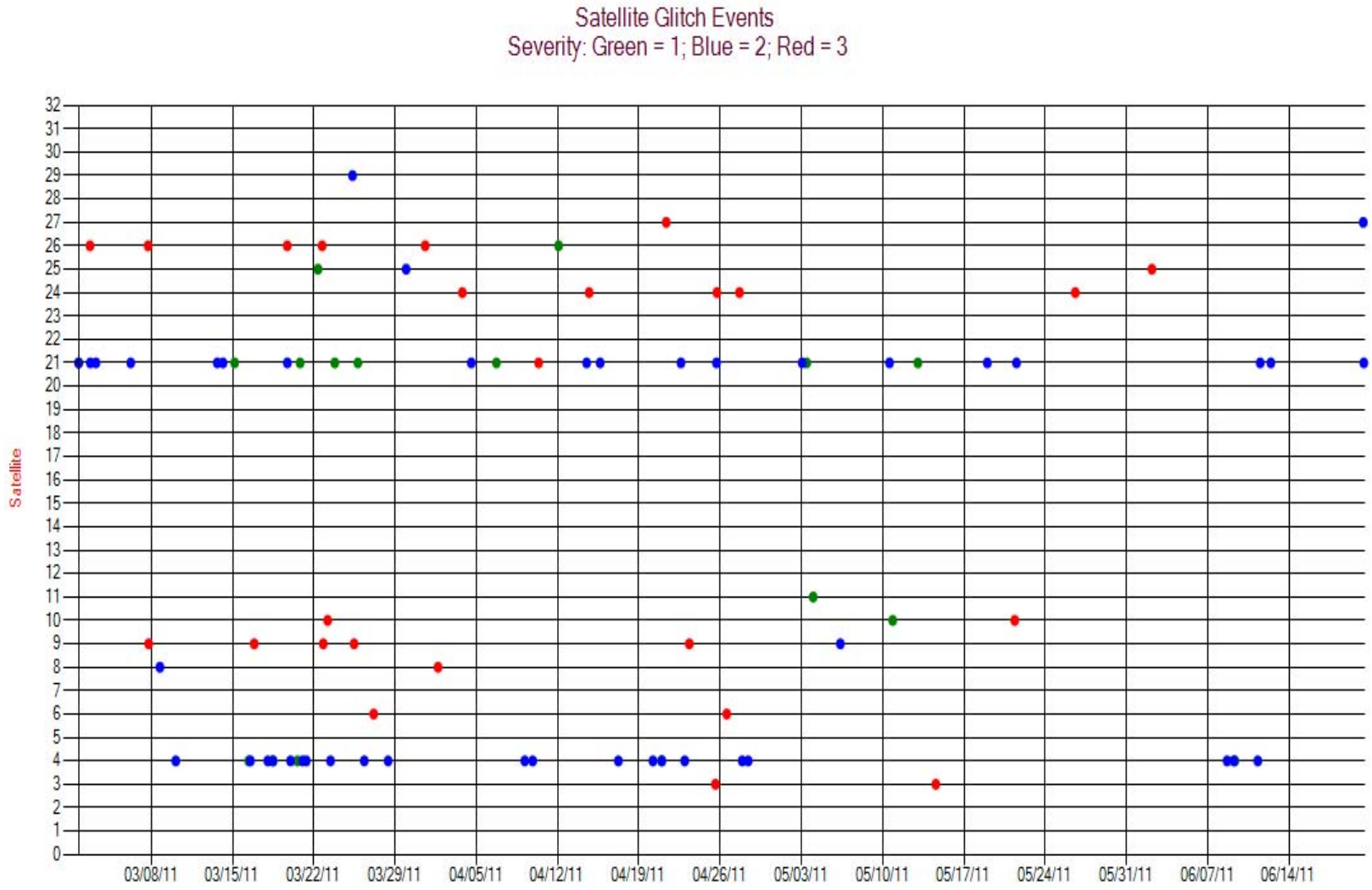
Band	On Time	Late	Max Late Length (seconds)
0	35822	0	0
1	35788	1	358
2	35812	2	400
3	35781	1	322
9	35790	0	0

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.

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	1.859	100	1.719	100	1.623	100	1.497	100	2.248	100	1.664	100
3	1.030	100	1.132	100	1.199	100	0.887	100	1.184	100	1.121	100
4	1.727	100	1.466	100	1.640	100	1.378	100	1.072	100	1.642	100
5	1.398	100	1.061	100	1.360	100	1.532	100	0.804	100	1.361	100
6	1.452	100	1.235	100	1.579	100	0.879	100	1.194	100	1.276	100
7	0.992	100	0.844	100	1.378	100	1.092	100	1.028	100	0.976	100
8	0.878	100	0.849	100	0.965	100	1.206	100	1.257	100	1.218	100
9	1.058	100	1.111	100	1.081	100	1.061	100	1.158	100	1.288	100
10	1.056	100	1.099	100	1.077	100	1.078	100	2.055	100	1.165	100
11	0.712	100	1.055	100	0.915	100	1.173	100	1.774	100	0.793	100
12	1.324	100	1.153	100	1.344	100	1.342	100	1.077	100	1.220	100
13	1.590	100	0.983	100	1.154	100	1.220	100	1.251	100	1.033	100
14	1.381	100	0.823	100	1.294	100	0.841	100	1.113	100	0.700	100
15	1.309	100	1.321	100	1.518	100	1.498	100	1.413	100	1.449	100
16	1.512	100	1.501	100	1.206	100	1.360	100	1.583	100	1.043	100
17	2.622	100	0.855	100	1.951	100	0.786	100	1.245	100	1.202	100
18	1.246	100	1.371	100	1.199	100	1.179	100	1.498	100	1.085	100
19	2.272	100	2.373	100	2.267	100	2.336	100	2.578	100	2.544	100
20	0.907	100	1.747	100	1.185	100	1.369	100	1.814	100	1.402	100
21	1.354	100	1.666	100	1.298	100	1.348	100	1.442	100	1.580	100
22	1.845	100	2.279	100	2.482	100	2.299	100	2.507	100	2.174	100
23	1.669	100	1.979	100	1.824	100	2.007	100	2.256	100	1.655	100
24	1.738	100	1.351	100	1.390	100	1.834	100	1.875	100	1.584	100
25	2.627	100	1.879	100	2.180	100	2.138	100	3.914	100	2.185	100
26	1.525	100	1.403	100	1.429	100	1.522	100	1.483	100	1.081	100
27	1.186	100	1.084	100	1.452	100	1.095	100	1.555	100	0.978	100
28	0.987	100	1.284	100	1.010	100	1.199	100	1.590	100	1.135	100
29	1.678	100	1.416	100	1.231	100	1.482	100	1.255	100	1.708	100
30	1.403	100	1.424	100	1.236	100	1.107	100	1.341	100	1.553	100
31	1.190	100	1.401	100	0.793	100	0.780	100	0.990	100	1.054	100
32	1.157	100	1.144	100	0.984	100	1.037	100	1.019	100	0.771	100
135	2.597	100	1.703	100	2.981	100	1.552	100	2.071	100	2.075	100
138	1.866	100	1.605	100	2.231	100	2.226	100	2.019	100	1.931	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	2.254	100	1.928	100	2.062	100	1.544	100	1.534	100	1.511	100
3	1.128	100	0.813	100	1.048	100	1.929	100	0.893	100	0.881	100
4	0.915	100	1.205	100	1.311	100	1.283	100	1.375	100	1.328	100
5	1.079	100	1.240	100	1.566	100	1.319	100	1.503	100	1.486	100
6	0.890	100	1.321	100	1.228	100	1.083	100	1.337	100	1.589	100
7	0.848	100	0.786	100	1.381	100	1.182	100	0.836	100	1.218	100
8	1.087	100	0.880	100	0.813	100	1.320	100	1.030	100	1.088	100
9	1.448	100	0.909	100	1.047	100	2.176	100	1.364	100	0.912	100
10	1.225	100	1.193	100	1.211	100	0.805	100	0.947	100	0.960	100
11	1.469	100	1.431	100	1.940	100	1.064	100	1.337	100	1.255	100
12	1.197	100	1.127	100	1.438	100	1.409	100	1.608	100	1.261	100
13	0.959	100	1.941	100	1.374	100	1.157	100	0.960	100	1.104	100
14	1.506	100	0.981	100	1.272	100	0.714	100	0.810	100	0.873	100
15	1.218	100	1.041	100	1.452	100	1.604	100	1.544	100	1.308	100
16	1.840	100	1.374	100	1.557	100	1.125	100	1.186	100	0.930	100
17	0.921	100	0.963	100	1.301	100	0.967	100	0.907	100	1.014	100
18	1.721	100	1.942	100	1.376	100	1.123	100	1.291	100	1.251	100
19	2.583	100	2.461	100	2.501	100	2.285	100	2.462	100	2.325	100
20	1.892	100	1.433	100	1.495	100	1.300	100	1.440	100	1.268	100
21	1.640	100	1.468	100	1.859	100	1.277	100	1.265	100	1.256	100
22	2.702	100	2.326	100	2.486	100	2.247	100	2.264	100	2.334	100
23	2.489	100	2.141	100	2.077	100	1.699	100	2.006	100	1.745	100
24	0.995	100	2.348	100	1.431	100	1.289	100	1.781	100	1.846	100
25	1.819	100	1.690	100	2.647	100	2.111	100	2.162	100	2.259	100
26	0.866	100	1.124	100	1.372	100	1.380	100	1.458	100	1.071	100
27	1.103	100	0.829	100	1.277	100	1.174	100	1.211	100	1.062	100
28	1.648	100	1.341	100	1.836	100	1.201	99.9951	1.448	100	1.088	100
29	0.897	100	2.502	100	1.747	100	1.728	100	1.198	100	1.632	100
30	1.120	100	1.481	100	1.292	100	1.777	100	1.223	100	1.721	100
31	1.224	100	0.979	100	1.197	100	0.725	100	0.817	100	1.118	100
32	1.125	100	0.949	100	1.118	100	0.736	100	0.817	100	0.905	100
135	2.258	100	1.586	100	1.908	100	2.585	100	1.833	100	1.431	100
138	2.817	100	1.565	100	2.682	100	2.184	100	2.169	100	2.098	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	1.292	100	0.932	100	1.143	100	0.952	100	1.049	100	1.077	100
3	0.450	100	0.585	100	0.452	100	0.445	100	0.731	100	0.576	100
4	1.172	100	1.244	100	1.253	100	1.245	100	1.434	100	1.471	100
5	0.828	100	0.941	100	0.581	100	1.070	100	0.963	100	0.924	100
6	0.676	100	0.671	100	0.728	100	0.436	100	0.852	100	0.559	100
7	0.666	100	0.706	100	0.656	100	0.765	100	0.623	100	0.684	100
8	0.460	100	0.533	100	0.497	100	0.605	100	0.593	100	0.655	100
9	0.590	100	0.650	100	0.459	100	0.508	100	0.590	100	0.534	100
10	0.482	100	0.503	100	0.540	100	0.426	100	1.252	100	0.543	100
11	0.459	100	0.440	100	0.415	100	0.409	100	0.754	100	0.376	100
12	0.687	100	0.759	100	0.635	100	0.775	100	0.689	100	0.598	100
13	0.677	100	0.715	100	0.564	100	0.665	100	0.689	100	0.520	100
14	0.560	100	0.455	100	0.683	100	0.361	100	0.617	100	0.413	100
15	0.616	100	0.848	100	0.619	100	0.901	100	0.849	100	0.864	100
16	0.818	100	0.780	100	0.535	100	0.441	100	0.663	100	0.613	100
17	1.785	100	0.844	100	1.159	100	0.624	100	0.744	100	0.874	100
18	0.937	100	0.600	100	0.883	100	0.733	100	0.823	100	0.640	100
19	1.508	100	1.405	100	1.517	100	1.457	100	1.820	100	1.615	100
20	0.620	100	0.794	100	0.806	100	0.597	100	0.829	100	0.718	100
21	0.962	100	0.724	100	1.137	100	0.913	100	0.756	100	1.098	100
22	1.610	100	1.547	100	2.057	100	1.700	100	1.684	100	1.651	100
23	1.268	100	1.232	100	1.493	100	1.397	100	1.478	100	1.056	100
24	0.767	100	0.770	100	0.690	100	0.815	100	0.982	100	0.699	100
25	1.526	100	1.398	100	1.233	100	1.254	100	2.020	100	1.232	100
26	0.871	100	0.918	100	0.608	100	0.765	100	0.830	100	0.591	100
27	0.661	100	0.643	100	0.566	100	0.469	100	0.671	100	0.521	100
28	0.471	100	0.494	100	0.612	100	0.571	100	0.766	100	0.565	100
29	0.897	100	1.116	100	0.670	100	0.857	100	1.055	100	0.974	100
30	0.926	100	1.044	100	0.672	100	0.902	100	1.243	100	1.095	100
31	0.687	100	0.858	100	0.318	100	0.620	100	0.766	100	0.794	100
32	0.507	100	0.586	100	0.447	100	0.480	100	0.424	100	0.372	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	1.210	100	1.124	100	0.970	100	1.038	100	0.873	100	1.107	100
3	0.456	100	0.385	100	0.639	100	0.678	100	0.478	100	0.558	100
4	0.830	100	0.778	100	1.193	100	0.984	100	1.006	100	0.796	100
5	0.807	100	0.609	100	1.271	100	0.658	100	1.015	100	0.916	100
6	0.468	100	0.591	100	0.837	100	0.608	100	0.718	100	0.832	100
7	0.743	100	0.521	100	0.897	100	0.810	100	0.719	100	0.754	100
8	0.499	100	0.441	100	0.873	100	0.638	100	0.470	100	0.583	100
9	0.567	100	0.507	100	0.583	100	0.873	100	0.599	100	0.507	100
10	0.574	100	0.613	100	0.436	100	0.481	100	0.538	100	0.544	100
11	0.702	100	0.567	100	0.692	100	0.519	100	0.483	100	0.632	100
12	0.642	100	0.639	100	0.998	100	0.723	100	0.792	100	0.605	100
13	0.489	100	0.768	100	1.081	100	0.532	100	0.575	100	0.576	100
14	0.612	100	0.534	100	0.745	100	0.388	100	0.395	100	0.491	100
15	0.719	100	0.561	100	0.969	100	0.859	100	0.792	100	0.835	100
16	0.849	100	0.655	100	0.533	100	0.681	100	0.518	100	0.717	100
17	0.744	100	0.735	100	0.944	100	0.571	100	0.707	100	0.624	100
18	0.853	100	1.151	100	0.615	100	0.767	100	0.852	100	0.992	100
19	1.595	100	1.638	100	1.275	100	1.627	100	1.430	100	1.543	100
20	0.750	100	0.719	100	0.773	100	0.773	100	0.747	100	0.684	100
21	0.798	100	0.855	100	1.094	100	1.028	100	0.844	100	1.038	100
22	1.745	100	1.781	100	1.598	100	1.770	100	1.729	100	1.830	100
23	1.542	100	1.491	100	1.303	100	1.193	100	1.314	100	1.245	100
24	0.656	100	1.013	100	0.897	100	0.693	100	0.911	100	0.975	100
25	1.403	100	1.224	100	1.791	100	1.302	100	1.313	100	1.407	100
26	0.642	100	0.637	100	0.837	100	0.870	100	0.788	100	0.674	100
27	0.690	100	0.499	100	0.745	100	0.723	100	0.638	100	0.612	100
28	0.737	100	0.637	100	1.020	100	0.582	100	0.652	100	0.700	100
29	0.842	100	1.271	100	1.314	100	0.921	100	0.837	100	0.970	100
30	0.776	100	0.850	100	1.236	100	1.108	100	0.998	100	0.954	100
31	0.553	100	0.512	100	0.779	100	0.304	100	0.496	100	0.556	100
32	0.430	100	0.431	100	0.654	100	0.394	100	0.426	100	0.384	100

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

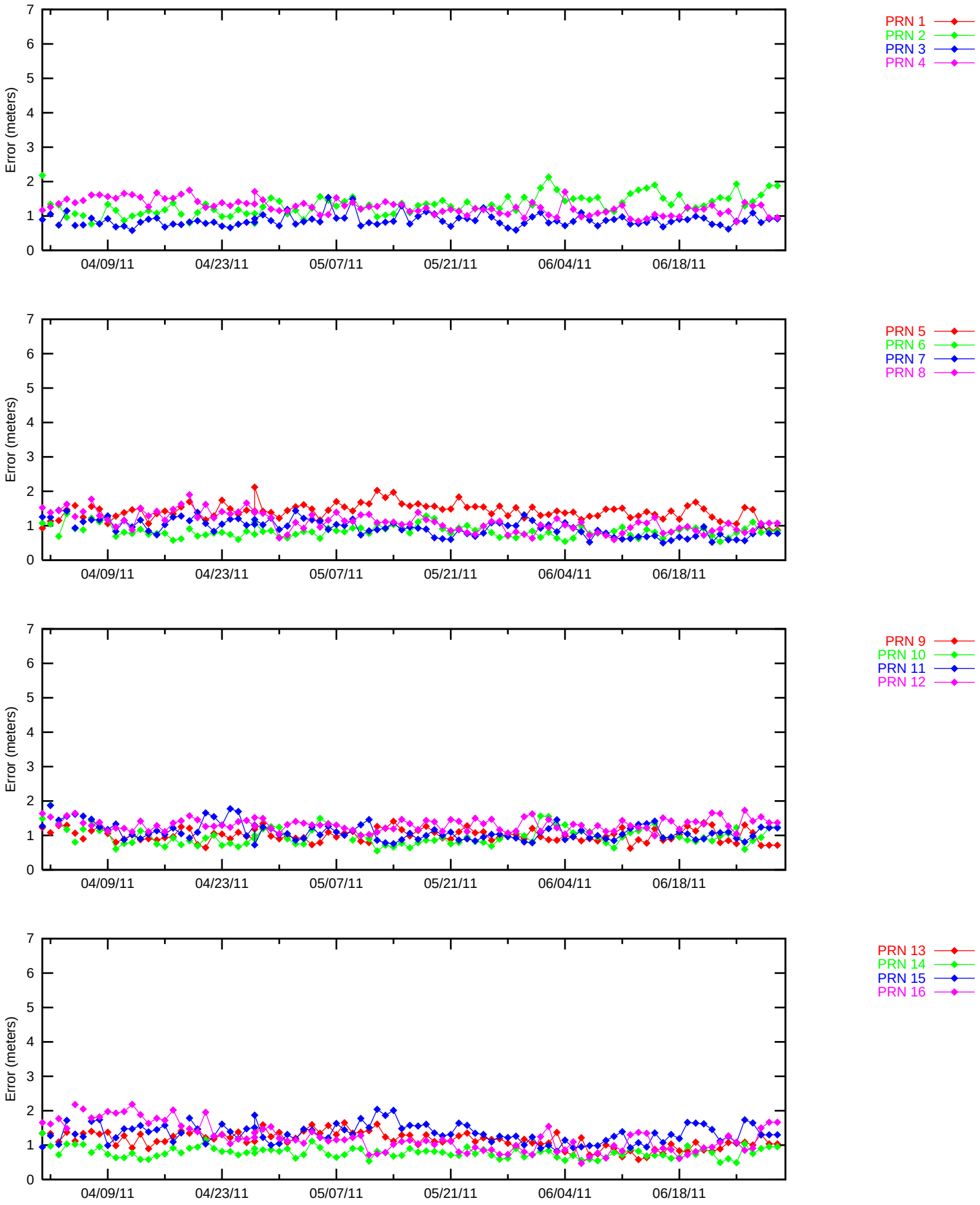


Figure 6-2 95% Range Error (PRN 17 - PRN 32) - Washington DC

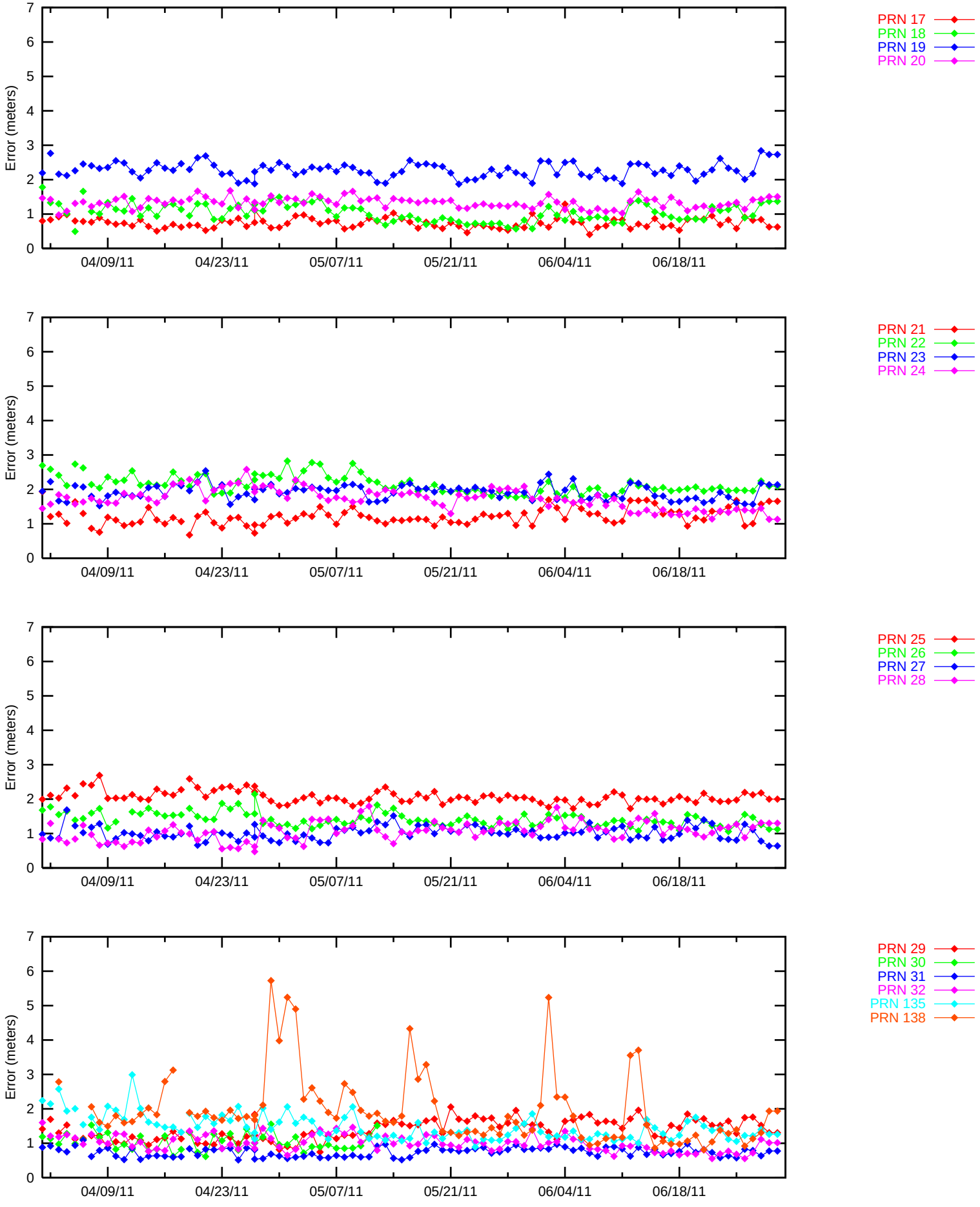


Figure 6-3 95% Ionospheric (PRN 1 - PRN 16) - Washington DC

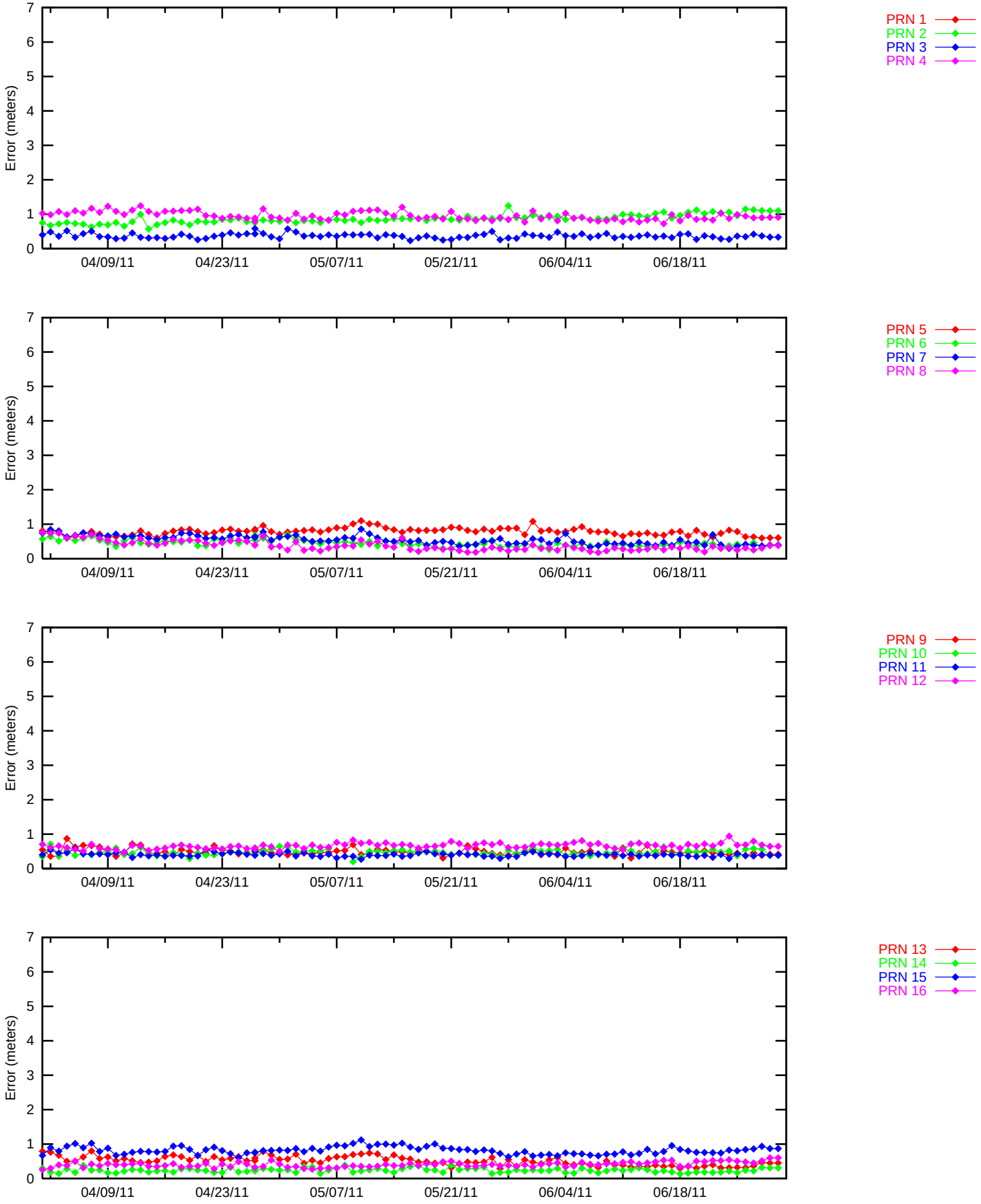
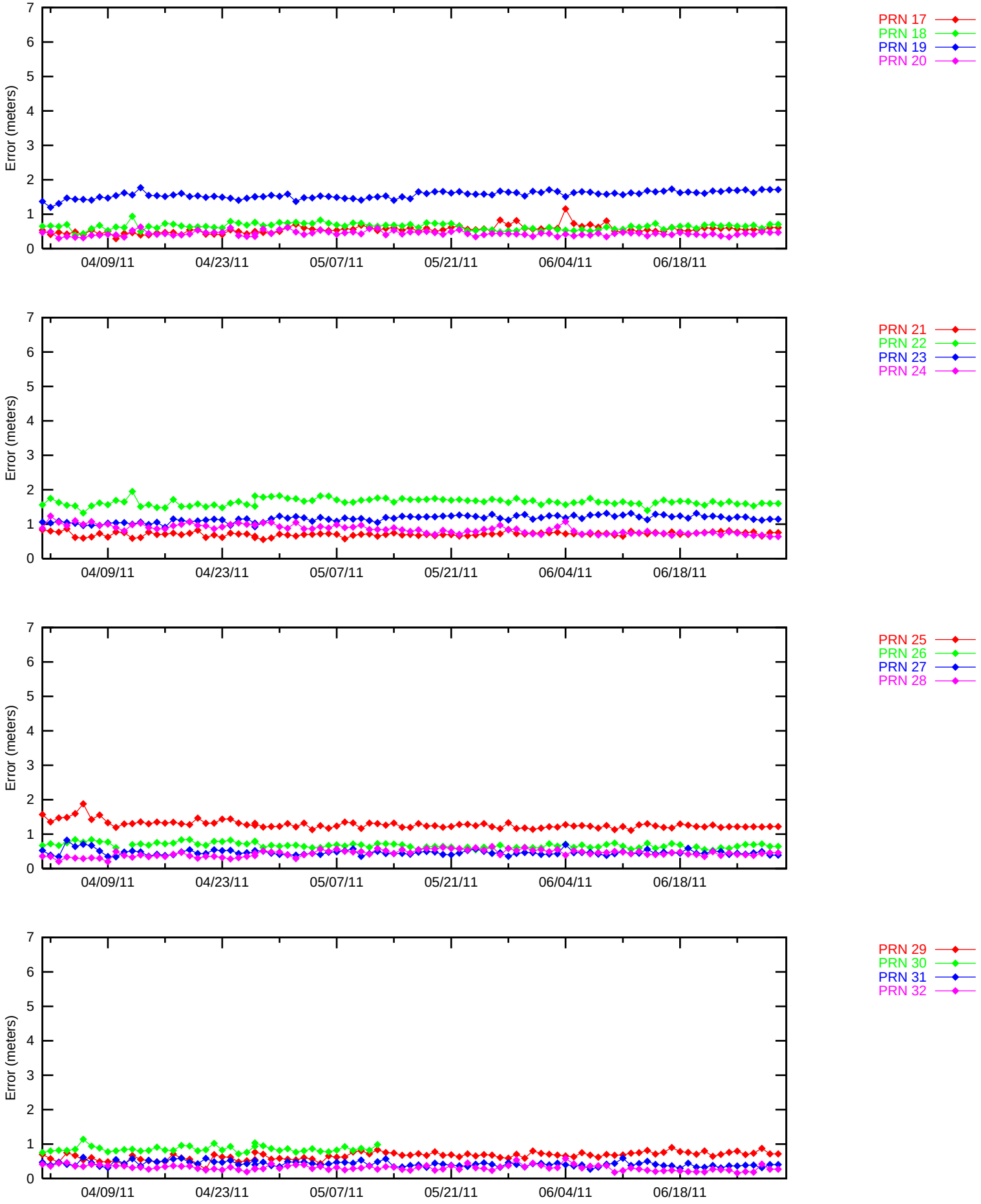


Figure 6-4 95% Ionospheric (PRN 17 - PRN 32) - Washington DC



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.

From 4/1/11 to 6/14/11, there was an orbit mismatch between C&V ZLA, ZDC, and ZTL that caused AMR GEO, CRW GEO, and CRE GEO to broadcast different UDRE values for CRE. C&V ZLA was the selected source for AMR, C&V ZDC was the selected source for CRW, and C&V ZTL was the selected source for CRE. The CRE UDRE values reported by AMR and CRW was set to Not Monitored for most of the period causing low CRW GEO PA ranging availability.

ZLA, ZDC, and ZTL software was updated to W6.077L (WFO – Release 2b) on 6/14/11 and 6/15/11. Starting 6/15/11 C&V ZTL, ZDC, and ZLA orbits matched and AMR, CRW, and CRE broadcast the same UDRE values for CRE.

Table 7-1 GEO Ranging Availability

GEO Source	GEO	PA (%)	NPA (%)	Not Monitored (%)	Do Not Use (%)
CRW 135	CRW	97.60	1.79	0.49	0.11
CRW 135	CRE	35.64	2.02	62.27	0.06
CRE 138	CRW	96.89	1.78	1.21	0.12
CRE 138	CRE	97.48	2.02	0.43	0.06
AMR 133	CRW	97.60	1.79	0.49	0.11
AMR 133	CRE	35.56	2.02	62.34	0.06

Figure 7-1 Daily PA CRW GEO Ranging Availability Trend

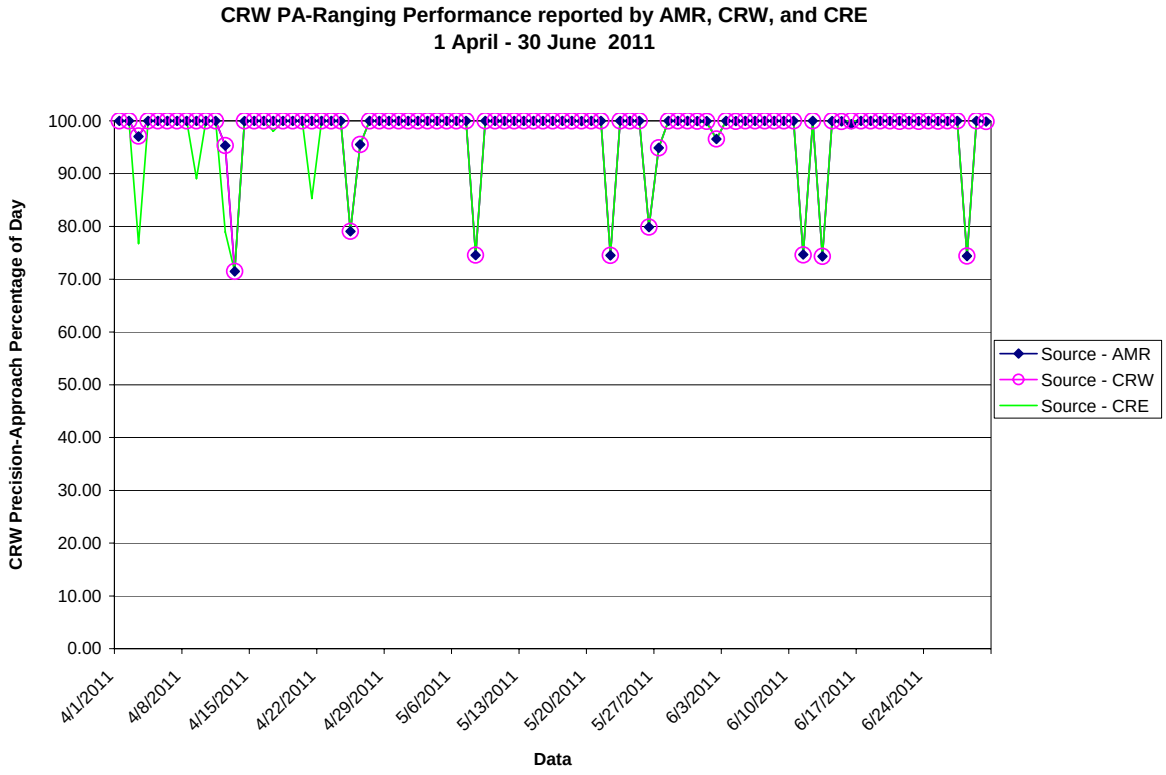
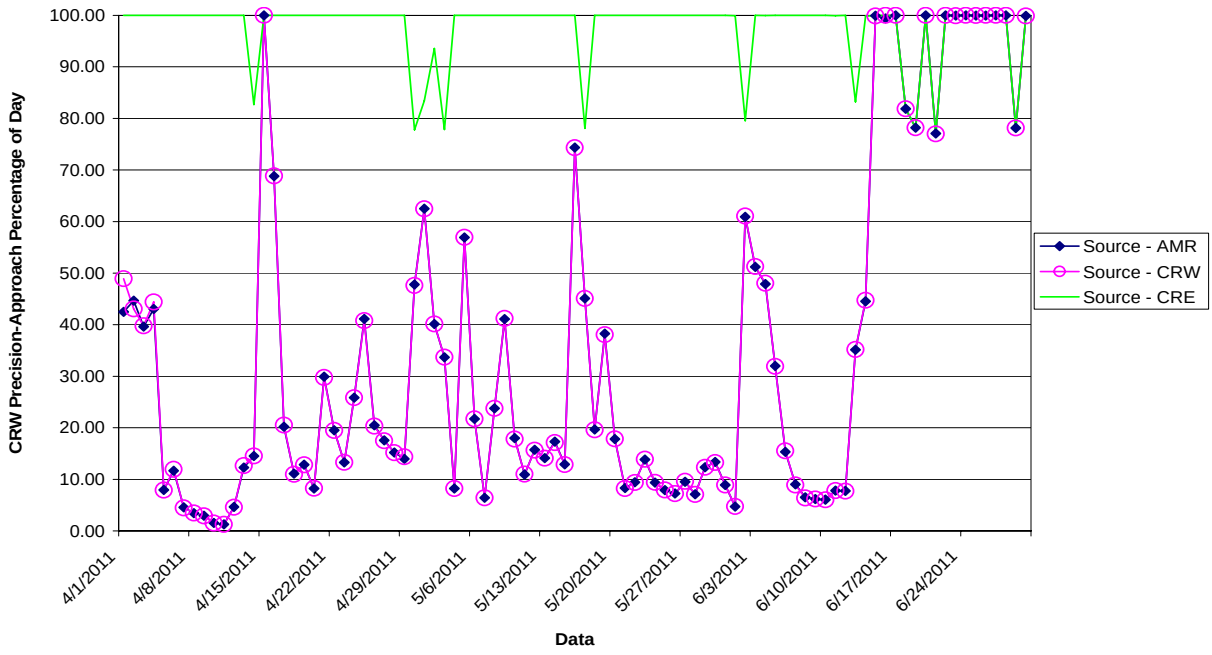


Figure 7-2 Daily PA CRE GEO Ranging Availability Trend



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	3	0.999561	34	0.997753
9A3	CHUATHBALUK	AK	LPV	2	0.999554	8	0.998932
CLP	CLARKS POINT	AK	LPV	2	0.9995	13	0.998596
CDB	COLD BAY	AK	LPV	6	0.999016	413	0.935684
SCC	DEADHORSE	AK	LPV	4	0.999378	15	0.998069
GAL	EDWARD G. PITKA SR	AK	LPV	3	0.99937	6	0.99876
ELI	ELIM	AK	LPV	4	0.999489	18	0.997913
ENM	EMMONAK	AK	LPV	6	0.999542	35	0.997192
FAI	FAIRBANKS INTL	AK	LPV200	3	0.999252	4	0.99905
GKN	GULKANA	AK	LPV	3	0.999565	4	0.999153
HOM	HOMER	AK	LPV	2	0.9995	5	0.999122
HLA	HUSLIA	AK	LPV	3	0.999344	6	0.99871
ILI	ILIAMNA	AK	LPV	3	0.999481	5	0.99908
KAL	KALTAG	AK	LPV	3	0.999473	9	0.998577
ENA	KENAI MUNICIPAL	AK	LPV	2	0.99947	5	0.999183
KTN	KETCHIKAN INTL	AK	LPV	1	0.999596	2	0.999141
AKN	KING SALMON	AK	LPV	2	0.999493	10	0.998768
KYU	KOYUKUK	AK	LPV	4	0.999363	7	0.998638
KWT	KWETHLUK	AK	LPV	3	0.999527	22	0.998302
WNA	NAPAKIAK	AK	LPV	3	0.999565	39	0.997966
AQH	QUINHAGAK	AK	LPV	2	0.999664	32	0.997512

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
OTZ	RALPH WIEN MEMORIAL	AK	LPV200	18	0.998676	126	0.98832
D76	ROBERT/BOB/CURTIS MEMORIAL	AK	LPV	14	0.998745	96	0.990984
RBY	RUBY	AK	LPV	3	0.999344	6	0.998771
WLK	SELAWIK	AK	LPV	3	0.999431	17	0.9981
SHX	SHAGELUK	AK	LPV	4	0.999557	9	0.998794
2C7	SHAKTOOLIK	AK	LPV	6	0.999458	16	0.998283
KSM	ST MARY'S	AK	LPV	4	0.999607	31	0.997596
SMK	ST MICHAEL	AK	LPV	7	0.999554	17	0.998352
ANC	TED STEVENS ANCHORAGE INTL	AK	LPV	2	0.99947	4	0.999203
BRW	WILEY POST-WILL ROGERS MEMORIA	AK	LPV	15	0.998638	262	0.973573
YAK	YAKUTAT	AK	LPV200	2	0.999618	4	0.999348
8A0	ALBERTVILLE RGNL-THOMAS J BRUM	AL	LPV	0	1	0	1
ANB	ANNISTON METROPOLITAN	AL	LPV	0	1	0	1
AUO	AUBURN UNIVERSITY RGNL	AL	LPV	0	1	0	1
EKY	BESSEMER	AL	LPV200	0	1	0	1
BHM	BIRMINGHAM-SHUTTLESWORTH INTL	AL	LPV200	0	1	0	1
12J	BREWTON MUNICIPAL	AL	LPV	0	1	0	1
SEM	CRAIG FIELD	AL	LPV	0	1	0	1
DHN	DOTHAN RGNL	AL	LPV	0	1	0	1
EDN	ENTERPRISE MUNICIPAL	AL	LPV	0	1	0	1
5R4	FOLEY MUNICIPAL	AL	LPV	0	1	0	1
3A1	FOLSOM FIELD	AL	LPV	0	1	0	1
4R4	H L SONNY CALLAHAN	AL	LPV	0	1	0	1
HSV	HUNTSVILLE INTL-CARL T JONES F	AL	LPV200	0	1	0	1
4A9	ISBELL FIELD	AL	LPV	0	1	0	1
JKA	JACK EDWARDS	AL	LPV	0	1	0	1
MDQ	MADISON COUNTY EXECUTIVE/TOM S	AL	LPV	0	1	0	1
HAB	MARION COUNTY-RANKIN FITE	AL	LPV	0	1	0	1
SCD	MERKEL FIELD SYLACAUGA MUNICIPAL	AL	LPV	0	1	0	1
BFM	MOBILE DOWNTOWN	AL	LPV200	0	1	0	1
MOB	MOBILE RGNL	AL	LPV	0	1	0	1
MGM	MONTGOMERY RGNL (DANNELLY FIEL	AL	LPV	0	1	0	1
GAD	NORTHEAST ALABAMA RGNL	AL	LPV	0	1	0	1
MSL	NORTHWEST ALABAMA RGNL	AL	LPV200	0	1	0	1
DCU	PRYOR FIELD RGNL	AL	LPV200	0	1	0	1
EET	SHELBY COUNTY	AL	LPV	0	1	0	1
79J	SOUTH ALABAMA RGNL AT BILL BEN	AL	LPV	0	1	0	1
PLR	ST CLAIR COUNTY	AL	LPV	0	1	0	1
2R5	ST ELMO	AL	LPV	0	1	0	1
ASN	TALLADEGA MUNICIPAL	AL	LPV	0	1	0	1
TOI	TROY MUNICIPAL	AL	LPV200	0	1	0	1
TCL	TUSCALOOSA RGNL	AL	LPV	0	1	0	1
LIT	ADAMS FIELD	AR	LPV200	0	1	0	1
BYH	ARKANSAS INTL	AR	LPV200	0	1	1	0.999908
BVX	BATESVILLE RGNL	AR	LPV	0	1	1	0.999966
HRO	BOONE COUNTY	AR	LPV	1	0.999996	1	0.999992
4M3	CARLISLE MUNICIPAL	AR	LPV	0	1	0	1
FSM	FORT SMITH RGNL	AR	LPV200	0	1	0	1
JBR	JONESBORO MUNICIPAL	AR	LPV	0	1	1	0.999935
M19	NEWPORT MUNICIPAL	AR	LPV	0	1	1	0.999958
ORK	NORTH LITTLE ROCK MUNICIPAL	AR	LPV	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
XNA	NORTHWEST ARKANSAS RGNL	AR	LPV	0	1	0	1
BPK	OZARK RGNL	AR	LPV	1	0.999969	1	0.999969
ROG	ROGERS MUNICIPAL-CARTER FIELD	AR	LPV	0	1	0	1
RUE	RUSSELLVILLE RGNL	AR	LPV	0	1	0	1
SUZ	SALINE COUNTY RGNL	AR	LPV	0	1	0	1
SRC	SEARCY MUNICIPAL	AR	LPV	0	1	1	0.999985
SLG	SMITH FIELD	AR	LPV	0	1	0	1
ELD	SOUTH ARKANSAS RGNL AT GOODWIN	AR	LPV	0	1	0	1
ASG	SPRINGDALE MUNICIPAL	AR	LPV	0	1	0	1
SGT	STUTTGART MUNICIPAL	AR	LPV	0	1	0	1
TXK	TEXARKANA RGNL-WEBB FIELD	AR	LPV	0	1	0	1
AWM	WEST MEMPHIS MUNICIPAL	AR	LPV200	0	1	1	0.999992
P33	COCHISE COUNTY	AZ	LPV	0	1	35	0.999237
PRC	ERNEST A. LOVE FIELD	AZ	LPV	0	1	2	0.999935
FLG	FLAGSTAFF PULLIAM	AZ	LPV	0	1	2	0.999966
GEU	GLENDALE MUNICIPAL	AZ	LPV	0	1	2	0.999943
IGM	KINGMAN	AZ	LPV	0	1	2	0.999889
HII	LAKE HAVASU CITY	AZ	LPV	0	1	2	0.999874
IFP	LAUGHLIN/BULLHEAD INTL	AZ	LPV	0	1	2	0.99987
PGA	PAGE MUNICIPAL	AZ	LPV	0	1	2	0.999973
DVT	PHOENIX DEER VALLEY	AZ	LPV	0	1	2	0.999947
PHX	PHOENIX SKY HARBOR INTL	AZ	LPV	0	1	2	0.99995
IWA	PHOENIX-MESA GATEWAY	AZ	LPV	0	1	87	0.996741
SAD	SAFFORD RGNL	AZ	LPV	0	1	14	0.99976
SOW	SHOW LOW RGNL	AZ	LPV	0	1	5	0.999939
TUS	TUCSON INTL	AZ	LPV	0	1	86	0.996883
APV	APPLE VALLEY	CA	LPV	2	0.999897	4	0.999664
ACV	ARCATA	CA	LPV	0	1	99	0.991495
AUN	AUBURN MUNICIPAL	CA	LPV	2	0.999947	44	0.9986
DAG	BARSTOW-DAGGETT	CA	LPV	2	0.999947	3	0.999687
C83	BYRON	CA	LPV	3	0.999695	88	0.993544
CMA	CAMARILLO	CA	LPV	2	0.999779	24	0.998352
MER	CASTLE	CA	LPV200	2	0.99976	52	0.998268
STS	CHARLES M. SCHULZ - SONOMA COU	CA	LPV	2	0.999748	101	0.989137
CIC	CHICO MUNICIPAL	CA	LPV	1	0.999977	49	0.997348
CNO	CHINO	CA	LPV	2	0.999863	5	0.999588
FAT	FRESNO YOSEMITE INTL	CA	LPV	2	0.999752	11	0.999313
WJF	GENERAL WM J FOX AIRFIELD	CA	LPV	2	0.999836	5	0.999451
HAF	HALF MOON BAY	CA	LPV	4	0.999657	136	0.98716
HWD	HAYWARD EXECUTIVE	CA	LPV	3	0.999668	103	0.990549
CVH	HOLLISTER MUNICIPAL	CA	LPV	2	0.999702	111	0.992876
CEC	JACK MC NAMARA FIELD	CA	LPV	0	1	93	0.99552
SNA	JOHN WAYNE AIRPORT-ORANGE COUN	CA	LPV	2	0.999821	11	0.999485
LHM	LINCOLN RGNL/KARL HARDER FIELD	CA	LPV200	2	0.99992	56	0.997115
LVK	LIVERMORE MUNICIPAL	CA	LPV	3	0.999683	93	0.992178
LGB	LONG BEACH /DAUGHERTY FIELD/	CA	LPV	2	0.999855	10	0.999477
LAX	LOS ANGELES INTL	CA	LPV	2	0.999847	11	0.999332
LSN	LOS BANOS MUNICIPAL	CA	LPV	2	0.999725	85	0.996471
MAE	MADERA MUNICIPAL	CA	LPV	2	0.999748	24	0.998874
CRQ	MC CLELLAN-PALOMAR	CA	LPV	2	0.999866	13	0.999401
BFL	MEADOWS FIELD	CA	LPV200	2	0.999714	7	0.999363
MCE	MERCED RGNL//MACREADY FIELD	CA	LPV	2	0.999763	49	0.998375

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
OAK	METROPOLITAN OAKLAND INTL	CA	LPV	3	0.999664	104	0.990194
MOD	MODESTO CITY-CO-HARRY SHAM FLD	CA	LPV	2	0.99976	72	0.997024
MRY	MONTEREY PENINSULA	CA	LPV	3	0.999676	165	0.98563
MYF	MONTGOMERY FIELD	CA	LPV200	2	0.999882	20	0.998729
APC	NAPA COUNTY	CA	LPV	3	0.999679	93	0.991033
O02	NERVINO	CA	LPV	1	0.999981	1	0.999729
SJC	NORMAN Y. MINETA SAN JOSE INTL	CA	LPV	3	0.999683	110	0.990518
VCB	NUT TREE	CA	LPV	2	0.999897	80	0.993025
ONT	ONTARIO INTL	CA	LPV	2	0.999863	5	0.999592
OXR	OXNARD	CA	LPV	2	0.999691	27	0.997745
28J	PALATKA MUNICIPAL - LT. KAY LARKIN	CA	LPV	0	1	0	1
PRB	PASO ROBLES MUNICIPAL	CA	LPV200	2	0.99971	131	0.994029
RBL	RED BLUFF MUNICIPAL	CA	LPV	1	0.999977	50	0.997215
RDD	REDDING MUNICIPAL	CA	LPV	1	0.999973	38	0.998214
RHV	REID-HILLVIEW OF SANTA CLARA C	CA	LPV	3	0.999683	106	0.991251
RAL	RIVERSIDE MUNICIPAL	CA	LPV	2	0.999866	5	0.999603
SAC	SACRAMENTO EXECUTIVE	CA	LPV200	2	0.999878	71	0.995711
SMF	SACRAMENTO INTL	CA	LPV	2	0.999874	69	0.995196
MHR	SACRAMENTO MATHER	CA	LPV	2	0.999866	63	0.996532
SNS	SALINAS MUNICIPAL	CA	LPV200	2	0.999695	144	0.98966
SFO	SAN FRANCISCO INTL	CA	LPV	3	0.999664	119	0.98874
SBA	SANTA BARBARA MUNICIPAL	CA	LPV	2	0.999668	119	0.992674
MIT	SHAFTER-MINTER FIELD	CA	LPV	2	0.999714	7	0.999348
VCV	SOUTHERN CALIFORNIA LOGISTICS	CA	LPV	2	0.999893	4	0.999645
SCK	STOCKTON METROPOLITAN	CA	LPV	2	0.999763	75	0.99607
TCY	TRACY MUNICIPAL	CA	LPV	2	0.999737	89	0.994464
DWA	YOLO COUNTY	CA	LPV	2	0.999886	75	0.994116
MYV	YUBA COUNTY	CA	LPV200	1	0.999973	61	0.996787
APA	CENTENNIAL	CO	LPV	1	0.999741	1	0.999599
COS	CITY OF COLORADO SPRINGS MUNICIPAL	CO	LPV200	1	0.999966	1	0.999702
CEZ	CORTEZ MUNICIPAL	CO	LPV	0	1	1	0.999996
DEN	DENVER INTL	CO	LPV200	1	0.999702	1	0.999596
DRO	DURANGO-LA PLATA COUNTY	CO	LPV200	0	1	1	0.999996
FNL	FORT COLLINS-LOVELAND MUNICIPAL	CO	LPV200	1	0.999702	1	0.999332
FTG	FRONT RANGE	CO	LPV	1	0.999702	1	0.999596
RIL	GARFIELD COUNTY RGNL	CO	LPV	1	0.999996	1	0.999767
GJT	GRAND JUNCTION REGIONAL	CO	LPV200	0	1	1	0.999962
GXY	GREELEY-WELD COUNTY	CO	LPV	1	0.999702	1	0.999325
ITR	KIT CARSON COUNTY	CO	LPV	1	0.999634	1	0.999557
LHX	LA JUNTA MUNICIPAL	CO	LPV	1	0.999947	1	0.999748
LAA	LAMAR MUNICIPAL	CO	LPV	1	0.999916	1	0.99971
MTJ	MONTROSE RGNL	CO	LPV200	0	1	0	1
PUB	PUEBLO MEMORIAL	CO	LPV200	1	0.999973	1	0.999718
BJC	ROCKY MOUNTAIN METROPOLITAN	CO	LPV200	1	0.99971	1	0.999702
ALS	SAN LUIS VALLEY RGNL/BERGMAN F	CO	LPV200	0	1	1	0.999985
HDN	YAMPA VALLEY	CO	LPV	1	0.999882	1	0.999561
BDL	BRADLEY INTL	CT	LPV200	0	1	1	0.999985
GON	GROTON-NEW LONDON	CT	LPV	0	1	1	0.999977
HVN	TWEED-NEW HAVEN	CT	LPV	0	1	1	0.999977
OXC	WATERBURY-OXFORD	CT	LPV	0	1	1	0.999977

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
DCA	RONALD REAGAN WASHINGTON NATIO	DC	LPV	0	1	4	0.999924
ILG	NEW CASTLE	DE	LPV	0	1	0	1
EVY	SUMMIT	DE	LPV	0	1	0	1
GED	SUSSEX COUNTY	DE	LPV	0	1	0	1
AAF	APALACHICOLA REGIONAL	FL	LPV	0	1	0	1
AVO	AVON PARK EXECUTIVE	FL	LPV	0	1	1	0.999779
BOW	BARTOW MUNICIPAL	FL	LPV	0	1	1	0.999969
CEW	BOB SIKES	FL	LPV	0	1	0	1
BCT	BOCA RATON	FL	LPV	2	0.999714	6	0.999531
VQQ	CECIL FIELD	FL	LPV	0	1	0	1
PGD	CHARLOTTE COUNTY	FL	LPV	1	0.999939	1	0.999779
CRG	CRAIG MUNICIPAL	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 MUNICIPAL-SIDNEY H TAYLOR FI	FL	LPV	0	1	0	1
FHB	FERNANDINA BEACH MUNICIPAL	FL	LPV	0	1	0	1
XFL	FLAGLER COUNTY	FL	LPV	0	1	0	1
FXE	FORT LAUDERDALE EXECUTIVE	FL	LPV200	2	0.99971	6	0.999508
FLL	FORT LAUDERDALE/HOLLYWOOD INTL	FL	LPV	2	0.999706	7	0.999489
GNV	GAINESVILLE RGNL	FL	LPV	0	1	0	1
BKV	HERNANDO COUNTY	FL	LPV	0	1	0	1
IMM	IMMOKALEE RGNL	FL	LPV200	2	0.999771	3	0.999718
JAX	JACKSONVILLE INTL	FL	LPV	0	1	0	1
TMB	KENDALL-TAMIAMI EXECUTIVE	FL	LPV200	2	0.999702	6	0.99947
EYW	KEY WEST INTL	FL	LPV	3	0.999668	7	0.999286
ISM	KISSIMMEE GATEWAY	FL	LPV200	0	1	0	1
X14	LA BELLE MUNICIPAL	FL	LPV	1	0.999779	2	0.999729
LCQ	LAKE CITY MUNICIPAL	FL	LPV	0	1	0	1
LAL	LAKELAND LINDER RGNL	FL	LPV200	0	1	1	0.999996
LEE	LEESBURG INTL	FL	LPV	0	1	0	1
MKY	MARCO ISLAND	FL	LPV	2	0.999767	4	0.999649
MLB	MELBOURNE INTL	FL	LPV	0	1	0	1
COI	MERRITT ISLAND	FL	LPV	0	1	0	1
MIA	MIAMI INTL	FL	LPV	2	0.999702	7	0.999466
APF	NAPLES MUNICIPAL	FL	LPV	1	0.999779	4	0.999691
EVB	NEW SMYRNA BEACH MUNICIPAL	FL	LPV	0	1	0	1
F45	NORTH PALM BEACH COUNTY GENERA	FL	LPV	2	0.999737	6	0.999653
ECP	NORTHWEST FLORIDA BEACHES INTL	FL	LPV200	0	1	0	1
OCF	OCALA INTL-JIM TAYLOR FIELD	FL	LPV200	0	1	0	1
OBE	OKEECHOBEE COUNTY	FL	LPV	1	0.999969	1	0.999779
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	2	0.999756	2	0.999718
PBI	PALM BEACH INTL	FL	LPV	2	0.999725	6	0.999584
PNS	PENSACOLA GULF COAST RGNL	FL	LPV	0	1	0	1
40J	PERRY-FOLEY	FL	LPV	0	1	0	1
PMP	POMPANO BEACH AIRPARK	FL	LPV	2	0.99971	6	0.999508
SRQ	SARASOTA/BRADENTON INTL	FL	LPV200	0	1	1	0.999779
SEF	SEBRING RGNL	FL	LPV	1	0.999966	1	0.999779
RSW	SOUTHWEST FLORIDA INTL	FL	LPV	1	0.999779	3	0.999718
TIX	SPACE COAST RGNL	FL	LPV200	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
SGJ	ST AUGUSTINE	FL	LPV	0	1	0	1
FPR	ST LUCIE COUNTY INTL	FL	LPV	1	0.999985	1	0.999779
PIE	ST PETERSBURG-CLEARWATER INTL	FL	LPV200	0	1	1	0.999985
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	3	0.999687	11	0.999019
VRB	VERO BEACH MUNICIPAL	FL	LPV	1	0.999985	1	0.999779
GIF	WINTER HAVEN'S GILBERT	FL	LPV	0	1	0	1
SUA	WITHAM FIELD	FL	LPV	2	0.999809	5	0.999733
ZPH	ZEPHYRHILLS MUNICIPAL	FL	LPV	0	1	0	1
AHN	ATHENS/BEN EPPS	GA	LPV	0	1	0	1
FFC	ATLANTA RGNL FALCON FIELD	GA	LPV200	0	1	0	1
AGS	AUGUSTA RGNL AT BUSH FIELD	GA	LPV	0	1	0	1
MLJ	BALDWIN COUNTY	GA	LPV	0	1	0	1
WDR	BARROW COUNTY	GA	LPV	0	1	0	1
BQK	BRUNSWICK GOLDEN ISLES	GA	LPV200	0	1	0	1
VPC	CARTERSVILLE	GA	LPV	0	1	0	1
47A	CHEROKEE COUNTY	GA	LPV	0	1	0	1
CWV	CLAXTON-EVANS COUNTY	GA	LPV	0	1	0	1
RYY	COBB COUNTY-MC COLLUM FIELD	GA	LPV200	0	1	0	1
48A	COCHRAN	GA	LPV	0	1	0	1
CSG	COLUMBUS METROPOLITAN	GA	LPV	0	1	0	1
15J	COOK COUNTY	GA	LPV	0	1	0	1
9A1	COVINGTON MUNICIPAL	GA	LPV	0	1	0	1
CKF	CRISP COUNTY-CORDELE	GA	LPV	0	1	0	1
DNN	DALTON MUNICIPAL	GA	LPV	0	1	0	1
BGE	DECATUR COUNTY INDUSTRIAL AIR	GA	LPV200	0	1	0	1
BIJ	EARLY COUNTY	GA	LPV	0	1	0	1
SBO	EMANUEL COUNTY	GA	LPV	0	1	0	1
18A	FRANKLIN COUNTY	GA	LPV	0	1	0	1
FTY	FULTON COUNTY AIRPORT-BROWN FI	GA	LPV	0	1	0	1
3J7	GREENE COUNTY RGNL	GA	LPV	0	1	0	1
PIM	HARRIS COUNTY	GA	LPV	0	1	0	1
ATL	HARTSFIELD - JACKSON ATLANTA I	GA	LPV200	0	1	0	1
EZM	HEART OF GEORGIA RGNL	GA	LPV	0	1	0	1
TMA	HENRY TIFT MYERS	GA	LPV	0	1	0	1
HOE	HOMERVILLE	GA	LPV	0	1	0	1
19A	JACKSON COUNTY	GA	LPV	0	1	0	1
JES	JESUP-WAYNE COUNTY	GA	LPV	0	1	0	1
LGC	LAGRANGE-CALLAWAY	GA	LPV200	0	1	0	1
GVL	LEE GILMER MEMORIAL	GA	LPV	0	1	0	1
MCN	MIDDLE GEORGIA RGNL	GA	LPV	0	1	0	1
2J5	MILLEN	GA	LPV	0	1	0	1
MGR	MOULTRIE MUNICIPAL	GA	LPV	0	1	0	1
CCO	NEWNAN COWETA COUNTY	GA	LPV	0	1	0	1
PUJ	PAULDING NORTHWEST ATLANTA	GA	LPV200	0	1	0	1
PXE	PERRY-HOUSTON COUNTY	GA	LPV	0	1	0	1
JZP	PICKENS COUNTY	GA	LPV	0	1	0	1
JYL	PLANTATION ARPK	GA	LPV	0	1	0	1
RMG	RICHARD B RUSSELL	GA	LPV	0	1	0	1
SAV	SAVANNAH/HILTON HEAD INTL	GA	LPV200	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
ABY	SOUTHWEST GEORGIA RGNL	GA	LPV200	0	1	0	1
4J6	ST MARYS	GA	LPV	0	1	0	1
TBR	STATESBORO-BULLOCH COUNTY	GA	LPV	0	1	0	1
MQW	TELFAIR-WHEELER	GA	LPV	0	1	0	1
OPN	THOMASTON-UPSON COUNTY	GA	LPV200	0	1	0	1
TVI	THOMASVILLE RGNL	GA	LPV	0	1	0	1
TOC	TOCCOA RG LETOURNEAU FIELD	GA	LPV	0	1	0	1
VLD	VALDOSTA RGNL	GA	LPV	0	1	0	1
VDI	VIDALIA RGNL	GA	LPV	0	1	0	1
IIY	WASHINGTON-WILKES COUNTY	GA	LPV	0	1	0	1
AYS	WAYCROSS-WARE COUNTY	GA	LPV	0	1	0	1
CTJ	WEST GEORGIA RGNL - O V GRAY F	GA	LPV	0	1	0	1
AMW	AMES MUNICIPAL	IA	LPV	2	0.999512	3	0.999367
IKV	ANKENY RGNL	IA	LPV	1	0.999523	2	0.999374
TVK	CENTERVILLE MUNICIPAL	IA	LPV	1	0.999596	2	0.999374
CKP	CHEROKEE COUNTY RGNL	IA	LPV	1	0.999416	1	0.999378
CWI	CLINTON MUNICIPAL	IA	LPV200	1	0.99934	1	0.99934
CBF	COUNCIL BLUFFS MUNICIPAL	IA	LPV200	1	0.999378	2	0.999374
DVN	DAVENPORT MUNICIPAL	IA	LPV200	2	0.999466	1	0.99934
DNS	DENISON MUNICIPAL	IA	LPV	1	0.999378	2	0.999374
DSM	DES MOINES INTL	IA	LPV	1	0.999523	2	0.999374
DBQ	DUBUQUE RGNL	IA	LPV200	1	0.99934	1	0.99934
EST	ESTHERVILLE MUNICIPAL	IA	LPV	1	0.999416	1	0.999378
FFL	FAIRFIELD MUNICIPAL	IA	LPV	2	0.999573	1	0.99934
FXY	FOREST CITY MUNICIPAL	IA	LPV	2	0.999607	2	0.999374
FOD	FORT DODGE RGNL	IA	LPV200	1	0.999378	2	0.999374
GGI	GRINNELL RGNL	IA	LPV	1	0.999596	4	0.999473
IOW	IOWA CITY MUNICIPAL	IA	LPV	2	0.999542	1	0.99934
EFW	JEFFERSON MUNICIPAL	IA	LPV	1	0.999378	2	0.999374
EOK	KEOKUK MUNICIPAL	IA	LPV	2	0.99958	1	0.99934
OXV	KNOXVILLE MUNICIPAL	IA	LPV	1	0.999596	3	0.999367
LRJ	LE MARS MUNICIPAL	IA	LPV	1	0.999416	1	0.999313
MPZ	MOUNT PLEASANT MUNICIPAL	IA	LPV	2	0.999561	1	0.99934
MUT	MUSCATINE MUNICIPAL	IA	LPV	2	0.999546	1	0.99934
TNU	NEWTON MUNICIPAL	IA	LPV	1	0.999596	3	0.999351
OOA	OSKALOOSA MUNICIPAL	IA	LPV	1	0.999596	4	0.999481
OTM	OTTUMWA RGNL	IA	LPV	1	0.999596	3	0.999481
PEA	PELLA MUNICIPAL	IA	LPV	1	0.999596	3	0.999359
PRO	PERRY MUNICIPAL	IA	LPV	2	0.999512	2	0.999374
ICL	SCHENCK FIELD	IA	LPV	1	0.999378	2	0.999374
SDA	SHENANDOAH MUNICIPAL	IA	LPV	1	0.999378	2	0.999374
SUX	SIOUX GATEWAY/COL. BUD DAY FIE	IA	LPV200	1	0.999428	1	0.99929
BRL	SOUTHEAST IOWA RGNL	IA	LPV200	2	0.999557	1	0.99934
SPW	SPENCER MUNICIPAL	IA	LPV200	1	0.999416	1	0.999378
SLB	STORM LAKE MUNICIPAL	IA	LPV	1	0.999416	2	0.999374
CID	THE EASTERN IOWA	IA	LPV200	2	0.999538	2	0.999336
VTI	VINTON VETERANS MEMORIAL ARPK	IA	LPV	2	0.999561	3	0.999317
AWG	WASHINGTON MUNICIPAL	IA	LPV200	2	0.99955	1	0.99934
ALO	WATERLOO RGNL	IA	LPV	1	0.999596	3	0.999306
EBS	WEBSTER CITY MUNICIPAL	IA	LPV	2	0.999496	3	0.99937
BOI	BOISE AIR TERMINAL/GOWEN FLD	ID	LPV	0	1	2	0.999824
EUL	CALDWELL INDUSTRIAL	ID	LPV	0	1	2	0.999809

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
COE	COEUR D'ALENE - PAPPY BOYINGTO	ID	LPV200	1	0.999668	1	0.999523
GNG	GOODING MUNICIPAL	ID	LPV	0	1	3	0.999878
IDA	IDAHO FALLS RGNL	ID	LPV200	1	0.999973	2	0.999679
JER	JEROME COUNTY	ID	LPV	0	1	3	0.999893
TWF	JOSLIN FIELD - MAGIC VALLEY RG	ID	LPV200	0	1	2	0.999916
LWS	LEWISTON-NEZ PERCE COUNTY	ID	LPV200	1	0.99966	1	0.99966
MYL	MC CALL MUNICIPAL	ID	LPV	0	1	3	0.99979
U76	MOUNTAIN HOME MUNICIPAL	ID	LPV	0	1	2	0.99984
MAN	NAMPA MUNICIPAL	ID	LPV	0	1	2	0.999813
PIH	POCATELLO RGNL	ID	LPV200	1	0.999989	2	0.999775
SPI	ABRAHAM LINCOLN CAPITAL	IL	LPV	2	0.999588	1	0.99934
FEP	ALBERTUS	IL	LPV	1	0.99934	1	0.99934
ARR	AURORA MUNICIPAL	IL	LPV	1	0.99934	1	0.99934
BMI	CENTRAL IL RGNL ARPT AT BLOOMI	IL	LPV	2	0.999508	1	0.99934
MDW	CHICAGO MIDWAY INTL	IL	LPV	2	0.999508	1	0.99934
ORD	CHICAGO O'HARE INTL	IL	LPV200	1	0.999351	1	0.99934
RFD	CHICAGO/ROCKFORD INTL	IL	LPV200	1	0.99934	1	0.99934
MTO	COLES COUNTY MEMORIAL	IL	LPV	1	0.999561	1	0.999451
RSV	CRAWFORD CO	IL	LPV	1	0.999802	1	0.999534
DKB	DE KALB TAYLOR MUNICIPAL	IL	LPV	1	0.99934	1	0.99934
DEC	DECATUR	IL	LPV	2	0.999531	1	0.99934
C73	DIXON MUNICIPAL-CHARLES R. WALGREEN	IL	LPV	1	0.99934	1	0.99934
DPA	DUPAGE	IL	LPV200	1	0.999344	1	0.99934
PIA	GENERAL DOWNING - PEORIA INTL	IL	LPV	2	0.999485	1	0.99934
IKK	GREATER KANKAKEE	IL	LPV	2	0.999538	1	0.99934
HSB	HARRISBURG-RALEIGH	IL	LPV	1	0.99987	1	0.999813
IGQ	LANSING MUNICIPAL	IL	LPV	2	0.999573	1	0.99934
LOT	LEWIS UNIVERSITY	IL	LPV200	2	0.999481	1	0.99934
3LF	LITCHFIELD MUNICIPAL	IL	LPV	3	0.999744	1	0.99934
AJG	MOUNT CARMEL MUNICIPAL	IL	LPV	1	0.999809	1	0.99955
3MY	MOUNT HAWLEY AUXILIARY	IL	LPV	2	0.999485	1	0.99934
I63	MOUNT STERLING MUNICIPAL	IL	LPV	2	0.999569	1	0.99934
MVN	MOUNT VERNON	IL	LPV	1	0.999836	1	0.999534
C15	PEKIN MUNICIPAL	IL	LPV	2	0.999489	1	0.99934
PNT	PONTIAC MUNICIPAL	IL	LPV	2	0.999496	1	0.99934
MLI	QUAD CITY INTL	IL	LPV	2	0.99947	1	0.99934
UIN	QUINCY RGNL-BALDWIN FIELD	IL	LPV200	2	0.999573	1	0.99934
BLV	SCOTT AFB/MIDAMERICA	IL	LPV200	2	0.99979	1	0.99934
ALN	ST LOUIS RGNL	IL	LPV	2	0.999775	1	0.99934
CMI	UNIVERSITY OF ILLINOIS-WILLARD	IL	LPV200	2	0.999542	1	0.99934
DNV	VERMILION REGIONAL	IL	LPV	1	0.999596	1	0.999378
UGN	WAUKEGAN RGNL	IL	LPV	1	0.999348	1	0.99934
SQI	WHITESIDE CO ARPT-JOS H BITTOR	IL	LPV	1	0.99934	1	0.99934
MWA	WILLIAMSON COUNTY RGNL	IL	LPV	1	0.999874	1	0.999817
AID	ANDERSON MUNICIPAL-DARLINGTON FIELD	IN	LPV	1	0.999603	1	0.999596
BAK	COLUMBUS MUNICIPAL	IN	LPV	1	0.999607	1	0.999607
GWB	DE KALB COUNTY	IN	LPV	1	0.999599	1	0.999596
MIE	DELAWARE COUNTY RGNL	IN	LPV	1	0.999615	1	0.999615
EYE	EAGLE CREEK AIRPARK	IN	LPV	1	0.999599	1	0.99958
EKM	ELKHART MUNICIPAL	IN	LPV	1	0.999596	1	0.999523

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
EVV	EVANSVILLE RGNL	IN	LPV200	1	0.999897	1	0.999779
FWA	FORT WAYNE INTL	IN	LPV200	1	0.999618	1	0.999599
SER	FREEMAN MUNICIPAL	IN	LPV	1	0.99992	1	0.999741
FRH	FRENCH LICK MUNICIPAL	IN	LPV	1	0.999931	1	0.999596
RCR	FULTON COUNTY	IN	LPV	1	0.999596	1	0.999523
GSH	GOSHEN MUNICIPAL	IN	LPV	1	0.999596	1	0.999523
HFY	GREENWOOD MUNICIPAL	IN	LPV	1	0.999599	1	0.999599
HNB	HUNTINGBURG	IN	LPV	1	0.999947	1	0.999596
TYQ	INDIANAPOLIS EXECUTIVE	IN	LPV	1	0.999599	1	0.999557
IND	INDIANAPOLIS INTL	IN	LPV	1	0.999599	1	0.999592
OKK	KOKOMO MUNICIPAL	IN	LPV	1	0.999596	1	0.999523
GGP	LOGANSPORT/CASS COUNTY	IN	LPV	1	0.999596	1	0.999523
IMS	MADISON MUNICIPAL	IN	LPV	1	0.999924	1	0.999741
MZZ	MARION MUNICIPAL	IN	LPV	1	0.999599	1	0.999569
CEV	METTEL FIELD	IN	LPV	1	0.999741	1	0.999741
BMG	MONROE COUNTY	IN	LPV200	1	0.999607	1	0.999596
MQJ	MOUNT COMFORT	IN	LPV	1	0.999599	1	0.999596
OVO	NORTH VERNON	IN	LPV	1	0.99992	1	0.999741
VPZ	PORTER COUNTY MUNICIPAL	IN	LPV	1	0.999596	1	0.999477
LAF	PURDUE UNIVERSITY	IN	LPV	1	0.999596	1	0.999489
4I7	PUTNAM COUNTY	IN	LPV	1	0.999599	1	0.99955
I22	RANDOLPH COUNTY	IN	LPV	1	0.999741	1	0.999702
RID	RICHMOND MUNICIPAL	IN	LPV200	2	0.999866	1	0.999741
GEZ	SHELBYVILLE MUNICIPAL	IN	LPV	1	0.999603	1	0.999603
SMD	SMITH FIELD	IN	LPV	1	0.999599	1	0.999592
SBN	SOUTH BEND RGNL	IN	LPV	1	0.999596	1	0.999523
OXI	STARKE COUNTY	IN	LPV	1	0.999596	1	0.999523
HUF	TERRE HAUTE INTL-HULMAN FIELD	IN	LPV	1	0.999596	1	0.999477
ASW	WARSAW MUNICIPAL	IN	LPV	1	0.999596	1	0.999523
PTS	ATKINSON MUNICIPAL	KS	LPV	0	1	3	0.99987
ADT	ATWOOD-RAWLINS COUNTY CITY-COU	KS	LPV	1	0.999618	2	0.999534
AAO	COLONEL JAMES JABARA	KS	LPV	0	1	3	0.999802
DDC	DODGE CITY RGNL	KS	LPV	0	1	1	0.999779
EHA	ELKHART-MORTON COUNTY	KS	LPV	0	1	1	0.999973
EMP	EMPORIA MUNICIPAL	KS	LPV	1	0.999935	2	0.9995
FOE	FORBES FIELD	KS	LPV	3	0.999752	2	0.999374
FSK	FORT SCOTT MUNICIPAL	KS	LPV	1	0.999992	3	0.999756
GCK	GARDEN CITY RGNL	KS	LPV	1	0.999912	1	0.999691
GBD	GREAT BEND MUNICIPAL	KS	LPV200	1	0.999924	2	0.99966
HYS	HAYS RGNL	KS	LPV200	1	0.999653	2	0.999554
HQG	HUGOTON MUNICIPAL	KS	LPV	0	1	1	0.999866
HUT	HUTCHINSON MUNICIPAL	KS	LPV	1	0.999958	3	0.999664
IDP	INDEPENDENCE MUNICIPAL	KS	LPV	0	1	3	0.999905
OJC	JOHNSON COUNTY EXECUTIVE	KS	LPV	2	0.999645	2	0.999374
LWC	LAWRENCE MUNICIPAL	KS	LPV200	2	0.999638	2	0.999374
LBL	LIBERAL MID-AMERICA RGNL	KS	LPV	1	0.999992	1	0.99987
MHK	MANHATTAN RGNL	KS	LPV200	2	0.999634	2	0.999332
MYZ	MARYSVILLE MUNICIPAL	KS	LPV	1	0.999473	2	0.999317
MPR	MC PHERSON	KS	LPV	1	0.999928	2	0.999458
IXD	NEW CENTURY AIRCENTER	KS	LPV	2	0.999645	2	0.999374
EWK	NEWTON-CITY-COUNTY	KS	LPV	1	0.999935	2	0.999477
NRN	NORTON MUNICIPAL	KS	LPV	1	0.999588	3	0.999332

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
OEL	OAKLEY MUNICIPAL	KS	LPV	1	0.999634	1	0.999557
PTT	PRATT RGNL	KS	LPV	0	1	2	0.999813
GLD	RENNER FLD /GOODLAND MUNICIPAL/	KS	LPV200	1	0.999634	1	0.999557
RSL	RUSSELL MUNICIPAL	KS	LPV	1	0.999653	2	0.999428
SLN	SALINA MUNICIPAL	KS	LPV	1	0.999813	2	0.999443
TQK	SCOTT CITY MUNICIPAL	KS	LPV	1	0.999748	1	0.999596
CBK	SHALZ FIELD	KS	LPV	1	0.999626	2	0.999554
3K3	SYRACUSE-HAMILTON COUNTY MUNICIPAL	KS	LPV	1	0.999996	1	0.999756
PPF	TRI-CITY	KS	LPV	0	1	3	0.999882
ULS	ULYSSES	KS	LPV	0	1	1	0.999775
EGT	WELLINGTON MUNICIPAL	KS	LPV	0	1	3	0.999866
ICT	WICHITA MID-CONTINENT	KS	LPV200	0	1	3	0.999817
EKX	ADDINGTON FIELD	KY	LPV	1	0.999992	1	0.999924
PAH	BARKLEY RGNL	KY	LPV	1	0.999996	1	0.99984
K22	BIG SANDY RGNL	KY	LPV	0	1	1	0.999889
LEX	BLUE GRASS	KY	LPV	1	0.999989	1	0.999889
BWG	BOWLING GREEN-WARREN COUNTY RG	KY	LPV	0	1	1	0.999943
LOU	BOWMAN FIELD	KY	LPV	1	0.999935	2	0.999866
CVG	CINCINNATI/NORTHERN KENTUCKY I	KY	LPV200	1	0.999924	1	0.999741
FGX	FLEMING-MASON	KY	LPV	1	0.999947	1	0.999741
27K	GEORGETOWN SCOTT COUNTY - MARS	KY	LPV200	1	0.999962	2	0.999878
GLW	GLASGOW MUNICIPAL	KY	LPV	0	1	1	0.999931
EHR	HENDERSON CITY-COUNTY	KY	LPV	1	0.999985	1	0.999817
SME	LAKE CUMBERLAND RGNL	KY	LPV	0	1	1	0.999897
LOZ	LONDON-CORBIN ARPT-MAGEE FLD	KY	LPV	0	1	1	0.999886
SDF	LOUISVILLE INTL-STANDIFORD FIE	KY	LPV200	1	0.99995	2	0.999874
I39	MADISON	KY	LPV	0	1	1	0.999886
2I0	MADISONVILLE MUNICIPAL	KY	LPV	1	0.999992	1	0.999817
M97	MOREHEAD-ROWAN COUNTY CLYDE A.	KY	LPV	1	0.999989	1	0.999866
OWB	OWENSBORO-DAVIESS COUNTY	KY	LPV200	1	0.999989	1	0.999805
BRY	SAMUELS FIELD	KY	LPV	1	0.999992	1	0.999912
DVK	STUART POWELL FIELD	KY	LPV	0	1	1	0.999897
TWT	STURGIS MUNICIPAL	KY	LPV	1	0.999989	1	0.999817
TZV	TOMPKINSVILLE-MONROE COUNTY	KY	LPV	0	1	1	0.999928
W38	WILLIAMSBURG-WHITLEY COUNTY	KY	LPV	0	1	1	0.999889
ARA	ACADIANA RGNL	LA	LPV	0	1	0	1
AEX	ALEXANDRIA INTL	LA	LPV200	0	1	0	1
ACP	ALLEN PARISH	LA	LPV	0	1	0	1
BTR	BATON ROUGE METROPOLITAN` RYAN	LA	LPV200	0	1	0	1
CWF	CHENNAULT INTL	LA	LPV200	0	1	0	1
ESF	ESLER RGNL	LA	LPV200	0	1	0	1
HZR	FALSE RIVER RGNL	LA	LPV	0	1	0	1
BXA	GEORGE R CARR MEMORIAL AIR FLD	LA	LPV	0	1	0	1
HDC	HAMMOND NORTHSHORE RGNL	LA	LPV200	0	1	0	1
3R4	HART	LA	LPV	0	1	0	1
HUM	HOUMA-TERREBONNE	LA	LPV200	0	1	0	1
M79	JOHN H HOOKS JR MEMORIAL	LA	LPV	0	1	0	1
LFT	LAFAYETTE RGNL	LA	LPV	0	1	0	1
LCH	LAKE CHARLES RGNL	LA	LPV	0	1	0	1
NEW	LAKEFRONT	LA	LPV	0	1	0	1
MSY	LOUIS ARMSTRONG NEW ORLEANS IN	LA	LPV200	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
MLU	MONROE RGNL	LA	LPV200	0	1	0	1
BQP	MOREHOUSE MEMORIAL	LA	LPV	0	1	0	1
IER	NATCHITOCHES RGNL	LA	LPV	0	1	0	1
DTN	SHREVEPORT DOWNTOWN	LA	LPV	0	1	0	1
SHV	SHREVEPORT RGNL	LA	LPV200	0	1	0	1
GAO	SOUTH LAFOURCHE LEONARD MILLER	LA	LPV	0	1	0	1
UXL	SOUTHLAND FIELD	LA	LPV	0	1	0	1
1L0	ST JOHN THE BAPTIST PARISH	LA	LPV	0	1	0	1
TVR	VICKSBURG TALLULAH RGNL	LA	LPV	0	1	0	1
BAF	BARNES MUNICIPAL	MA	LPV	0	1	1	0.999985
HYA	BARNSTABLE MUNICIPAL-BOARDMAN/POLAN	MA	LPV200	0	1	1	0.99995
BED	LAURENCE G HANSCOM FLD	MA	LPV200	0	1	1	0.999996
MVY	MARTHAS VINEYARD	MA	LPV200	0	1	1	0.999939
ACK	NANTUCKET MEMORIAL	MA	LPV200	0	1	1	0.999912
OWD	NORWOOD MEMORIAL	MA	LPV	0	1	1	0.999939
3B0	SOUTHBRIDGE MUNICIPAL	MA	LPV	0	1	1	0.999989
ORH	WORCESTER RGNL	MA	LPV	0	1	1	0.999989
BWI	BALTIMORE/WASHINGTON INTL THUR	MD	LPV200	0	1	0	1
DMW	CARROLL COUNTY RGNL/JACK B POA	MD	LPV200	0	1	0	1
ESN	EASTON/NEWNAM FIELD	MD	LPV200	0	1	1	0.999992
FDK	FREDERICK MUNICIPAL	MD	LPV	0	1	0	1
HGR	HAGERSTOWN RGNL-RICHARD A HENS	MD	LPV200	0	1	0	1
MTN	MARTIN STATE	MD	LPV	0	1	0	1
GAI	MONTGOMERY COUNTY AIRPARK	MD	LPV	0	1	2	0.999985
OXB	OCEAN CITY MUNICIPAL	MD	LPV	0	1	2	0.999939
SBY	SALISBURY-OCEAN CITY WICOMICO	MD	LPV200	0	1	2	0.999954
2W6	ST. MARY'S COUNTY RGNL	MD	LPV	0	1	6	0.999699
LEW	AUBURN/LEWISTON MUNICIPAL	ME	LPV200	0	1	2	0.999969
AUG	AUGUSTA STATE	ME	LPV	0	1	3	0.999935
BGR	BANGOR INTL	ME	LPV	0	1	2	0.999889
BHB	HANCOCK COUNTY-BAR HARBOR	ME	LPV200	0	1	2	0.99992
RKD	KNOX COUNTY RGNL	ME	LPV	0	1	3	0.999973
FVE	NORTHERN AROOSTOOK RGNL	ME	LPV	1	0.999947	1	0.999485
PQI	NORTHERN MAINE RGNL ARPT AT PR	ME	LPV200	0	1	1	0.999493
PWM	PORTLAND INTL JETPORT	ME	LPV	0	1	1	0.999969
WVL	WATERVILLE ROBERT LAFLEUR	ME	LPV200	0	1	3	0.999905
APN	ALPENA COUNTY RGNL	MI	LPV200	1	0.999596	1	0.99934
ARB	ANN ARBOR MUNICIPAL	MI	LPV	1	0.999744	1	0.999596
ACB	ANTRIM COUNTY	MI	LPV	1	0.999523	1	0.99934
FNT	BISHOP INTL	MI	LPV200	1	0.999618	1	0.999596
OEB	BRANCH COUNTY MEMORIAL	MI	LPV	1	0.999596	1	0.999557
LAN	CAPITAL REGION INTL	MI	LPV200	1	0.999615	1	0.999596
CVX	CHARLEVOIX MUNICIPAL	MI	LPV	1	0.999519	1	0.999336
TVC	CHERRY CAPITAL	MI	LPV	1	0.999515	1	0.999332
CIU	CHIPPEWA COUNTY INTL	MI	LPV	1	0.999451	1	0.999214
DET	COLEMAN A. YOUNG MUNICIPAL	MI	LPV	1	0.999679	1	0.999596
TTF	CUSTER	MI	LPV	1	0.999756	1	0.999596
ESC	DELTA COUNTY	MI	LPV200	1	0.999351	2	0.999206
DTW	DETROIT METROPOLITAN WAYNE COU	MI	LPV	1	0.999752	1	0.999596
IMT	FORD	MI	LPV	2	0.999283	1	0.998985
FFX	FREMONT MUNICIPAL	MI	LPV	1	0.999569	1	0.999412

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
GRR	GERALD R. FORD INTL	MI	LPV200	1	0.999596	1	0.999523
IWD	GOGEBIC-IRON COUNTY	MI	LPV200	1	0.999019	2	0.998802
CMX	HOUGHTON COUNTY MEMORIAL	MI	LPV	1	0.999031	1	0.998684
BAX	HURON COUNTY MEMORIAL	MI	LPV	1	0.999668	1	0.999596
IKW	JACK BARSTOW	MI	LPV	1	0.999596	1	0.999523
JXN	JACKSON COUNTY-REYNOLDS FIELD	MI	LPV200	1	0.999596	1	0.999596
AZO	KALAMAZOO/BATTLE CREEK INTL	MI	LPV	1	0.999596	1	0.999523
IRS	KIRSCH MUNICIPAL	MI	LPV	1	0.999596	1	0.999523
ADG	LENAWEE COUNTY	MI	LPV	1	0.999653	1	0.999596
OZW	LIVINGSTON COUNTY SPENCER J. H	MI	LPV	1	0.999599	1	0.999596
ERY	LUCE COUNTY	MI	LPV	1	0.999378	1	0.999214
LDM	MASON COUNTY	MI	LPV	1	0.999493	1	0.999382
MBS	MBS INTL	MI	LPV200	1	0.999596	1	0.999523
MNM	MENOMINEE-MARINETTE TWIN COUNT	MI	LPV200	1	0.999454	2	0.999267
MOP	MOUNT PLEASANT MUNICIPAL	MI	LPV	1	0.999596	1	0.999523
MKG	MUSKEGON COUNTY	MI	LPV200	1	0.999569	1	0.999412
PTK	OAKLAND COUNTY INTL	MI	LPV200	1	0.999687	1	0.999596
OSC	OSCODA-WURTSMITH	MI	LPV200	1	0.999611	1	0.999523
RNP	OWOSSO COMMUNITY	MI	LPV	1	0.999603	1	0.999596
PLN	PELLSTON RGNL AIRPORT OF EMMET	MI	LPV200	1	0.999523	1	0.99934
HYX	SAGINAW COUNTY H.W. BROWNE	MI	LPV	1	0.999603	1	0.999596
SAW	SAWYER INTL	MI	LPV200	2	0.999309	1	0.999012
BEH	SOUTHWEST MICHIGAN RGNL	MI	LPV	2	0.999592	1	0.999412
BIV	TULIP CITY	MI	LPV	1	0.999592	1	0.999412
BTL	W K KELLOGG	MI	LPV	1	0.999596	1	0.999523
CAD	WEXFORD COUNTY	MI	LPV200	1	0.999523	1	0.999523
YIP	WILLOW RUN	MI	LPV	1	0.999748	1	0.999596
LVN	AIRLAKE	MN	LPV	1	0.999596	1	0.999267
AEL	ALBERT LEA MUNICIPAL	MN	LPV	1	0.999634	2	0.999374
ANE	ANOKA COUNTY-BLAINE ARPT(JANES	MN	LPV	2	0.999302	2	0.999153
AUM	AUSTIN MUNICIPAL	MN	LPV	1	0.999596	3	0.999355
BDE	BAUDETTE INTL	MN	LPV	1	0.998756	1	0.998607
BJI	BEMIDJI RGNL	MN	LPV200	1	0.998756	1	0.998607
BBB	BENSON MUNICIPAL	MN	LPV	1	0.999214	2	0.998962
BRD	BRAINERD LAKES RGNL	MN	LPV200	2	0.999061	1	0.998756
AXN	CHANDLER FIELD	MN	LPV	1	0.999203	2	0.998928
CKN	CROOKSTON MUNICIPAL KIRKWOOD FLD	MN	LPV	1	0.998756	1	0.998607
DTL	DETROIT LAKES-WETHING FIELD	MN	LPV	2	0.998916	1	0.998607
DLH	DULUTH INTL	MN	LPV200	1	0.999016	1	0.998756
FRM	FAIRMONT MUNICIPAL	MN	LPV	1	0.999634	1	0.999378
INL	FALLS INTL	MN	LPV	1	0.998756	1	0.998687
FFM	FERGUS FALLS MUNICIPAL-EINAR MICKEL	MN	LPV200	1	0.999191	2	0.998783
FCM	FLYING CLOUD	MN	LPV200	2	0.999527	2	0.999164
GPZ	GRAND RAPIDS/ITASCA CO-GORDON	MN	LPV200	1	0.998928	1	0.998726
LJF	LITCHFIELD MUNICIPAL	MN	LPV	1	0.999271	2	0.999157
MKT	MANKATO RGNL	MN	LPV200	1	0.999626	1	0.999523
MSP	MINNEAPOLIS-ST PAUL INTL/WOLD-	MN	LPV	2	0.999527	3	0.999279
CNB	MYERS FIELD	MN	LPV	1	0.99926	1	0.999065
LYV	QUENTIN AANENSON FIELD	MN	LPV200	1	0.999409	1	0.999313
RGK	RED WING RGNL	MN	LPV	1	0.999592	2	0.999286

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
RWF	REDWOOD FALLS MUNICIPAL	MN	LPV	1	0.999542	1	0.999229
RST	ROCHESTER INTL	MN	LPV	1	0.999596	4	0.999431
ROX	ROSEAU MUNICIPAL/RUDY BILLBERG FIEL	MN	LPV	1	0.998642	1	0.998607
ROS	RUSH CITY RGNL	MN	LPV	2	0.999252	1	0.998962
MML	SOUTHWEST MINNESOTA RGNL MARSH	MN	LPV	1	0.999397	1	0.999229
STC	ST CLOUD RGNL	MN	LPV200	2	0.999264	2	0.999092
STP	ST PAUL DOWNTOWN HOLMAN FLD	MN	LPV	2	0.999523	3	0.999279
TVF	THIEF RIVER FALLS RGNL	MN	LPV	1	0.998756	1	0.998607
RRT	WARROAD INTL MEMORIAL	MN	LPV	1	0.998638	1	0.998607
BDH	WILLMAR MUNICIPAL-JOHN L RICE FIELD	MN	LPV	1	0.999279	2	0.999115
M17	BOLIVAR MUNICIPAL	MO	LPV	1	0.999958	2	0.999798
BBG	BRANSON	MO	LPV200	1	0.999985	1	0.999882
H21	CAMDENTON MEMORIAL	MO	LPV	1	0.999931	2	0.999821
EZZ	CAMERON MEMORIAL	MO	LPV	1	0.999378	2	0.999374
CGI	CAPE GIRARDEAU RGNL	MO	LPV	1	0.999897	1	0.99984
M05	CARUTHERSVILLE MEMORIAL	MO	LPV	0	1	1	0.999893
MKC	CHARLES B. WHEELER DOWNTOWN	MO	LPV	2	0.999638	2	0.999374
CHT	CHILLICOTHE MUNICIPAL	MO	LPV	2	0.999534	2	0.999374
COU	COLUMBIA RGNL	MO	LPV	1	0.999794	2	0.999557
EIW	COUNTY MEMORIAL	MO	LPV	0	1	1	0.999882
1H0	CREVE COEUR	MO	LPV	2	0.999786	1	0.99934
UBX	CUBA MUNICIPAL	MO	LPV	1	0.999893	1	0.999718
DXE	DEXTER MUNICIPAL	MO	LPV	1	0.999973	1	0.999859
FTT	ELTON HENSLEY MEMORIAL	MO	LPV	1	0.99979	2	0.999565
FAM	FARMINGTON RGNL	MO	LPV	1	0.999893	1	0.999824
K57	GOULD PETERSON MUNICIPAL	MO	LPV	1	0.999378	2	0.999374
HAE	HANNIBAL RGNL	MO	LPV	1	0.999596	1	0.99934
HIG	HIGGINSVILLE INDUSTRIAL MUNICIPAL	MO	LPV	2	0.999645	2	0.999374
JEF	JEFFERSON CITY MEMORIAL	MO	LPV	1	0.999802	2	0.999565
VER	JESSE VIERTEL MEMORIAL	MO	LPV	1	0.99979	2	0.999527
JLN	JOPLIN RGNL	MO	LPV	0	1	3	0.999916
MCI	KANSAS CITY INTL	MO	LPV	2	0.999515	2	0.999374
IRK	KIRKSVILLE RGNL	MO	LPV200	1	0.999596	2	0.999546
STL	LAMBERT-ST LOUIS INTL	MO	LPV	2	0.999786	1	0.99934
LRY	LAWRENCE SMITH MEMORIAL	MO	LPV	2	0.999744	2	0.999374
AIZ	LEE C FINE MEMORIAL	MO	LPV	1	0.99992	2	0.999725
LXT	LEE'S SUMMIT MUNICIPAL	MO	LPV	2	0.999645	2	0.999374
6M6	LEWIS COUNTY RGNL	MO	LPV	1	0.999596	1	0.99934
PLK	M. GRAHAM CLARK - TANEY COUNTY	MO	LPV200	1	0.999985	1	0.999878
MAW	MALDEN RGNL	MO	LPV	0	1	1	0.999893
MHL	MARSHALL MEMORIAL MUNICIPAL	MO	LPV	2	0.999653	1	0.999378
MYJ	MEXICO MEMORIAL	MO	LPV	2	0.999771	2	0.999321
GPH	MIDWEST NATIONAL AIR CENTER	MO	LPV	2	0.999515	2	0.999374
HFJ	MONETT MUNICIPAL	MO	LPV	1	0.999996	1	0.999866
EOS	NEOSHO HUGH ROBINSON	MO	LPV	0	1	1	0.999973
NVD	NEVADA MUNICIPAL	MO	LPV200	1	0.999973	3	0.999748
MO8	NORTH CENTRAL MISSOURI RGNL	MO	LPV	2	0.999573	1	0.999378
EVU	NORTHWEST MISSOURI RGNL	MO	LPV	1	0.999378	2	0.999374
K02	PERRYVILLE MUNICIPAL	MO	LPV	1	0.999878	1	0.999821

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
POF	POPLAR BLUFF MUNICIPAL	MO	LPV	1	0.999931	1	0.999859
VIH	ROLLA NATIONAL	MO	LPV200	1	0.999897	1	0.99971
STJ	ROSECRANS MEMORIAL	MO	LPV200	1	0.999378	2	0.999374
DMO	SEDALIA MEMORIAL	MO	LPV	2	0.999737	1	0.999378
SIK	SIKESTON MEMORIAL MUNICIPAL	MO	LPV	1	0.999966	1	0.999851
RCM	SKYHAVEN	MO	LPV	2	0.999733	2	0.999374
SUS	SPIRIT OF ST LOUIS	MO	LPV200	1	0.999794	1	0.99934
SGF	SPRINGFIELD-BRANSON NATIONAL	MO	LPV	1	0.999969	2	0.999844
UUV	SULLIVAN RGNL	MO	LPV	1	0.999817	1	0.999679
8WC	WASHINGTON COUNTY	MO	LPV	1	0.999886	1	0.999809
FYG	WASHINGTON RGNL	MO	LPV	1	0.999798	1	0.99934
TBN	WAYNESVILLE-ST. ROBERT RGNL FO	MO	LPV	1	0.99992	1	0.999832
UNO	WEST PLAINS RGNL	MO	LPV	1	0.999939	1	0.999863
STF	GEORGE M BRYAN	MS	LPV200	0	1	0	1
GTR	GOLDEN TRIANGLE RGNL	MS	LPV	0	1	0	1
GWO	GREENWOOD-LEFLORE	MS	LPV	0	1	0	1
GNF	GRENADA MUNICIPAL	MS	LPV	0	1	0	1
GPT	GULFPORT-BILOXI INTL	MS	LPV200	0	1	0	1
HEZ	HARDY-ANDERS FIELD NATCHEZ-ADA	MS	LPV	0	1	0	1
HBG	HATTIESBURG BOBBY L CHAIN MUNICIPAL	MS	LPV200	0	1	0	1
PIB	HATTIESBURG-LAUREL RGNL	MS	LPV200	0	1	0	1
HKS	HAWKINS FIELD	MS	LPV200	0	1	0	1
LUL	HESLER-NOBLE FIELD	MS	LPV	0	1	0	1
IDL	INDIANOLA MUNICIPAL	MS	LPV	0	1	0	1
JAN	JACKSON-EVERS INTL	MS	LPV200	0	1	0	1
M16	JOHN BELL WILLIAMS	MS	LPV	0	1	0	1
MEI	KEY FIELD	MS	LPV200	0	1	0	1
MCB	MC COMB/PIKE COUNTY/JOHN E LEW	MS	LPV	0	1	0	1
GLH	MID DELTA RGNL	MS	LPV200	0	1	0	1
M40	MONROE COUNTY	MS	LPV	0	1	0	1
OLV	OLIVE BRANCH	MS	LPV	0	1	0	1
MPE	PHILADELPHIA MUNICIPAL	MS	LPV	0	1	0	1
MJD	PICAYUNE MUNICIPAL	MS	LPV	0	1	0	1
M43	PRENTISS-JEFFERSON DAVIS COUNT	MS	LPV	0	1	0	1
CRX	ROSCOE TURNER	MS	LPV200	0	1	0	1
HSA	STENNIS INTL	MS	LPV	0	1	0	1
PQL	TRENT LOTT INTL	MS	LPV200	0	1	0	1
UTA	TUNICA MUNICIPAL	MS	LPV200	0	1	0	1
TUP	TUPELO RGNL	MS	LPV200	0	1	0	1
UOX	UNIVERSITY-OXFORD	MS	LPV	0	1	0	1
BTM	BERT MOONEY	MT	LPV	2	0.999866	1	0.999321
BIL	BILLINGS LOGAN INTL	MT	LPV	1	0.999412	1	0.999107
MLS	FRANK WILEY FIELD	MT	LPV	1	0.999306	1	0.999119
BZN	GALLATIN FIELD	MT	LPV	1	0.999561	1	0.999336
GPI	GLACIER PARK INTL	MT	LPV	1	0.999672	1	0.999451
GTF	GREAT FALLS INTL	MT	LPV	1	0.999561	1	0.999367
HVR	HAVRE CITY-COUNTY	MT	LPV	1	0.999424	1	0.999409
HLN	HELENA RGNL	MT	LPV	1	0.999599	1	0.999367
LWT	LEWISTOWN MUNICIPAL	MT	LPV	1	0.999561	1	0.99913
MSO	MISSOULA INTL	MT	LPV	2	0.999824	1	0.999485
7S0	RONAN	MT	LPV	2	0.999798	1	0.999435

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
SDY	SIDNEY-RICHLAND MUNICIPAL	MT	LPV	1	0.99905	1	0.999046
WYS	YELLOWSTONE	MT	LPV200	1	0.999611	1	0.999359
OAJ	ALBERT J ELLIS	NC	LPV	0	1	4	0.99984
AFP	ANSON COUNTY -JEFF CLOUD FIE	NC	LPV	0	1	0	1
AVL	ASHEVILLE RGNL	NC	LPV	0	1	0	1
BUY	BURLINGTON-ALAMANCE RGNL	NC	LPV200	0	1	0	1
SUT	CAPE FEAR RGNL JETPORT/HOWIE F	NC	LPV	0	1	4	0.999893
CLT	CHARLOTTE/DOUGLAS INTL	NC	LPV200	0	1	0	1
EQY	CHARLOTTE-MONROE EXECUTIVE	NC	LPV	0	1	0	1
EWN	COASTAL CAROLINA REGIONAL	NC	LPV	0	1	6	0.99979
JQF	CONCORD RGNL	NC	LPV	0	1	0	1
ONX	CURRITUCK COUNTY RGNL	NC	LPV	0	1	9	0.9995
EYF	CURTIS L BROWN JR FIELD	NC	LPV200	0	1	3	0.999943
ECG	ELIZABETH CITY CG AIR STATION/	NC	LPV	0	1	8	0.999561
FAY	FAYETTEVILLE RGNL/GRANNIS FIEL	NC	LPV	0	1	1	0.999992
AKH	GASTONIA MUNICIPAL	NC	LPV	0	1	0	1
GWW	GOLDSBORO-WAYNE MUNICIPAL	NC	LPV	0	1	3	0.99987
HRJ	HARNETT RGNL JETPORT	NC	LPV	0	1	2	0.999977
HNZ	HENDERSON-OXFORD	NC	LPV	0	1	2	0.999958
JNX	JOHNSTON COUNTY	NC	LPV200	0	1	3	0.99992
ISO	KINSTON RGNL JETPORT AT STALLI	NC	LPV	0	1	4	0.99979
IPJ	LINCOLNTON-LINCOLN COUNTY RGNL	NC	LPV	0	1	0	1
MRH	MICHAEL J. SMITH FIELD	NC	LPV	0	1	7	0.999786
MWK	MOUNT AIRY/SURRY COUNTY	NC	LPV	0	1	0	1
EDE	NORTHEASTERN RGNL	NC	LPV	0	1	8	0.999638
TDF	PERSON COUNTY	NC	LPV200	0	1	0	1
GSO	PIEDMONT TRIAD INTL	NC	LPV200	0	1	0	1
PGV	PITT-GREENVILLE	NC	LPV	0	1	4	0.999775
RDU	RALEIGH-DURHAM INTL	NC	LPV200	0	1	2	0.999969
RCZ	RICHMOND COUNTY	NC	LPV	0	1	0	1
RWI	ROCKY MOUNT-WILSON RGNL	NC	LPV200	0	1	3	0.999851
FQD	RUTHERFORD CO - MARCHMAN FIELD	NC	LPV	0	1	0	1
INT	SMITH REYNOLDS	NC	LPV200	0	1	0	1
VUJ	STANLY COUNTY	NC	LPV200	0	1	0	1
SVH	STATESVILLE RGNL	NC	LPV	0	1	0	1
LHZ	TRIANGLE NORTH EXECUTIVE	NC	LPV	0	1	2	0.999935
OCW	WARREN FIELD	NC	LPV	0	1	6	0.999744
ILM	WILMINGTON INTL	NC	LPV	0	1	4	0.999863
BAC	BARNES COUNTY MUNICIPAL	ND	LPV	1	0.999019	2	0.99876
BIS	BISMARCK MUNICIPAL	ND	LPV	1	0.99905	1	0.999012
D09	BOTTINEAU MUNICIPAL	ND	LPV	1	0.999012	1	0.998974
5N8	CASSELTON ROBERT MILLER RGNL	ND	LPV	1	0.999023	1	0.998607
DVL	DEVILS LAKE RGNL	ND	LPV	1	0.999012	1	0.998607
DIK	DICKINSON - THEODORE ROOSEVELT	ND	LPV200	1	0.99905	1	0.999012
GFK	GRAND FORKS INTL	ND	LPV	1	0.998798	1	0.998607
GWR	GWINNER-ROGER MELROE FIELD	ND	LPV200	1	0.999077	2	0.998985
5H4	HARVEY MUNICIPAL	ND	LPV	1	0.999012	1	0.999012
FAR	HECTOR INTL	ND	LPV200	2	0.998993	1	0.998607
GAF	HUTSON FIELD	ND	LPV	1	0.998726	1	0.998607
JMS	JAMESTOWN RGNL	ND	LPV200	1	0.999031	2	0.99879
HZE	MERCER COUNTY RGNL	ND	LPV	1	0.99905	1	0.999012
MOT	MINOT INTL	ND	LPV	1	0.999019	1	0.999012

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
D55	ROBERTSON FIELD	ND	LPV	1	0.999012	1	0.998607
ISN	SLOULIN FLD INTL	ND	LPV200	1	0.99905	1	0.999012
S25	WATFORD CITY MUNICIPAL	ND	LPV	1	0.99905	1	0.999012
ANW	AINSWORTH RGNL	NE	LPV200	1	0.999279	1	0.99908
BVN	ALBION MUNICIPAL	NE	LPV	1	0.999325	2	0.999286
AIA	ALLIANCE MUNICIPAL	NE	LPV200	1	0.999634	1	0.999073
4V9	ANTELOPE COUNTY	NE	LPV	1	0.999317	2	0.999241
AUH	AURORA MUNICIPAL - AL POTTER FIELD	NE	LPV	1	0.999359	2	0.999298
BIE	BEATRICE MUNICIPAL	NE	LPV	1	0.999466	2	0.999306
FNB	BRENNER FIELD	NE	LPV	1	0.999378	2	0.999374
HDE	BREWSTER FIELD	NE	LPV	1	0.999576	2	0.999336
BBW	BROKEN BOW MUNICIPAL	NE	LPV	1	0.99934	2	0.999256
GRI	CENTRAL NEBRASKA RGNL	NE	LPV	1	0.999351	2	0.999298
CDR	CHADRON MUNICIPAL	NE	LPV	2	0.999527	1	0.999058
OLU	COLUMBUS MUNICIPAL	NE	LPV	1	0.999344	3	0.999252
CZD	COZAD MUNICIPAL	NE	LPV	1	0.999565	1	0.999328
CEK	CRETE MUNICIPAL	NE	LPV	1	0.999382	2	0.999298
93Y	DAVID CITY MUNICIPAL	NE	LPV	1	0.999359	3	0.999283
OMA	EPPLEY AIRFIELD	NE	LPV	1	0.999451	2	0.999374
ODX	EVELYN SHARP FIELD	NE	LPV	1	0.999321	2	0.999237
FBY	FAIRBURY MUNICIPAL	NE	LPV	1	0.999466	2	0.999309
FMZ	FAIRMONT STATE AIRFIELD	NE	LPV	1	0.999378	2	0.999271
FET	FREMONT MUNICIPAL	NE	LPV	1	0.999447	2	0.999283
OKS	GARDEN COUNTY	NE	LPV	1	0.999634	3	0.999275
GRN	GORDON MUNICIPAL	NE	LPV	1	0.999355	1	0.999065
GGF	GRANT MUNICIPAL	NE	LPV	1	0.999599	2	0.99926
HSI	HASTINGS MUNICIPAL	NE	LPV	2	0.999489	2	0.999298
IML	IMPERIAL MUNICIPAL	NE	LPV	1	0.999599	2	0.999279
LXN	JIM KELLY FIELD	NE	LPV	1	0.999569	1	0.999332
EAR	KEARNEY RGNL	NE	LPV	2	0.999561	1	0.999336
IBM	KIMBALL MUNICIPAL/ROBERT E ARRAJ FI	NE	LPV	1	0.999634	1	0.999302
LNK	LINCOLN	NE	LPV	1	0.999386	2	0.999294
MCK	MC COOK BEN NELSON RGNL	NE	LPV	1	0.999576	2	0.999298
MLE	MILLARD	NE	LPV	1	0.999451	2	0.999374
VTN	MILLER FIELD	NE	LPV	1	0.999267	1	0.999073
9V5	MODISETT	NE	LPV	1	0.999359	1	0.999065
AFK	NEBRASKA CITY MUNICIPAL	NE	LPV	1	0.999462	2	0.999374
OFK	NORFOLK RGNL/KARL STEFAN MEMOR	NE	LPV	1	0.999325	1	0.999271
LBF	NORTH PLATTE RGNL AIRPORT LEE	NE	LPV	2	0.999538	3	0.999248
0V3	PIONEER VILLAGE FIELD	NE	LPV	1	0.99958	2	0.999336
PMV	PLATTSMOUTH MUNICIPAL	NE	LPV	1	0.999458	2	0.999374
RBE	ROCK COUNTY	NE	LPV	1	0.999279	1	0.999084
OGA	SEARLE FIELD	NE	LPV	1	0.999599	2	0.999256
SWT	SEWARD MUNICIPAL	NE	LPV	1	0.99937	2	0.999294
SNY	SIDNEY MUNICIPAL/LLOYD W. CARR FIEL	NE	LPV	1	0.999634	1	0.999306
ONL	THE O'NEILL MUNICIPAL-JOHN L BAKER	NE	LPV	1	0.99929	1	0.999084
TIF	THOMAS COUNTY	NE	LPV	1	0.999328	1	0.999084
AHQ	WAHOO MUNICIPAL	NE	LPV	1	0.999378	2	0.999286

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
LCG	WAYNE MUNICIPAL	NE	LPV	1	0.999321	1	0.999267
BFF	WESTERN NEB. RGNL/WILLIAM B. H	NE	LPV	1	0.999634	2	0.999206
JYR	YORK MUNICIPAL	NE	LPV	1	0.999367	2	0.999267
ASH	BOIRE FIELD	NH	LPV	0	1	0	1
CON	CONCORD MUNICIPAL	NH	LPV	0	1	0	1
EEN	DILLANT-HOPKINS	NH	LPV	0	1	1	0.999992
LCI	LACONIA MUNICIPAL	NH	LPV	0	1	0	1
LEB	LEBANON MUNICIPAL	NH	LPV	0	1	1	0.999996
MHT	MANCHESTER	NH	LPV200	0	1	0	1
HIE	MOUNT WASHINGTON RGNL	NH	LPV	0	1	0	1
PSM	PORTSMOUTH INTL AT PEASE	NH	LPV200	0	1	1	0.999973
DAW	SKYHAVEN	NH	LPV	0	1	1	0.999977
ACY	ATLANTIC CITY INTL	NJ	LPV200	0	1	1	0.999958
WWD	CAPE MAY COUNTY	NJ	LPV	0	1	1	0.999962
MIV	MILLVILLE MUNICIPAL	NJ	LPV	0	1	0	1
EWR	NEWARK LIBERTY INTL	NJ	LPV	0	1	1	0.999992
39N	PRINCETON	NJ	LPV	0	1	0	1
TEB	TETERBORO	NJ	LPV	0	1	1	0.999985
ABQ	ALBUQUERQUE INTL SUNPORT	NM	LPV	0	1	1	0.999996
CVN	CLOVIS MUNICIPAL	NM	LPV	0	1	0	1
DMN	DEMING MUNICIPAL	NM	LPV	0	1	1	0.999996
FMN	FOUR CORNERS RGNL	NM	LPV200	0	1	1	0.999996
SVC	GRANT COUNTY	NM	LPV	0	1	3	0.999969
HOB	LEA COUNTY RGNL	NM	LPV200	0	1	1	0.999996
ROW	ROSWELL INTL AIR CENTER	NM	LPV	0	1	1	0.999996
ONM	SOCORRO MUNICIPAL	NM	LPV	0	1	1	0.999996
LAS	MC CARRAN INTL	NV	LPV	0	1	2	0.999851
RTS	RENO/STEAD	NV	LPV	1	0.999985	1	0.999741
RNO	RENO/TAHOE INTL	NV	LPV	1	0.999969	1	0.999741
WMC	WINNEMUCCA MUNICIPAL	NV	LPV	0	1	2	0.999802
9G3	AKRON	NY	LPV	1	0.999889	1	0.99958
ALB	ALBANY INTL	NY	LPV	0	1	0	1
HWV	BROOKHAVEN	NY	LPV	0	1	1	0.999973
BUF	BUFFALO NIAGARA INTL	NY	LPV	1	0.999889	1	0.999588
OLE	CATTARAUGUS COUNTY-OLEAN	NY	LPV	1	0.999931	1	0.999596
JHW	CHAUTAUQUA COUNTY/JAMESTOWN	NY	LPV200	1	0.999832	1	0.999599
1B1	COLUMBIA COUNTY	NY	LPV	0	1	1	0.999992
POU	DUTCHESS COUNTY	NY	LPV	0	1	1	0.999985
HTO	EAST HAMPTON	NY	LPV	0	1	1	0.999977
GFL	FLOYD BENNETT MEMORIAL	NY	LPV	0	1	1	0.999996
FOK	FRANCIS S GABRESKI	NY	LPV	0	1	1	0.999977
NY0	FULTON COUNTY	NY	LPV	0	1	1	0.999996
GVQ	GENESEE COUNTY	NY	LPV	1	0.999889	1	0.99958
BGM	GREATER BINGHAMTON/EDWIN A LIN	NY	LPV200	0	1	2	0.999874
ROC	GREATER ROCHESTER INTL	NY	LPV200	1	0.999889	1	0.999561
RME	GRIFFISS INTL	NY	LPV200	0	1	2	0.999851
VGC	HAMILTON MUNICIPAL	NY	LPV	0	1	2	0.999886
ITH	ITHACA TOMPKINS RGNL	NY	LPV	0	1	2	0.999771
JFK	JOHN F KENNEDY INTL	NY	LPV	0	1	1	0.999969
LGA	LA GUARDIA	NY	LPV	0	1	1	0.999973
ISP	LONG ISLAND MAC ARTHUR	NY	LPV200	0	1	1	0.999969
MSS	MASSENA INTL-RICHARDS FIELD	NY	LPV	0	1	2	0.999683

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
N66	ONEONTA MUNICIPAL	NY	LPV	0	1	1	0.999992
MGJ	ORANGE COUNTY	NY	LPV	0	1	0	1
PEO	PENN YAN	NY	LPV	1	0.999924	2	0.999683
PBG	PLATTSBURGH INTL	NY	LPV	0	1	1	0.999718
FRG	REPUBLIC	NY	LPV200	0	1	1	0.999973
5B2	SARATOGA COUNTY	NY	LPV	0	1	0	1
44N	SKY ACRES	NY	LPV	0	1	1	0.999981
SWF	STEWART INTL	NY	LPV200	0	1	1	0.999996
MSV	SULLIVAN COUNTY INTL	NY	LPV	0	1	0	1
SYR	SYRACUSE HANCOCK INTL	NY	LPV200	1	0.999954	2	0.999805
4B6	TICONDEROGA MUNICIPAL	NY	LPV	0	1	2	0.999992
ART	WATERTOWN INTL	NY	LPV	1	0.999905	1	0.999584
ELZ	WELLSVILLE MUNICIPAL ARPT`TARANTINE	NY	LPV	1	0.999931	1	0.999596
HPN	WESTCHESTER COUNTY	NY	LPV	0	1	1	0.999973
SDC	WILLIAMSON-SODUS	NY	LPV	1	0.999897	1	0.99955
ILN	AIRBORNE AIRPARK	OH	LPV200	1	0.999863	1	0.999741
CAK	AKRON-CANTON RGNL	OH	LPV200	1	0.999844	1	0.999645
HZY	ASHTABULA COUNTY	OH	LPV	1	0.999821	1	0.999634
TZR	BOLTON FIELD	OH	LPV200	1	0.999844	1	0.999744
HAO	BUTLER CO RGNL	OH	LPV	1	0.999878	1	0.999741
CXY	CAPITAL CITY	OH	LPV	0	1	0	1
PCW	CARL R KELLER FIELD	OH	LPV	1	0.999756	1	0.999596
LUK	CINCINNATI MUNICIPAL AIRPORT LUNKEN	OH	LPV	1	0.999924	1	0.999741
CLE	CLEVELAND-HOPKINS INTL	OH	LPV	1	0.999744	1	0.999596
I66	CLINTON FIELD	OH	LPV	1	0.999863	1	0.999741
MGY	DAYTON-WRIGHT BROTHERS	OH	LPV	1	0.99987	1	0.999741
DLZ	DELAWARE MUNICIPAL	OH	LPV	1	0.99984	1	0.999691
LHQ	FAIRFIELD COUNTY	OH	LPV	1	0.999832	1	0.999767
FDY	FINDLAY	OH	LPV	1	0.999779	1	0.999649
FZI	FOSTORIA METROPOLITAN	OH	LPV	1	0.999771	1	0.999596
PMH	GREATER PORTSMOUTH RGNL	OH	LPV	1	0.999954	1	0.999844
I19	GREENE COUNTY-LEWIS A. JACKSON	OH	LPV	1	0.999863	1	0.999741
I74	GRIMES FIELD	OH	LPV	1	0.999855	1	0.999718
DAY	JAMES M COX DAYTON INTL	OH	LPV200	1	0.999866	1	0.999741
1G3	KENT STATE UNIV	OH	LPV	1	0.999798	1	0.999607
CQA	LAKEFIELD	OH	LPV	1	0.999817	1	0.999672
AOH	LIMA ALLEN COUNTY	OH	LPV	1	0.999824	1	0.999649
LPR	LORAIN COUNTY RGNL	OH	LPV200	1	0.999752	1	0.999596
UYF	MADISON COUNTY	OH	LPV	1	0.999851	1	0.999741
MFD	MANSFIELD LAHM RGNL	OH	LPV200	1	0.999798	1	0.99966
MNN	MARION MUNICIPAL	OH	LPV	1	0.999836	1	0.999672
AXV	NEIL ARMSTRONG	OH	LPV	1	0.999863	1	0.999672
OSU	OHIO STATE UNIVERSITY	OH	LPV200	1	0.99984	1	0.999741
UNI	OHIO UNIVERSITY SNYDER FIELD	OH	LPV200	1	0.999973	1	0.999813
CMH	PORT COLUMBUS INTL	OH	LPV200	1	0.999836	1	0.999748
OWX	PUTNAM COUNTY	OH	LPV	1	0.999786	1	0.999638
LCK	RICKENBACKER INTL	OH	LPV200	1	0.99984	1	0.999752
16G	SENECA COUNTY	OH	LPV	1	0.999771	1	0.999641
SGH	SPRINGFIELD-BECKLEY MUNICIPAL	OH	LPV200	1	0.999859	1	0.999741
TOL	TOLEDO EXPRESS	OH	LPV200	1	0.999779	1	0.999596

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
BJJ	WAYNE COUNTY	OH	LPV	1	0.999805	1	0.99963
LNN	WILLOUGHBY LOST NATION MUNICIPAL	OH	LPV	1	0.999741	1	0.999596
1G0	WOOD COUNTY	OH	LPV	1	0.999775	1	0.999596
YNG	YOUNGSTOWN-WARREN RGNL	OH	LPV	1	0.999851	1	0.999634
ADH	ADA MUNICIPAL	OK	LPV	0	1	1	0.999996
AXS	ALTUS/QUARTZ MOUNTAIN RGNL	OK	LPV	0	1	0	1
BVO	BARTLESVILLE MUNICIPAL	OK	LPV	0	1	2	0.999981
BKN	BLACKWELL-TONKAWA MUNICIPAL	OK	LPV	0	1	1	0.999996
GCM	CLAREMORE RGNL	OK	LPV	0	1	1	0.999996
RCE	CLARENCE E PAGE MUNICIPAL	OK	LPV	0	1	1	0.999996
CSM	CLINTON-SHERMAN	OK	LPV200	0	1	0	1
MKO	DAVIS FIELD	OK	LPV	0	1	1	0.999996
DUA	DURANT RGNL - EAKER FIELD	OK	LPV	0	1	1	0.999996
ELK	ELK CITY RGNL BUSINESS	OK	LPV	0	1	0	1
WDG	ENID WOODRING RGNL	OK	LPV200	0	1	1	0.999996
FDR	FREDERICK RGNL	OK	LPV200	0	1	0	1
GMJ	GROVE MUNICIPAL	OK	LPV	0	1	1	0.999996
GOK	GUTHRIE-EDMOND RGNL	OK	LPV	0	1	1	0.999996
DUC	HALLIBURTON FIELD	OK	LPV	0	1	0	1
HBR	HOBART RGNL	OK	LPV	0	1	0	1
MLC	MC ALESTER RGNL	OK	LPV	0	1	1	0.999996
OKM	OKMULGEE RGNL	OK	LPV	0	1	1	0.999996
PVJ	PAULS VALLEY MUNICIPAL	OK	LPV200	0	1	1	0.999996
PNC	PONCA CITY RGNL	OK	LPV	0	1	1	0.999996
RVS	RICHARD LLOYD JONES JR	OK	LPV	0	1	1	0.999996
SNL	SHAWNEE RGNL	OK	LPV200	0	1	1	0.999996
SWO	STILLWATER RGNL	OK	LPV	0	1	1	0.999996
TQH	TAHLEQUAH MUNICIPAL	OK	LPV	0	1	1	0.999996
TUL	TULSA INTL	OK	LPV200	0	1	1	0.999996
OUN	UNIVERSITY OF OKLAHOMA WESTHEI	OK	LPV	0	1	1	0.999996
WWR	WEST WOODWARD	OK	LPV	0	1	0	1
PWA	WILEY POST	OK	LPV200	0	1	1	0.999996
OKC	WILL ROGERS WORLD	OK	LPV200	0	1	1	0.999996
OWP	WILLIAM R. POGUE MUNICIPAL	OK	LPV	0	1	1	0.999996
AST	ASTORIA RGNL	OR	LPV	0	1	10	0.999302
UAO	AURORA STATE	OR	LPV	0	1	6	0.999699
BDN	BEND MUNICIPAL	OR	LPV	0	1	2	0.999813
CVO	CORVALLIS MUNICIPAL	OR	LPV200	0	1	22	0.999367
PDT	EASTERN OREGON RGNL AT PENDLET	OR	LPV200	1	0.999981	2	0.999618
GCD	GRANT CO RGNL/OGILVIE FIELD	OR	LPV	0	1	2	0.999844
LMT	KLAMATH FALLS	OR	LPV	0	1	3	0.999725
LGD	LA GRANDE/UNION COUNTY	OR	LPV	1	0.999996	2	0.999664
S33	MADRAS MUNICIPALCIPAL	OR	LPV	0	1	3	0.999821
EUG	MAHLON SWEET FIELD	OR	LPV200	0	1	22	0.999359
MMV	MC MINNVILLE MUNICIPAL	OR	LPV	0	1	9	0.999611
SLE	MCNARY FLD	OR	LPV200	0	1	12	0.999599
ONO	ONTARIO MUNICIPAL	OR	LPV	0	1	2	0.999828
PDX	PORTLAND INTL	OR	LPV200	0	1	5	0.999668
HIO	PORTLAND-HILLSBORO	OR	LPV200	0	1	7	0.999618
RDM	ROBERTS FIELD	OR	LPV200	0	1	2	0.999817
AGC	ALLEGHENY COUNTY	PA	LPV	0	1	1	0.999756

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
AOO	ALTOONA-BLAIR COUNTY	PA	LPV	0	1	1	0.999928
LBE	ARNOLD PALMER RGNL	PA	LPV	0	1	1	0.999763
HMZ	BEDFORD COUNTY	PA	LPV	0	1	0	1
BFD	BRADFORD RGNL	PA	LPV200	1	0.999939	2	0.999725
BTP	BUTLER COUNTY/K W SCHOLTER FIE	PA	LPV	1	0.999969	1	0.999668
MQS	CHESTER COUNTY G O CARLSON	PA	LPV	0	1	0	1
AXQ	CLARION COUNTY	PA	LPV	1	0.999897	1	0.999607
8G2	CORRY-LAWRENCE	PA	LPV	1	0.999824	1	0.999611
9D4	DECK	PA	LPV	0	1	0	1
DUJ	DUBOIS RGNL	PA	LPV200	1	0.99995	1	0.999771
ERI	ERIE INTL/TOM RIDGE FIELD	PA	LPV200	1	0.999813	1	0.999618
WAY	GREENE COUNTY	PA	LPV	0	1	1	0.999874
MDT	HARRISBURG INTL	PA	LPV	0	1	0	1
HZL	HAZLETON MUNICIPAL	PA	LPV	0	1	0	1
JST	JOHN MURTHA JOHNSTOWN-CAMBRIA	PA	LPV200	0	1	1	0.999901
LNS	LANCASTER	PA	LPV	0	1	0	1
ABE	LEHIGH VALLEY INTL	PA	LPV	0	1	0	1
RVL	MIFFLIN COUNTY	PA	LPV	0	1	1	0.999889
UCP	NEW CASTLE MUNICIPAL	PA	LPV	1	0.999889	1	0.99963
PNE	NORTHEAST PHILADELPHIA	PA	LPV	0	1	0	1
PHL	PHILADELPHIA INTL	PA	LPV	0	1	0	1
PIT	PITTSBURGH INTL	PA	LPV200	0	1	1	0.999725
MPO	POCONO MOUNTAINS MUNICIPAL	PA	LPV	0	1	0	1
RDG	READING RGNL/CARL A SPAATZ FIE	PA	LPV	0	1	0	1
FWQ	ROSTRAVER	PA	LPV	0	1	1	0.999779
ZER	SCHUYLKILL COUNTY /JOE ZERBEY/	PA	LPV200	0	1	0	1
2G9	SOMERSET COUNTY	PA	LPV	0	1	1	0.999996
OYM	ST MARYS MUNICIPAL	PA	LPV	1	0.999973	1	0.99976
UNV	UNIVERSITY PARK	PA	LPV200	0	1	1	0.999855
FKL	VENANGO RGNL	PA	LPV	1	0.999866	1	0.999615
AFJ	WASHINGTON COUNTY	PA	LPV	0	1	1	0.999798
AVP	WILKES-BARRE/SCRANTON INTL	PA	LPV	0	1	0	1
LOM	WINGS FIELD	PA	LPV	0	1	0	1
BID	BLOCK ISLAND STATE	RI	LPV	0	1	1	0.999935
OQU	QUONSET STATE	RI	LPV	0	1	1	0.999943
PVD	THEODORE FRANCIS GREEN STATE	RI	LPV	0	1	1	0.999943
AIK	AIKEN MUNICIPAL	SC	LPV	0	1	0	1
AND	ANDERSON RGNL	SC	LPV200	0	1	0	1
BNL	BARNWELL RGNL	SC	LPV200	0	1	0	1
ARW	BEAUFORT COUNTY	SC	LPV200	0	1	0	1
MKS	BERKELEY COUNTY	SC	LPV	0	1	0	1
CHS	CHARLESTON AFB/INTL	SC	LPV200	0	1	0	1
JZI	CHARLESTON EXECUTIVE	SC	LPV200	0	1	0	1
DCM	CHESTER CATAWBA RGNL	SC	LPV	0	1	0	1
CAE	COLUMBIA METROPOLITAN	SC	LPV200	0	1	0	1
UDG	DARLINGTON COUNTY JETPORT	SC	LPV	0	1	0	1
GYH	DONALDSON CENTER	SC	LPV	0	1	0	1
FLO	FLORENCE RGNL	SC	LPV	0	1	0	1
GGE	GEORGETOWN COUNTY	SC	LPV200	0	1	1	0.999996
CRE	GRAND STRAND	SC	LPV200	0	1	3	0.999973
GMU	GREENVILLE DOWNTOWN	SC	LPV200	0	1	0	1
GSP	GREENVILLE SPARTANBURG INTL	SC	LPV200	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
LKR	LANCASTER COUNTY-MC WHIRTER FI	SC	LPV200	0	1	0	1
RBW	LOWCOUNTRY RGNL	SC	LPV200	0	1	0	1
BBP	MARLBORO COUNTY JETPORT - H.E.	SC	LPV	0	1	0	1
LRO	MT PLEASANT RGNL-FAISON FIELD	SC	LPV	0	1	0	1
MYR	MYRTLE BEACH INTL	SC	LPV200	0	1	1	0.999985
CEU	OCONEE COUNTY RGNL	SC	LPV	0	1	0	1
OGB	ORANGEBURG MUNICIPAL	SC	LPV200	0	1	0	1
LQK	PICKENS COUNTY	SC	LPV	0	1	0	1
DYB	SUMMERVILLE	SC	LPV200	0	1	0	1
SMS	SUMTER	SC	LPV200	0	1	0	1
CDN	WOODWARD FIELD	SC	LPV	0	1	0	1
ABR	ABERDEEN RGNL	SD	LPV200	1	0.999054	2	0.999046
BKX	BROOKINGS RGNL	SD	LPV	1	0.999256	1	0.999069
YKN	CHAN GURNEY MUNICIPAL	SD	LPV	1	0.999309	2	0.999248
VMR	HAROLD DAVIDSON FIELD	SD	LPV	1	0.999309	1	0.999256
HON	HURON RGNL	SD	LPV200	1	0.999248	1	0.999065
MHE	MITCHELL MUNICIPAL	SD	LPV	1	0.99926	1	0.999073
PIR	PIERRE RGNL	SD	LPV	1	0.99908	1	0.99905
RAP	RAPID CITY RGNL	SD	LPV200	2	0.999183	1	0.99905
ATY	WATERTOWN RGNL	SD	LPV200	1	0.999241	1	0.999061
ICR	WINNER RGNL	SD	LPV	1	0.999256	1	0.999069
PVE	BEECH RIVER RGNL	TN	LPV	0	1	1	0.999924
0M4	BENTON COUNTY	TN	LPV	0	1	1	0.999878
SYI	BOMAR FIELD-SHELBYVILLE MUNICIPAL	TN	LPV	0	1	1	0.999958
HZD	CARROLL COUNTY	TN	LPV	0	1	1	0.999859
CSV	CROSSVILLE MEMORIAL-WHITSON FI	TN	LPV200	0	1	1	0.99992
LUG	ELLINGTON	TN	LPV	0	1	1	0.999966
UCY	EVERETT-STEWART RGNL	TN	LPV	0	1	1	0.999866
FYM	FAYETTEVILLE MUNICIPAL	TN	LPV	0	1	1	0.999973
GKT	GATLINBURG-PIGEON FORGE	TN	LPV	0	1	1	0.99995
PHT	HENRY COUNTY	TN	LPV200	0	1	1	0.999847
DKX	KNOXVILLE DOWNTOWN ISLAND	TN	LPV	0	1	1	0.999897
3M7	LAFAYETTE MUNICIPAL	TN	LPV	0	1	1	0.999939
M54	LEBANON MUNICIPAL	TN	LPV	0	1	1	0.999947
CHA	LOVELL FIELD	TN	LPV200	0	1	0	1
MRC	MAURY COUNTY	TN	LPV	0	1	1	0.999973
TYS	MC GHEE TYSON	TN	LPV	0	1	1	0.999897
MKL	MC KELLAR-SIPES RGNL	TN	LPV200	0	1	1	0.999908
MMI	MCMINN COUNTY	TN	LPV	0	1	1	0.99992
MEM	MEMPHIS INTL	TN	LPV200	0	1	0	1
NQA	MILLINGTON RGNL JETPORT	TN	LPV	0	1	1	0.999943
MBT	MURFREESBORO MUNICIPAL	TN	LPV	0	1	1	0.99995
BNA	NASHVILLE INTL	TN	LPV200	0	1	1	0.999958
CKV	OUTLAW FIELD	TN	LPV	0	1	1	0.999859
SZY	ROBERT SIBLEY	TN	LPV	0	1	0	1
SNH	SAVANNAH-HARDIN COUNTY	TN	LPV	0	1	0	1
MQY	SMYRNA	TN	LPV	0	1	1	0.999954
SRB	UPPER CUMBERLAND RGNL	TN	LPV200	0	1	1	0.999931
BGF	WINCHESTER MUNICIPAL	TN	LPV	0	1	1	0.99995
ABI	ABILENE RGNL	TX	LPV200	0	1	0	1
ADS	ADDISON	TX	LPV	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
ALI	ALICE INTL	TX	LPV	0	1	1	0.999996
E11	ANDREWS COUNTY	TX	LPV	0	1	1	0.999996
LFK	ANGELINA COUNTY	TX	LPV	0	1	0	1
RKP	ARANSAS CO	TX	LPV	0	1	1	0.999996
GKY	ARLINGTON MUNICIPAL	TX	LPV200	0	1	0	1
EDC	AUSTIN EXECUTIVE	TX	LPV200	0	1	0	1
BPG	BIG SPRING MC MAHON-WRINKLE	TX	LPV	0	1	0	1
11R	BRENHAM MUNICIPAL	TX	LPV	0	1	0	1
XBP	BRIDGEPORT MUNICIPAL	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	0	1
CRP	CORPUS CHRISTI INTL	TX	LPV200	0	1	1	0.999996
CFD	COULTER FIELD	TX	LPV	0	1	0	1
PRX	COX FIELD	TX	LPV	0	1	0	1
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
DWH	DAVID WAYNE HOOKS MEMORIAL	TX	LPV	0	1	0	1
LUD	DECATUR MUNICIPAL	TX	LPV	0	1	0	1
DRT	DEL RIO INTL	TX	LPV	0	1	1	0.999996
DTO	DENTON MUNICIPAL	TX	LPV	0	1	0	1
TPL	DRAUGHON-MILLER CENTRAL TEXAS	TX	LPV200	0	1	0	1
GGG	EAST TEXAS RGNL	TX	LPV	0	1	0	1
EFD	ELLINGTON FIELD	TX	LPV	0	1	0	1
FST	FORT STOCKTON-PECOS COUNTY	TX	LPV	0	1	1	0.999996
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	1	0.999996
GLE	GAINESVILLE MUNICIPAL	TX	LPV	0	1	0	1
IAH	GEORGE BUSH INTERCONTINENTAL/H	TX	LPV	0	1	0	1
GDJ	GRANBURY RGNL	TX	LPV	0	1	0	1
PVW	HALE COUNTY	TX	LPV	0	1	0	1
HRX	HEREFORD MUNICIPAL	TX	LPV200	0	1	0	1
INJ	HILLSBORO MUNICIPAL	TX	LPV	0	1	0	1
HDO	HONDO MUNICIPAL	TX	LPV	0	1	1	0.999996
TME	HOUSTON EXECUTIVE	TX	LPV	0	1	0	1
AXH	HOUSTON-SOUTHWEST	TX	LPV	0	1	0	1
UTS	HUNTSVILLE MUNICIPAL	TX	LPV	0	1	0	1
BPT	JACK BROOKS RGNL	TX	LPV200	0	1	0	1
JAS	JASPER COUNTY-BELL FIELD	TX	LPV	0	1	0	1
HBV	JIM HOGG COUNTY	TX	LPV	0	1	1	0.999996
ERV	KERRVILLE MUNICIPAL/LOUIS SCHREINER	TX	LPV	0	1	1	0.999996
IKG	KLEBERG COUNTY	TX	LPV	0	1	1	0.999996
LNC	LANCASTER RGNL	TX	LPV200	0	1	0	1
LRD	LAREDO INTL	TX	LPV	0	1	1	0.999996
LLN	LEVELLAND MUNICIPAL	TX	LPV	0	1	0	1
CXO	LONE STAR EXECUTIVE	TX	LPV200	0	1	0	1
LBB	LUBBOCK PRESTON SMITH INTL	TX	LPV200	0	1	0	1
GVT	MAJORS	TX	LPV	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
5T9	MAVERICK COUNTY MEMORIAL INTL	TX	LPV	0	1	1	0.999996
MFE	MC ALLEN MILLER INTL	TX	LPV	0	1	3	0.999989
HQZ	MESQUITE METRO	TX	LPV	0	1	0	1
MAF	MIDLAND INTL	TX	LPV	0	1	1	0.999996
JWY	MID-WAY RGNL	TX	LPV200	0	1	0	1
DUX	MOORE COUNTY	TX	LPV200	0	1	0	1
RAS	MUSTANG BEACH	TX	LPV	0	1	1	0.999996
BAZ	NEW BRAUNFELS MUNICIPAL	TX	LPV	0	1	1	0.999996
ODO	ODESSA-SCHLEMEYER FIELD	TX	LPV200	0	1	1	0.999996
ORG	ORANGE COUNTY	TX	LPV	0	1	0	1
PIL	PORT ISABEL-CAMERON COUNTY	TX	LPV	0	1	3	0.999989
AMA	RICK HUSBAND AMARILLO INTL	TX	LPV200	0	1	0	1
GRK	ROBERT GRAY AAF	TX	LPV200	0	1	0	1
SJT	SAN ANGELO RGNL/MATHIS FIELD	TX	LPV	0	1	0	1
SAT	SAN ANTONIO INTL	TX	LPV200	0	1	1	0.999996
GLS	SCHOLES INTL AT GALVESTON	TX	LPV	0	1	0	1
EBG	SOUTH TEXAS INTL AT EDINBURG	TX	LPV	0	1	1	0.999996
SGR	SUGAR LAND RGNL	TX	LPV	0	1	0	1
TFP	T P MC CAMPBELL	TX	LPV	0	1	1	0.999996
TRL	TERRELL MUNICIPAL	TX	LPV	0	1	0	1
LBX	TEXAS GULF COAST RGNL	TX	LPV	0	1	0	1
TYR	TYLER POUNDS RGNL	TX	LPV	0	1	0	1
VCT	VICTORIA RGNL	TX	LPV	0	1	1	0.999996
ACT	WACO RGNL	TX	LPV200	0	1	0	1
ARM	WHARTON RGNL	TX	LPV	0	1	0	1
F05	WILBARGER COUNTY	TX	LPV	0	1	0	1
HOU	WILLIAM P HOBBY	TX	LPV	0	1	0	1
BCE	BRYCE CANYON	UT	LPV	0	1	2	0.999939
FOM	FILLMORE MUNICIPAL	UT	LPV	0	1	2	0.999943
LGU	LOGAN-CACHE	UT	LPV	0	1	2	0.999977
OGD	OGDEN-HINCKLEY	UT	LPV	0	1	2	0.999985
PVU	PROVO MUNICIPAL	UT	LPV	0	1	2	0.999977
DXZ	ST GEORGE MUNICIPAL	UT	LPV	0	1	2	0.99992
MFV	ACCOMACK COUNTY	VA	LPV	0	1	8	0.999447
MTV	BLUE RIDGE	VA	LPV	0	1	0	1
CHO	CHARLOTTESVILLE-ALBEMARLE	VA	LPV	0	1	0	1
FCI	CHESTERFIELD COUNTY	VA	LPV	0	1	3	0.999893
CJR	CULPEPER RGNL	VA	LPV	0	1	0	1
DAN	DANVILLE RGNL	VA	LPV200	0	1	0	1
PTB	DINWIDDIE COUNTY	VA	LPV	0	1	3	0.999874
FVX	FARMVILLE RGNL	VA	LPV	0	1	0	1
OFP	HANOVER COUNTY MUNICIPAL	VA	LPV	0	1	3	0.999908
HSP	INGALLS FIELD	VA	LPV	0	1	0	1
0VG	LEE COUNTY	VA	LPV	0	1	1	0.999897
JYO	LEESBURG EXECUTIVE	VA	LPV	0	1	0	1
LNP	LONESOME PINE	VA	LPV	0	1	1	0.999897
LKU	LOUISA COUNTY/FREEMAN FIELD	VA	LPV	0	1	0	1
LYH	LYNCHBURG RGNL/PRESTON GLENN F	VA	LPV	0	1	0	1
HEF	MANASSAS RGNL/HARRY P. DAVIS F	VA	LPV	0	1	1	0.999996
AVC	MECKLENBURG-BRUNSWICK RGNL	VA	LPV200	0	1	2	0.999924
FYJ	MIDDLE PENINSULA RGNL	VA	LPV	0	1	6	0.999691
MKJ	MOUNTAIN EMPIRE	VA	LPV	0	1	0	1

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
PSK	NEW RIVER VALLEY	VA	LPV	0	1	0	1
PHF	NEWPORT NEWS/WILLIAMSBURG INTL	VA	LPV200	0	1	7	0.999515
RIC	RICHMOND INTL	VA	LPV200	0	1	3	0.999847
SHD	SHENANDOAH VALLEY RGNL	VA	LPV200	0	1	0	1
RMN	STAFFORD RGNL	VA	LPV	0	1	2	0.999969
XSA	TAPPAHANNOCK-ESSEX COUNTY	VA	LPV	0	1	6	0.999744
VJI	VIRGINIA HIGHLANDS	VA	LPV	0	1	1	0.999935
BCB	VIRGINIA TECH/MONTGOMERY EXECU	VA	LPV	0	1	0	1
IAD	WASHINGTON DULLES INTL	VA	LPV200	0	1	0	1
W78	WILLIAM M TUCK	VA	LPV	0	1	0	1
OKV	WINCHESTER RGNL	VA	LPV200	0	1	0	1
MPV	EDWARD F KNAPP STATE	VT	LPV	0	1	0	1
FSO	FRANKLIN COUNTY STATE	VT	LPV	0	1	1	0.999729
BLI	BELLINGHAM INTL	WA	LPV	2	0.999691	2	0.999222
HQM	BOWERMAN	WA	LPV200	1	0.999943	5	0.999264
PWT	BREMERTON NATIONAL	WA	LPV	2	0.999912	3	0.99926
DEW	DEER PARK	WA	LPV	1	0.999676	2	0.999328
TDO	ED CARLSON MEMORIAL FIELD - SO	WA	LPV	0	1	4	0.999267
EPH	EPHRATA MUNICIPAL	WA	LPV	2	0.999832	3	0.999271
FHR	FRIDAY HARBOR	WA	LPV	2	0.999752	2	0.999256
MWH	GRANT CO INTL	WA	LPV200	2	0.999813	3	0.999348
OLM	OLYMPIA RGNL	WA	LPV	1	0.999969	4	0.999309
PUW	PULLMAN/MOSCOW RGNL	WA	LPV	1	0.999657	1	0.999657
RNT	RENTON MUNICIPAL	WA	LPV	2	0.999939	3	0.999115
RLD	RICHLAND	WA	LPV	1	0.999969	3	0.999393
SEA	SEATTLE-TACOMA INTL	WA	LPV200	2	0.999939	3	0.999271
BVS	SKAGIT RGNL	WA	LPV	2	0.999699	2	0.999218
PAE	SNOHOMISH COUNTY (PAINE FLD)	WA	LPV	2	0.999897	3	0.999145
OTH	SOUTHWEST OREGON RGNL	WA	LPV	0	1	41	0.998661
GEG	SPOKANE INTL	WA	LPV200	1	0.999664	2	0.999309
TIW	TACOMA NARROWS	WA	LPV	1	0.999966	3	0.999286
PSC	TRI-CITIES	WA	LPV200	1	0.999969	3	0.999424
ALW	WALLA WALLA RGNL	WA	LPV	1	0.999958	2	0.999622
CLM	WILLIAM R FAIRCHILD INTL	WA	LPV	2	0.999882	3	0.999248
YKM	YAKIMA AIR TERMINAL/MCALLISTER	WA	LPV	1	0.999973	3	0.999378
GRB	AUSTIN STRAUBEL INTL	WI	LPV200	1	0.999451	2	0.999332
DLL	BARABOO WISCONSIN DELLS	WI	LPV	1	0.99934	1	0.99934
OVS	BOSCOBEL	WI	LPV	1	0.99934	1	0.99934
EAU	CHIPPEWA VALLEY RGNL	WI	LPV200	2	0.999359	2	0.999012
CLI	CLINTONVILLE MUNICIPAL	WI	LPV	1	0.999451	1	0.999122
UNU	DODGE COUNTY	WI	LPV	1	0.99934	1	0.99934
SUE	DOOR COUNTY CHERRYLAND	WI	LPV	1	0.999458	2	0.99929
EGV	EAGLE RIVER UNION	WI	LPV	1	0.999069	1	0.998943
FLD	FOND DU LAC COUNTY	WI	LPV	1	0.999451	1	0.99934
MKE	GENERAL MITCHELL INTL	WI	LPV200	1	0.999348	1	0.99934
ASX	JOHN F KENNEDY MEMORIAL	WI	LPV	1	0.999016	1	0.998684
RAC	JOHN H BATTEN	WI	LPV	1	0.999348	1	0.99934
ENW	KENOSHA RGNL	WI	LPV200	1	0.999348	1	0.99934
LSE	LA CROSSE MUNICIPAL	WI	LPV	1	0.999554	2	0.999336
ARV	LAKELAND/NOBLE F. LEE MEMORIAL	WI	LPV	1	0.999161	1	0.999016
MTW	MANITOWOC COUNTY	WI	LPV200	1	0.999458	1	0.99934
MFI	MARSHFIELD MUNICIPAL	WI	LPV	1	0.999451	2	0.999161

Airport Id	Airport Name	State	Service	LPV Outages	LPV Availability	LPV 200 Outages	LPV 200 Availability
LUM	MENOMONIE MUNICIPAL-SCORE FIELD	WI	LPV	3	0.999508	2	0.999145
RRL	MERRILL MUNICIPAL	WI	LPV	2	0.999348	1	0.999016
C29	MIDDLETON MUNICIPAL - MOREY FIELD	WI	LPV	1	0.99934	1	0.99934
ATW	OUTAGAMIE COUNTY RGNL	WI	LPV200	1	0.999451	1	0.99934
PVB	PLATTEVILLE MUNICIPAL	WI	LPV	1	0.99934	1	0.99934
PBH	PRICE COUNTY	WI	LPV	1	0.999157	1	0.999016
RHI	RHINELANDER-ONEIDA COUNTY	WI	LPV200	2	0.999332	1	0.999016
RPD	RICE LAKE RGNL - CARL'S FIELD	WI	LPV	1	0.999153	1	0.999016
HYR	SAWYER COUNTY	WI	LPV	1	0.999088	1	0.998962
SBM	SHEBOYGAN COUNTY MEMORIAL	WI	LPV	1	0.999454	1	0.99934
JVL	SOUTHERN WISCONSIN RGNL	WI	LPV200	1	0.99934	1	0.99934
STE	STEVENS POINT MUNICIPAL	WI	LPV200	1	0.999451	2	0.999222
MDZ	TAYLOR COUNTY	WI	LPV	2	0.999344	2	0.999012
TKV	TOMAHAWK RGNL	WI	LPV	1	0.999195	1	0.999016
LNR	TRI-COUNTY RGNL	WI	LPV	1	0.99934	1	0.99934
UES	WAUKESHA COUNTY	WI	LPV200	1	0.99934	1	0.99934
ETB	WEST BEND MUNICIPAL	WI	LPV	1	0.99934	1	0.99934
OSH	WITTMAN RGNL	WI	LPV	1	0.999451	1	0.99934
MRB	EASTERN WV RGNL/SHEPHERD FLD	WV	LPV	0	1	0	1
LWB	GREENBRIER VALLEY	WV	LPV	0	1	0	1
3I2	MASON COUNTY	WV	LPV	1	0.999981	1	0.999824
BLF	MERCER COUNTY	WV	LPV	0	1	0	1
PKB	MID-OHIO VALLEY RGNL	WV	LPV	0	1	1	0.999805
MGW	MORGANTOWN MUNICIPAL-WALTER L. BILL	WV	LPV200	0	1	1	0.999992
CKB	NORTH CENTRAL WEST VIRGINIA	WV	LPV200	0	1	1	0.999973
BKW	RALEIGH COUNTY MEMORIAL	WV	LPV200	0	1	0	1
HTS	TRI-STATE/MILTON J. FERGUSON F	WV	LPV	1	0.999989	1	0.999844
HLG	WHEELING OHIO CO	WV	LPV200	0	1	1	0.99979
CRW	YEAGER	WV	LPV200	0	1	1	0.999855
CPR	CASPER/NATRONA COUNTY INTL	WY	LPV	1	0.999634	1	0.999233
CYS	CHEYENNE RGNL/JERRY OLSON FIEL	WY	LPV	1	0.999702	1	0.999294
DGW	CONVERSE COUNTY	WY	LPV200	1	0.999634	1	0.999233
EVW	EVANSTON-UINTA COUNTY BURNS FI	WY	LPV	0	1	2	0.999866
GCC	GILLETTE-CAMPBELL COUNTY	WY	LPV	1	0.999306	1	0.999161
JAC	JACKSON HOLE	WY	LPV	1	0.999908	1	0.999561
LAR	LARAMIE RGNL	WY	LPV	1	0.999779	1	0.999389
RWL	RAWLINS MUNICIPAL/HARVEY FIELD	WY	LPV	1	0.999989	1	0.999271
RIW	RIVERTON RGNL	WY	LPV200	1	0.99987	1	0.999271
RKS	ROCK SPRINGS-SWEETWATER COUNTY	WY	LPV200	0	1	1	0.999561
SHR	SHERIDAN COUNTY	WY	LPV	1	0.999306	1	0.999141
COD	YELLOWSTONE RGNL	WY	LPV	1	0.999561	1	0.999134

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

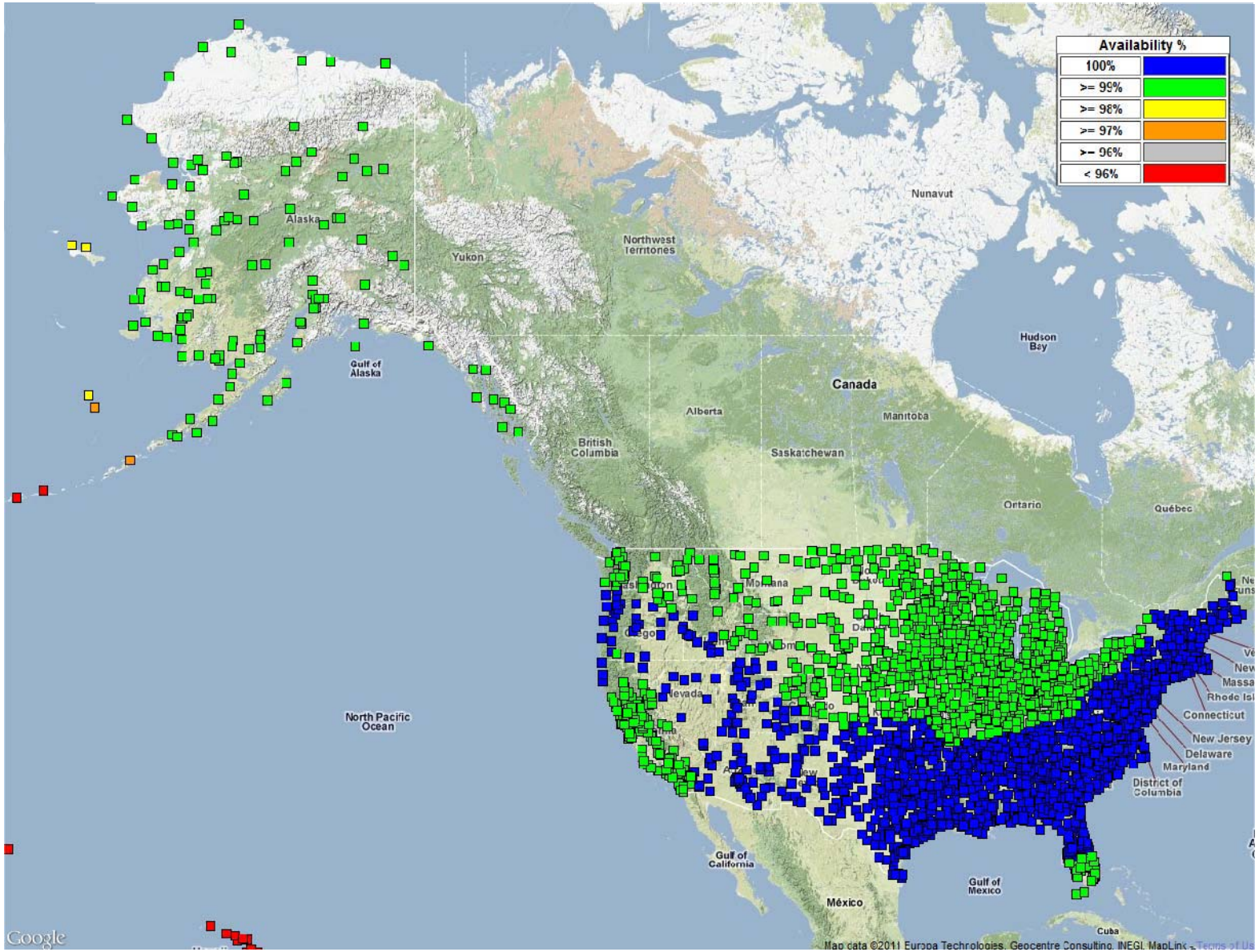


Figure 8-2 WAAS LPV Outages at US Airports with GPS RNAV Instrument Approach Procedures

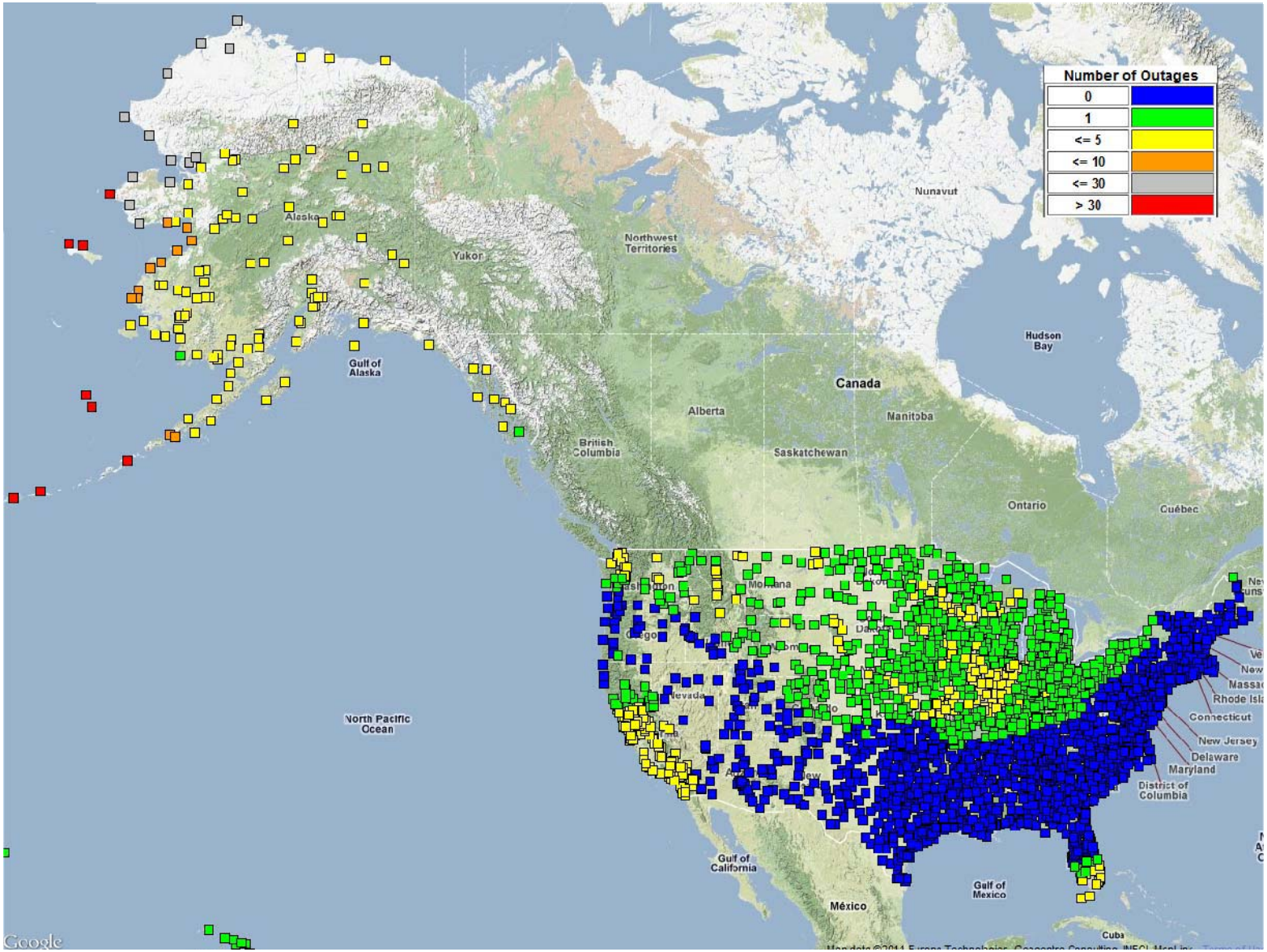


Figure 8-3 WAAS LPV 200 Availability at US Airports with GPS RNAV Instrument Approach Procedures

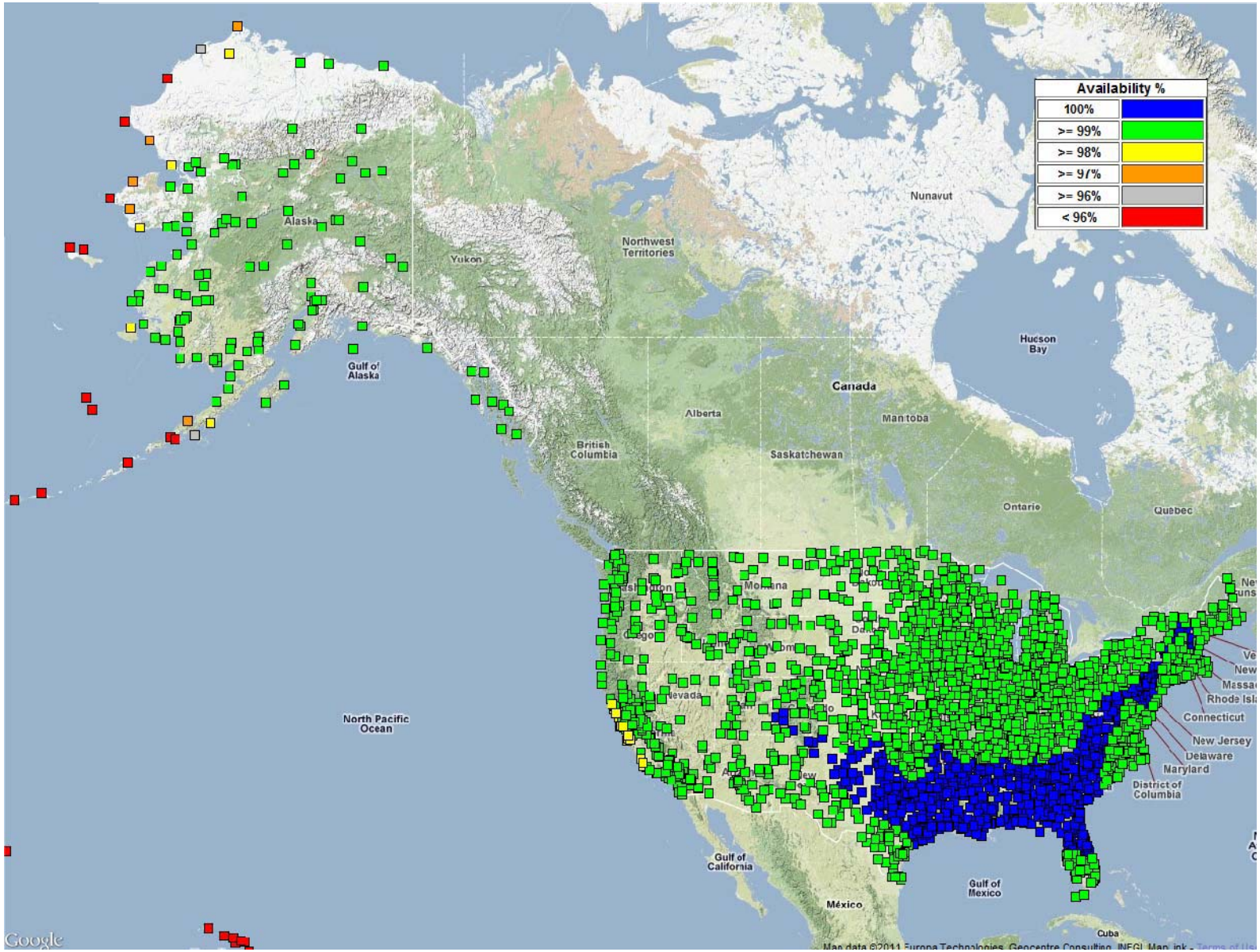
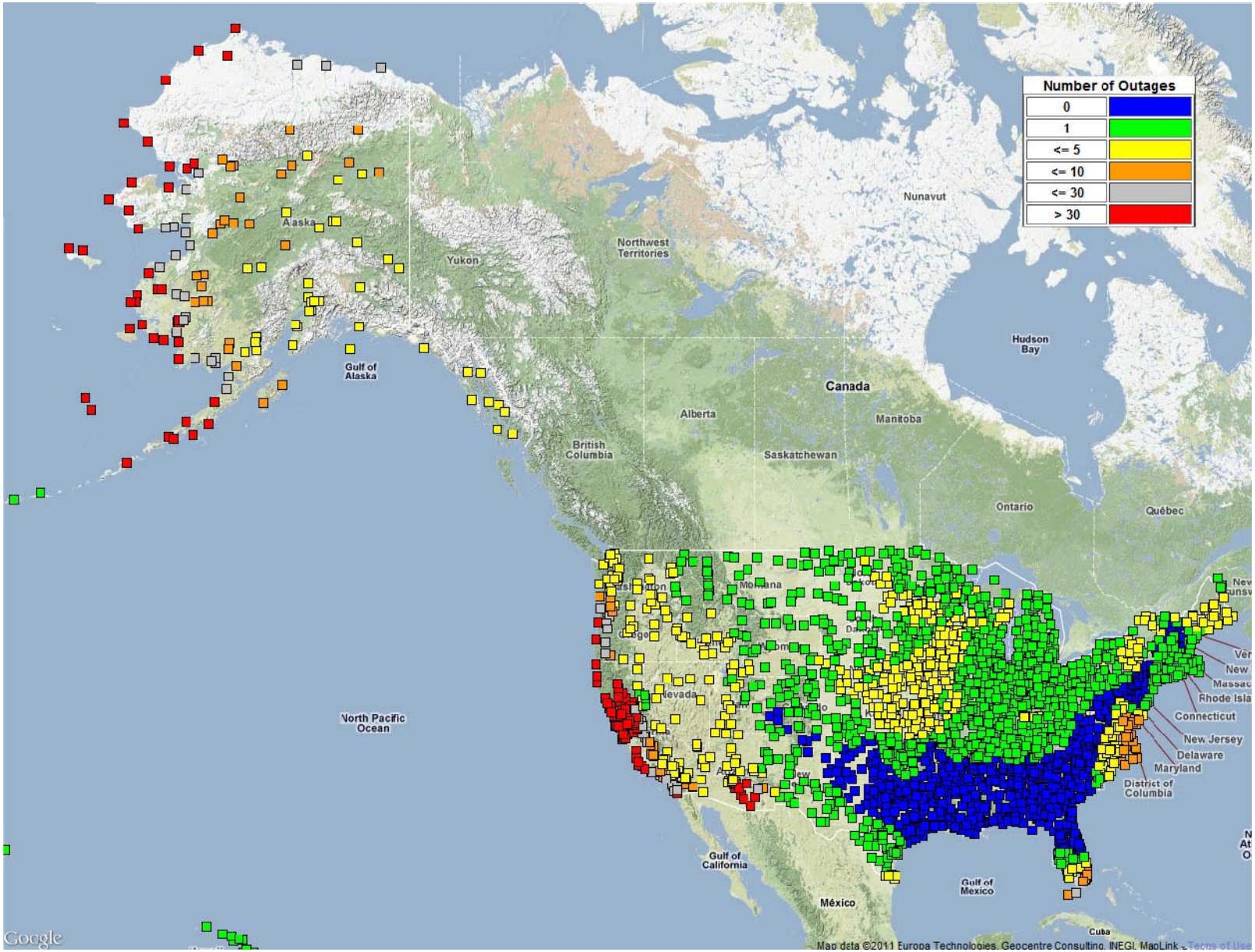


Figure 8-4 WAAS LPV 200 Outages at US Airports with GPS RNAV Instrument Approach Procedures



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	Jul 10	Aug 10	Sep 10	Oct 10	Nov 10	Dec 10	Jan 11	Feb 11	Mar 11	Apr 11	May 11	Jun 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	Jul 10	Aug 10	Sep 10	Oct 10	Nov 10	Dec 10	Jan 11	Feb 11	Mar 11	Apr 11	May 11	Jun 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 7/2/1 to 23:59:30 on 7/3/11 for all of the WAAS receivers with the following exceptions: All three receivers at Tapachula are off line again due to lightning damage, Bethel receiver A (BET1) used data from 6/27/11, Fort Worth receiver C (ZFW3) used data from 6/16/11. In addition OPUS would not process the 7/3/11 Jacksonville data even though CSRS successfully processed the same data. Rather than manipulate the OPUS reference receiver selection, 7/15/11 data was used for Jacksonville for the OPUS surveys.

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. The overall RMS qualities reported by OPUS were all less than or equal to 2.4 cm. The CSRS survey's RSSs of the reported ECEF sigma's were all less than equal to 1.5 cm. The OPUS and CSRS surveys agreed to 5 cm or better except for Houston A (6.3 cm) and Houston B (6.2 cm) and Chicago A (6.0 cm).

The positions were compared to the positions in the current WAAS software build 6.078 that was fielded during June 2011 and the next release, build 6.097, which will be fielded early 2012.

The OPUS surveys agree with the build 6.078 positions to better than or equal to 5.9 cm (ZHU2), with the expected exception of Mexico City which was 9.4 cm. The CSRS surveys agree with the build 6.097 positions to better or equal 8.9 cm (HNL) with the expected exception of Mexico City which is 23 cm because build 6.097 anticipates subsidence at MMX that has yet to occur.

Table 10.1 lists the WAAS antenna L1 phase center positions as of 7/3/11. The positions are in IRTF00 and are the OPUS estimated positions. The Tapachula positions are from WAAS software build 6.078

Figure 10.1 to 10.3 show the RSS of the ECEF difference between the 7/3/11 CSRS survey antenna phase center locations and the locations in the build 6.078 software which was fielded June 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 WRS 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 sigma's reported by CSRS.

Figure 10.13 to 10.15 show the RSS of the ECEF difference between the 7/3/11 OPUS survey antenna phase center locations and the locations in the build 6.097 software which will be fielded in early 2012.

Table 10-1 WAAS Antenna Positions (OPUS IRTF00) as of 7/3/11, MTP is Build 6.078

WRE	X(m)	Y(m)	Z(m)	Latitude	Longitude	H(m)
BET1	-2965385.002	-972576.633	5543892.922	60.7879158750000	-161.8417245277780	52.185
BET2	-2965385.775	-972580.353	5543891.872	60.7878964416667	-161.8416640555560	52.193
BET3	-2965388.344	-972577.487	5543891.001	60.7878805027778	-161.8417287500000	52.188
BIL1	-1416445.866	-4223577.042	4550862.167	45.8037068166667	-108.5397227944440	1112.268
BIL2	-1416449.937	-4223574.901	4550862.887	45.8037160750000	-108.5397811944440	1112.271
BIL3	-1416441.562	-4223574.309	4550866.019	45.8037565111111	-108.5396814888890	1112.269
BRW1	-1886758.890	-809058.704	6018494.514	71.2827651527778	-156.7899233583330	15.603
BRW2	-1886756.303	-809055.960	6018495.695	71.2827979111111	-156.7899652888890	15.611
BRW3	-1886755.213	-809059.743	6018495.518	71.2827932500000	-156.7898562611110	15.601
CDB1	-3484099.006	-1084748.820	5213678.659	55.1923745388889	-162.7064039083330	49.702
CDB2	-3484105.651	-1084741.613	5213675.707	55.1923284083333	-162.7065429694440	49.677
CDB3	-3484111.915	-1084734.854	5213672.965	55.1922850583333	-162.7066735333330	49.693
FAI1	-2304741.761	-1448715.289	5748843.691	64.8096303333333	-147.8473401361110	149.925
FAI2	-2304741.287	-1448706.478	5748846.083	64.8096807777778	-147.8474918333330	149.923
FAI3	-2304732.756	-1448707.413	5748849.232	64.8097473805556	-147.8473796166670	149.910
HNL1	-5508637.094	-2234493.398	2303722.149	21.3129898166667	-157.9208267055560	24.679
HNL2	-5508656.255	-2234483.722	2303686.905	21.3126469277778	-157.9209825444440	25.022
HNL3	-5508647.664	-2234497.660	2303693.992	21.3127154916667	-157.9208269333330	25.063
JNU1	-2354254.862	-2388549.671	5407043.106	58.3625746250000	-134.5857064000000	16.090
JNU2	-2354252.765	-2388565.780	5407036.914	58.3624690222222	-134.5854876972220	16.064
JNU3	-2354239.549	-2388568.625	5407041.383	58.3625454916667	-134.5852927750000	16.066
MMD1	35070.436	-5959686.703	2264365.762	20.9319091055556	-89.6628405361111	29.151
MMD2	35065.509	-5959687.059	2264364.968	20.9319013527778	-89.6628879222222	29.173
MMD3	35065.174	-5959685.292	2264369.631	20.9319463972222	-89.6628910416667	29.187
MMX1	-948701.127	-5943935.825	2109212.759	19.4316533222222	-99.0683895861111	2235.821
MMX2	-948696.703	-5943935.646	2109215.184	19.4316765972222	-99.0683482694444	2235.804
MMX3	-948705.554	-5943936.016	2109210.330	19.4316299722222	-99.0684309138889	2235.849
MPR1	-1570142.206	-5759530.633	2238184.755	20.6790032388889	-105.2492030027780	11.000
MPR2	-1570139.385	-5759530.144	2238188.808	20.6790413611111	-105.2491781138890	11.296
MPR3	-1570143.495	-5759528.030	2238190.574	20.6790593416667	-105.2492215083330	11.023
MSD1	-1979519.687	-5523223.107	2493106.758	23.1604464916667	-109.7176475694440	104.308
MSD2	-1979521.257	-5523225.447	2493100.358	23.1603836555556	-109.7176542916670	104.304
MSD3	-1979525.699	-5523222.170	2493104.027	23.1604197500000	-109.7177059250000	104.288
MTP1	-254854.327	-6162909.172	1617805.075	14.791366070	-92.367998930	54.949
MTP2	-254850.716	-6162910.205	1617801.639	14.791334010	-92.367965020	54.926
MTP3	-254855.485	-6162910.315	1617800.118	14.791320000	-92.368009250	54.833

WRE	X(m)	Y(m)	Z(m)	Latitude	Longitude	H(m)
OTZ1	-2396055.983	-750356.177	5843502.532	66.8873324805556	-162.6113723166670	10.888
OTZ2	-2396052.810	-750354.346	5843504.063	66.8873673555556	-162.6113905500000	10.893
OTZ3	-2396052.792	-750358.285	5843503.572	66.8873560611111	-162.6113046472220	10.897
YFB1	1035381.466	-2634289.659	5696539.495	63.7314901500000	-68.5431832111111	9.997
YFB2	1035372.254	-2634296.055	5696538.143	63.7314640027778	-68.5434041222222	9.928
YFB3	1035366.179	-2634306.805	5696534.364	63.7313863916667	-68.5435981722222	9.984
YQX1	2430424.655	-3419640.384	4788223.793	48.9664897388889	-54.5976318611111	146.852
YQX2	2430432.626	-3419639.055	4788220.755	48.9664478305556	-54.5975326166667	146.881
YQX3	2430440.529	-3419637.688	4788217.748	48.9664065833333	-54.5974338250000	146.887
YWG1	-520164.332	-4083475.875	4855842.958	49.9005743500000	-97.2593971277778	221.993
YWG2	-520150.465	-4083468.819	4855850.343	49.9006772972222	-97.2592180750000	222.005
YWG3	-520152.324	-4083477.932	4855842.507	49.9005681388889	-97.2592277138889	221.985
YYR1	1885341.448	-3321428.371	5091171.623	53.3086467777778	-60.4194680694444	37.833
YYR2	1885344.401	-3321419.890	5091176.030	53.3087130750000	-60.4193667333333	37.831
YYR3	1885340.121	-3321413.070	5091182.042	53.3088033083333	-60.4193720666667	37.845
ZAB1	-1488636.815	-5003946.555	3654557.676	35.1735751222222	-106.5673494361110	1620.113
ZAB2	-1488631.480	-5003948.246	3654557.663	35.1735745083333	-106.5672880250000	1620.187
ZAB3	-1488632.267	-5003950.820	3654553.808	35.1735321416667	-106.5672882472220	1620.166
ZAN1	-2659536.602	-1549114.814	5567750.751	61.2292019000000	-149.7802497777780	80.681
ZAN2	-2659548.350	-1549110.862	5567746.263	61.2291183083333	-149.7804234250000	80.676
ZAN3	-2659541.306	-1549106.731	5567750.735	61.2292018583333	-149.7804238750000	80.666
ZAU1	138704.118	-4761244.184	4227763.947	41.7826579000000	-88.3313366777778	195.930
ZAU2	138704.382	-4761248.801	4227758.784	41.7825955083333	-88.3313351194444	195.937
ZAU3	138711.102	-4761248.539	4227758.868	41.7825964694444	-88.3312542305556	195.944
ZBW1	1490299.239	-4448983.186	4306010.479	42.7357202611111	-71.4804257027778	39.118
ZBW2	1490304.355	-4448981.176	4306010.822	42.7357242472222	-71.4803586666667	39.144
ZBW3	1490306.064	-4448984.797	4306006.524	42.7356715388889	-71.4803529222222	39.148
ZDC1	1069125.785	-4839599.014	4001126.500	39.1015956722222	-77.5427463500000	80.083
ZDC2	1069128.179	-4839603.647	4001120.296	39.1015236694444	-77.5427308777778	80.082
ZDC3	1069124.073	-4839602.729	4001122.492	39.1015491444444	-77.5427749388889	80.084
ZDV1	-1273628.595	-4711375.599	4094890.105	40.1873031166667	-105.1272240888890	1541.367
ZDV2	-1273622.892	-4711377.110	4094890.118	40.1873033777778	-105.1271548277780	1541.352
ZDV3	-1273624.908	-4711380.314	4094885.835	40.1872528916667	-105.1271678583330	1541.353
ZFW1	-659983.191	-5324060.830	3438276.483	32.8306495611111	-97.0664716361111	155.668
ZFW2	-659988.458	-5324063.384	3438271.484	32.8305961277778	-97.0665241055556	155.632
ZFW3	-659983.489	-5324063.909	3438271.697	32.8305981833333	-97.0664707500000	155.672
ZHU1	-513864.473	-5506451.780	3166720.502	29.9618962444444	-95.3314262166667	10.928
ZHU2	-513867.115	-5506455.173	3166714.338	29.9618317444444	-95.3314502055556	10.990
ZHU3	-513873.392	-5506457.814	3166708.723	29.9617733861111	-95.3315124111111	10.969

WRE	X(m)	Y(m)	Z(m)	Latitude	Longitude	H(m)
ZJX1	772646.462	-5434462.237	3237231.742	30.6988594194444	-81.9081849944445	2.179
ZJX2	772649.785	-5434463.773	3237228.334	30.6988238305556	-81.9081529083333	2.149
ZJX3	772645.723	-5434466.202	3237225.226	30.6987912833333	-81.9081984555556	2.138
ZKC1	-415247.506	-4954556.417	3982161.122	38.8801593000000	-94.7908336805556	305.923
ZKC2	-415231.113	-4954557.728	3982161.178	38.8801600472222	-94.7906441694444	305.909
ZKC3	-415237.228	-4954561.083	3982155.979	38.8801018000000	-94.7907111611111	305.646
ZLA1	-2474409.907	-4637294.694	3602183.514	34.6035180222222	-118.0838948666670	763.522
ZLA2	-2474404.622	-4637297.501	3602183.515	34.6035180888889	-118.0838296361110	763.513
ZLA3	-2474411.244	-4637297.183	3602179.536	34.6034740500000	-118.0838949527780	763.588
ZLC1	-1808273.179	-4486410.850	4145303.019	40.7860432194444	-111.9521770500000	1287.442
ZLC2	-1808274.584	-4486414.445	4145298.523	40.7859898722222	-111.9521765666670	1287.427
ZLC3	-1808270.377	-4486416.160	4145298.519	40.7859897388889	-111.9521227527780	1287.438
ZMA1	966042.313	-5662999.857	2761581.511	25.8246121527778	-80.3191897277778	-7.550
ZMA2	966029.346	-5662999.165	2761585.982	25.8246597361111	-80.3193160500000	-8.179
ZMA3	966037.422	-5662997.997	2761586.339	25.8246618222222	-80.3192346944444	-7.838
ZME1	4070.913	-5226189.312	3644028.410	35.0673939388889	-89.9553697583333	68.608
ZME2	4070.940	-5226186.755	3644032.516	35.0674374722222	-89.9553694416667	68.874
ZME3	4064.747	-5226186.632	3644032.676	35.0674393138889	-89.9554373361111	68.861
ZMP1	-249978.361	-4539297.534	4458955.047	44.6374630250000	-93.1520852027778	262.674
ZMP2	-249972.560	-4539297.877	4458955.054	44.6374629222222	-93.1520119638889	262.696
ZMP3	-249973.649	-4539302.155	4458950.582	44.6374069000000	-93.1520227027778	262.636
ZNY1	1406144.665	-4627344.014	4144322.056	40.7843283555556	-73.0971654500000	6.477
ZNY2	1406146.461	-4627347.057	4144317.278	40.7842755805556	-73.0971555750000	5.956
ZNY3	1406140.906	-4627348.704	4144317.308	40.7842760138889	-73.0972242138889	5.946
ZOA1	-2684436.844	-4293337.478	3865351.814	37.5430532694444	-122.0159470861110	-3.494
ZOA2	-2684433.827	-4293341.545	3865349.385	37.5430257666667	-122.0158937416670	-3.508
ZOA3	-2684438.193	-4293342.453	3865345.536	37.5429813333333	-122.0159301833330	-3.408
ZOB1	650770.203	-4754715.711	4187420.766	41.2971543138889	-82.2064445666667	223.723
ZOB2	650777.884	-4754714.883	4187422.779	41.2971666138889	-82.2063523694444	225.217
ZOB3	650776.207	-4754719.693	4187414.979	41.2970868833333	-82.2063799944444	223.479
ZSE1	-2308930.236	-3668169.700	4663526.488	47.2869933138889	-122.1883722750000	82.108
ZSE2	-2308934.649	-3668175.244	4663520.076	47.2869076472222	-122.1883826027780	82.174
ZSE3	-2308935.695	-3668179.524	4663516.132	47.2868559638889	-122.1883641666670	82.112
ZSU1	2462589.362	-5529371.557	2003724.618	18.4313385611111	-65.9934752555556	-28.571
ZSU2	2462587.279	-5529377.309	2003711.624	18.4312145972222	-65.9935154194444	-28.498
ZSU3	2462593.921	-5529375.113	2003709.571	18.4311950111111	-65.9934495305556	-28.487
ZTL1	529840.412	-5305248.827	3489342.860	33.3796885777778	-84.2967259333333	261.155
ZTL2	529846.804	-5305247.973	3489343.115	33.3796915638889	-84.2966566694444	261.116
ZTL3	529847.484	-5305251.412	3489337.880	33.3796348416667	-84.2966530722222	261.150

Figure 10-1 WAAS Build 6.078 Antenna Positions Deltas from 7/3/11 OPUS Survey

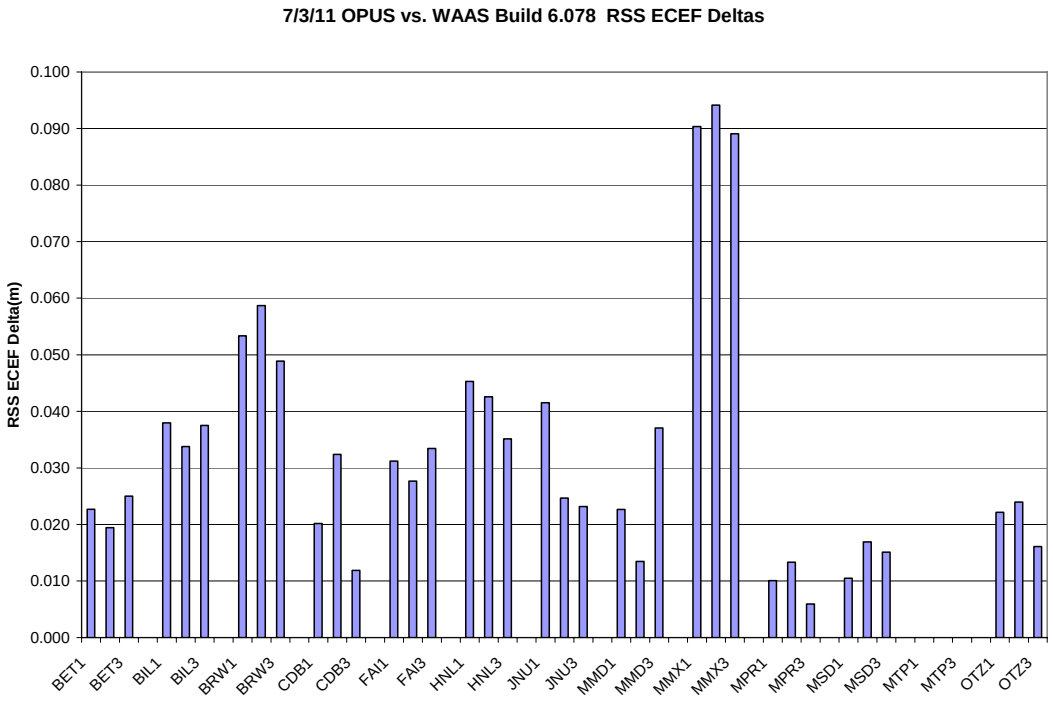


Figure 10-2 WAAS Build 6.078 Antenna Positions Deltas from 7/3/11 OPUS Survey

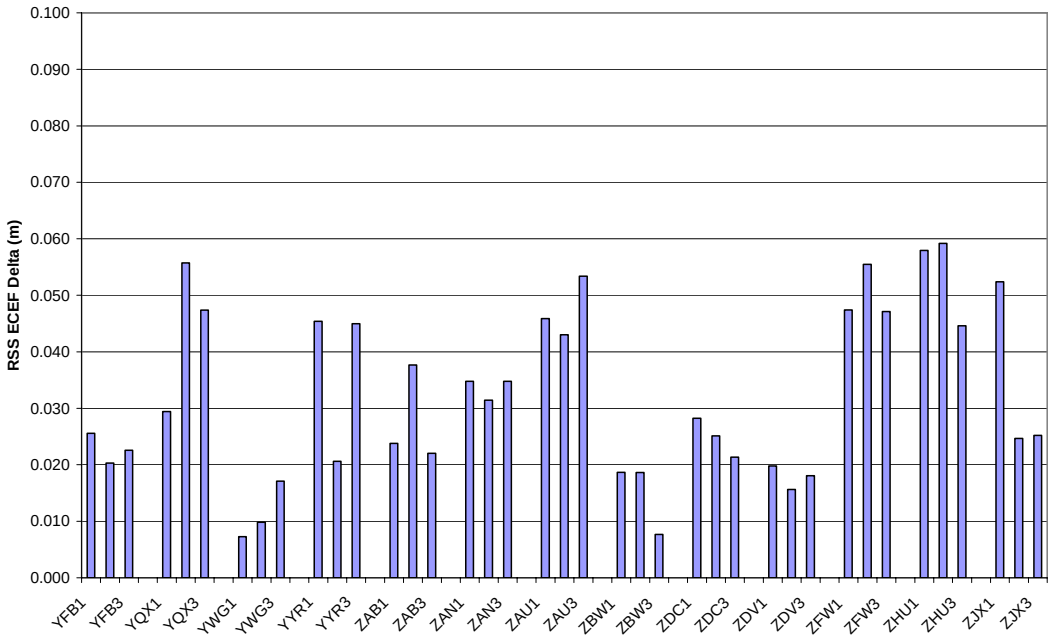


Figure 10-3 WAAS Build 6.078 Antenna Positions Deltas from 7/3/11 OPUS Survey

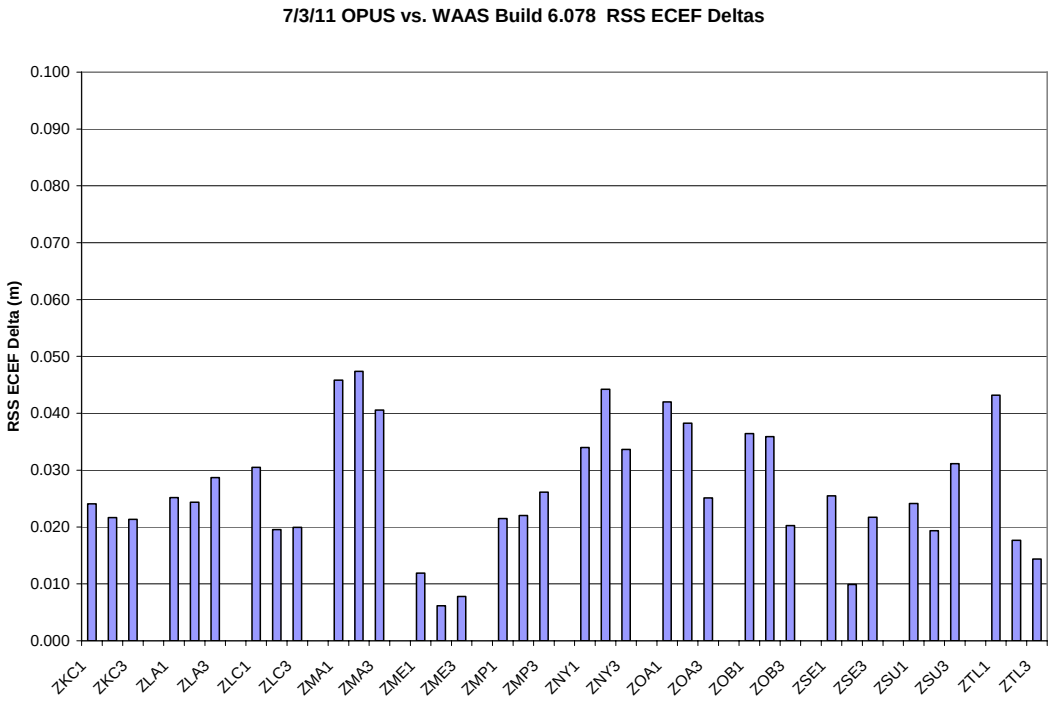


Figure 10-4 OPUS Overall RMS Qualitites

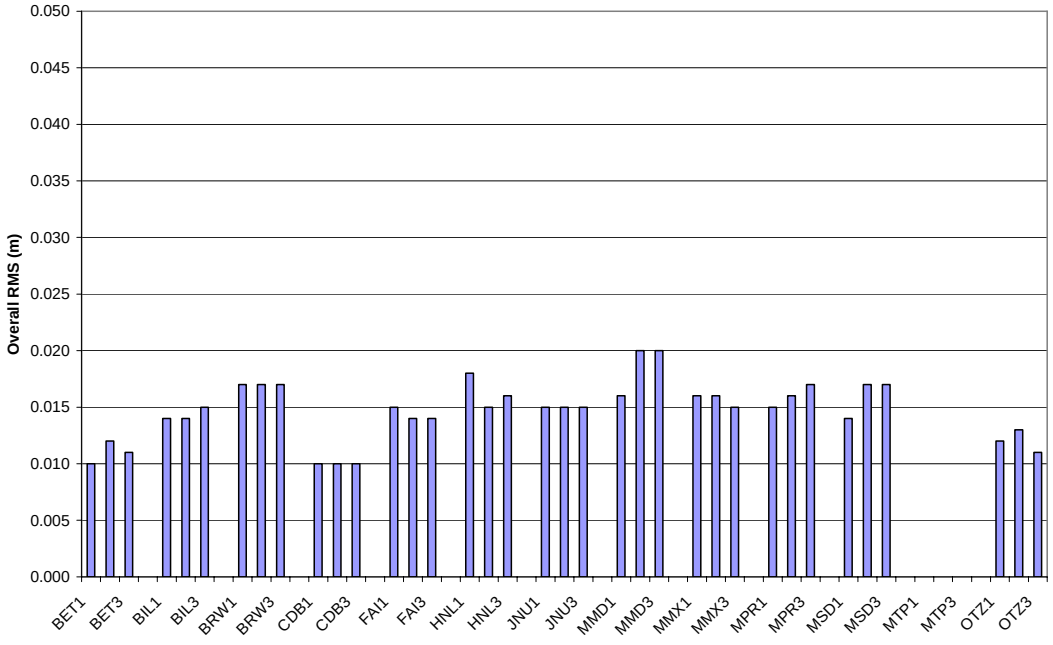


Figure 10-5 OPUS Survey Overall RMS Qualities

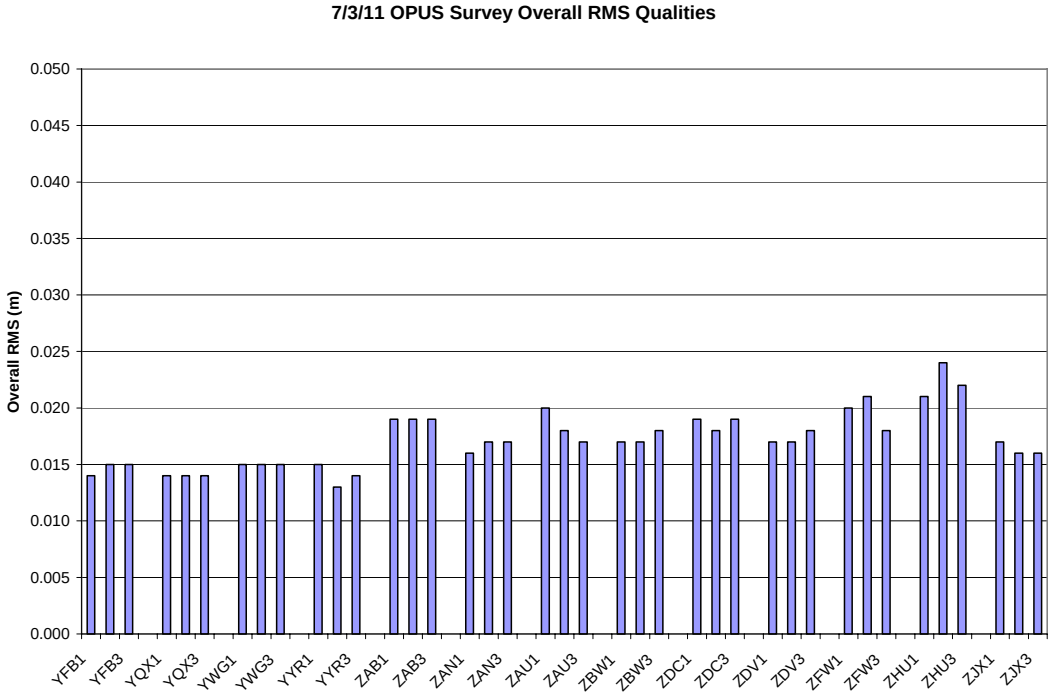


Figure 10-6 OPUS Survey Overall RMS Qualities

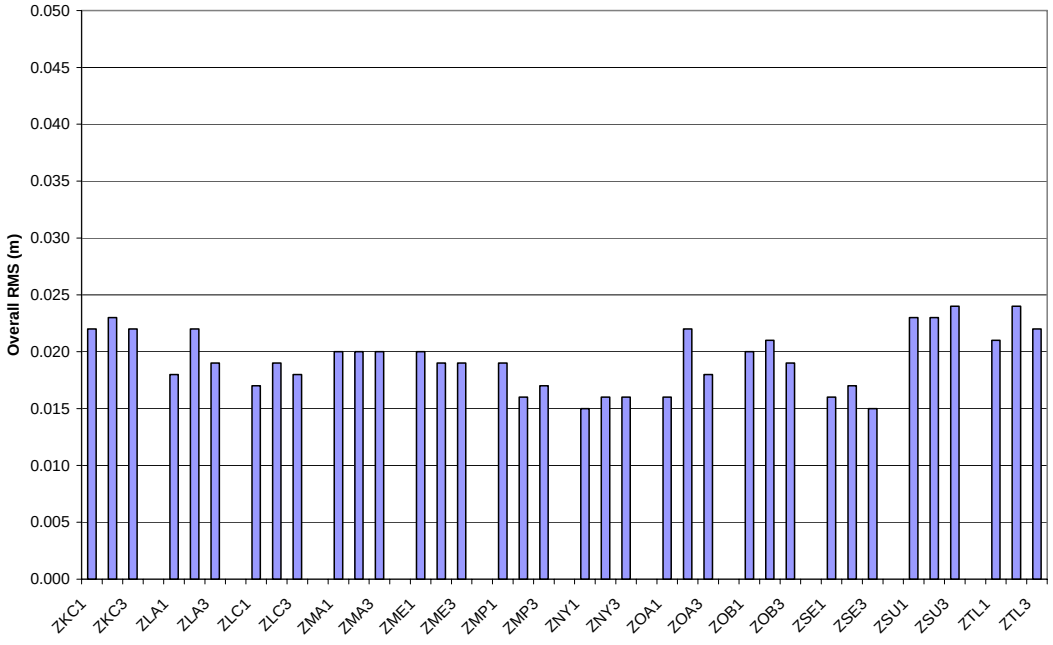


Figure 10-7 OPUS vs. CSRS RSS ECEF Deltas

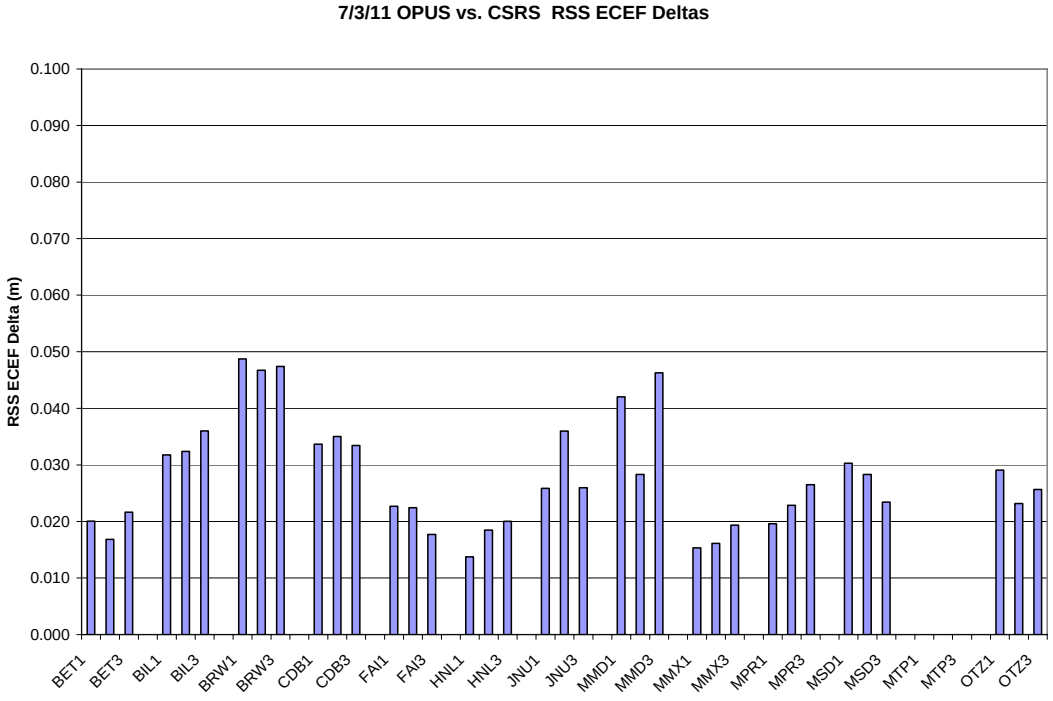


Figure 10-8 OPUS vs. CSRS RSS ECEF Deltas

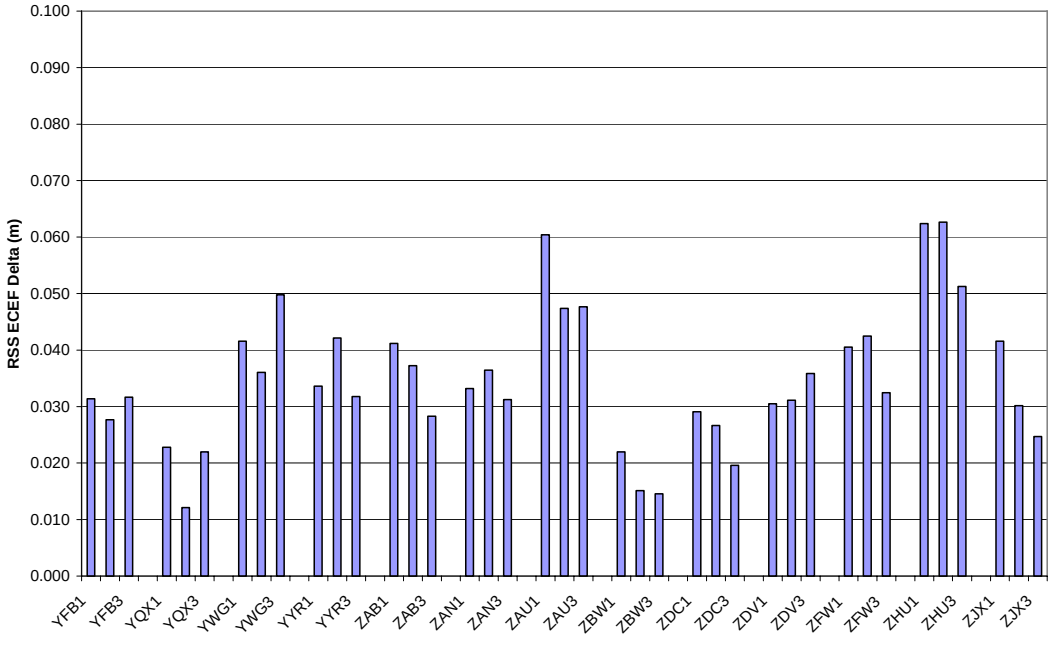


Figure 10-9 OPUS vs. CSRS RSS ECEF Deltas

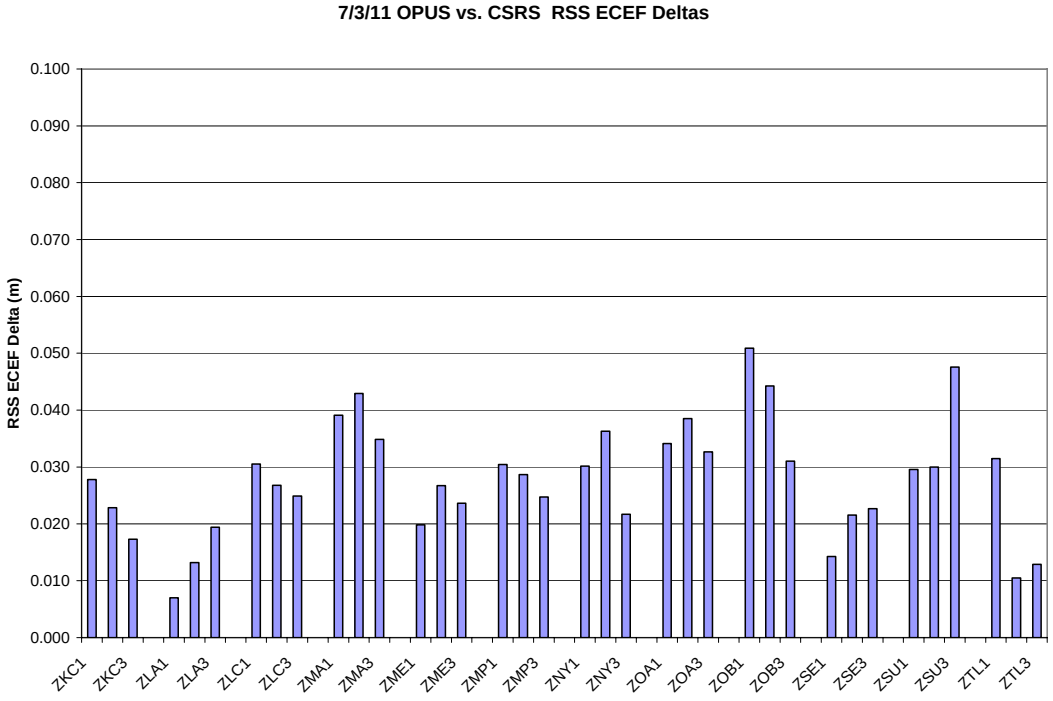


Figure 10-10 CSRS Survey Qualities

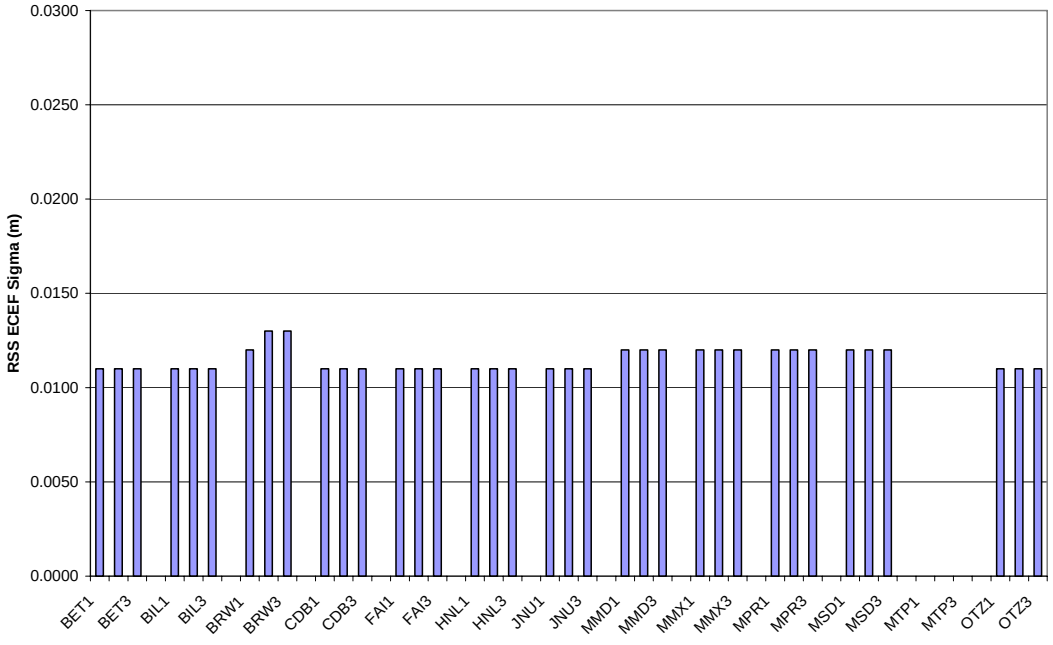


Figure 10-11 CSRS Survey Qualities

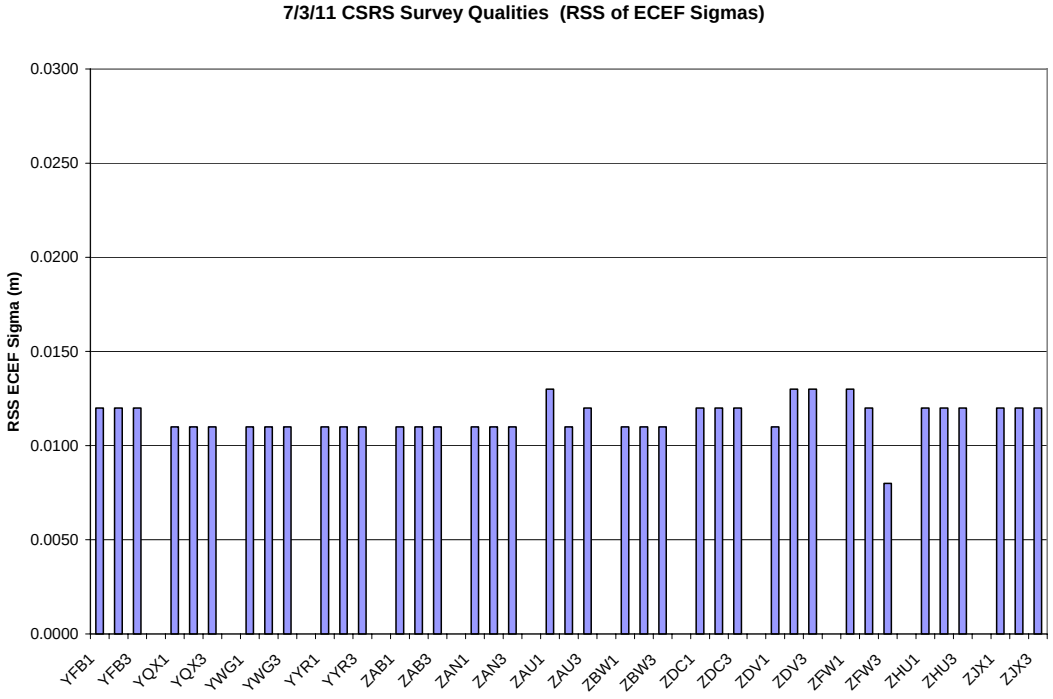


Figure 10-12 CSRS Survey Qualities

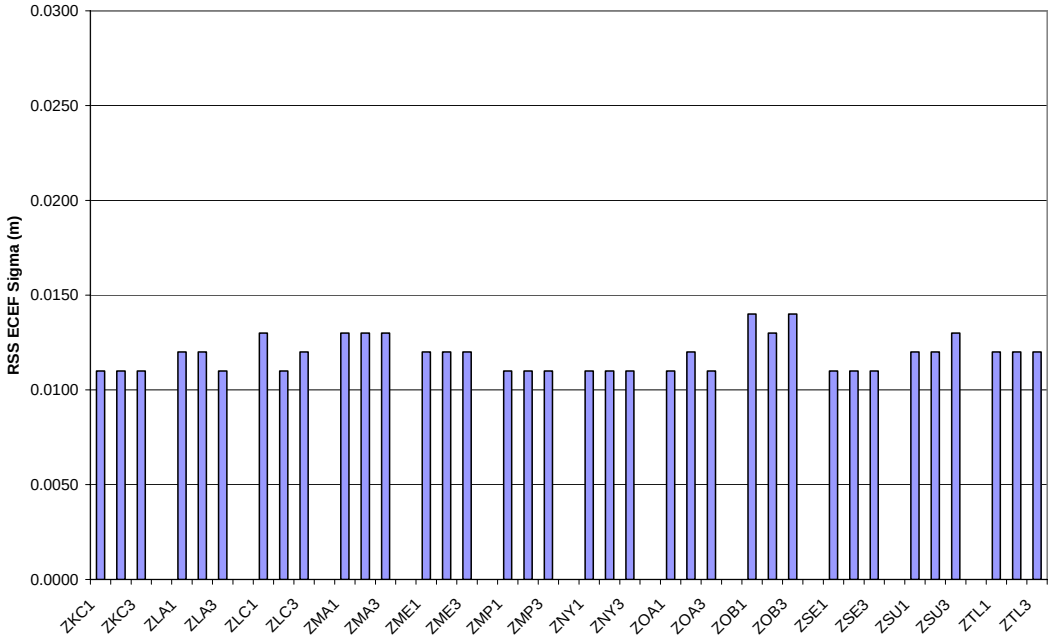


Figure 10-13 WAAS Build 6.071Antenna Positions Deltas from OPUS Survey

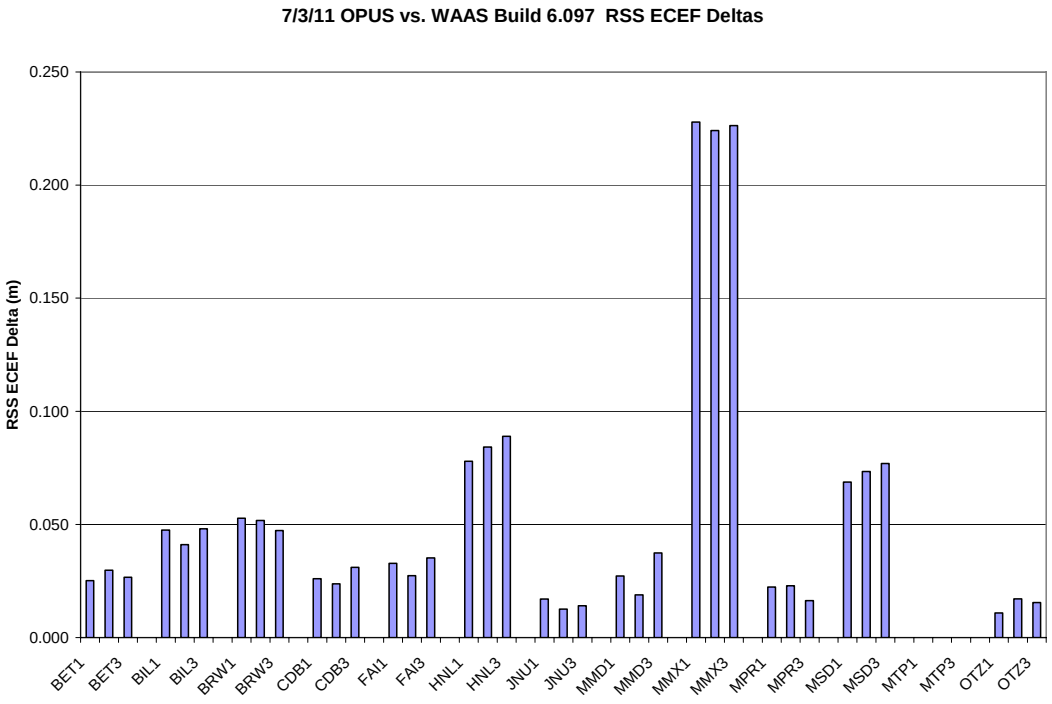


Figure 10-14 WAAS Build 6.071Antenna Positions Deltas from OPUS Survey

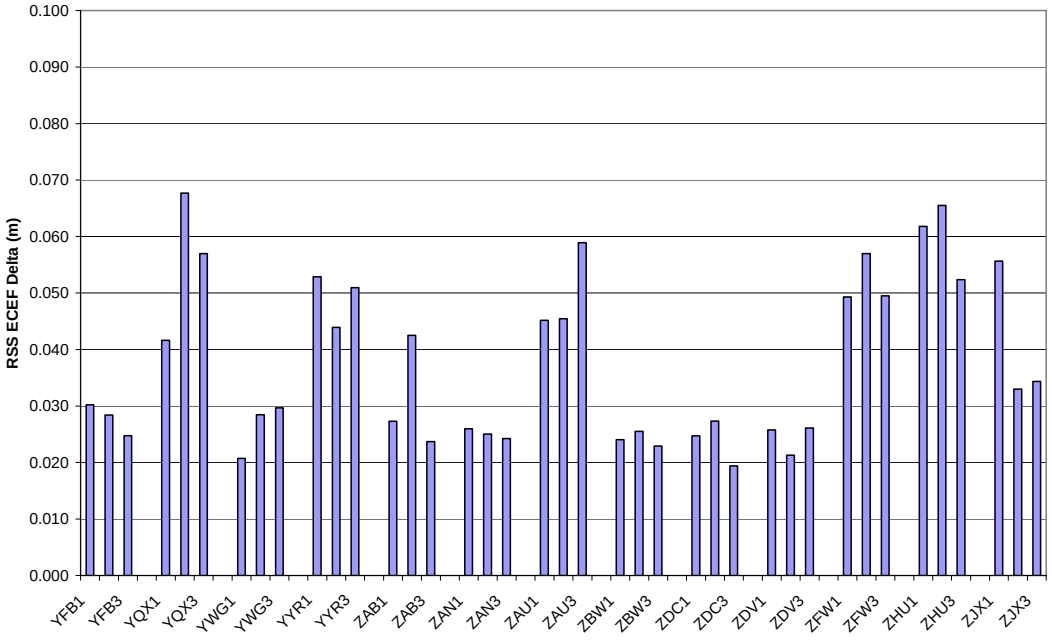
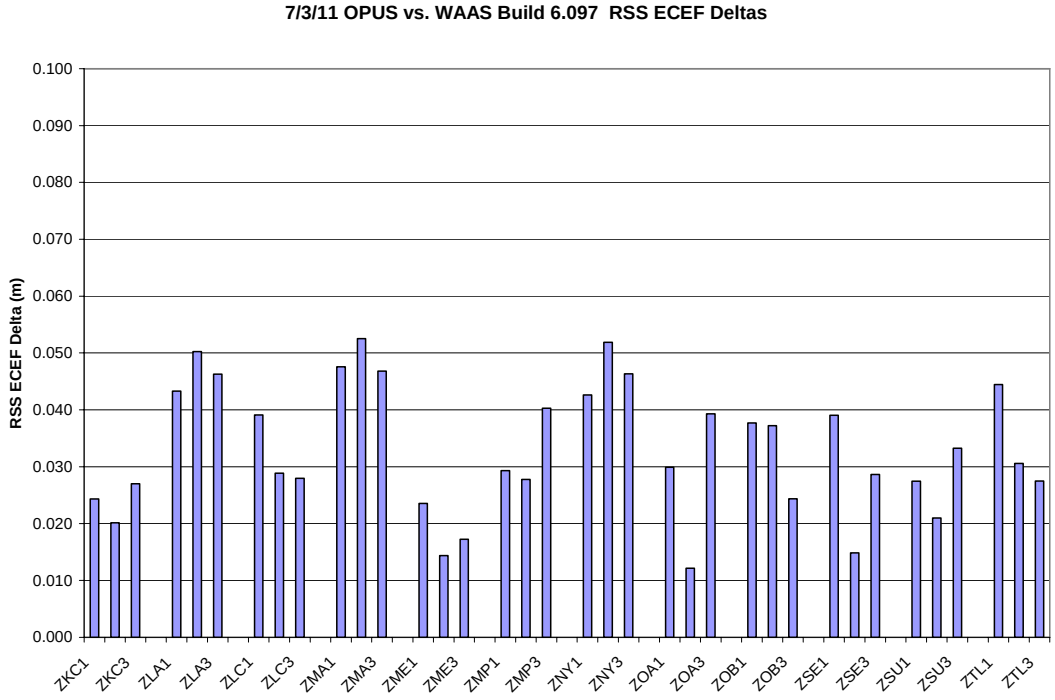


Figure 10-15 WAAS Build 6.071Antenna Positions Deltas from OPUS Survey



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.

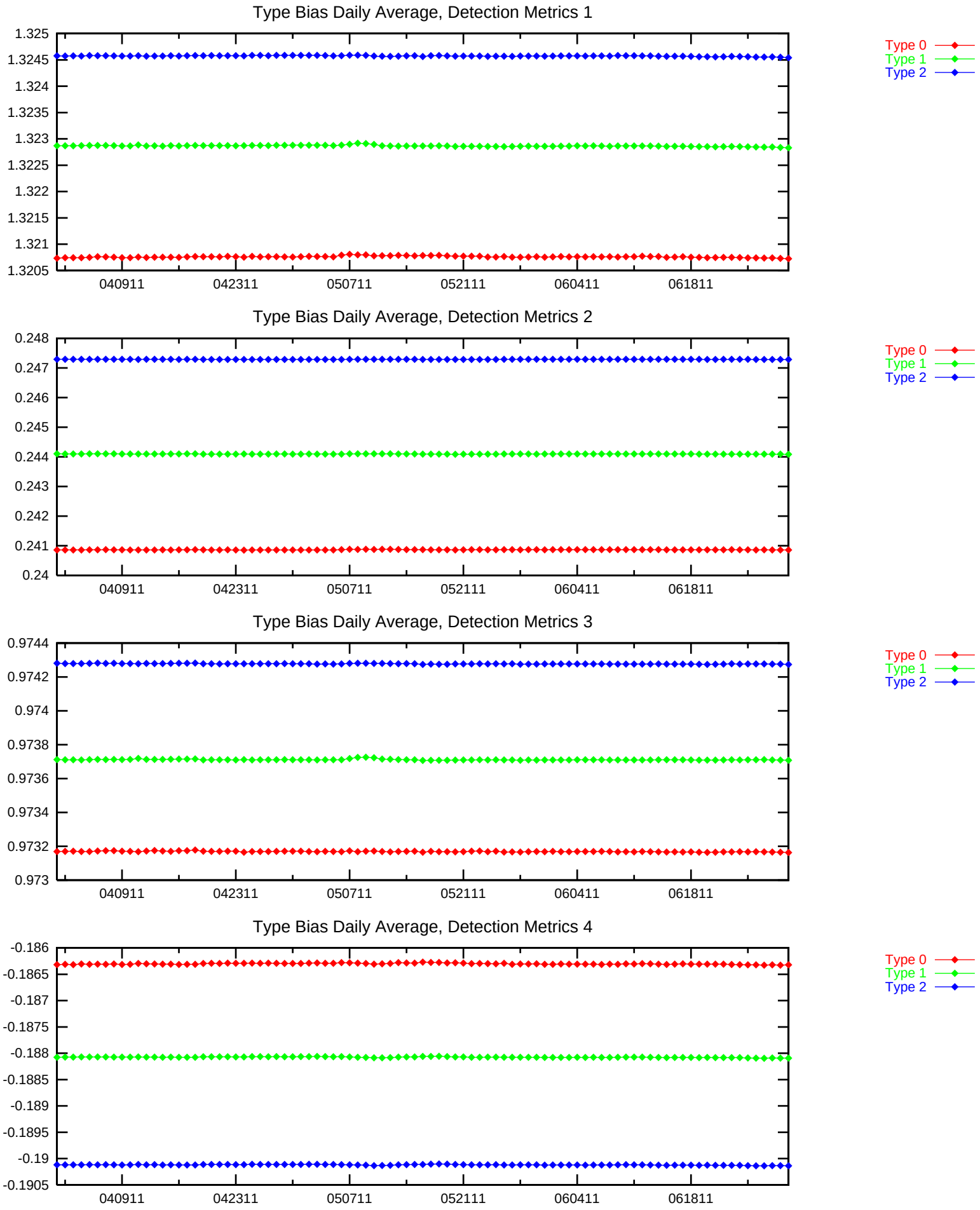
Table 11-2 Type Bias Average for the Quarter

Detection Metric	Type 0	Type 1	Type 2
DM 1	1.3207600	1.3228700	1.3245700
DM 2	0.2408640	0.2440950	0.2472890
DM 3	0.9731690	0.9737110	0.9742780
DM 4	-0.1863020	-0.1880750	-0.1901190

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

Detection Metric	Type 0	Type 1	Type 2
DM 1	1.3210100	1.3229100	1.3246200
DM 2	0.2408420	0.2441080	0.2472850
DM 3	0.9731770	0.9737130	0.9742770
DM 4	-0.1861520	-0.1880550	-0.1900880

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. The PRN 25 bias shifted slightly since coming back from maintenance on 4/10/11.

Table 11-4 PRN Bias Average for the Quarter

PRN	SVN	DM1	DM2	DM3	DM4
2	61	0.0002251	0.0000536	0.0000280	0.0000997
3	33	0.0001991	0.0000654	0.0000988	0.0003577
4	34	0.0001905	0.0000445	0.0000679	0.0001237
5	50	0.0001322	0.0001225	0.0000584	0.0001030
6	36	0.0001480	0.0000593	0.0000519	0.0001406
7	34	0.0001307	0.0000868	0.0000341	0.0001292
8	38	0.0001911	0.0001239	0.0000434	0.0001047
9	39	0.0001811	0.0000492	0.0000645	0.0001089
10	40	0.0007182	0.0000545	0.0002812	0.0001033
11	46	0.0009228	0.0001832	0.0000526	0.0002633
12	58	0.0001591	0.0000801	0.0000974	0.0000777
13	43	0.0005571	0.0000555	0.0000718	0.0001621
14	41	0.0006843	0.0001157	0.0001154	0.0001389
15	55	0.0001394	0.0000621	0.0000290	0.0001411
16	56	0.0001581	0.0000753	0.0001148	0.0003485
17	53	0.0001925	0.0000714	0.0000428	0.0001437
18	54	0.0006528	0.0001059	0.0000469	0.0002339
19	59	0.0004243	0.0001426	0.0000399	0.0000919
20	51	0.0001383	0.0000489	0.0000364	0.0001477
21	45	0.0005904	0.0001703	0.0001967	0.0001023
22	47	0.0004230	0.0000612	0.0000867	0.0003497
23	60	0.0010177	0.0001561	0.0000374	0.0004422
24	24	0.0002666	0.0000554	0.0000362	0.0001118
25	62	0.0003907	0.0002497	0.0000649	0.0001360
26	26	0.0002401	0.0000789	0.0001446	0.0000979
27	27	0.0004504	0.0000946	0.0000578	0.0003336
28	44	0.0002856	0.0000547	0.0000336	0.0001000
29	57	0.0002716	0.0000618	0.0000972	0.0002938
30	30	0.0003181	0.0000916	0.0000255	0.0001129
31	52	0.0004021	0.0001500	0.0000386	0.0002451
32	23	0.0001963	0.0000533	0.0000993	0.0000869

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

PRN	SVN	DM1	DM2	DM3	DM4
1	32	0.00013788	0.00004337	0.00007352	0.00007985
2	61	0.00018816	0.00005678	0.00002375	0.00009343
3	33	0.00021702	0.00005681	0.00009062	0.00035433
4	34	0.00023390	0.00004477	0.00007279	0.00013199
5	35	0.00042828	0.00006544	0.00011899	0.00015721
5	50	0.00014818	0.00013218	0.00006308	0.00009839
6	36	0.00015867	0.00005680	0.00004682	0.00012673
7	34	0.00013342	0.00008993	0.00003529	0.00012270
8	38	0.00016443	0.00012584	0.00004414	0.00010175
9	39	0.00021587	0.00005341	0.00006741	0.00011114
10	40	0.00066787	0.00006612	0.00026802	0.00009560
11	46	0.00090259	0.00018317	0.00005684	0.00023808
12	58	0.00022532	0.00008656	0.00010425	0.00008070
13	43	0.00051493	0.00005523	0.00006159	0.00015678
14	41	0.00064911	0.00011987	0.00011271	0.00012365
15	55	0.00012336	0.00006777	0.00002767	0.00013341
16	56	0.00016444	0.00007398	0.00011080	0.00034301
17	53	0.00013507	0.00007614	0.00003550	0.00012324
18	54	0.00061503	0.00010359	0.00004149	0.00021535
19	59	0.00038339	0.00013620	0.00003606	0.00008437
20	51	0.00015817	0.00004811	0.00003925	0.00013559
21	45	0.00061322	0.00018474	0.00020162	0.00009074
22	47	0.00019781	0.00008715	0.00009915	0.00015101
23	60	0.00095931	0.00014535	0.00003534	0.00042212
24	24	0.00030040	0.00004918	0.00003569	0.00010746
25	25	0.00015833	0.00011328	0.00008136	0.00030547
25	62	0.00036070	0.00020294	0.00008165	0.00012463
26	26	0.00026936	0.00008854	0.00015132	0.00008970
27	27	0.00047711	0.00008293	0.00006397	0.00033022
28	44	0.00024728	0.00005406	0.00003325	0.00009141
29	57	0.00022738	0.00006589	0.00010491	0.00028848
30	30	0.00030014	0.00009455	0.00002776	0.00011611
31	52	0.00046290	0.00015641	0.00003835	0.00025543
32	23	0.00028509	0.00004932	0.00010930	0.00009845

Figure 11-2 PRN Bias Average for the Quarter

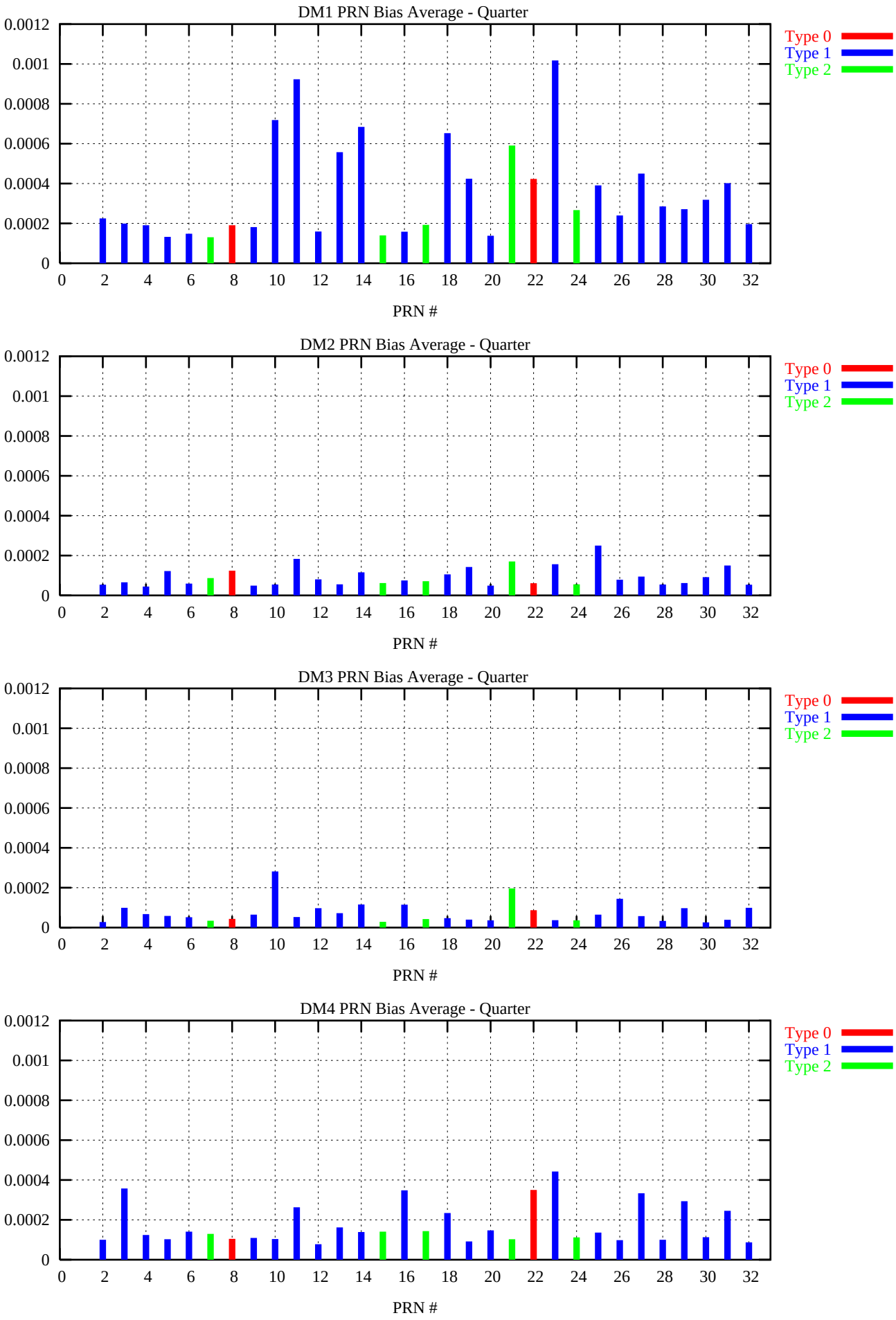


Figure 11-3 PRN Bias Average Trend (PRN 1 - PRN 4)

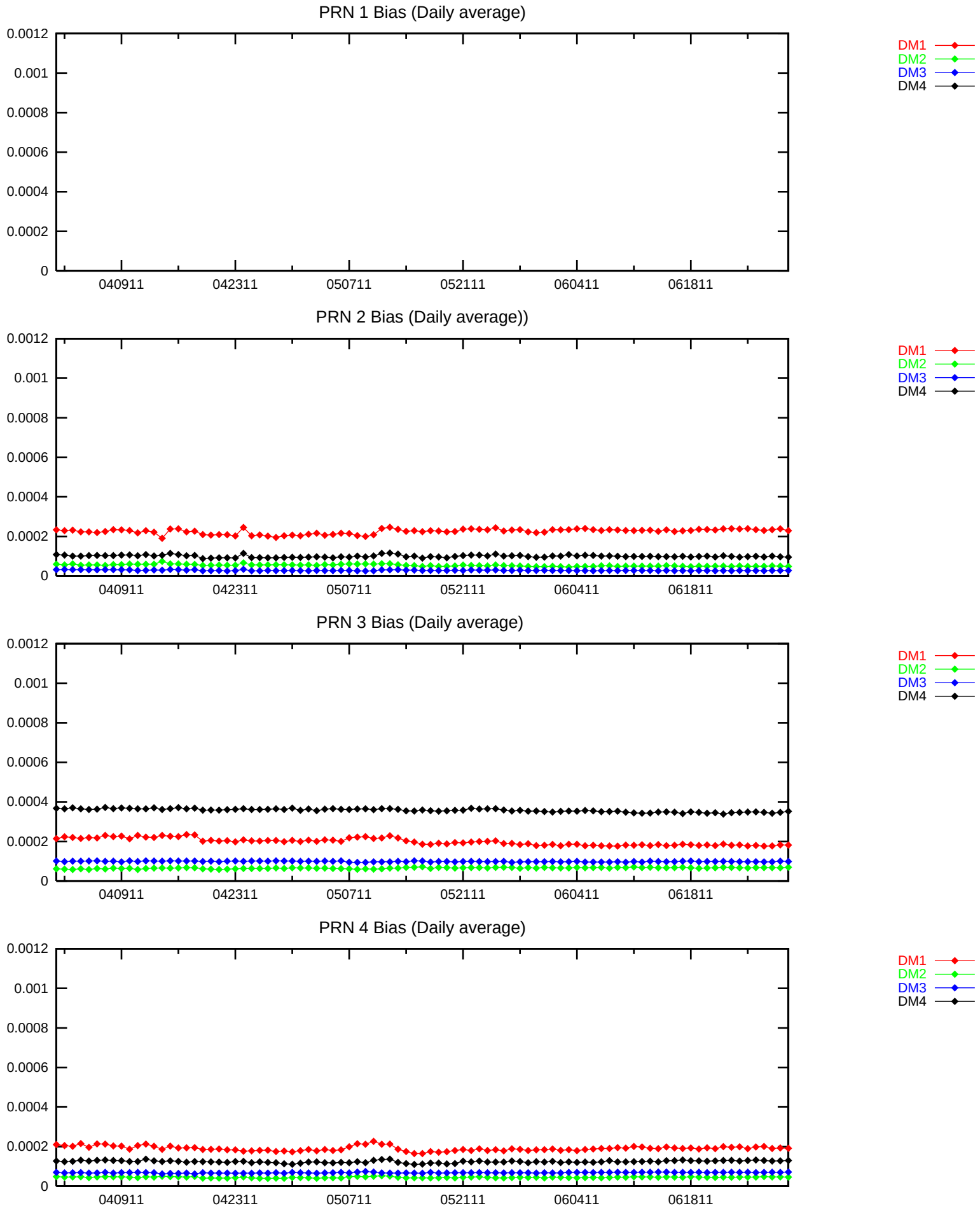


Figure 11-4 PRN Bias Average Trend (PRN 5 - PRN 8)

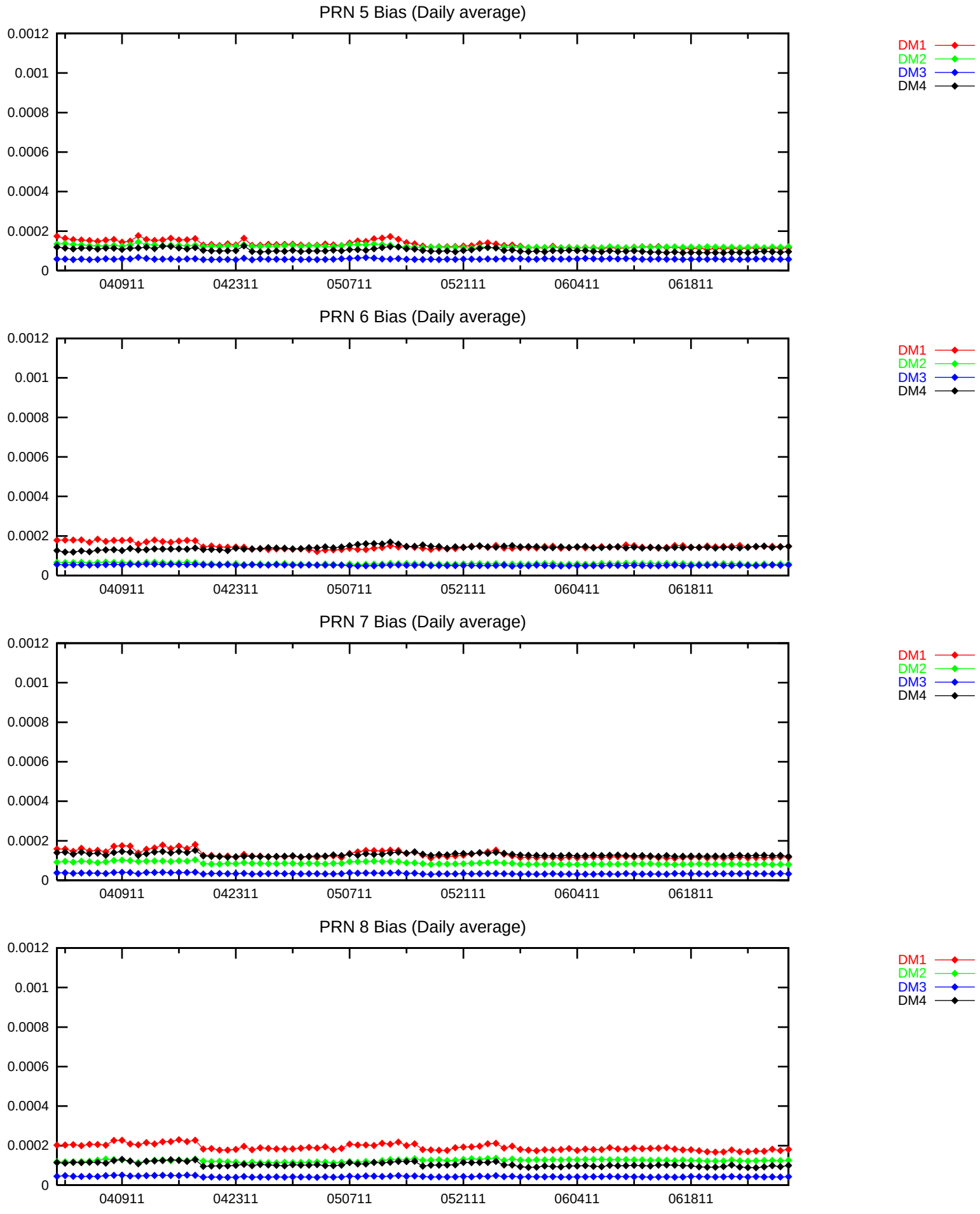


Figure 11-5 PRN Bias Average Trend (PRN 9 - PRN 12)

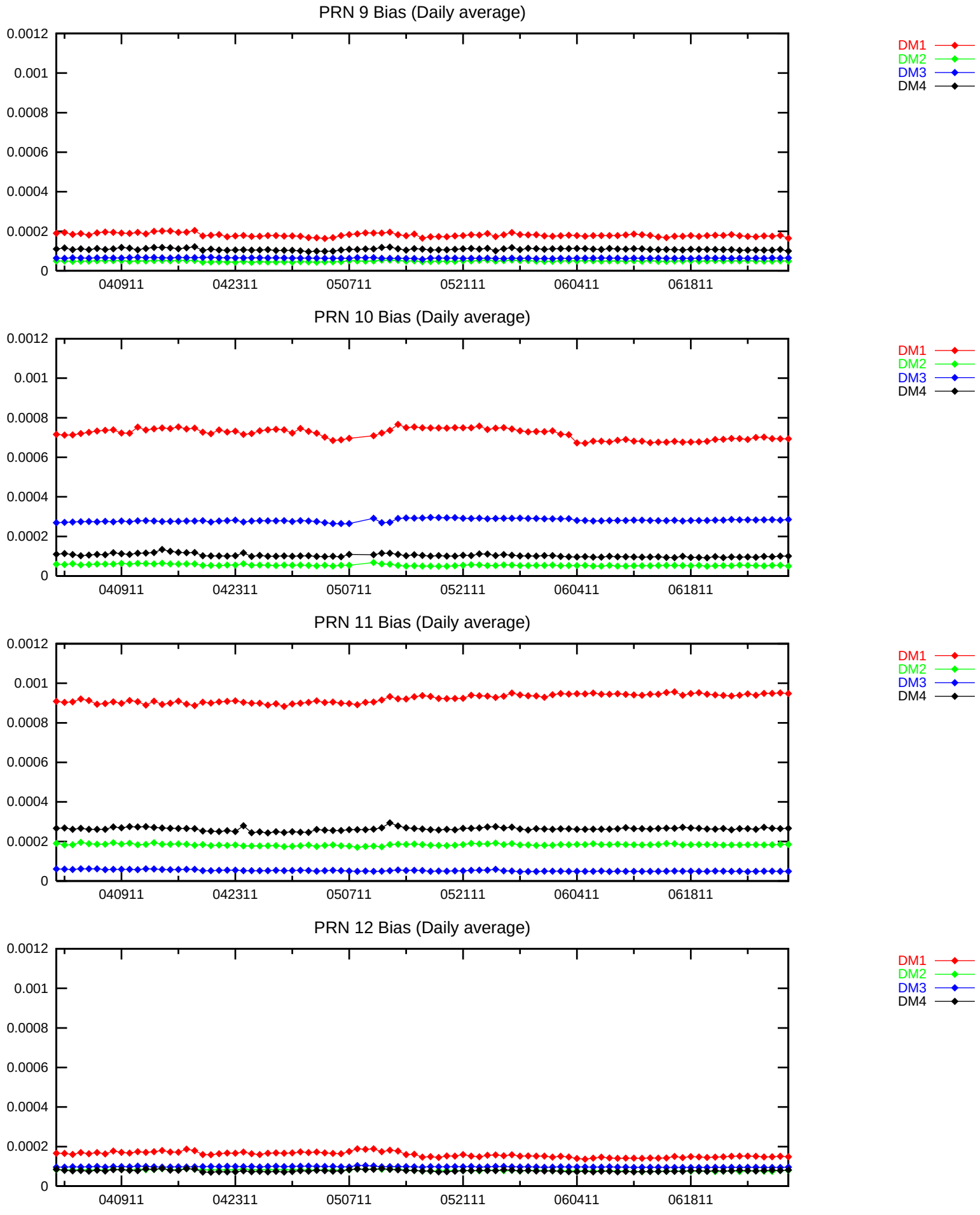


Figure 11-6 PRN Bias Average Trend (PRN 13 - PRN 16)

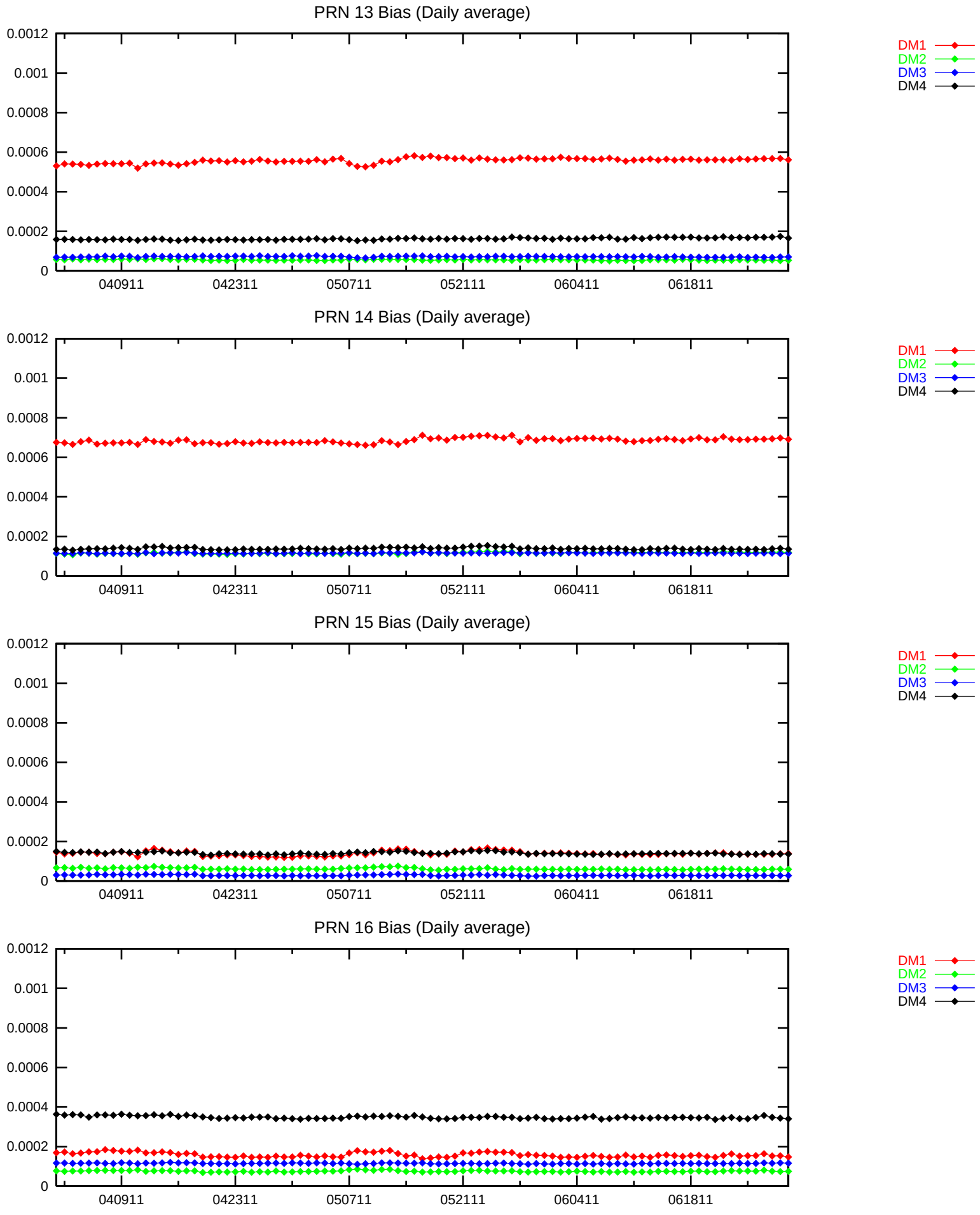


Figure 11-7 PRN Bias Average Trend (PRN 17 - PRN 20)

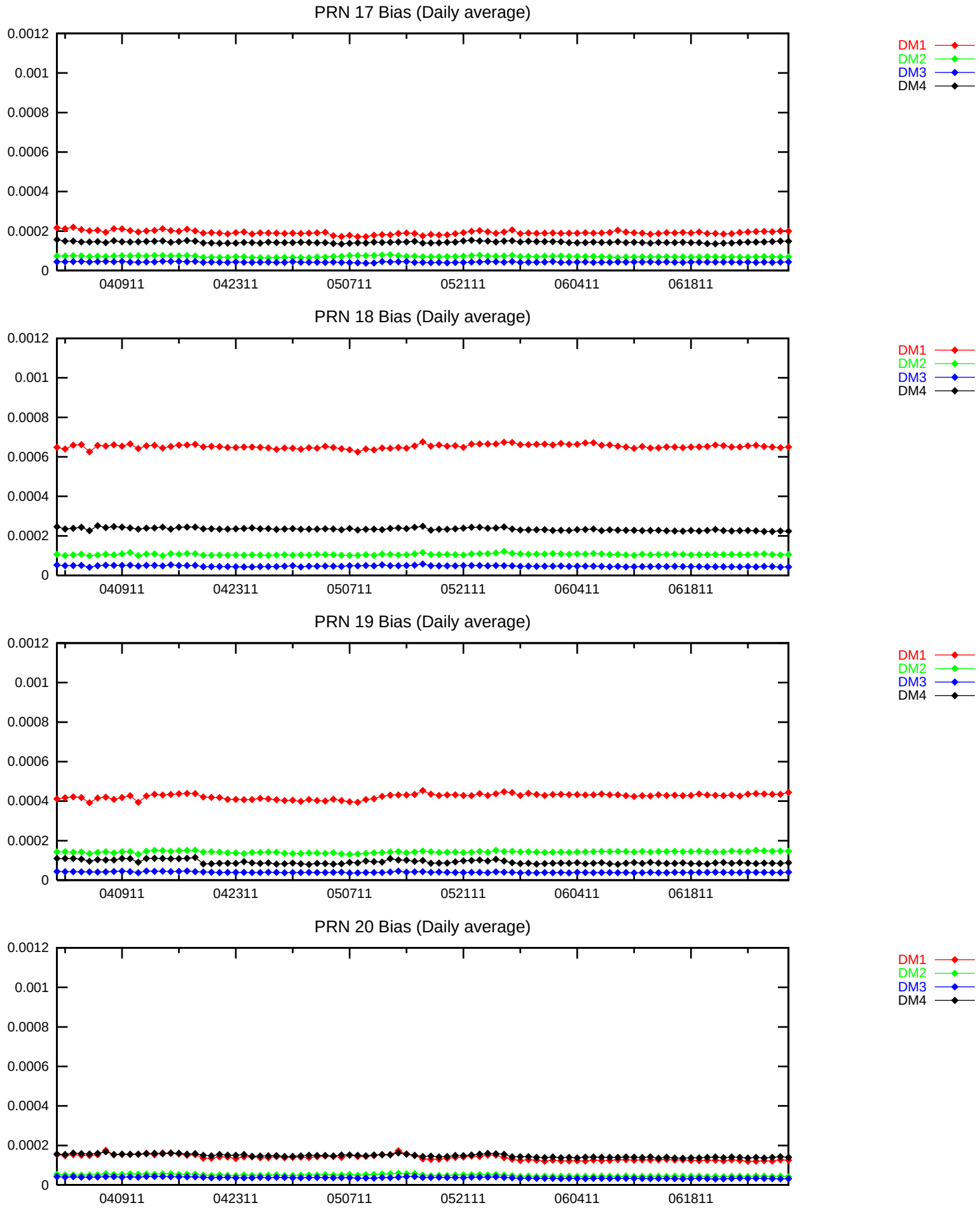


Figure 11-8 PRN Bias Average Trend (PRN 21 - PRN 24)

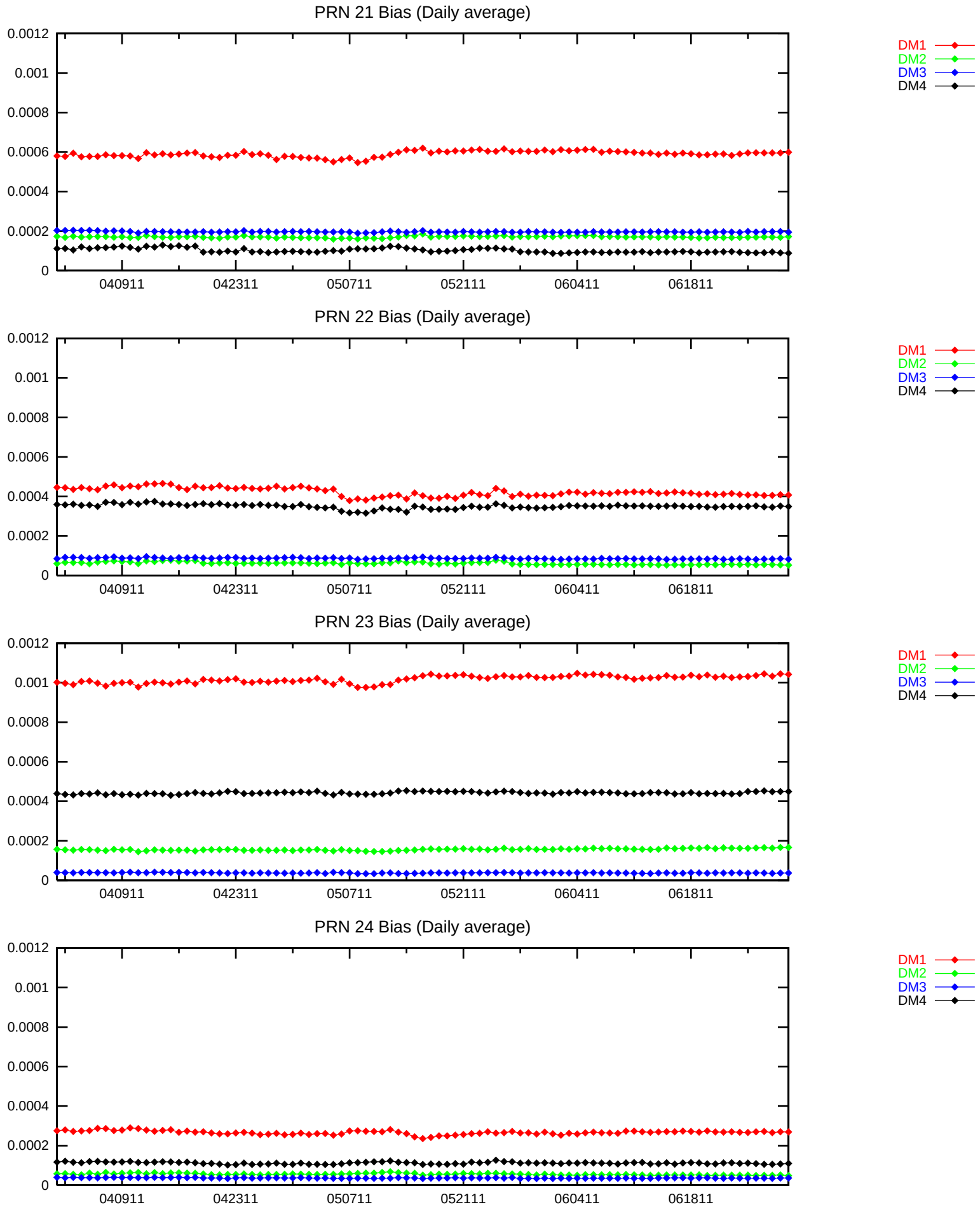


Figure 11-9 PRN Bias Average Trend (PRN 25 - PRN 28)

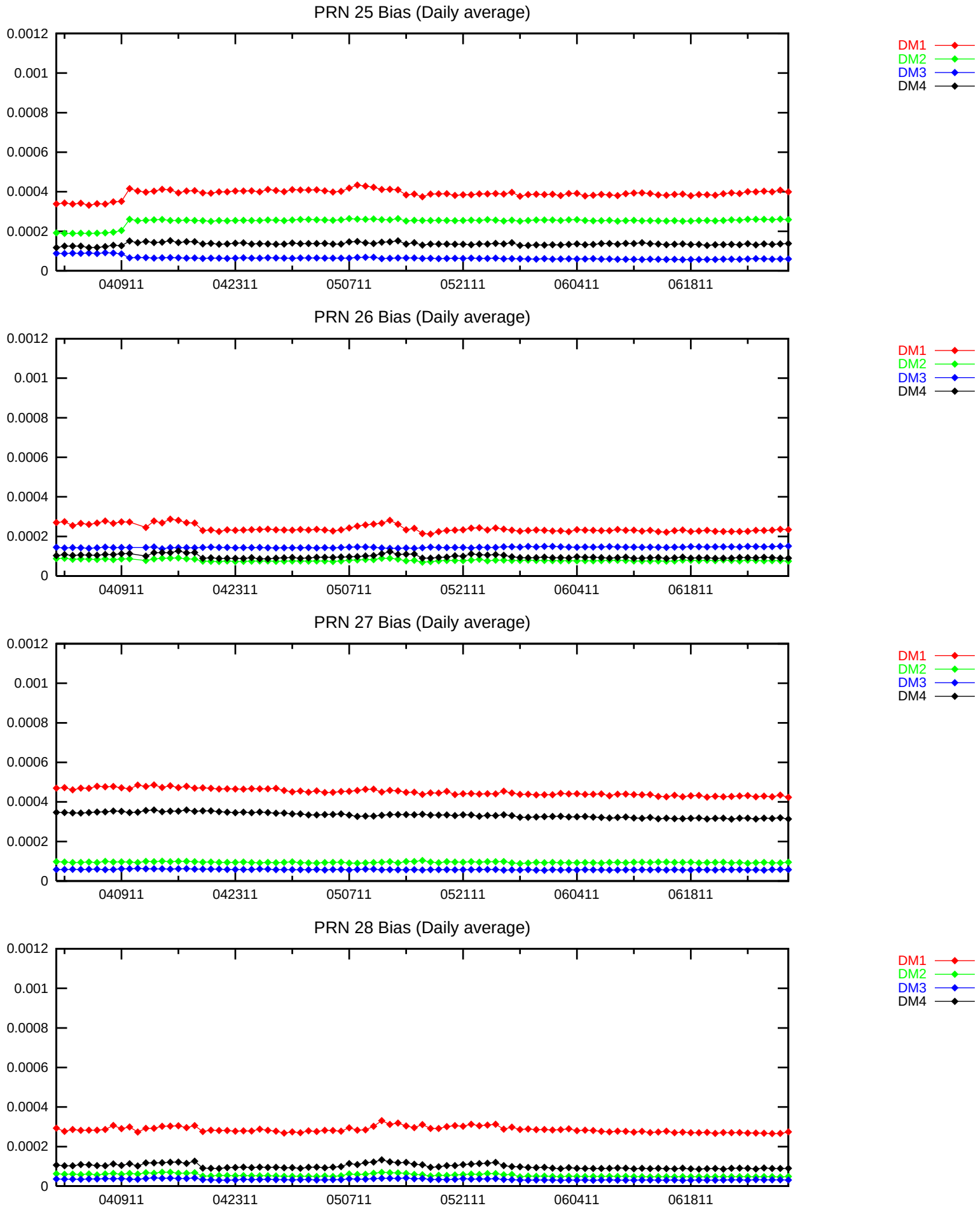
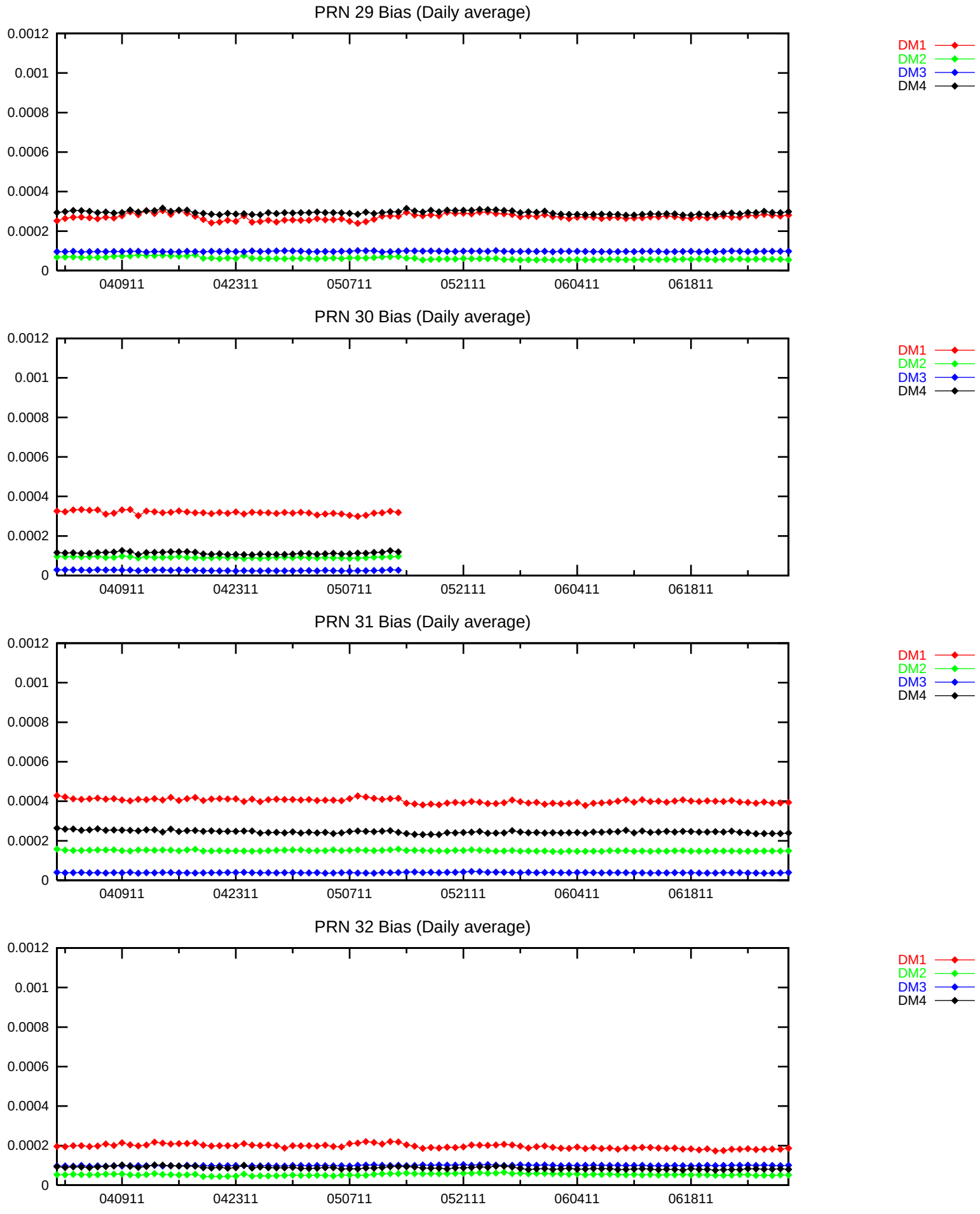


Figure 11-10 PRN Bias Average Trend (PRN 29 - PRN 32)



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

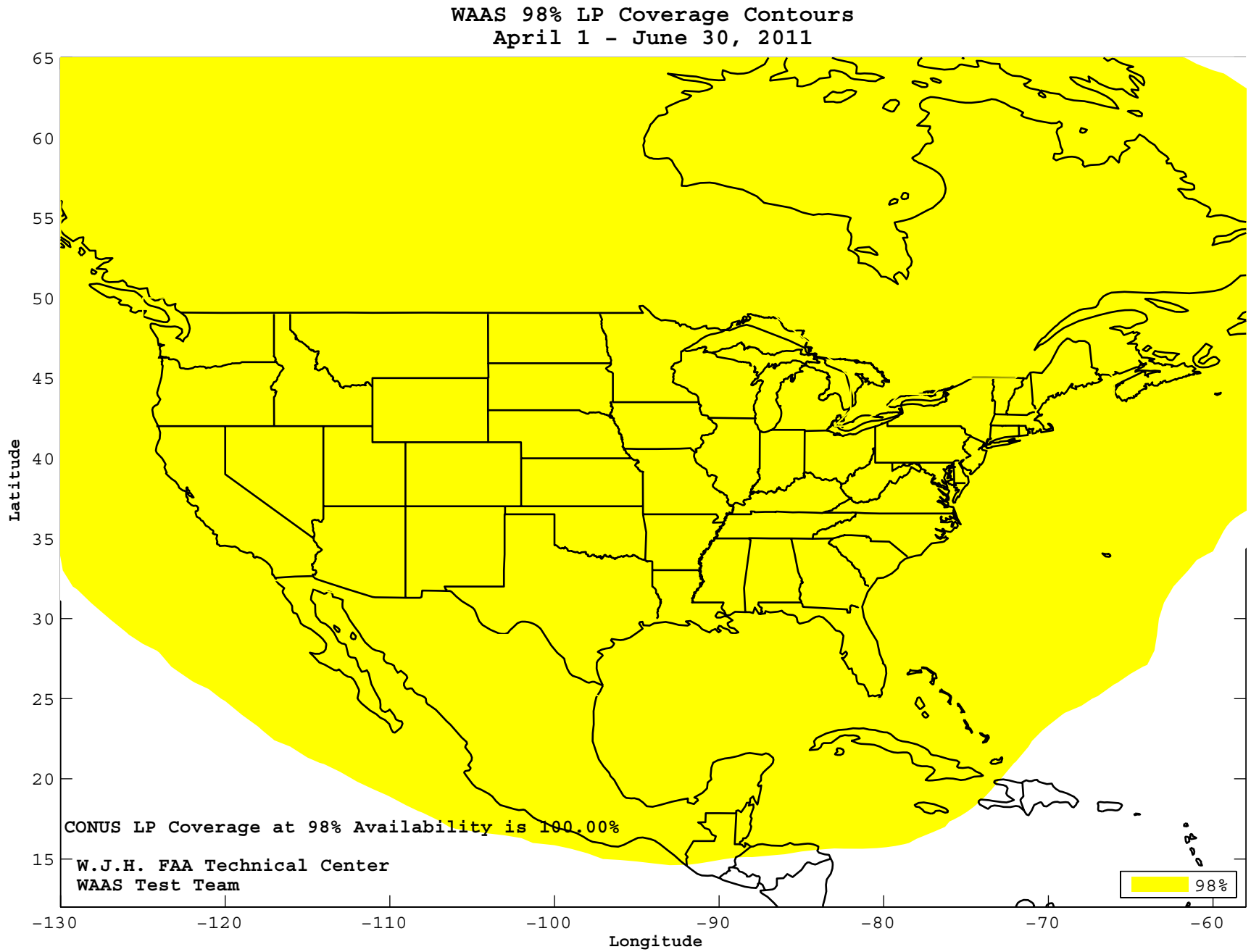


Figure B-2 98% Alaska LP Availability Contour for the Quarter

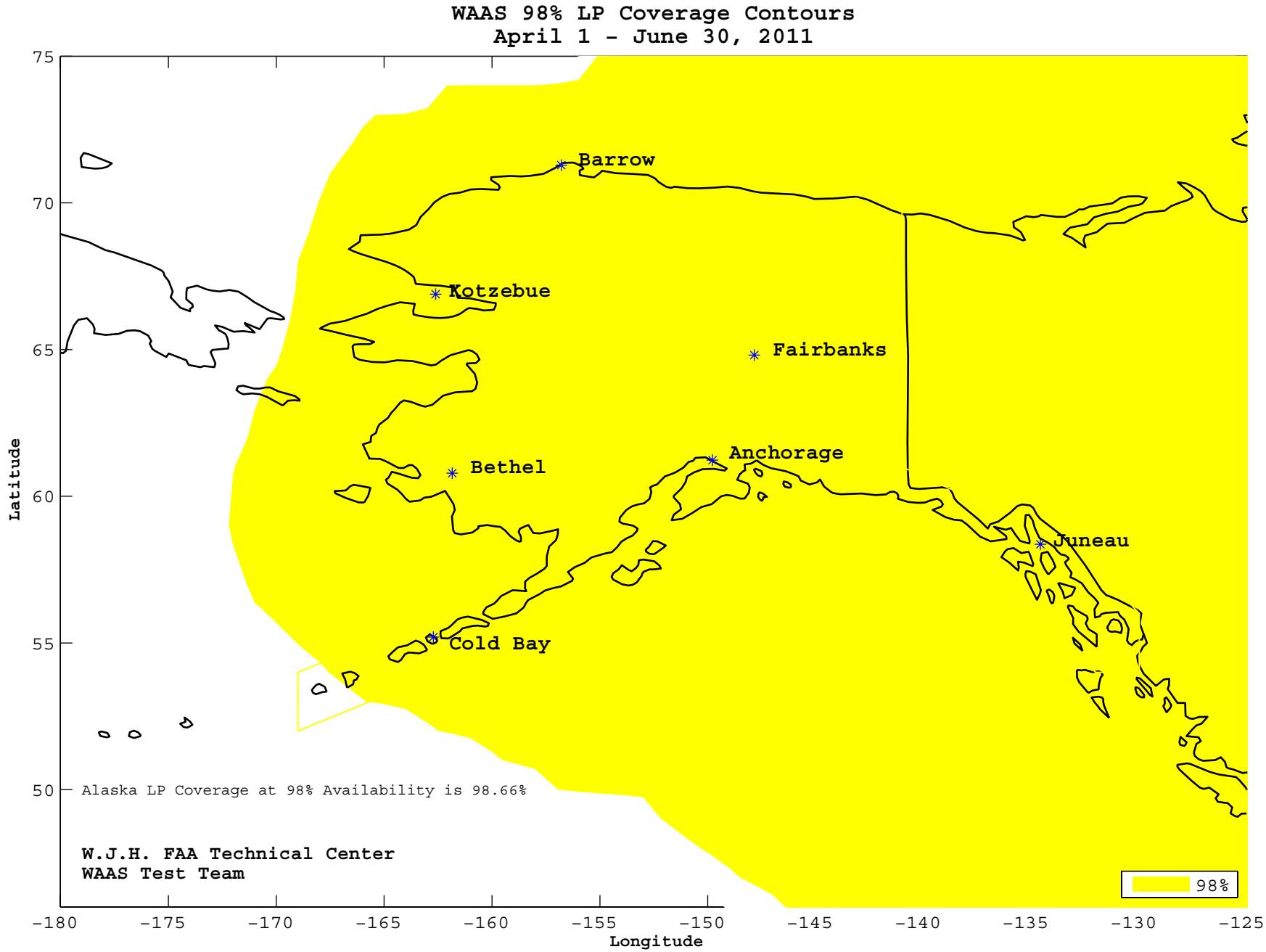


Figure B-3 98% CONUS LPV Availability Contour for the Quarter

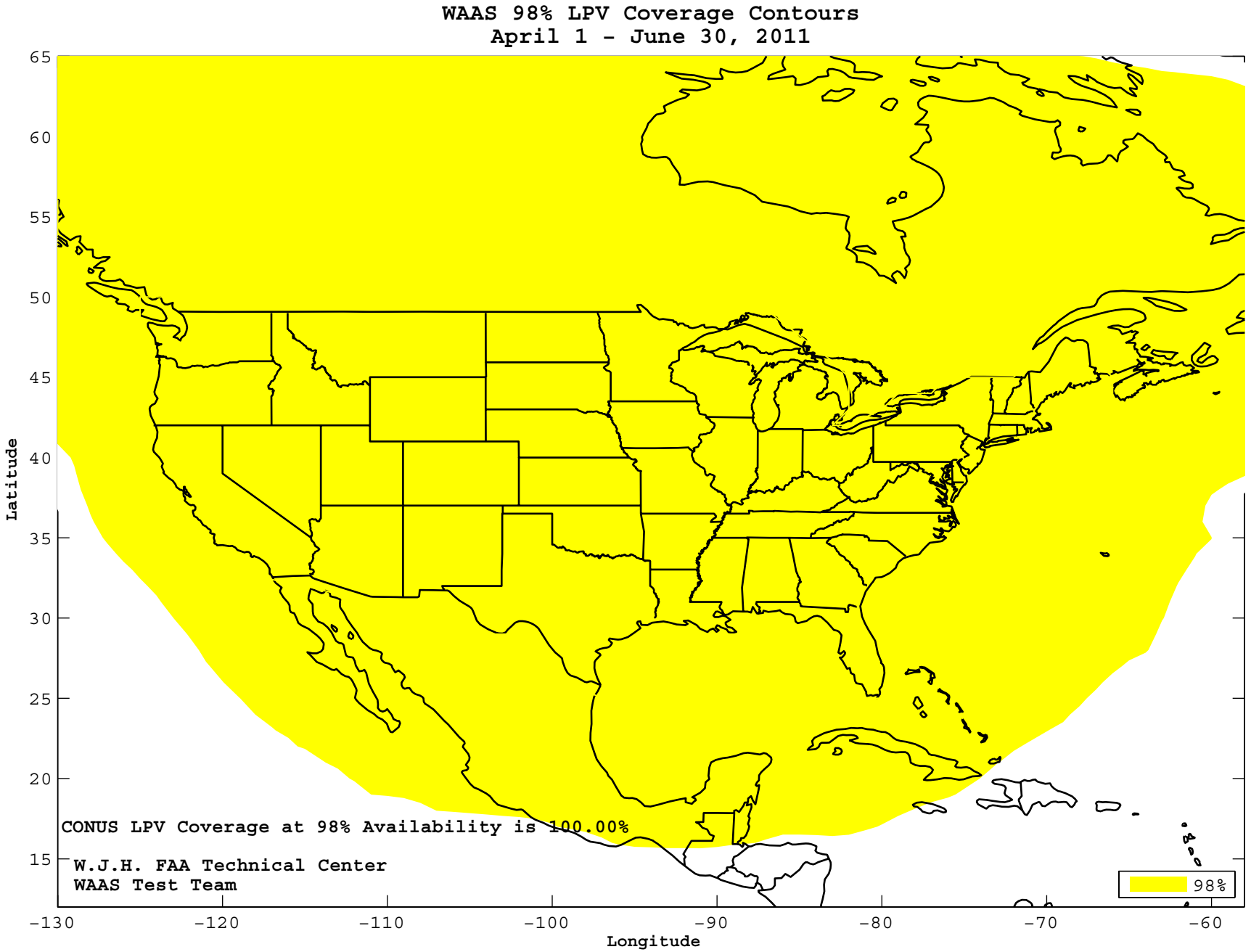


Figure B-4 98% Alaska LPV Availability Contour for the Quarter

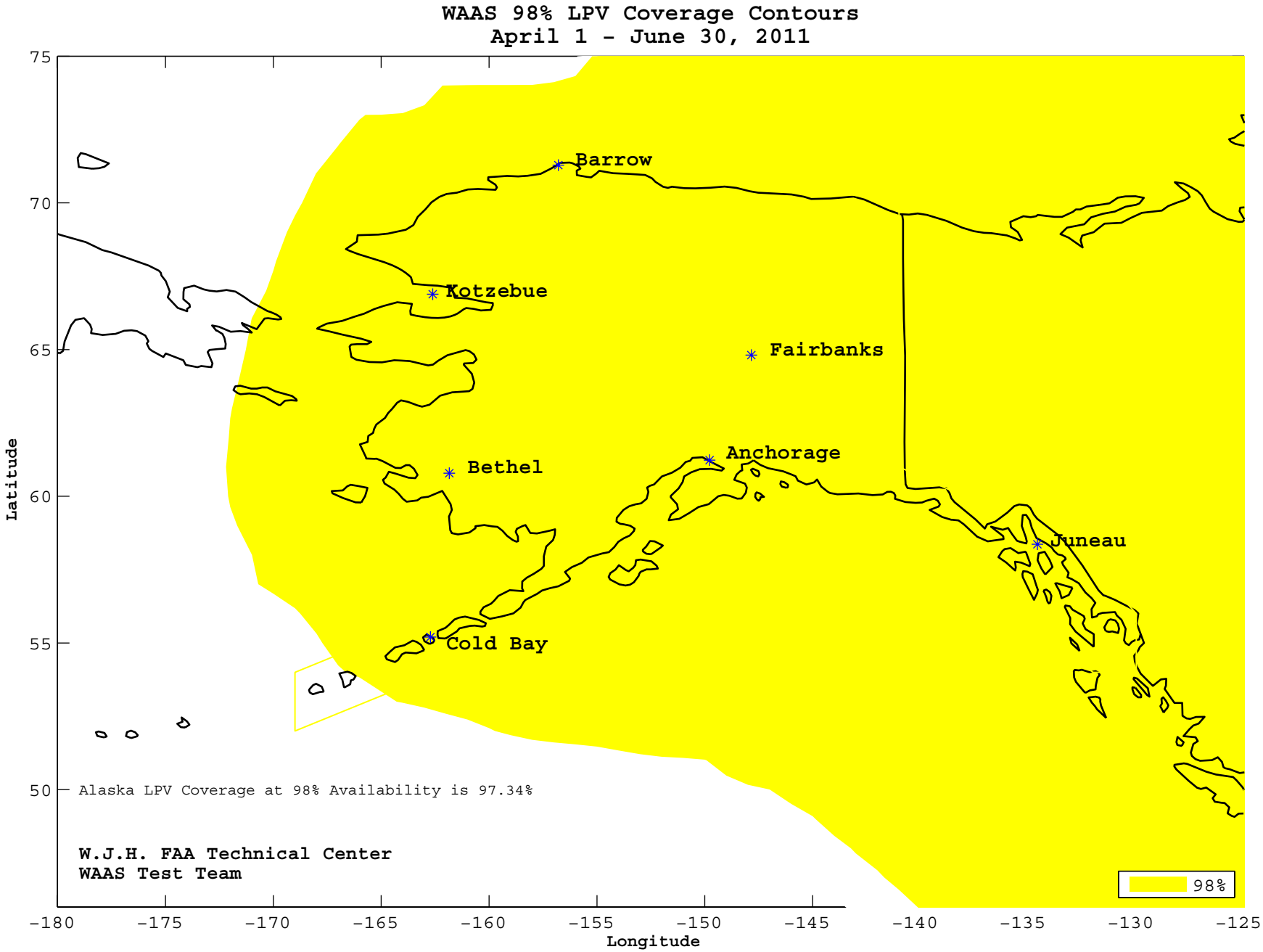


Figure B-5 99% CONUS LPV 200 Availability Contour for the Quarter

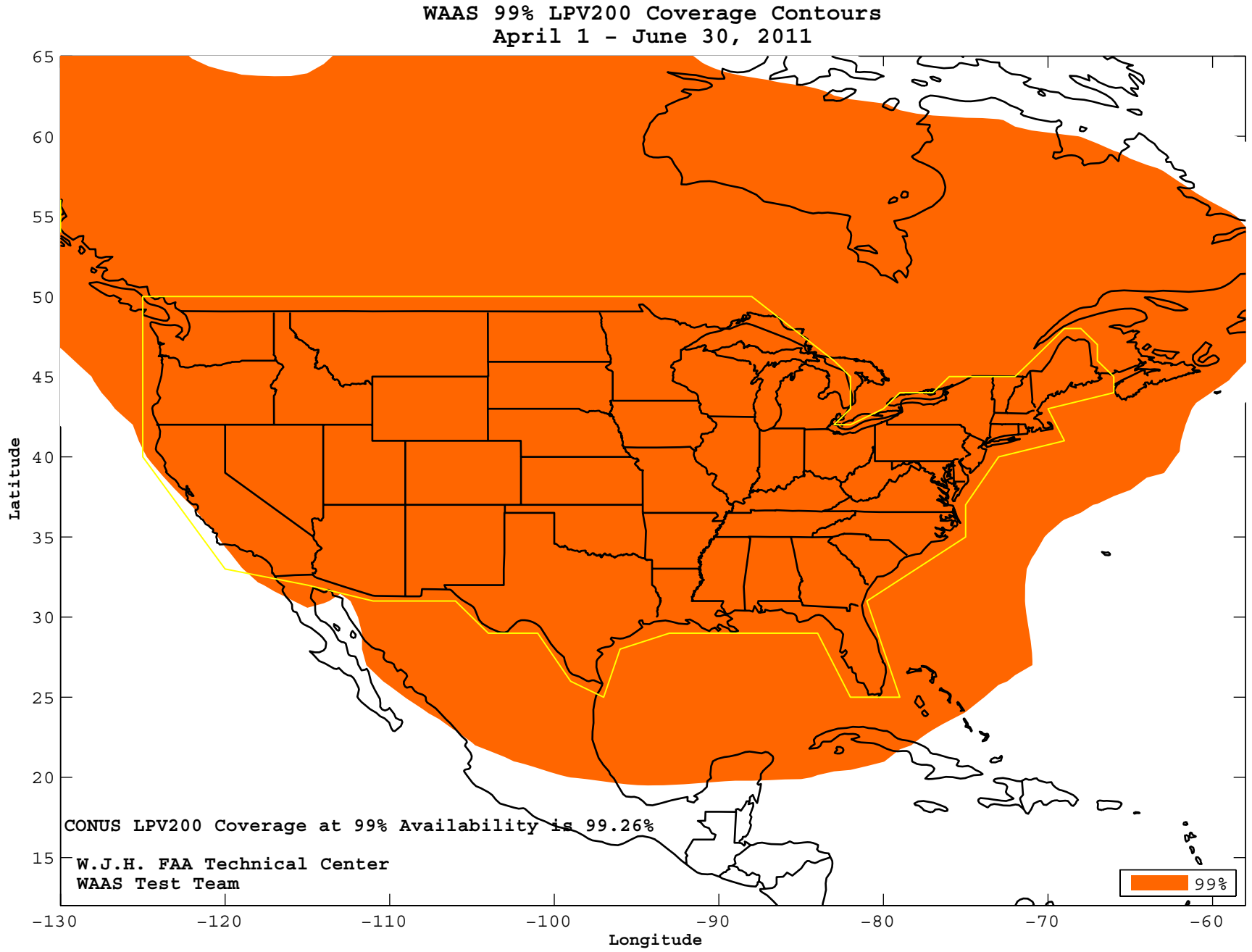


Figure B-6 99% Alaska LPV 200 Availability Contour for the Quarter