WIDE-AREA AUGMENTATION SYSTEM PERFORMANCE ANALYSIS REPORT

Report #39

Reporting Period: October 1 to December 31, 2011

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FAA/William J. Hughes Technical Center
NSTB/WAAS T&E Team
Atlantic City International Airport, NJ 08405
Website: http://www.nstb.tc.faa.gov/

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-ninth such WAAS quarterly report. This report covers WAAS performance during the period from October 1, 2011 to December 31, 2011.

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

Parameter	CONUS Site/Maximum	CONUS Site/Minimum	Alaska Site/Maximum	Alaska Site/Minimum
95% Horizontal Accuracy	Grand Forks 1.713 meters	Kansas City 0.62 meters	Barrow 0.866 meters	Bethel .61 meters
95% Vertical Accuracy	Miami 1.901 meters	Minneapolis 0.829 meters	Barrow 1.794 meters	Juneau 1.129 meters
LP Availability (HPL <= 40 meters)	Los Angeles 99.81%	Miami 99.36%	Barrow 99.53%	Juneau 99.45%
LPV Availability (HPL <= 40 meters & VPL <= 50 meters)	Los Angeles 99.71	Miami 99.32%	Fairbanks 99.51%	Barrow 99.31%
LPV 200 Availability (HPL <= 40 meters & VPL < =35 meters)	Albuquerque 99.57%	Arcata 96.34%	Fairbanks 99.46%	Cold Bay 91.42%
99% HPL	Miami 21.60 meters	Memphis 12.28 meters	Cold Bay 29.05 meters	Anchorage 14.68 meters
99% VPL	Arcata 39.40 meters	Memphis 21.00 meters	Barrow 41.41 meters	Juneau 24.72 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 provides a non-precision approach (NPA) ranging service starting 10/20/11 after Release 3A upgrade.

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	84	7236209
Grand Forks	88	7567192
Oklahoma City	89	7724197
WAAS:		
Albuquerque	92	7946876
Anchorage	92	7946471
Atlanta	92	7946570
Barrow	92	7944785
Bethel	91	7859744
Billings	92	7945593
Boston	92	7945317
Chicago	92	7946443
Cleveland	92	7943567
Cold Bay	92	7945993
Dallas	92	7931502
Denver	92	7939704
Fairbanks	92	7946933
Gander	92	7946947
Goose Bay	92	7936734
Houston	92	7944837
Iqaluit	92	7943359
Jacksonville	92	7948738
Juneau	92	7938799
Kansas City	92	7946114
Kotzebue	92	7946174
Los Angeles	92	7946637
Memphis	92	7941693
Merida	92	7944755
Mexico City	92	7945581
Miami	92	7918719
Minneapolis	92	7947075
New York	92	7944232
Oakland	92	7945160
Puerto Vallarta	92	7933612
Salt Lake City	92	7946327
San Jose Del Cabo	91	7843029
Seattle	92	7946406
Tapachula	73	6298675
Washington DC	92	7946722
Winnipeg	92	7946733

Table 1-3 NPA Sites

Location	Number of Days Evaluated	Number of Samples
Albuquerque	92	7946645
Anchorage	92	7946100
Atlanta	92	7943408
Barrow	92	7944664
Bethel	91	7900924
Billings	92	7943334
Boston	92	7940572
Cleveland	92	7945814
Cold Bay	92	7945548
Fairbanks	92	7925783
Gander	92	7946676
Honolulu	92	7946318
Houston	92	7946623
Iqaluit	92	7944841
Juneau	92	7940228
Kansas City	92	7939821
Kotzebue	92	7946588
Los Angeles	92	7944621
Merida	92	7934047
Miami	92	7946700
Minneapolis	92	7946856
Oakland	92	7942780
Salt Lake City	92	7946100
San Jose Del Cabo	92	7945522
San Juan	19	1615791
Seattle	92	7944742
Tapachula	73	6314241
Washington DC	92	7946564

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

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

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

Table 1-4 WAAS Performance Parameters

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

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

1.1 Event Summary

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

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

Table 1-5 Test Events

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
09/30/11	10/03/11	PRN8	LPV_Mexico, LPV200_CONUS, LPV200_Alaska, LPV200_Canada	Unplanned Maintenance NANU 2011084.
10/02/11	10/02/11	PRN135	LPV200_CONUS, LPV200_Alaska	Satellite maneuver was not entered. High UDRE values caused low service TOW 52780-55819.
10/03/11	10/03/11	GEO138, Brewster (BRE-B)	LPV200_CONUS	GUS manual switchover for maintenance, Brewster to Woodbine. Service was affected for 10/3/11 to 10/4/11 TOW 115221-115226.
10/05/11	10/09/11	Washington D.C. (C&V), Los Angeles (C&V), Atlanta (C&V)	LPV_Alaska, LPV_Canada, LPV_Mexico, LPV200_CONUS, LPV200_Alaska,	High GIVE values affected Canada, Alaska, and Mexico LPV and LPV200 all 5 days. Affected CONUS LPV200 Oct 8 and Oct 9.

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
			LPV200_Canada, LPV200_Mexico	
10/06/11	10/07/11	All Receivers	LPV_CONUS	LPV outages in California. Unexpected 4 minutes LPV outage occurred on the West coast (California). Increase of VPL to about 54 m (daily VPL at that time is around 47 m) was caused by IGP (40, -135) GIVE value.
10/07/11	10/08/11	Washington D.C. (C&V), Los Angeles (C&V), Atlanta (C&V)	Alaska, LPV200_CONUS	UDRE values spiked on several satellites at the same time on all 3 GEOs. There were no alerts issued. These spikes caused short (less than two minutes) outages for LP, LPV and LPV200 in Alaska, and LPV (California) and LPV200 (California and Arizona) outages in CONUS.
10/13/11	10/13/11	GEO138, Woodbine (QWE)	LPV200_CONUS, LPV200_Alaska, LPV200_Canada	GUS manual switchover - Woodbine to Brewster TOW 348635-348640.
10/14/11	10/14/11	PRN1	World Wide	PRN 1 (SVN 32) initially usable provided increased coverage in Alaska.
10/19/11	10/19/11	San Juan (ZSU1), San Juan (ZSU2), San Juan (ZSU3)	Mexico	Facility upgrade required WRS to be taken out of service. Taking this WRS out of WAAS system has caused low service in the Caribbean, and Mexico. Also affected Miami LPV200 coverage.
10/20/11	10/28/11	Washington D.C. (C&V), Los Angeles (C&V), Atlanta (C&V)	All	Software upgrade to 3A installation. This software upgrade supports AMR NPA ranging, improves iono storm detection and SQM processing.
10/21/11	10/22/11	Washington D.C. (C&V), Los Angeles (C&V), Atlanta (C&V)	All	Failed planned software upgrade caused C&V software to reset. This caused a ~4 hour service outage from 14:27 GMT to 18:40 GMT. 10/22/11 was also affected as the UDRE and GIVE values were elevated following the event. See DR#105 Software Upgrade 3A C&V Failure.
10/23/11	10/23/11	Washington D.C. (C&V), Los Angeles (C&V), Atlanta (C&V)	LPV_Alaska, LPV_Canada, LPV200_Alaska, LPV200_Canada	Numerous IGPs went to storm state affecting Alaska and Canada.
10/24/11	10/25/11	Washington D.C. (C&V), Los Angeles (C&V), Atlanta (C&V)	LPV_All, LPV200_All	Kp index of 7. Large Geomagnetic storm caused a large number of GIVE monitor trip.
10/27/11	10/27/11	GEO138, Brewster	LPV200_CONUS, LPV200_Alaska	GUS manual switchover, Brewster to Woodbine. Elevated UDRE values caused

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
		(BRE-B)		LPV200 coverage drop on eastern coast for October 27th and October 28th. TOW 374464-374469.
10/28/11	10/28/11	GEO135, NAPA (APC)	LPV200_CONUS, LPV200_Alaska	Napa SGS clock (PNE) - Phase/Freq jump resulted in 2s gap and UDRE values degradation. TOW 478965-478968.
11/01/11	11/01/11	GEO138, Woodbine (QWE)	LPV200_CONUS, LPV200_Alaska	GUS manual switchover, Woodbine to Brewster TOW 201659-201664.
11/01/11	11/01/11	Washington D.C. (C&V), Los Angeles (C&V), Atlanta (C&V)	LPV200_CONUS, LPV200_Alaska	Kp index of 5. GIVE monitor trips caused low service in Alaska and CONUS.
11/02/11	11/02/11	PRN138	LPV200_CONUS, LPV200_Alaska	Satellite maneuver was not entered. High UDRE values caused low service. TOW 294708-298527 (14-15).
11/03/11	11/04/11	GEO135, NAPA (APC)	LPV200_CONUS, LPV200_Alaska	GUS manual switchover - Napa to Littleton TOW 374483-374488.
11/03/11	11/30/11	Washington D.C. (C&V), Los Angeles (C&V), Atlanta (C&V)	LPV_All, LPV200_All	UDRE spikes caused service outage. Ongoing issue. Spikes were coming from RDM monitor bumping. See DR#106 UDRE spikes Lead to Reduced WAAS Availability.
11/04/11	11/04/11	PRN135	LPV200_CONUS	PRN 135 UDRE values increased from 11 to 15. TOW 462780-466527. Known behavior after software upgrade 3A.
11/10/11	11/10/11	PRN4	LPV_CONUS, LPV200_CONUS, LPV200_Alaska	NANU 2011090.
11/18/11	11/18/11	PRN32	LPV200_CONUS, LPV200_Alaska	NANU 2011092.
11/23/11	11/23/11	PRN31	None, LPV200_CONUS, LPV200_Alaska	NANU 2011094. Unexpected short LPV200 outages in CONUS and Alaska were caused by NANU on PRN 31 (from 2:42 to 9:35 GMT).
11/26/11	11/26/11	GEO135, Littleton (APA)	Alaska, LPV200_CONUS	GUS switchover, Littleton faulted. Receiver SCAF. LPV200 CONUS affected from ~21:59 to ~22:08. TOW 595097-595112.
11/30/11	11/30/11	PRN20	LPV_CONUS, LPV_Alaska, LPV200_CONUS, LPV200_Alaska	NANU 2011097.
12/04/11	12/13/11	PRN30	LPV200_Alaska	NANU 2011102.
12/15/11	12/15/11	GEO138, Brewster (BRE-B)	LPV_Alaska, LPV200_Alaska	GUS manual switchover, Brewster to Woodbine TOW 374653-374658. UDRE value for PRN138 was elevated after the switchover and equal to 11. NANU on PRN25. Both events contributed to the loss of the coverage for LPV and LPV200 in CONUS and Alaska.

Start Date	End Date	Location/ Satellite	Service Affected	Event Description
12/15/11	12/15/11	PRN25	LPV_Alaska, LPV200_CONUS, LPV200_Alaska	NANU 2011104.
12/19/11	12/19/11	Honolulu (HNL1), (HNL2), (HNL3)	Local	L2 interference on all threads at Honolulu. L1 was not affected therefore no service outage. See DR#108 Interference at Honolulu.
12/19/11	12/20/11	PRN25	LPV200_CONUS, LPV200_Alaska	NANU 2011106.
12/28/11	12/28/11	Washington D.C. (C&V), Los Angeles (C&V), Atlanta (C&V)	LPV200_Alaska	Coverage drop due to elevated GIVE values which went to the storm state at around 14:00 and 16:00 GMT. Coordinates for the storm state IGPs are (65,-160) and (60,-165).
12/29/11	01/04/12	GEO135	LPV200_Alaska	This event encapsulates behavior from GEO 135 that has happened from December 29 2011 through January 4 2012, and also on December 6 2011. TOW 303160-344510 Total of 17 seconds missing in this time period for Jan 4. Continued hardware failure. See DR#107 CRW Oscillator Failure.
12/30/11	12/30/11	PRN135	LPV200_Alaska	TOW 442591-444508 (11-15).
12/30/11	12/30/11	GEO135	LPV200_Alaska	Satellite hardware failure. TOW 348579-442516. Total 7 seconds missing over this time period.
12/31/11	12/31/11	GEO135, NAPA (APC)	LPV_Alaska, LPV200_Alaska	GUS manual switchover, Napa to Littleton. Many missed messages due to suspected bad USO (Universal Stable Oscillator) onboard CRW-135. Switchover done to rule out that the problem is GUS-related. TOW 593121-593126. Trouble shooting for the missed messages that occurred.

Table 1-6 WAAS Upgrades

START DATE	END DATE	EVENT DESCRIPTION
10/20/2011	10/28/2011	Software upgrade 3A installation started on October 20. Improve Iono storm detection, add AMR NPA ranging, and a fix to SQM processing.
10/21/2011	10/22/2011	Failed planned software upgrade caused C&V software to reset. This caused a ~4 hour service outage from 14:27 GMT to 18:40 GMT. 10/22/11 was also affected as the UDRE and GIVE values were elevated following the event.
11/05/2011	11/05/2011	Merida WRS software upgrade to Release 3A (W6.097L)
11/05/2011	11/05/2011	Iqaluit WRS software upgrade to Release 3A (W6.097L)
11/06/2011	11/06/2011	Mexico City WRS software upgrade to Release 3A (W6.097L)
11/06/2011	11/06/2011	Gander WRS software upgrade to Release 3A (W6.097L)
11/07/2011	11/07/2011	Kansas City WRS software upgrade to Release 3A (W6.097L)

START DATE	END DATE	EVENT DESCRIPTION
11/07/2011	11/07/2011	Honolulu WRS software upgrade to Release 3A (W6.097L)
11/08/2011	11/08/2011	Barrow WRS software upgrade to Release 3A (W6.097L)
11/09/2011	11/09/2011	Jacksonville WRS software upgrade to Release 3A (W6.097L)
11/09/2011	11/09/2011	Los Angeles WRS software upgrade to Release 3A (W6.097L)
11/10/2011	11/10/2011	Washington DC WRS software upgrade to Release 3A (W6.097L)
11/11/2011	11/11/2011	Winnipeg WRS software upgrade to Release 3A (W6.097L)
11/11/2011	11/11/2011	Goose Bay WRS software upgrade to Release 3A (W6.097L)
11/12/2011	11/12/2011	San Jose Del Cabo WRS software upgrade to Release 3A (W6.097L)
11/13/2011	11/13/2011	Tapachula WRS software upgrade to Release 3A (W6.097L)
11/14/2011	11/14/2011	Chicago WRS software upgrade to Release 3A (W6.097L)
11/14/2011	11/14/2011	Puerta vallarta WRS software upgrade to Release 3A (W6.097L)
11/15/2011	11/15/2011	Albuquerque and Miami WRS software upgrade to Release 3A (W6.097L)
11/16/2011	11/16/2011	Anchorage, Minneapolis, and NY WRS software upgrade to Release 3A (W6.097L)
11/17/2011	11/17/2011	Billings and Memphis WRS software upgrade to Release 3A (W6.097L)
11/28/2011	11/28/2011	Cold Bay WRS software upgrade to Release 3A (W6.097L)
11/29/2011	11/29/2011	Dallas and Juneau WRS software upgrade to Release 3A (W6.097L)
11/30/2011	11/30/2011	Denver and Seattle WRS software upgrade to Release 3A (W6.097L)
12/01/2011	12/01/2011	Bethel, NY, Oakland, and Cleveland WRS software upgrade to Release 3A (W6.097L)
12/02/2011	12/02/2011	Fairbanks and Houston WRS software upgrade to Release 3A (W6.097L)
12/05/2011	12/05/2011	Boston WRS software upgrade to Release 3A (W6.097L)
12/06/2011	12/06/2011	Kotzebue, Atlanta and Salt Lake City WRS software upgrade to Release 3A (W6.097L)

Table 1-7 GUS Switchovers

Start Date	End Date	GUS Switch	Location/ Satellite	Service Affected	Event Description
10/02/11	10/02/11	Manual	GEO133, Pamalu (HDH)	None	Manual GUS Switch from HDH to SZP TOW 28822-28827.
10/03/11	10/03/11	Manual	GEO138, Brewster (BRE-B)	LPV200_CONUS	GUS manual switchover for maintenance. Brewster to Woodbine, service was affected for 03-OCT-11 and 04-OCT-11 TOW 115221-115226.
10/13/11	10/13/11	Manual	GEO138, Woodbine (QWE)	LPV200_CONUS, LPV200_Alaska, LPV200_Canada	GUS manual switchover - Woodbine to Brewster TOW 348635-348640.
10/27/11	10/27/11	Manual	GEO138, Brewster (BRE-B)	LPV200_CONUS, LPV200_Alaska	GUS manual switchover, Brewster to Woodbine. Elevated UDRE values caused LPV200 coverage drop on eastern coast for October 27th and October 28th. TOW 374464-374469.
11/01/11	11/01/11	Manual	GEO138, Woodbine (QWE)	LPV200_CONUS, LPV200_Alaska	GUS manual switchover, Woodbine to Brewster TOW 201659-201664.

Start Date	End Date	GUS Switch	Location/ Satellite	Service Affected	Event Description
11/02/11	11/02/11	Manual	GEO133, Santa Paula (SZP)	None	GUS manual switchover, SZP to HDH TOW 288014-288019.
11/02/11	11/02/11	Faulted	GEO133, Pamalu (HDH)	None	GUS switchover due to rain. HDH faulted. TOW 344626-344642.
11/03/11	11/04/11	Manual	GEO135, NAPA (APC)	LPV200_CONUS, LPV200_Alaska	GUS manual switchover - Napa to Littleton TOW 374483-374488.
11/04/11	11/04/11	Manual	GEO133, Santa Paula (SZP)	None	GUS manual switchover - Santa Paula to Pamalu TOW 460910-460915.
11/15/11	11/15/11	Manual	GEO133, Pamalu (HDH)	None	GUS manual switchover, HDH to SZP TOW 201637-201642. Semi annual maintenance.
11/26/11	11/26/11	Faulted	GEO135, Littleton (APA)	Alaska, LPV200_CONUS	GUS switchover, Littleton faulted. Receiver SCAF. LPV200 CONUS affected from ~21:59 to ~22:08. TOW 595097-595112.
12/15/11	12/15/11	Manual	GEO138, Brewster (BRE-B)	LPV_Alaska, LPV200_Alaska	GUS manual switchover, Brewster to Woodbine TOW 374653-374658. Elevated UDRE values for PRN138 after the switchover (UDREi of 11). NANU on PRN25. Both events contributed to the loss of the coverage.
12/31/11	12/31/11	Manual	GEO135, NAPA (APC)	LPV_Alaska, LPV200_Alaska	GUS manual switchover, Napa to Littleton. Many missed messages due to suspected bad USO (Universal Stable Oscillator) onboard CRW-135. Switchover done to rule out that the problem is GUS-related. TOW 593121-593126. Trouble shooting for the missed messages that occurred.

1.2 Report Overview

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

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

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

Section 5 summarizes the number of HMI events detected during the reporting period and presents a safety margin index for each receiver. The safety margin index reflects the amount of over bounding of position error by WAAS protection levels. This section also includes update rates of WAAS messages transmitted from CRE, CRW, and AMR.

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

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

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

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

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

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

Section 13 compares GPS broadcast orbits verse IGS precise orbits.

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 the operational service levels shown in Table 1.1.

Table 2.1 shows PA horizontal and vertical position accuracy maintained for 95% of the time at LP, LPV and LNAV/VNAV operational service levels for the quarter. The table also includes 95% SPS accuracy for certain locations. Figures 2.1 to 2.6 show the daily horizontal and vertical 95% accuracy for LPV operational service level for the period. Note that WAAS accuracy statistics presented are compiled only when all WAAS corrections (fast, long term, and ionospheric) for at least 4 satellites are available. This is referred to as PA navigation mode. The percentage of time that PA navigation mode was supported by WAAS at each receiver is also shown in Table 2.1. 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 2.2 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.

Table 2.3 shows the maximum LPV error statistics. The column marked ‘Horizontal Error’ shows the maximum position errors while the calculated HPL meets the LPV service level defined in Table 1.1. The column marked ‘Vertical Error’ shows the maximum position errors while the calculated VPL meets the LPV service level. The columns marked ‘Horizontal Error/HPL’ and ‘Vertical Error/VPL’ show the ratio of position error to protection level at the time the maximum error occurred. The columns marked ‘Horizontal Maximum Ratio’ and ‘Vertical Maximum Ratio’ show the maximum position error to protection level ratio for the quarter.

During this reporting period, the maximum 95% CONUS horizontal and vertical LPV errors are 1.713 meters at Grand Forks and 1.901 meters at Miami, respectively. The minimum 95% CONUS horizontal and vertical LPV errors are 0.62 meters at Kansas City and 0.829 meters at Minneapolis, respectively. The maximum 95% and 99.999% NPA horizontal errors are 8.035 meters at Honolulu and 14.77 meters at San Juan, respectively. The minimum 95% and 99.999% horizontal errors are 1.35 meters and 3.638 meters both at Oakland, respectively.

The decreases in 95% accuracy on 10/24/11 and 11/1/11/11 in Figure 2.1 to 2.8 are due to geomagnetic activity. The increases in maximum position error and ratio at Mexico sites and Grand Forks in Table 2.3 are due to geomagnetic activity on 10/24/11 as well.

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 2-1 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	1.460	1.473	1.688	99.80238	*	*
Grand Forks	1.713	1.740	1.592	99.81086	*	*
Oklahoma City	1.183	1.196	1.822	99.81470	*	*
Albuquerque	0.630	0.631	1.002	99.81997	1.978	5.949
Anchorage	0.649	0.656	1.412	99.81930	2.242	6.356
Atlanta	0.683	0.687	1.373	99.81981	*	*
Barrow	0.866	0.874	1.794	99.81325	*	*
Bethel	0.610	0.617	1.187	99.81737	2.349	8.270
Billings	0.823	0.834	0.971	99.81994	2.108	5.686
Boston	0.810	0.813	1.056	99.81955	2.399	5.536
Chicago	0.813	0.819	0.962	99.81981	*	*
Cleveland	0.679	0.684	1.061	99.81959	2.193	5.658
Cold Bay	0.791	0.799	1.246	99.82040	*	*
Dallas	0.669	0.670	1.437	99.81954	*	*
Denver	0.663	0.669	0.917	99.81975	*	*
Fairbanks	0.711	0.719	1.426	99.81931	2.426	8.067
Gander	0.886	0.894	1.197	99.81947	*	*
Goose Bay	0.916	0.930	1.193	99.81923	*	*
Houston	0.783	0.783	1.753	99.81987	2.256	6.612
Iqaluit	1.585	1.686	2.254	99.81921	*	*
Jacksonville	0.734	0.739	1.723	99.81986	*	*
Juneau	0.776	0.781	1.129	99.82030	*	*
Kansas City	0.620	0.626	1.001	99.81987	2.114	6.100
Kotzebue	0.709	0.718	1.323	99.80992	2.550	8.379
Los Angeles	0.779	0.779	1.245	99.82004	2.012	7.075
Memphis	0.690	0.694	1.249	99.81977	*	*
Merida	0.864	0.879	1.850	99.81977	*	*
Mexico City	1.291	1.298	1.770	99.81989	*	*
Miami	0.875	0.881	1.901	99.81678	2.504	6.651
Minneapolis	0.865	0.872	0.829	99.81990	2.184	5.814
New York	0.802	0.806	1.090	99.81961	2.045	7.278
Oakland	0.727	0.729	1.173	99.82000	2.022	5.989
Puerto Vallarta	1.310	1.320	1.683	99.81962	*	*
Salt Lake City	0.732	0.736	0.865	99.81997	*	*
San Jose Del Cabo	0.993	1.002	1.824	99.81760	*	*
Seattle	0.964	0.979	0.977	99.82003	2.122	6.517
Tapachula	1.838	1.857	2.023	99.76973	*	*
Washington DC	0.760	0.764	1.231	99.81966	2.340	5.986
Winnipeg	0.722	0.729	1.069	99.81989	*	*

* = SPS Data not processed.

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

Location	95% Horizontal (meters)	99.999% Horizontal (meters)	Percentage in NPA mode (%)	Maximum Horizontal Error
Albuquerque	1.405	4.860	99.822	5.030
Anchorage	2.186	9.426	99.822	9.656
Atlanta	1.538	4.864	99.822	5.081
Barrow	2.670	6.238	99.819	6.666
Bethel	2.030	11.224	99.821	11.483
Billings	1.698	5.746	99.822	5.990
Boston	1.842	4.021	99.822	6.424
Cleveland	1.411	4.645	99.822	4.779
Cold Bay	1.605	6.582	99.822	6.784
Fairbanks	2.307	8.301	99.822	8.484
Gander	1.904	3.914	99.822	4.138
Honolulu	8.035	13.635	99.822	13.835
Houston	1.681	6.705	99.822	6.828
Iqaluit	3.556	8.818	99.822	8.996
Juneau	1.935	7.630	99.822	7.820
Kansas City	1.499	5.244	99.822	5.419
Kotzebue	2.293	8.073	99.819	8.239
Los Angeles	1.421	4.608	99.822	4.846
Merida	2.250	9.188	99.822	9.373
Miami	1.808	4.510	99.822	4.876
Minneapolis	1.716	5.403	99.822	5.574
Oakland	1.355	3.723	99.822	3.956
Salt Lake City	1.403	3.765	99.822	3.960
San Jose Del Cabo	2.567	10.027	99.822	10.273
San Juan	4.351	14.775	100	14.944
Seattle	1.610	6.411	99.822	6.680
Tapachula	4.098	13.346	99.776	13.764
Washington DC	1.726	5.642	99.822	5.934

Table 2-3 Maximum LPV Error Statistics

Location	Horizontal Error (m)	Horizontal Error/HPL	Horizontal Maximum Ratio	Vertical Error (m)	Vertical Error/VPL	Vertical Maximum Ratio
Arcata	5.322	0.135	0.265	6.806	0.196	0.197
Grand Forks	10.134*	0.288	0.299*	9.085*	0.188	0.283
Oklahoma City	4.505	0.178	0.280	7.061	0.251	0.330
Albuquerque	2.246	0.059	0.163	4.459	0.147	0.197
Anchorage	2.075	0.055	0.143	4.350	0.188	0.198
Atlanta	3.383	0.112	0.164	4.504	0.107	0.191
Barrow	4.058	0.156	0.189	6.525	0.211	0.211
Bethel	2.011	0.060	0.149	4.893	0.098	0.152
Billings	2.283	0.227	0.227	8.738	0.197	0.197
Boston	3.757	0.099	0.177	3.586	0.112	0.177
Chicago	2.161	0.088	0.189	5.790	0.149	0.167
Cleveland	2.627	0.074	0.192	4.756	0.114	0.202
Cold Bay	2.255	0.089	0.112	3.499	0.098	0.123
Dallas	2.390	0.064	0.181	5.568	0.120	0.261
Denver	3.720	0.102	0.216	3.985	0.122	0.209
Fairbanks	3.548	0.122	0.159	4.090	0.165	0.186
Gander	2.847	0.112	0.121	4.053	0.083	0.123
Goose Bay	4.007	0.100	0.177	4.414	0.122	0.156
Houston	2.994	0.235	0.235	4.728	0.318	0.318
Iqaluit	4.566	0.116	0.197	8.300	0.183	0.246
Jacksonville	2.603	0.193	0.193	5.012	0.121	0.196
Juneau	2.801	0.111	0.159	3.911	0.186	0.186
Kansas City	2.524	0.094	0.212	7.147	0.197	0.209
Kotzebue	3.357	0.130	0.164	4.613	0.113	0.173
Los Angeles	2.443	0.142	0.177	4.857	0.179	0.179
Memphis	2.708	0.074	0.175	3.827	0.181	0.193
Merida	4.092	0.186	0.241	4.792	0.154	0.190
Mexico City	10.446*	0.429	0.429*	9.387*	0.254	0.254
Miami	2.620	0.138	0.156	4.568	0.137	0.191
Minneapolis	2.097	0.078	0.182	3.213	0.075	0.166
New York	2.363	0.124	0.151	4.730	0.097	0.157
Oakland	2.805	0.213	0.213	4.341	0.095	0.155
Puerto Vallarta	9.990*	0.285	0.318*	10.060*	0.215	0.258
Salt Lake City	2.195	0.063	0.170	4.401	0.111	0.169
San Jose Del Cabo	6.839*	0.234	0.293*	8.929*	0.195	0.268
Seattle	2.789	0.084	0.197	5.640	0.134	0.184
Tapachula	7.906*	0.265	0.318*	11.042*	0.340	0.340
Washington DC	2.023	0.054	0.163	4.439	0.102	0.176
Winnipeg	3.107	0.087	0.195	6.864	0.217	0.227

*Increases in position error and ratio due to geomagnetic activity on 10/24/11

Figure 2-1 LPV 95% Horizontal Accuracy

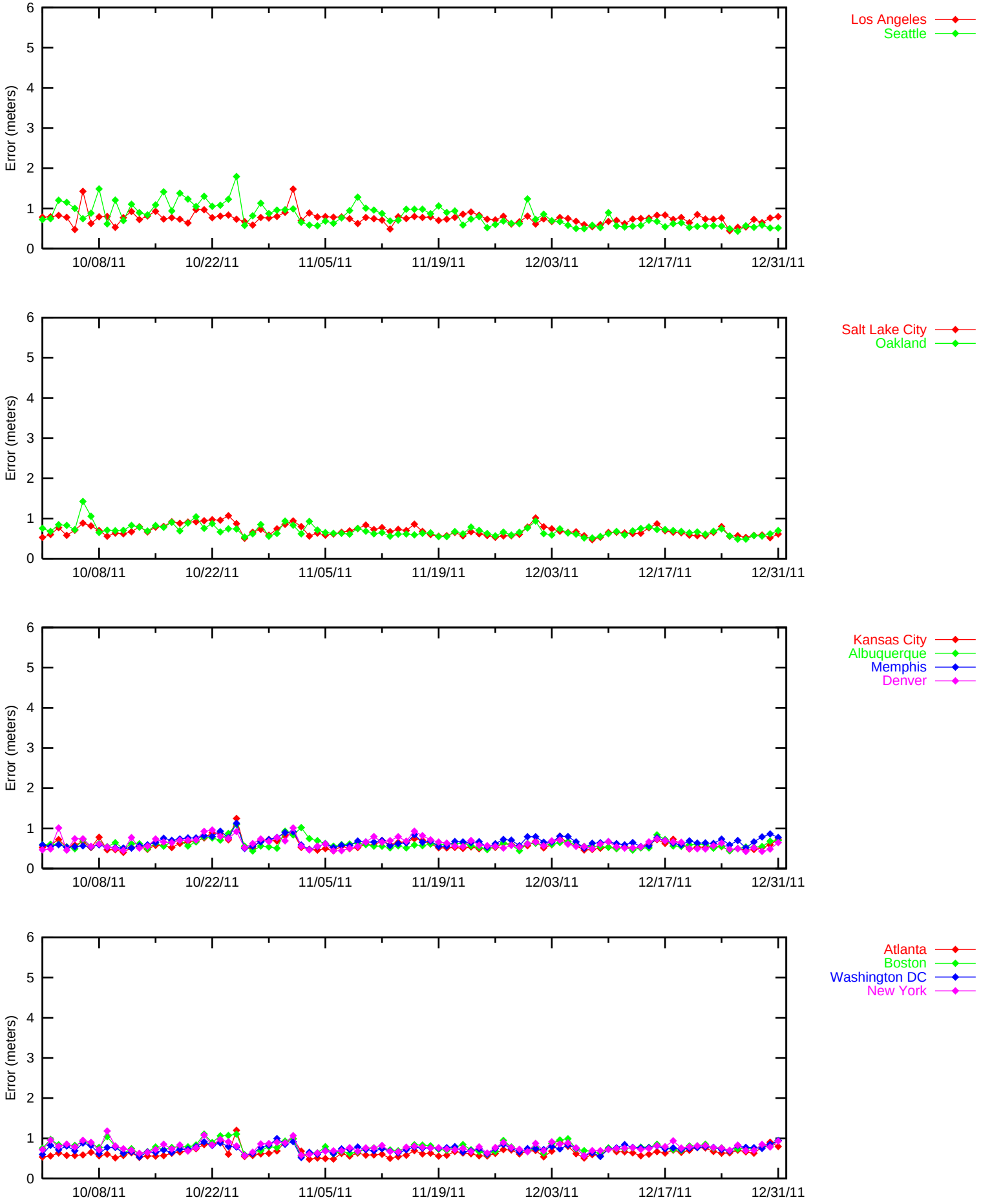


Figure 2-2 LPV 95% Horizontal Accuracy

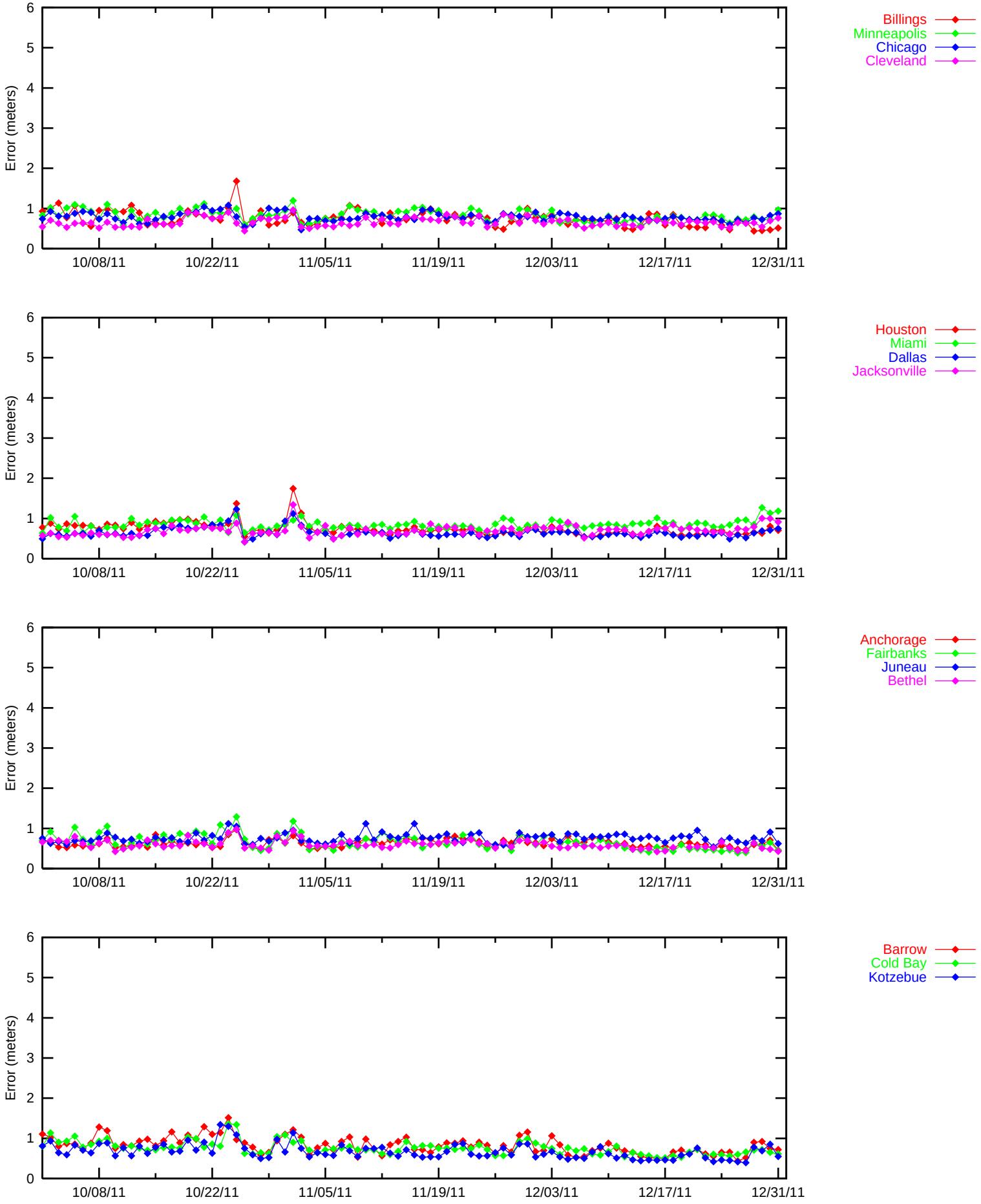


Figure 2-3 LPV 95% Horizontal Accuracy

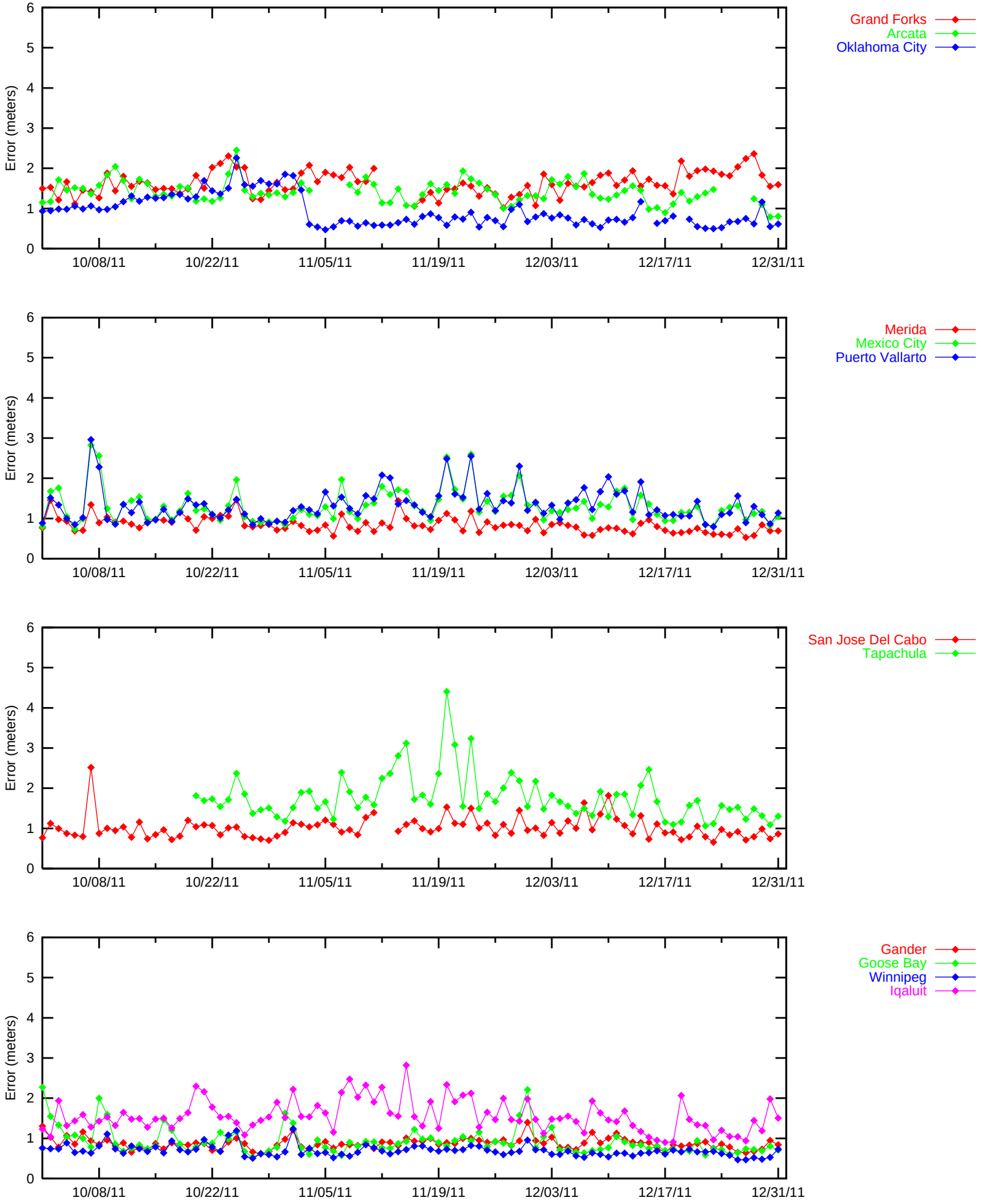


Figure 2-4 LPV 95% Vertical Accuracy

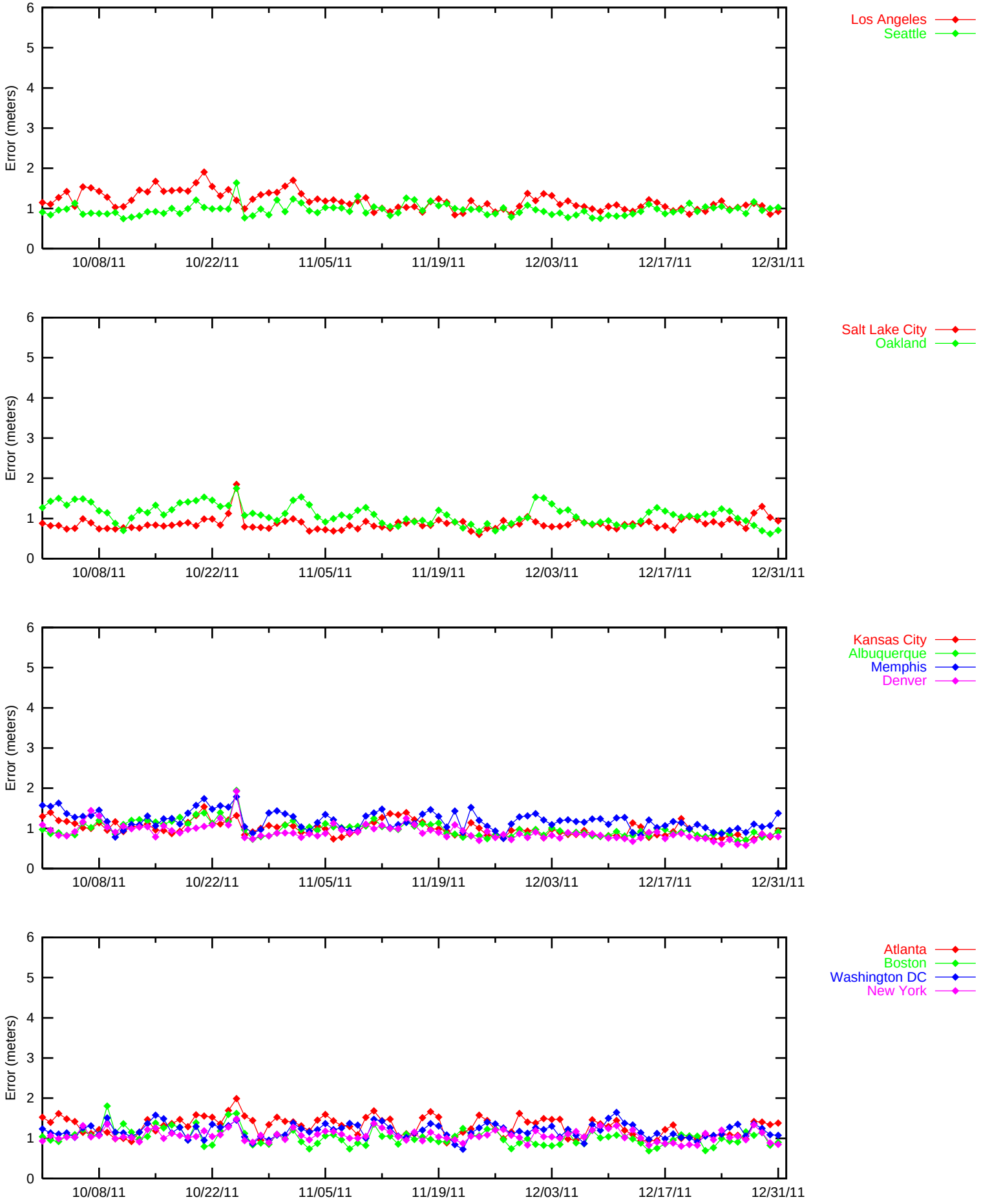


Figure 2-5 LPV 95% Vertical Accuracy

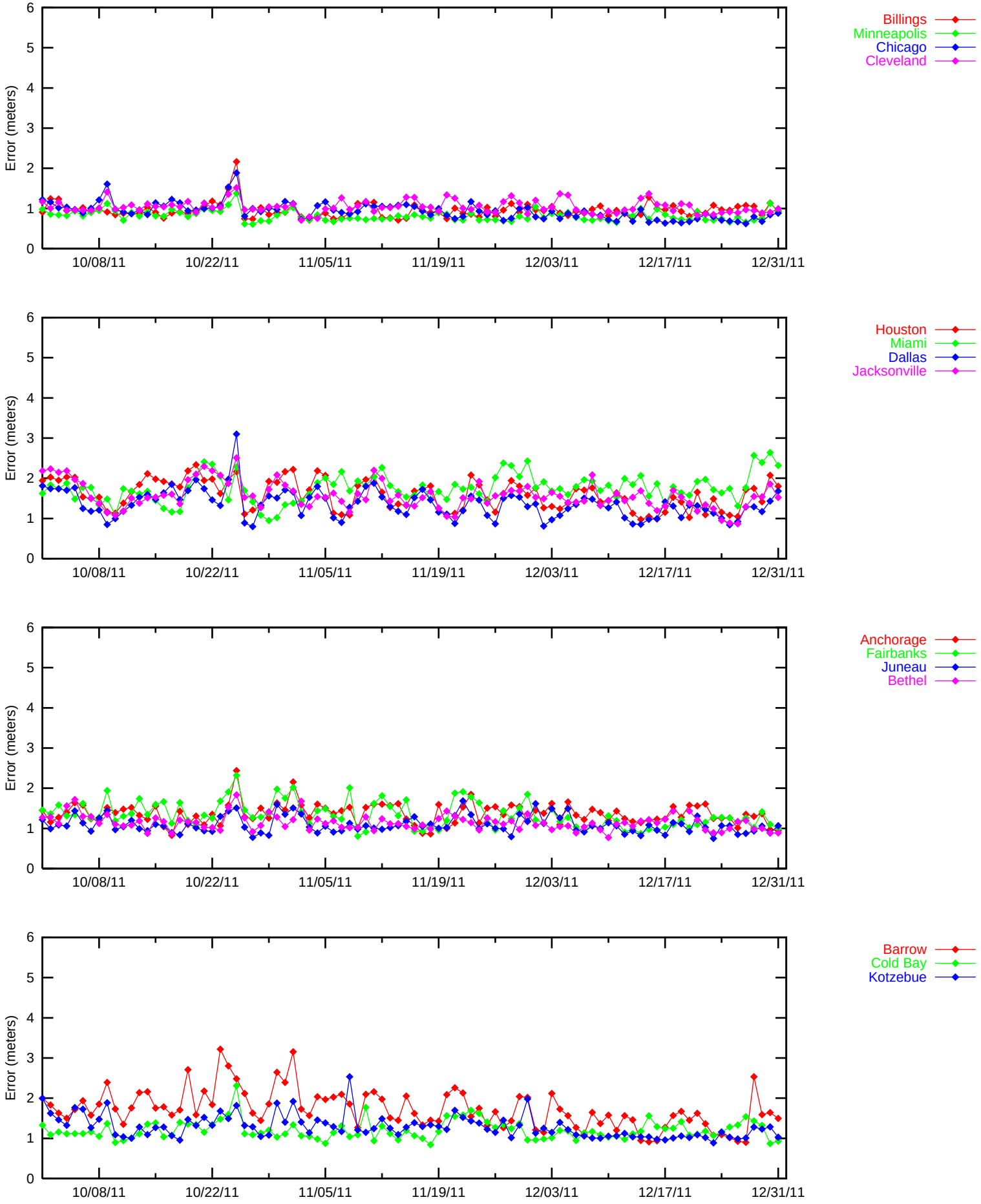


Figure 2-6 LPV 95% Vertical Accuracy

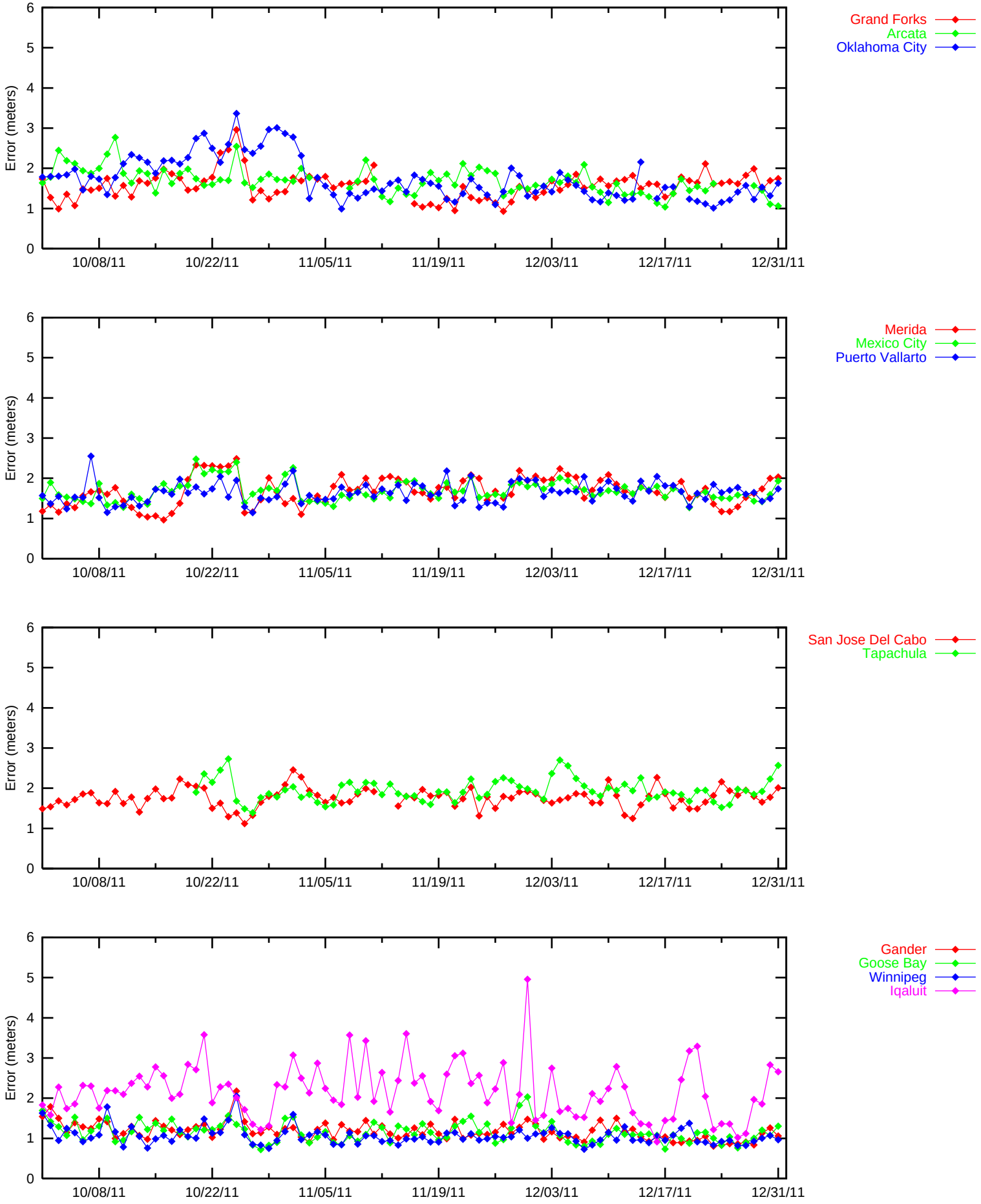


Figure 2-7 NPA 95% Horizontal Accuracy

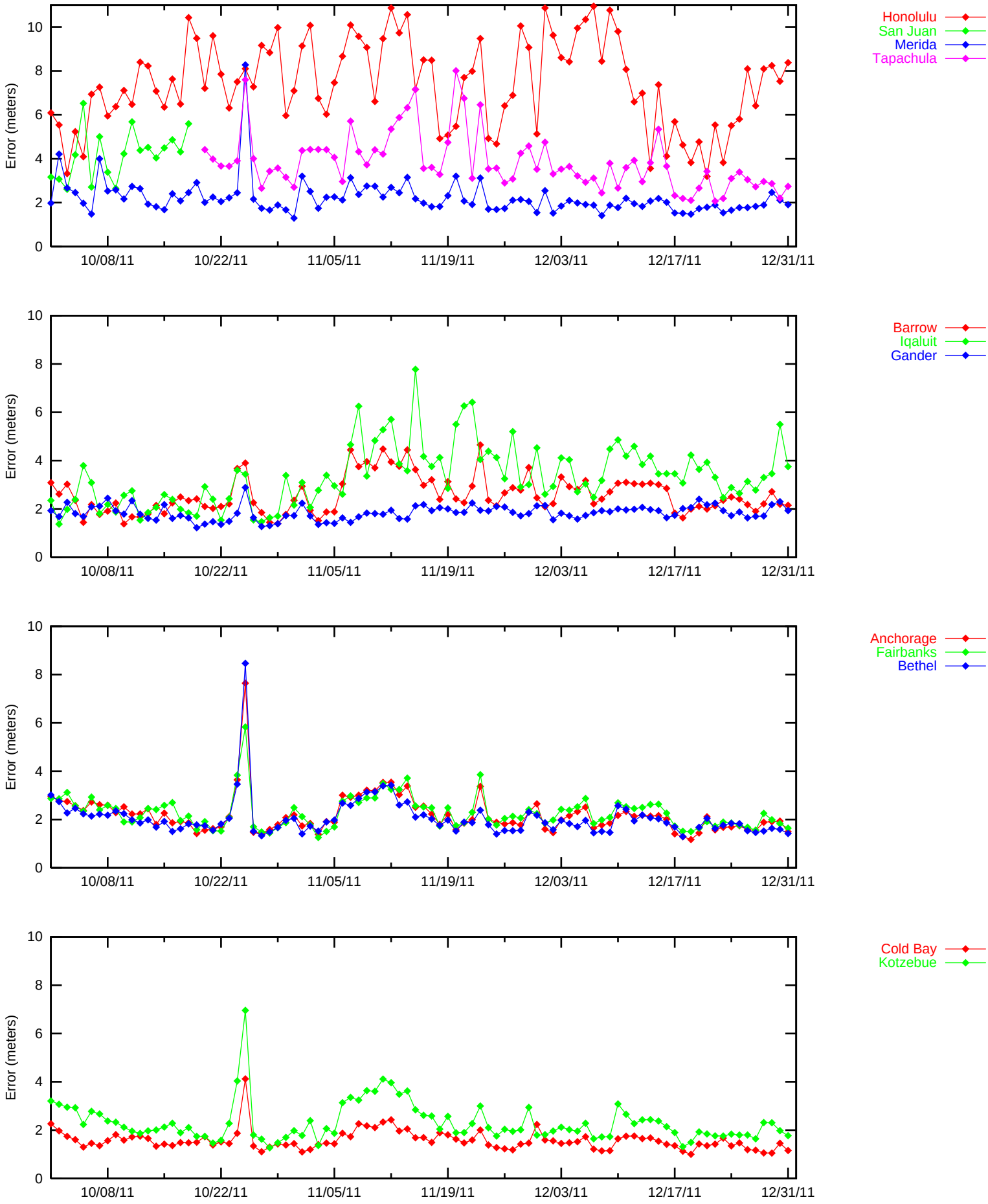


Figure 2-8 NPA 95% Horizontal Accuracy

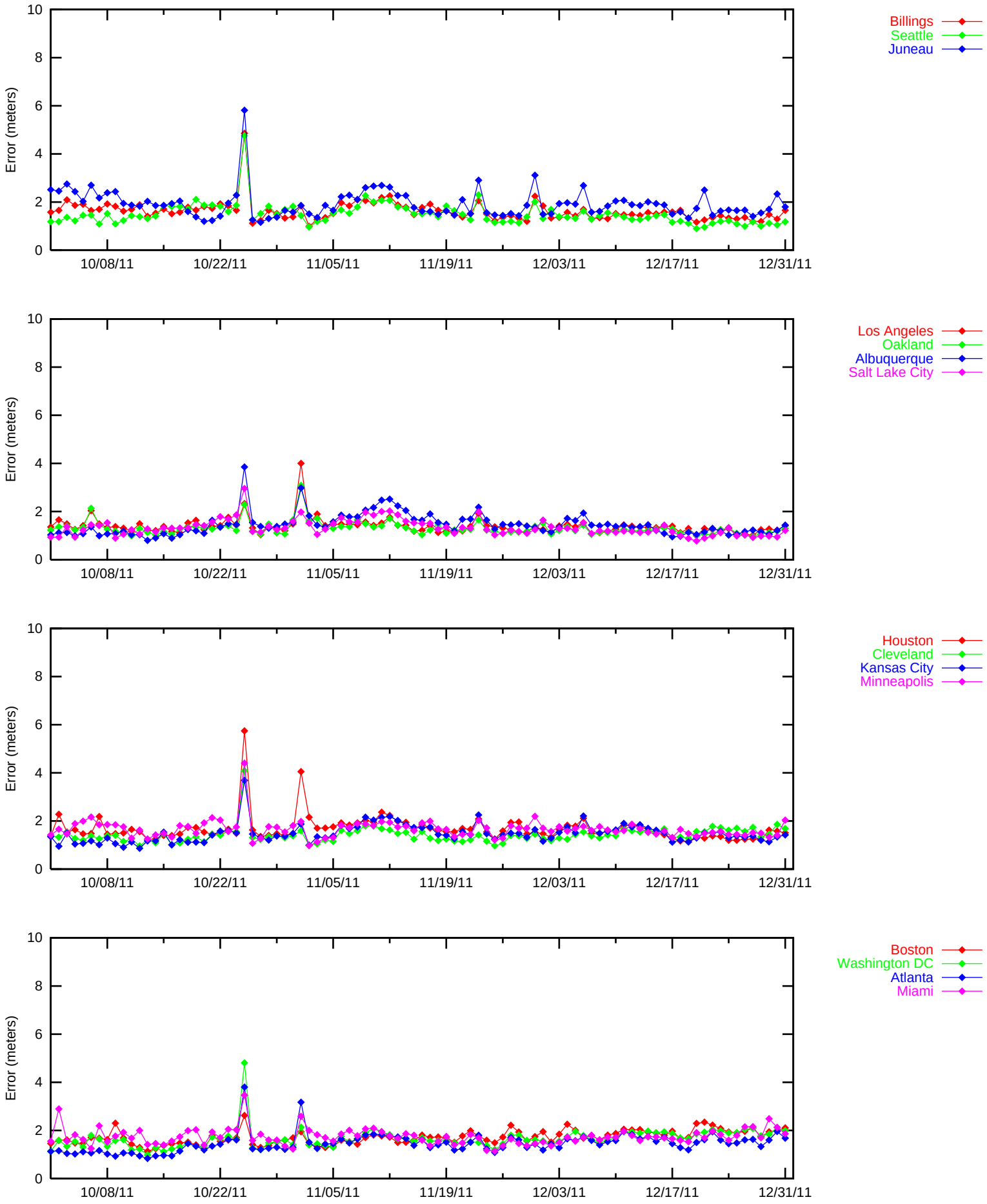


Figure 2-9 LPV Horizontal Error Bounding Triangle Chart

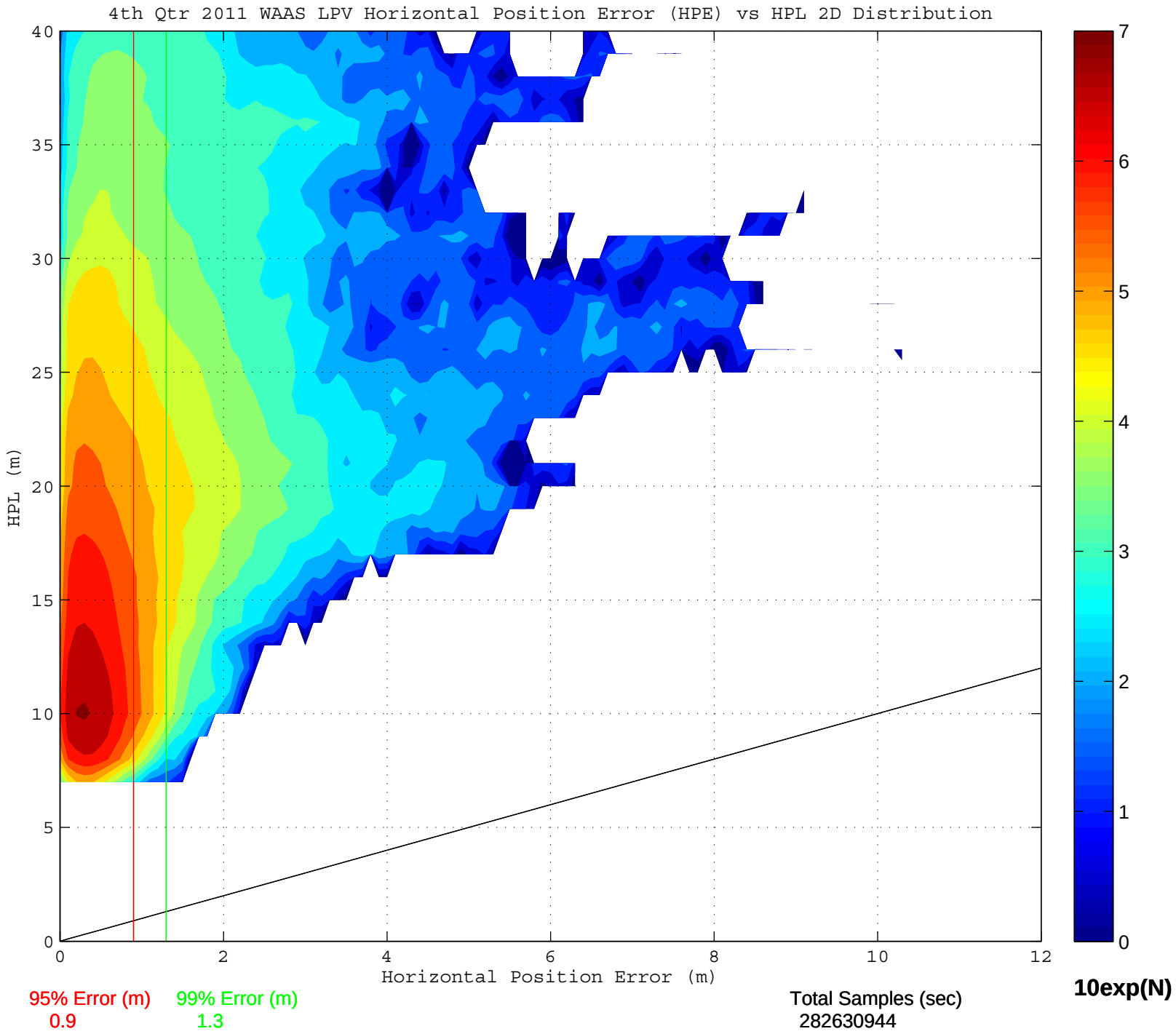


Figure 2-10 LPV Vertical Error Bounding Triangle Chart

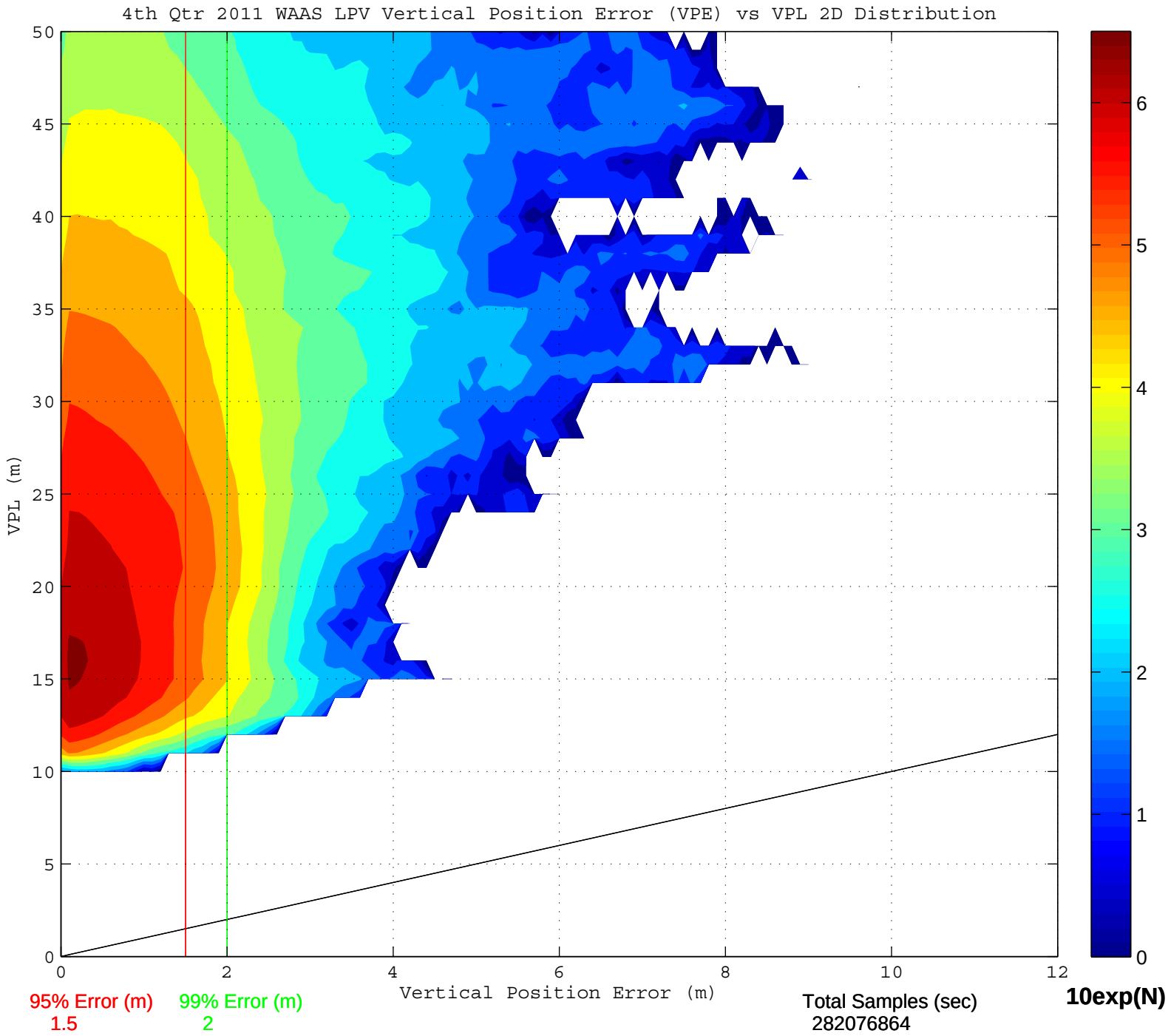


Figure 2-11 LPV 2-D Horizontal Error Distribution Histogram

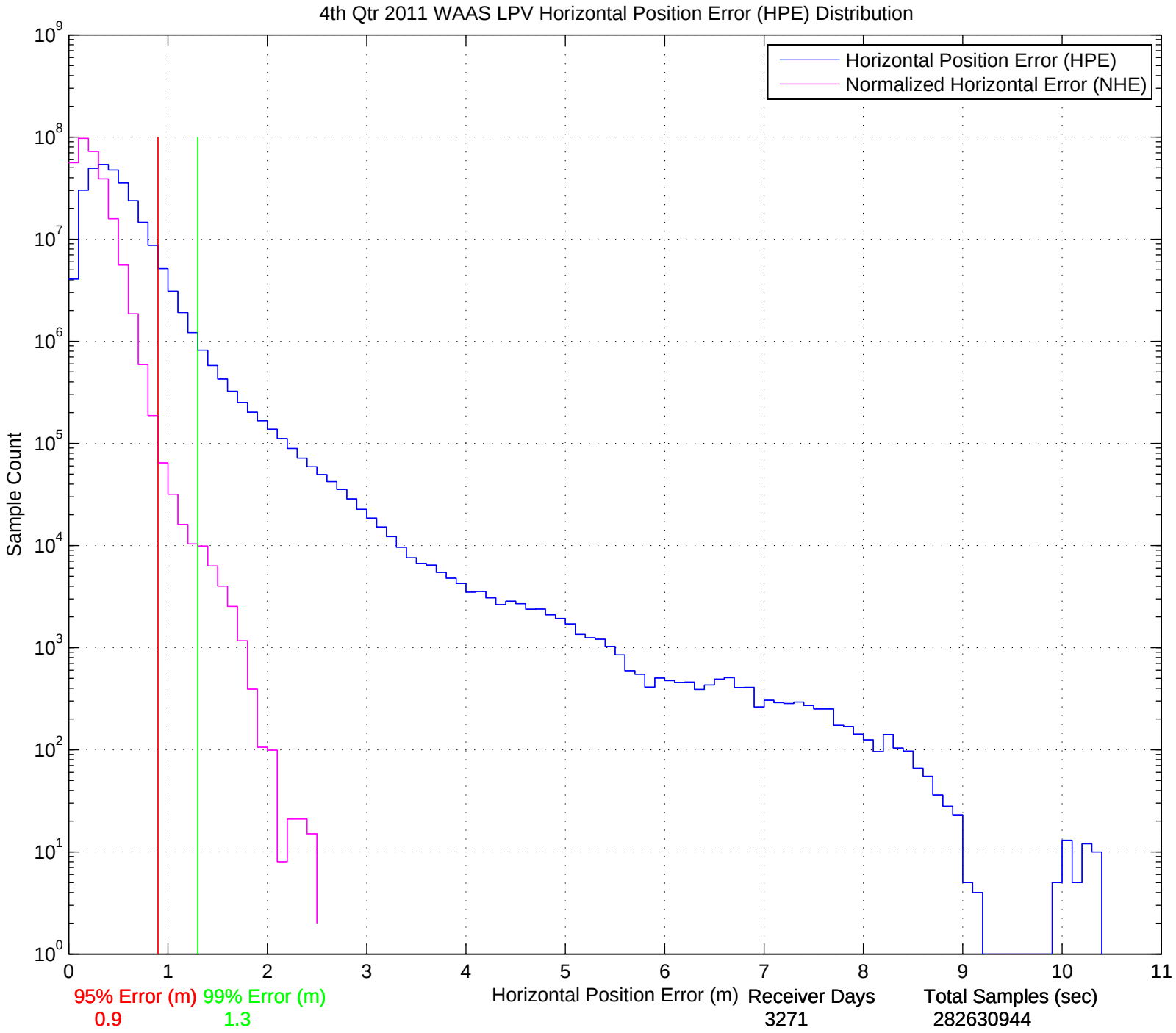
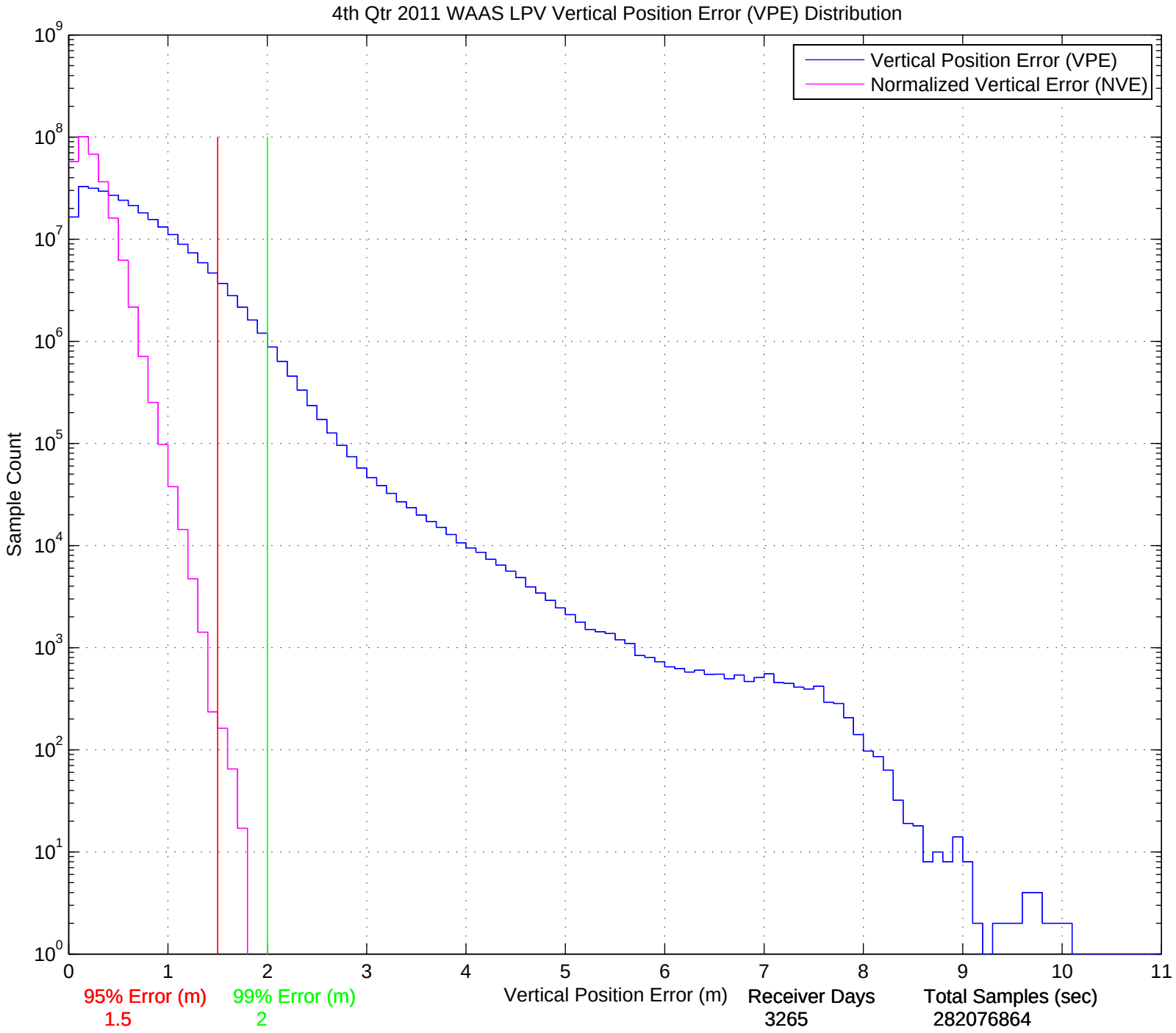


Figure 2-12 LPV 2-D Vertical Error Distribution Histogram



3.0 AVAILABILITY

The WAAS availability evaluation documents the percentage of time that the WAAS provided service for the operational service levels defined in Table 1.1. RTCA DO-229D Vertical and Horizontal Protection Levels were computed for each receiver being evaluated. Table 3.1 shows the protection levels that were maintained for 99% of the time for each receiver location for the quarter. The table also included the percentage in PA mode as described in section 2.0.

For this reporting period, the maximum 99% CONUS HPL and VPL are 21.60 meters and 34.3 meters, both at Oakland, respectively. The minimum 99% CONUS HPL and VPL are 12.28 meter and 21.0 meters, both at Memphis, respectively. The maximum 99% Alaska HPL and VPL are 29.05 meters at Cold Bay and 41.41 meters at Barrow, respectively. The minimum 99% Alaska HPL and VPL are 14.68 meters at Anchorage and 24.72 meters at Juneau, respectively.

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

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

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

Geomagnetic activity on 10/24/11 significantly reduced both CONUS and Alaska availability. Reduced availability on 10/21/11 is due to a planned software upgrade that resulted in service outage; see DR#105 Software Upgrade 3A C&V Failure. The decreases in availability from 11/3/11 to 11/30/11 are due to UDRE spikes; see DR#106 UDRE spikes Lead to Reduced WAAS Availability. Low Alaska availability on 12/29/11 is due to a hardware failure on CRW that caused elevated UDRE values; see DR#107 CRW Oscillator Failure. Degraded L2 performance at Honolulu reference stations on 12/19/11 did not affect service; see DR#108 Interference at Honolulu.

Table 3-1 99% Protection Level

Location	95% HPL (meters)	95% VPL (meters)	Percentage in PA mode
Arcata	17.377	39.403	99.802380
Grand Forks	15.335	24.471	99.811250
Oklahoma City	13.499	23.159	99.814700
Albuquerque	13.251	25.622	99.819970
Anchorage	14.688	24.952	99.819300
Atlanta	13.420	21.939	99.819810
Barrow	21.393	41.415	99.813250
Bethel	18.577	31.418	99.817370
Billings	14.607	23.126	99.819940
Boston	17.568	24.447	99.819550
Chicago	12.674	21.887	99.819810
Cleveland	16.046	25.750	99.819590
Cold Bay	29.053	41.318	99.820400
Dallas	13.654	23.191	99.819540
Denver	12.436	26.546	99.819750
Fairbanks	14.729	25.663	99.819310
Gander	31.426	45.624	99.819470
Goose Bay	28.080	35.001	99.819230
Houston	12.895	24.598	99.819870
Iqaluit	67.478	94.639	99.819210
Jacksonville	15.143	23.561	99.819860
Juneau	15.308	24.721	99.820300
Kansas City	12.723	22.077	99.819870
Kotzebue	18.471	35.414	99.809920
Los Angeles	15.846	29.501	99.820040
Memphis	12.286	21.007	99.819770
Merida	20.759	44.708	99.819770
Mexico City	22.797	37.887	99.819890
Miami	21.607	33.388	99.816780
Minneapolis	13.051	22.585	99.819900
New York	16.453	24.131	99.819610
Oakland	18.415	38.155	99.820000
Puerto Vallarta	26.351	40.682	99.819620
Salt Lake City	13.317	22.106	99.819970
San Jose Del Cabo	25.620	37.712	99.817600
Seattle	16.488	30.213	99.820030
Tapachula	38.497	69.791	99.769730
Washington DC	14.940	22.569	99.819660
Winnipeg	17.042	25.214	99.819890

Table 3-2 Quarterly Availability Statistics

Location	LP WAAS With 15 minute window	LPV WAAS With 15 minute window	LPV200 WAAS With 15 minute window
Arcata	0.995415	0.994137	0.963471
Grand Forks	0.994678	0.99464	0.993971
Oklahoma City	0.995553	0.995461	0.995099
Albuquerque	0.997554	0.996995	0.995742
Anchorage	0.995144	0.995116	0.994474
Atlanta	0.995894	0.995894	0.995343
Barrow	0.995352	0.99317	0.95286
Bethel	0.994969	0.994858	0.993556
Billings	0.994712	0.994705	0.993989
Boston	0.996308	0.995934	0.995391
Chicago	0.99549	0.995406	0.994961
Cleveland	0.995845	0.995811	0.995231
Cold Bay	0.994919	0.994403	0.914271
Dallas	0.996559	0.996191	0.995467
Denver	0.99504	0.994986	0.994688
Fairbanks	0.995296	0.995144	0.994671
Gander	0.993588	0.992033	0.891071
Goose Bay	0.99227	0.991373	0.987092
Houston	0.995528	0.995463	0.993805
Iqaluit	0.973618	0.961666	0.791518
Jacksonville	0.995477	0.995477	0.995154
Juneau	0.99459	0.994042	0.993513
Kansas City	0.995076	0.995076	0.99498
Kotzebue	0.994825	0.994316	0.983972
Los Angeles	0.998147	0.997175	0.9927
Memphis	0.995529	0.995344	0.99518
Merida	0.99332	0.991913	0.976718
Mexico City	0.996029	0.994001	0.962967
Miami	0.993699	0.993289	0.99009
Minneapolis	0.995194	0.995119	0.99448
New York	0.996308	0.995961	0.995528
Oakland	0.996741	0.995983	0.972426
Puerto Vallarta	0.99504	0.992663	0.924725
Salt Lake City	0.995136	0.995132	0.994605
San Jose Del Cabo	0.994473	0.993156	0.969305
Seattle	0.994485	0.994126	0.993786
Tapachula	0.989021	0.919426	0.511875
Washington DC	0.996349	0.995973	0.995503
Winnipeg	0.994918	0.994859	0.994255

Table 3-3 NPA Availability

Location	NPA Availability (Excluding RAIM/FDE)
Albuquerque	0.99822391
Anchorage	0.99822315
Atlanta	0.99822318
Barrow	0.99819401
Bethel	0.99821299
Billings	0.99822316
Boston	0.99822255
Cleveland	0.99822372
Cold Bay	0.99822303
Fairbanks	0.99821852
Gander	0.99822328
Honolulu	0.99821917
Houston	0.99822390
Iqaluit	0.99822300
Juneau	0.99822184
Kansas City	0.99822238
Kotzebue	0.99819281
Los Angeles	0.99822345
Merida	0.99822108
Miami	0.99822392
Minneapolis	0.99822395
Oakland	0.99822304
Salt Lake City	0.99822378
San Jose Del Cabo	0.99822365
Seattle	0.99822348
Tapachula	0.99775888
Washington DC	0.99822389

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

Location	LP Outages	LP Outage Rates	LPV Outages	LPV Outage Rates	LPV 200 Outages	LPV 200 Outage Rates
Arcata	4	0.000082	11	0.000227	124	0.002636
Grand Forks	3	0.000059	3	0.000059	6	0.000118
Oklahoma City	2	0.000039	2	0.000039	3	0.000058
Albuquerque	5	0.000094	6	0.000112	14	0.000263
Anchorage	4	0.000075	4	0.000075	9	0.000169
Atlanta	3	0.000056	3	0.000056	6	0.000113
Barrow	13	0.000244	26	0.000489	420	0.008232
Bethel	4	0.000076	5	0.000095	17	0.000323
Billings	3	0.000056	4	0.000075	5	0.000094
Boston	2	0.000037	6	0.000113	8	0.000150
Chicago	3	0.000056	4	0.000075	8	0.000150
Cleveland	2	0.000038	2	0.000038	8	0.000150
Cold Bay	7	0.000131	11	0.000207	533	0.010887
Dallas	4	0.000075	4	0.000075	4	0.000075
Denver	2	0.000038	2	0.000038	8	0.000150
Fairbanks	5	0.000094	4	0.000075	10	0.000188
Gander	14	0.000263	32	0.000602	496	0.010394
Goose Bay	11	0.000207	17	0.000321	73	0.001383
Houston	6	0.000111	7	0.000130	13	0.000242
Iqaluit	72	0.001381	140	0.002720	867	0.020462
Jacksonville	2	0.000038	2	0.000038	6	0.000113
Juneau	4	0.000075	5	0.000094	9	0.000169
Kansas City	2	0.000038	2	0.000038	5	0.000094
Kotzebue	11	0.000206	19	0.000357	207	0.003928
Los Angeles	1	0.000019	7	0.000131	87	0.001636
Memphis	2	0.000038	2	0.000038	6	0.000113
Merida	5	0.000094	35	0.000659	236	0.004513
Mexico City	3	0.000056	17	0.000319	329	0.006380
Miami	5	0.000094	7	0.000132	63	0.001192
Minneapolis	4	0.000075	5	0.000094	8	0.000150
New York	2	0.000037	5	0.000094	6	0.000113
Oakland	3	0.000056	10	0.000188	118	0.002266
Puerto Vallarta	4	0.000075	20	0.000377	400	0.008090
Salt Lake City	2	0.000038	4	0.000075	4	0.000075
San Jose Del Cabo	5	0.000095	12	0.000229	217	0.004235
Seattle	3	0.000056	7	0.000131	12	0.000225
Tapachula	33	0.000784	406	0.010374	1082	0.049659
Washington DC	2	0.000037	4	0.000075	5	0.000094
Winnipeg	3	0.000056	3	0.000056	9	0.000169

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

Location	NPA Outages	NPA Outage Rate
Albuquerque	1	0.00001891
Anchorage	1	0.00001891
Atlanta	1	0.00001892
Barrow	4	0.00007566
Bethel	1	0.00001902
Billings	1	0.00001892
Boston	1	0.00001892
Cleveland	1	0.00001891
Cold Bay	1	0.00001891
Fairbanks	1	0.00001896
Gander	1	0.00001891
Honolulu	1	0.00001891
Houston	1	0.00001891
Iqaluit	1	0.00001891
Juneau	1	0.00001893
Kansas City	1	0.00001893
Kotzebue	4	0.00007564
Los Angeles	1	0.00001891
Merida	1	0.00001894
Miami	1	0.00001891
Minneapolis	1	0.00001891
Oakland	1	0.00001892
Salt Lake City	1	0.00001891
San Jose Del Cabo	1	0.00001891
Seattle	1	0.00001891
Tapachula	1	0.00002381
Washington DC	1	0.00001891

Figure 3-1 LPV Instantaneous Availability

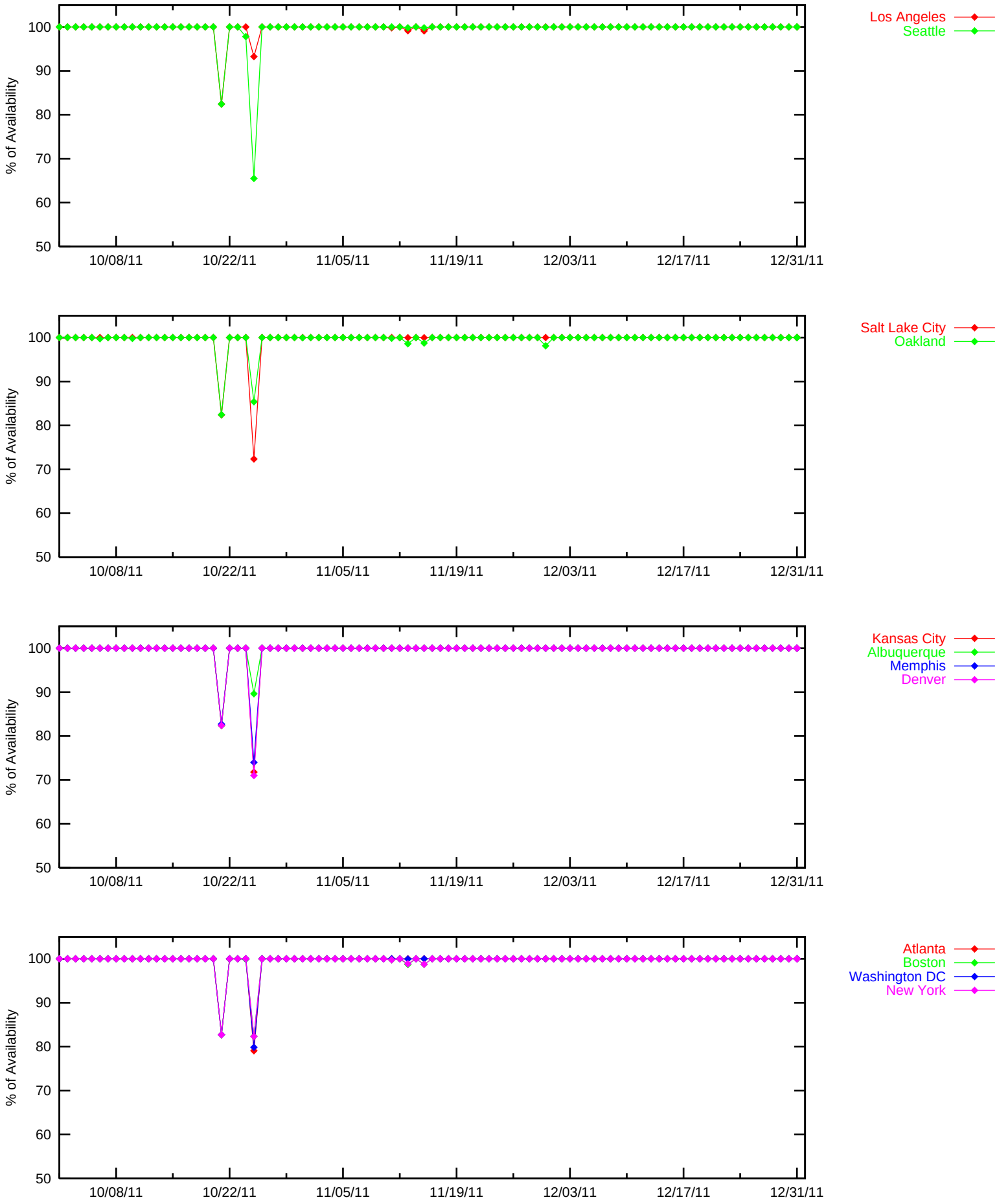
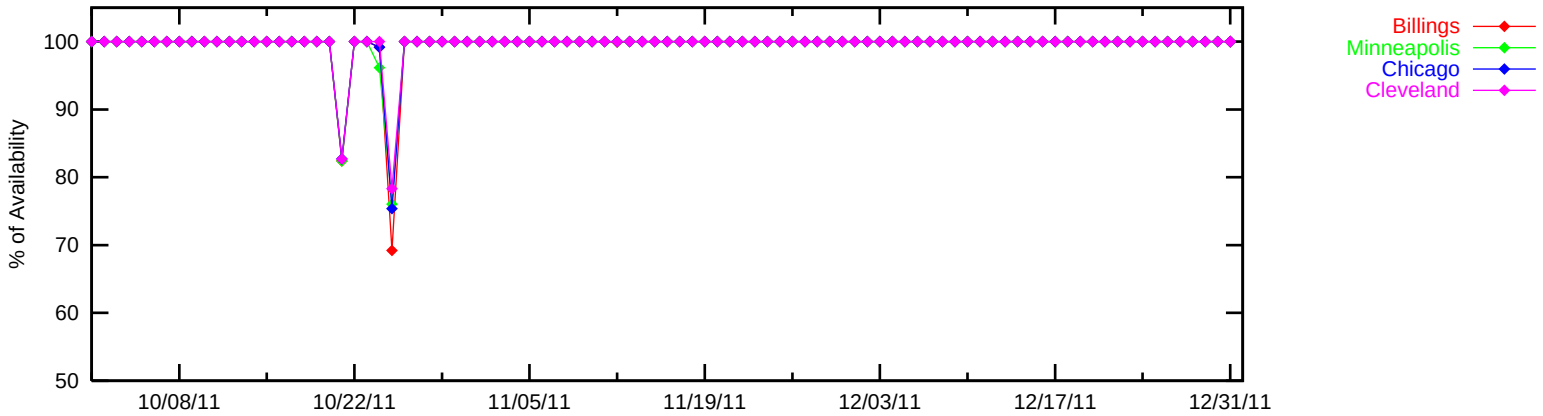
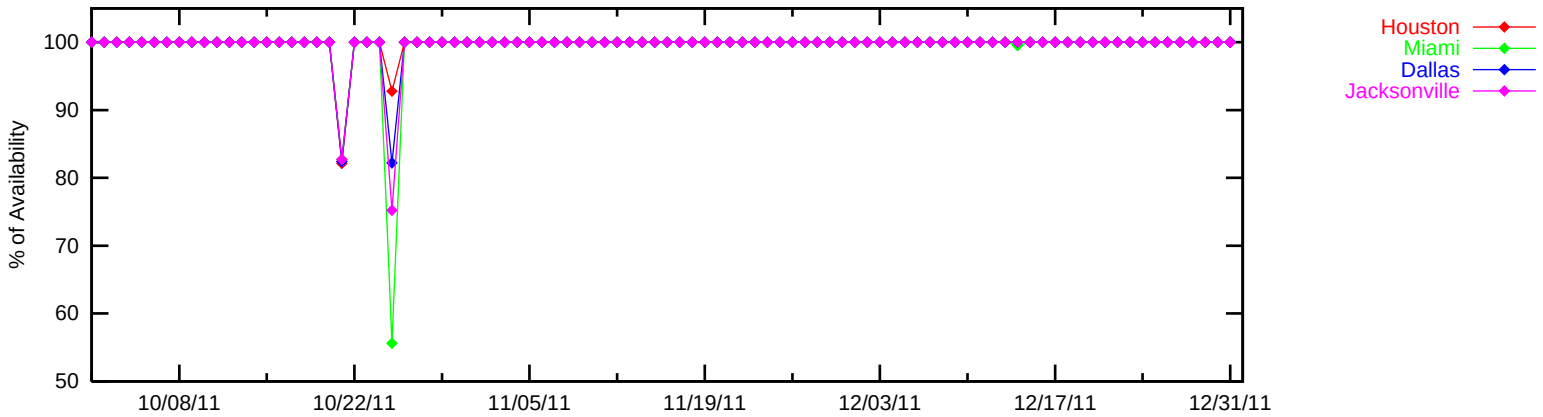
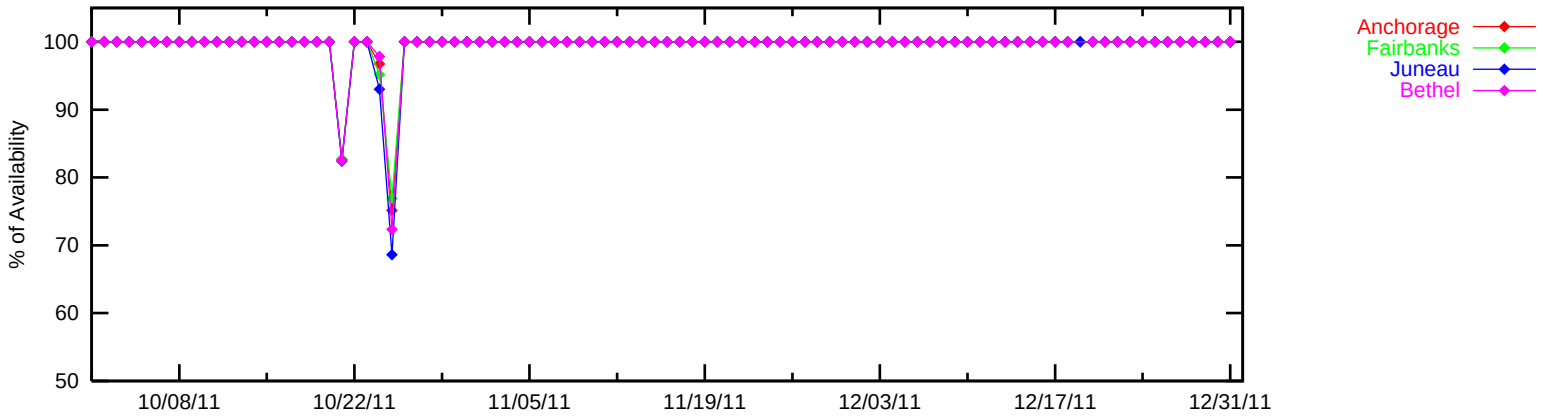


Figure 3-2 LPV Instantaneous Availability







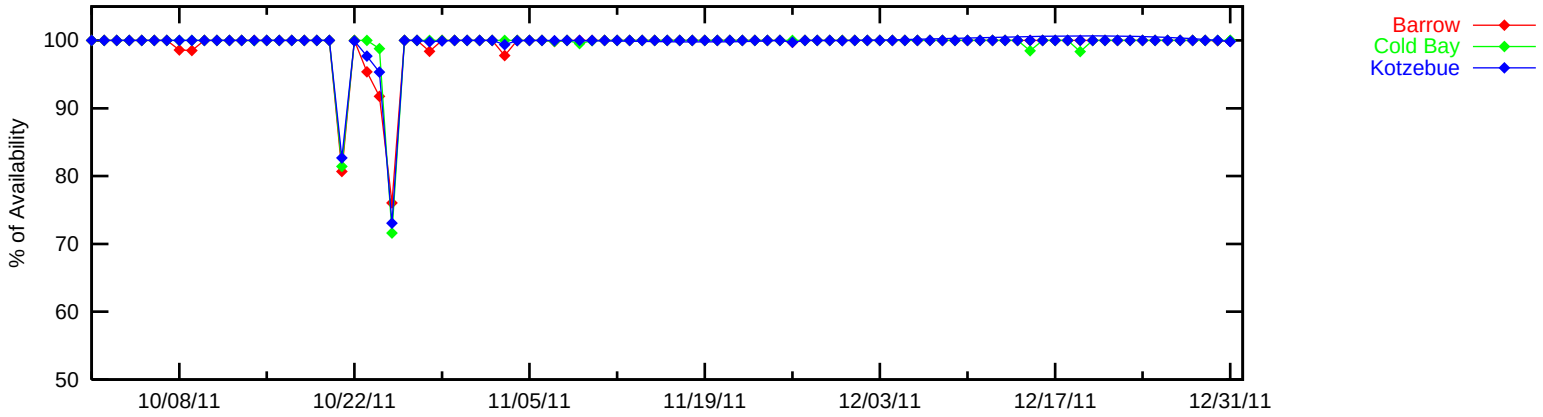


Figure 3-3 LPV Instantaneous Availability

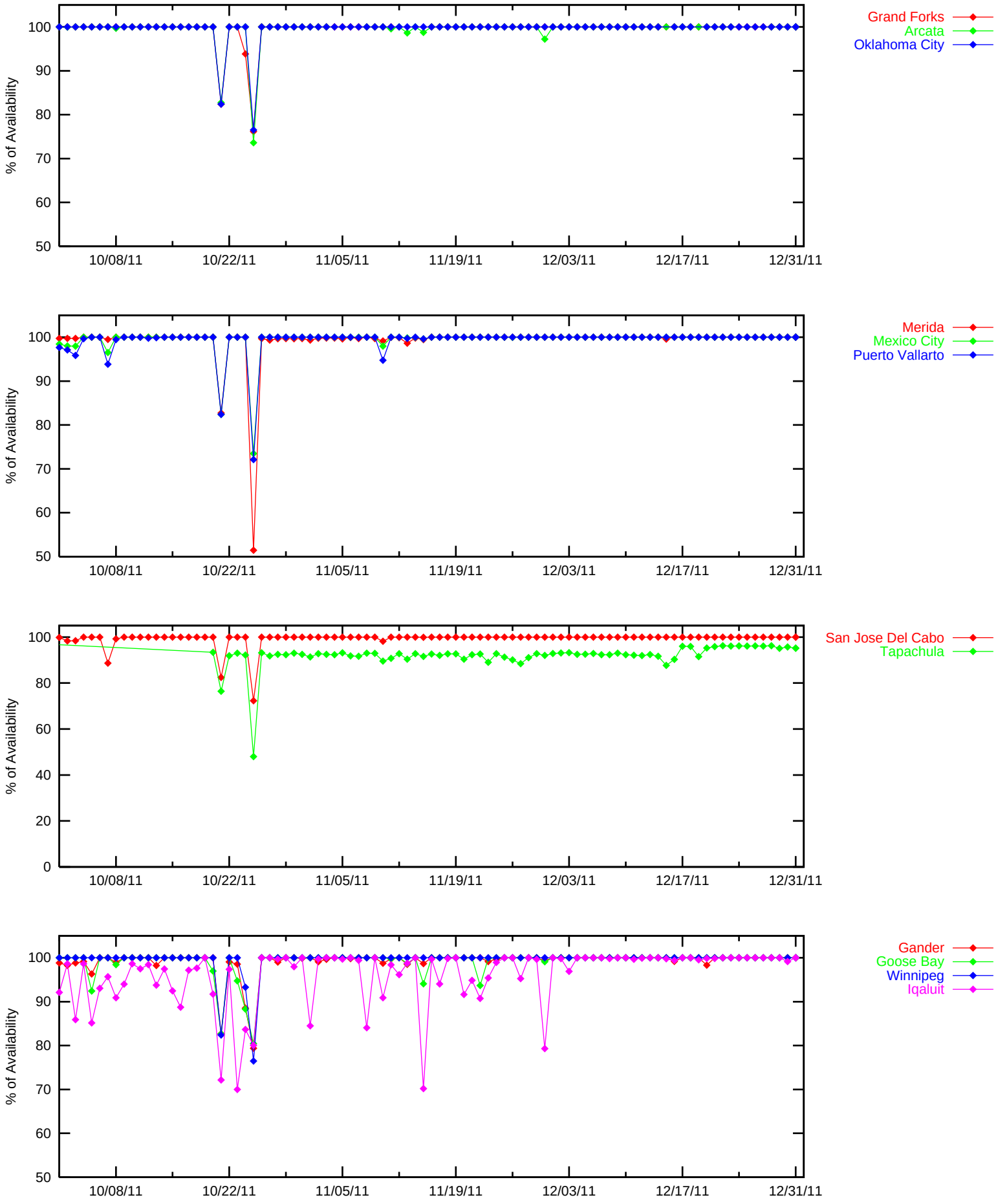


Figure 3-4 LPV 200 Instantaneous Availability

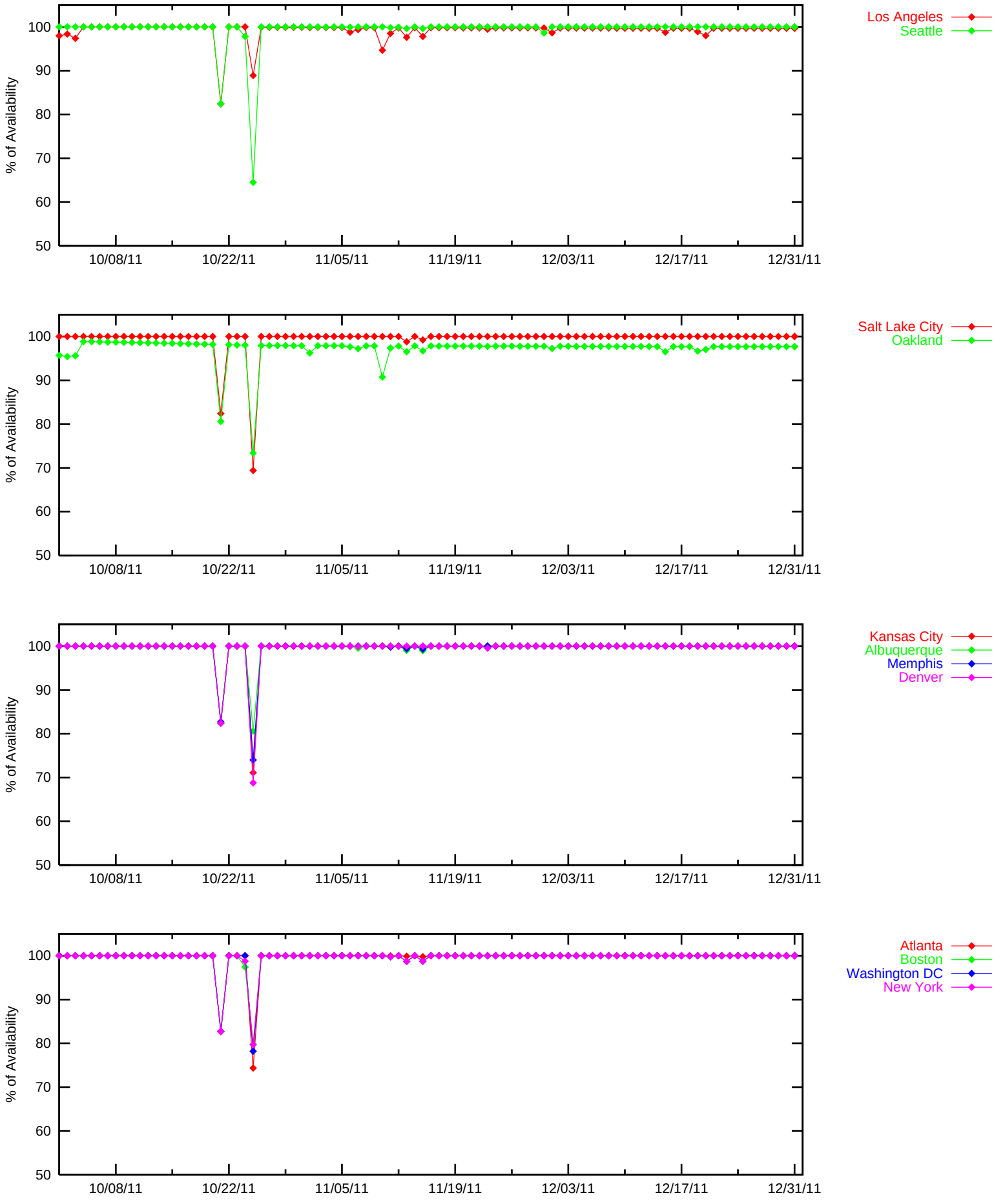


Figure 3-5 LPV 200 Instantaneous Availability

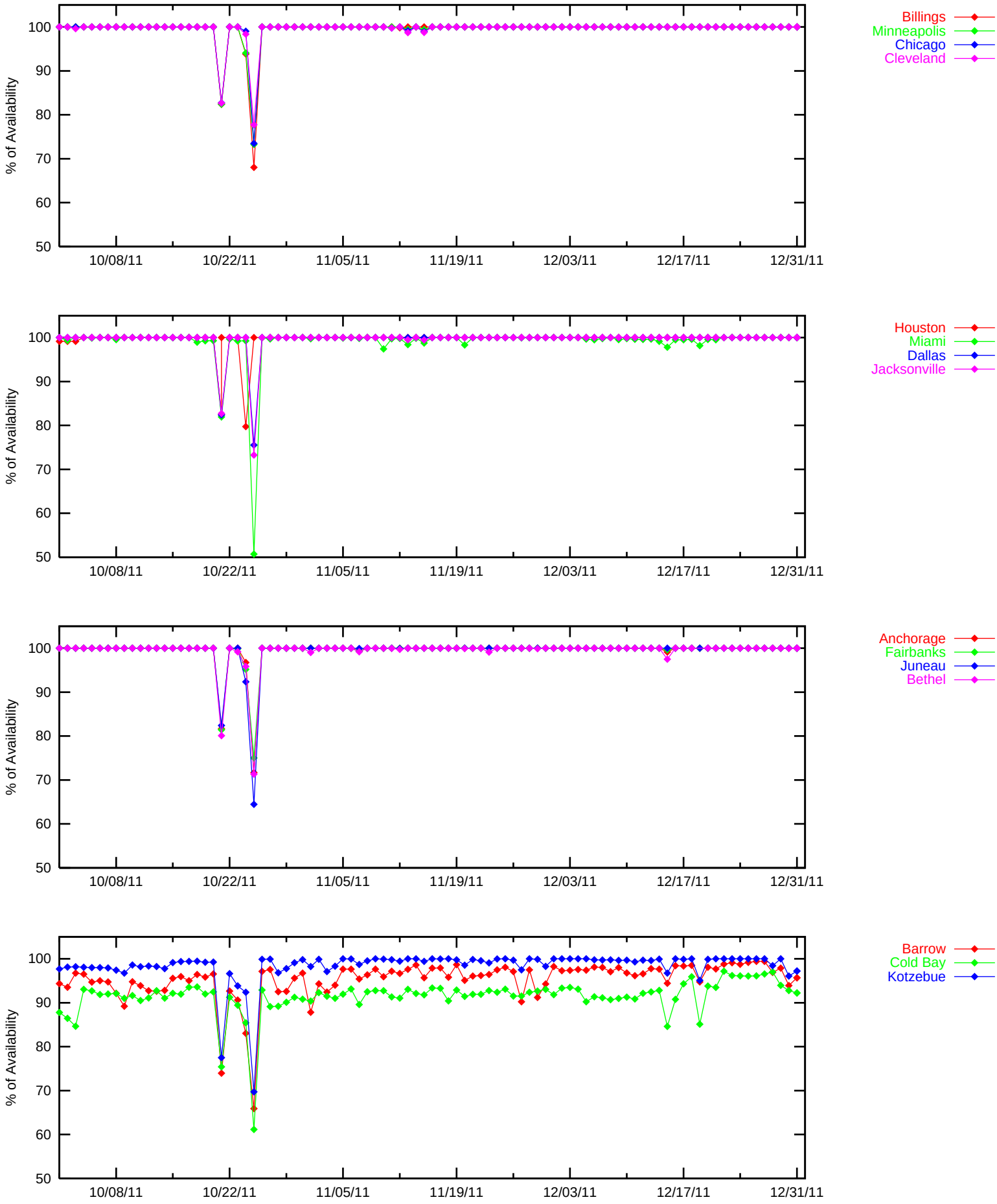


Figure 3-6 LPV 200 Instantaneous Availability

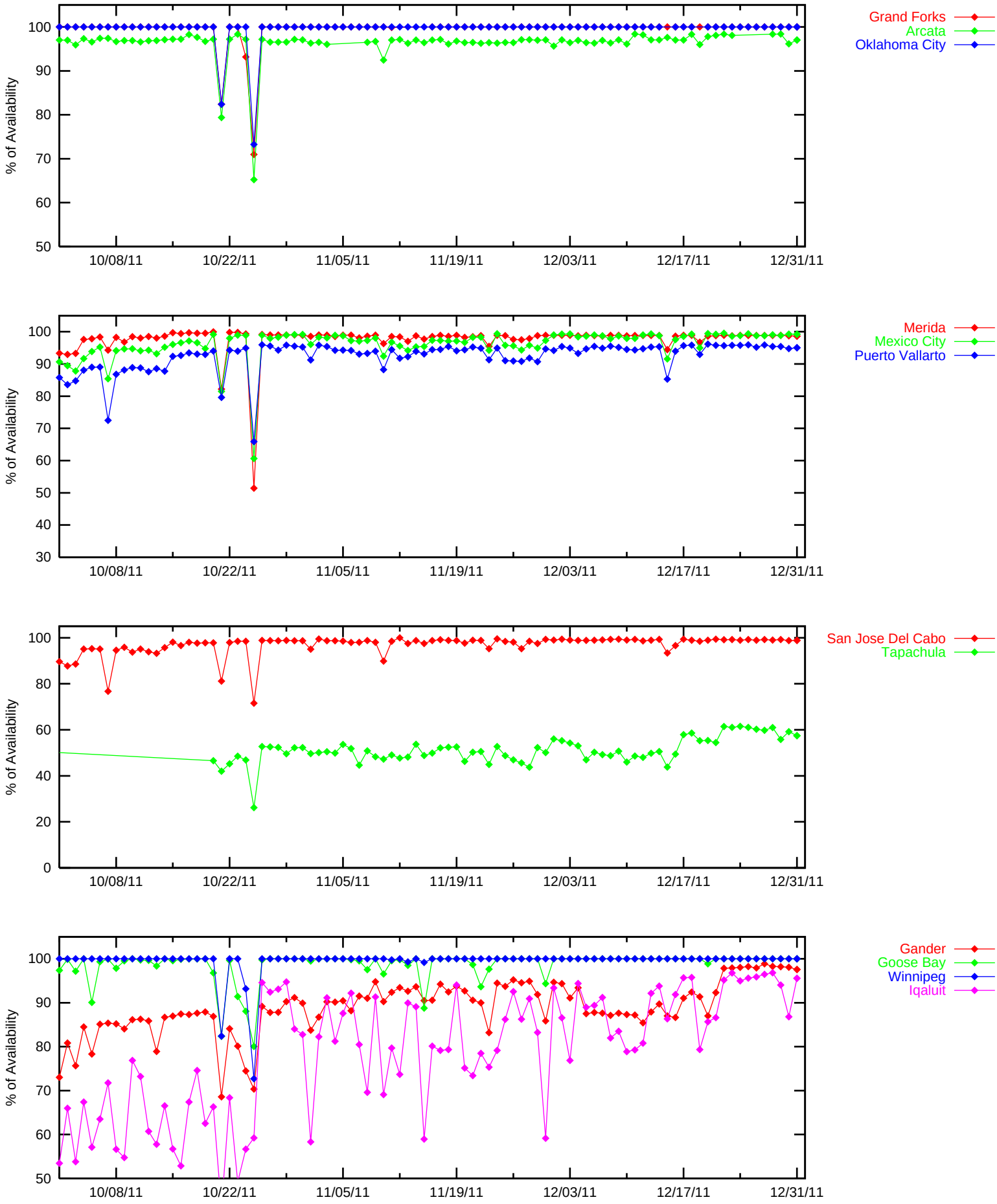


Figure 3-7 LPV Outages

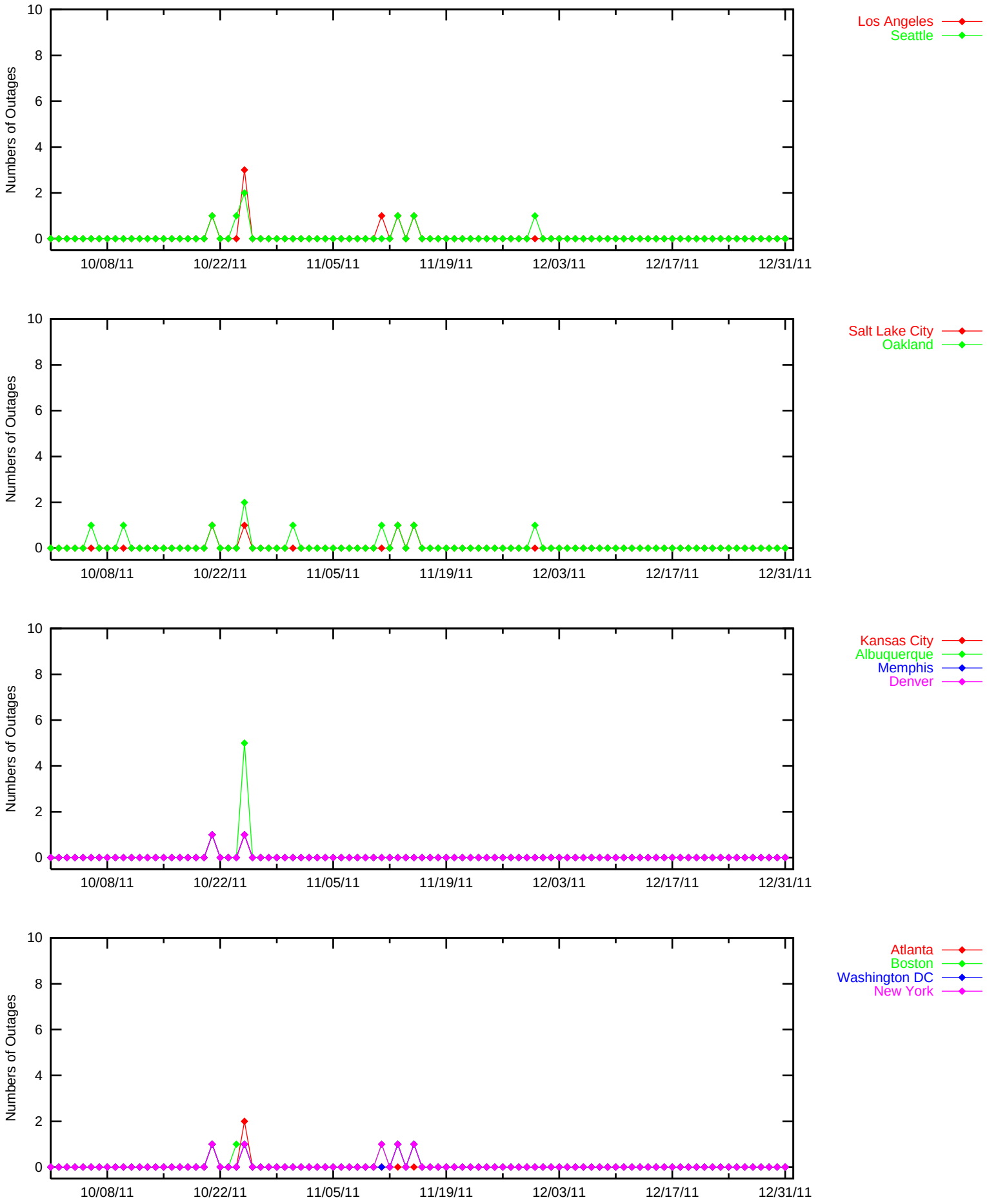


Figure 3-8 LPV Outages

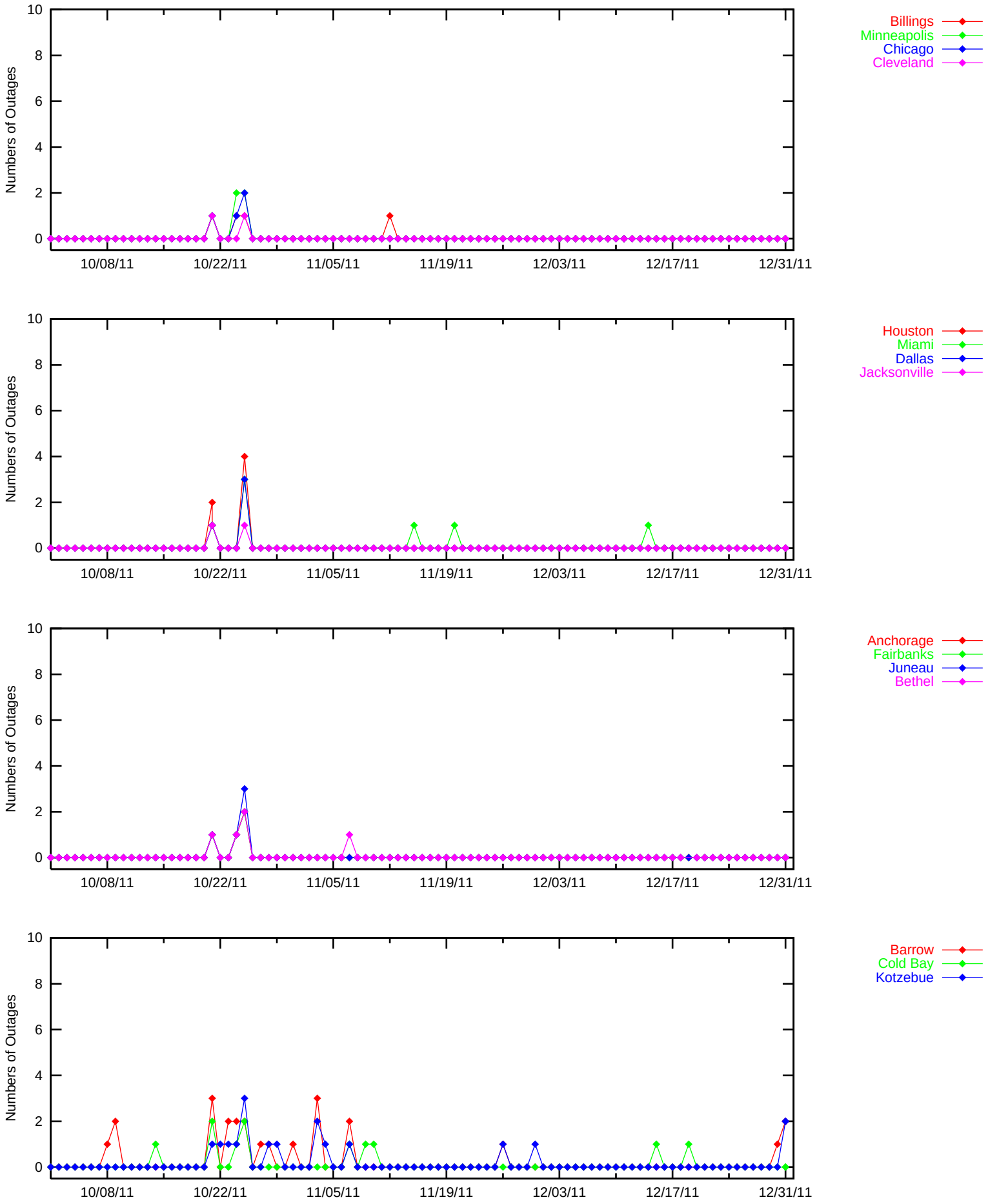


Figure 3-9 LPV Outages

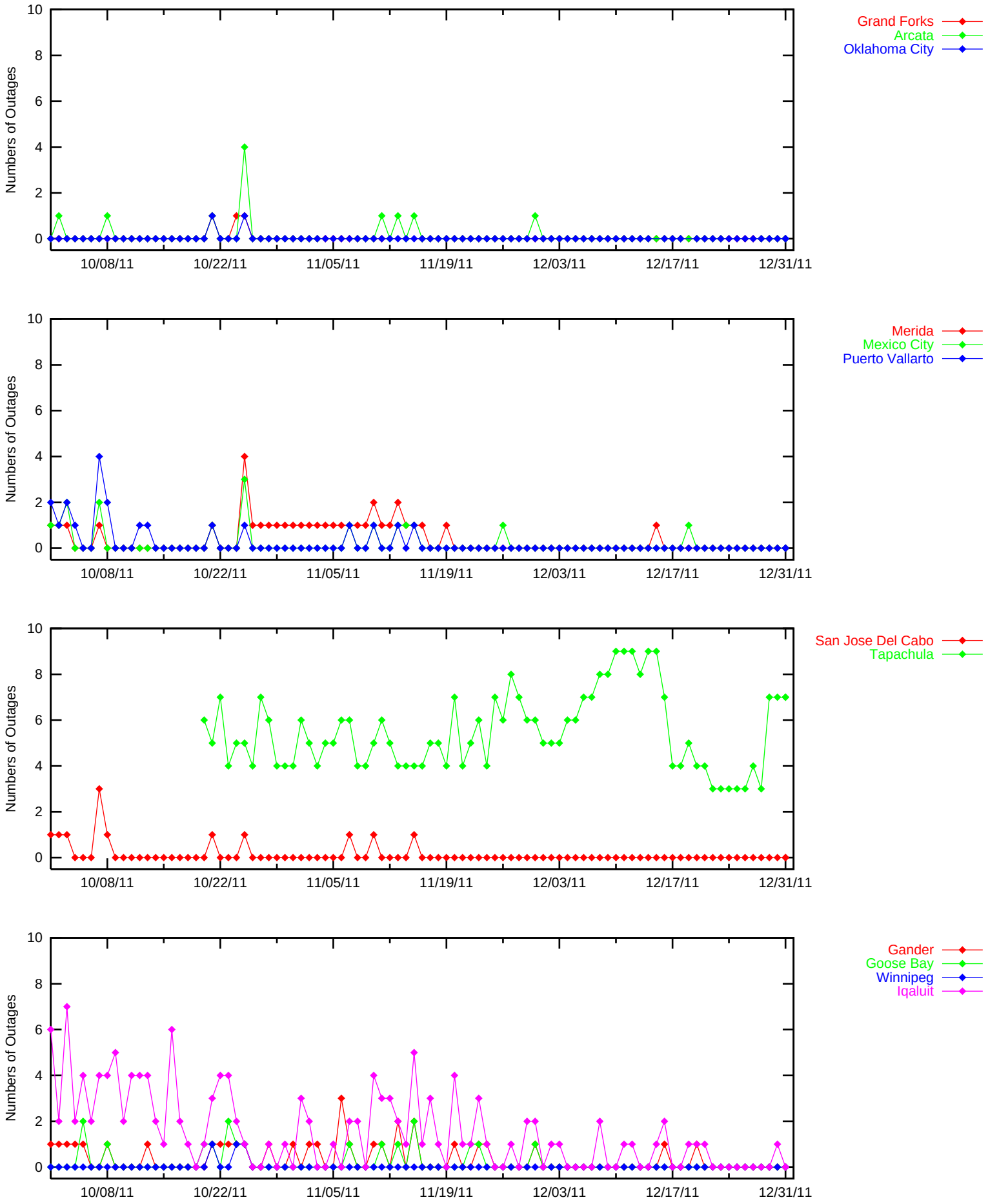


Figure 3-10 LPV 200 Outages

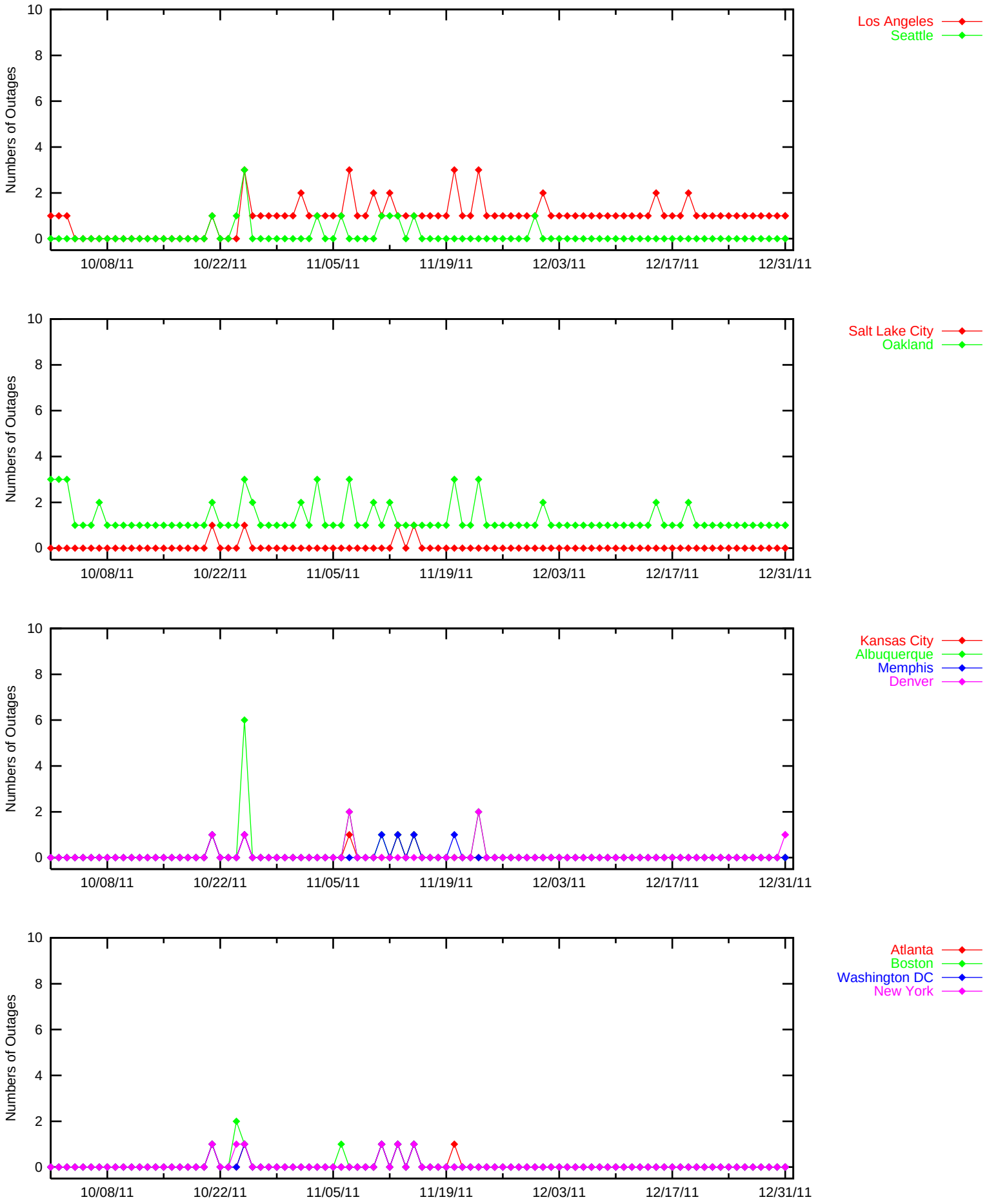


Figure 3-11 LPV 200 Outages

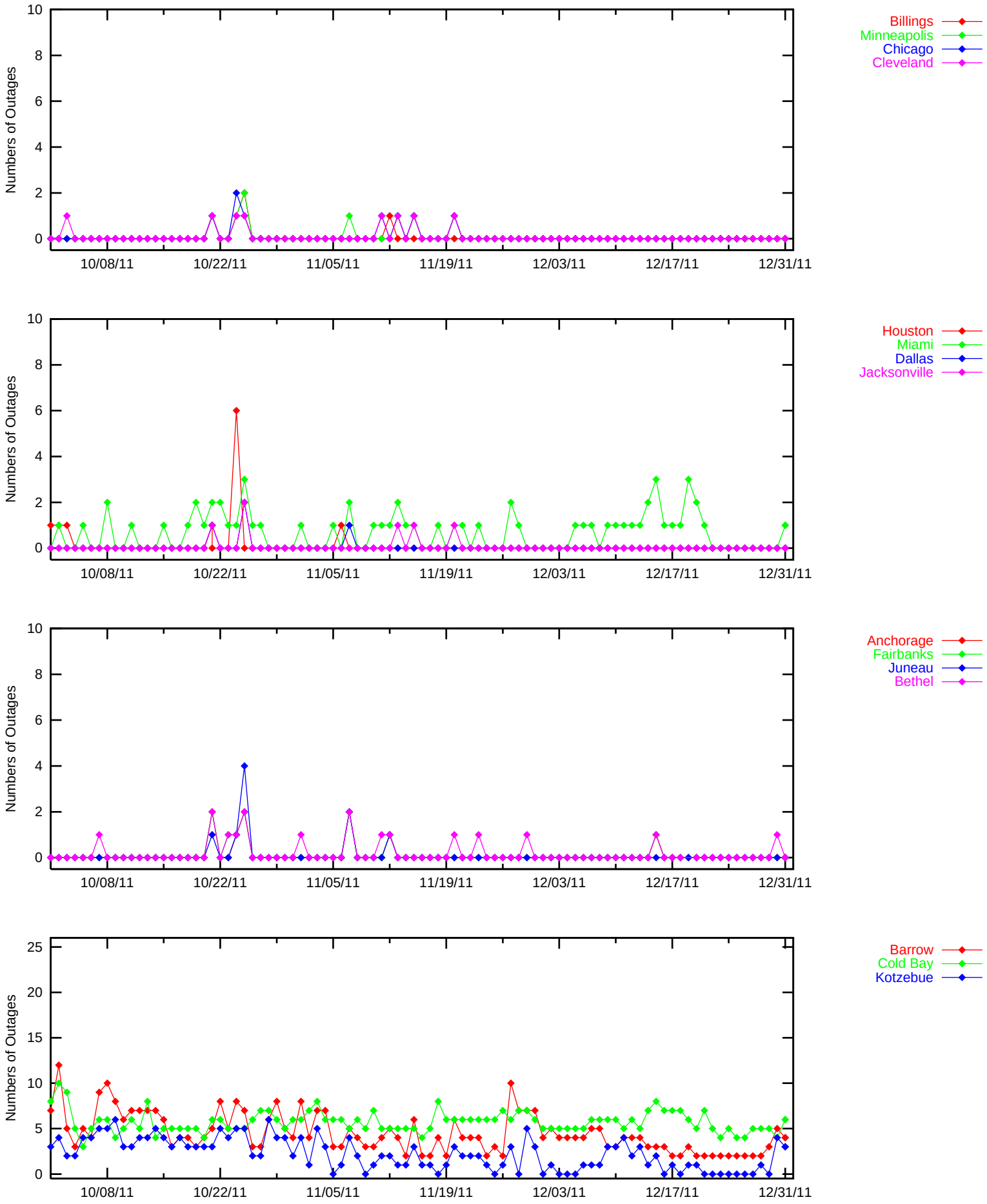
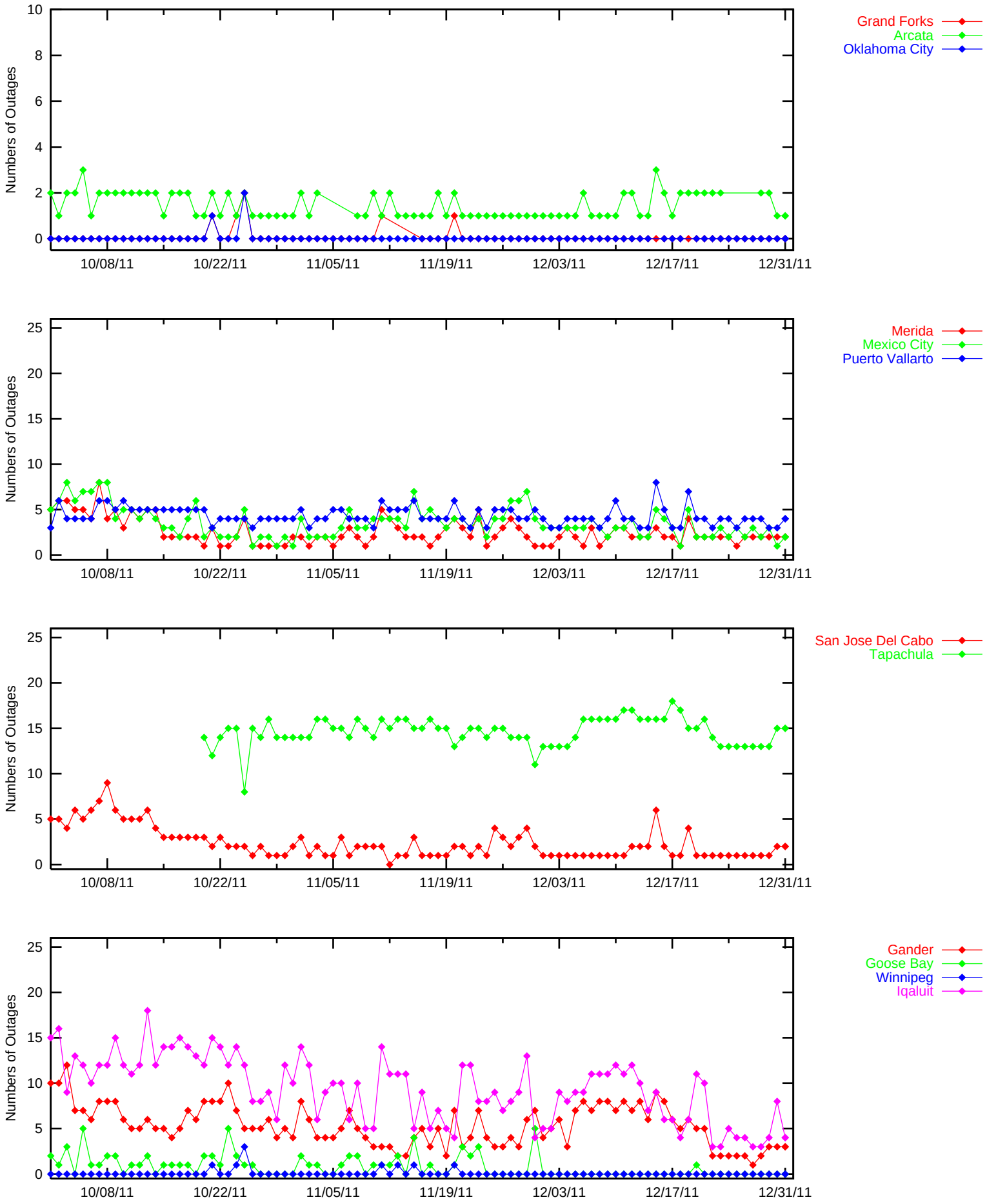


Figure 3-12 LPV 200 Outages



4.0 COVERAGE

The WAAS coverage area evaluation estimates the percent of service volume where WAAS provided service for the operational service levels defined in Table 1.1. 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. The coverage plots provide 100, 99.9, 99, 98 and 95% availability contours. Figure 4.1 shows the rollup LP North America coverage. Figure 4.2 shows the rollup LPV North America coverage. Figure 4.3 shows the rollup LPV 200 North America coverage. Figure 4.6 shows the daily LPV and LPV 200 CONUS coverage, and Figure 4.7 shows the daily LPV Alaska coverage at 99% availability and ionosphere Kp index values for this quarter. Please see Appendix B for coverage plots of 98% LP and LPV availability contour, and 99% LPV 200 availability contour. Kp quantifies the disturbance in the earth's magnetic field and is an indicator of solar storms causing geomagnetic disturbances that can cause the ionosphere to become unpredictable. WAAS increases GIVE values making PA service unavailable when WAAS detects that the ionosphere is disturbed.

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

The coverage decreases for this quarter are due to GUS switchovers, satellite outages, geomagnetic activity, and elevated UDRE and GIVE values. Please refer to Table 1.5 for the events that affected coverage.

The small decreases in RNP coverage are due to GUS switchovers. PRN 1 (SVN 63) was set to usable on 10/14/2011 provided an increased in Alaska coverage. Geomagnetic activity on 10/24/11 that caused elevated GIVE values significantly reduced both CONUS and Alaska coverage. Coverage was affected on 10/21/11 due to a planned software upgrade that resulted in service outage; see DR#105 Software Upgrade 3A C&V Failure. The decreases in coverage from 11/3/11 to 11/30/11 are due to UDRE spikes; see DR#106 UDRE spikes Lead to Reduced WAAS Availability. Low Alaska LPV200 coverage on 12/29/11 is due to a hardware failure on CRW that caused elevated UDRE values; see DR#107 CRW Oscillator Failure. Degraded L2 performance at Honolulu reference stations on 12/19/11 did not affect service; see DR#108 Interference at Honolulu.

Figure 4-1 LP North America Coverage for the Quarater

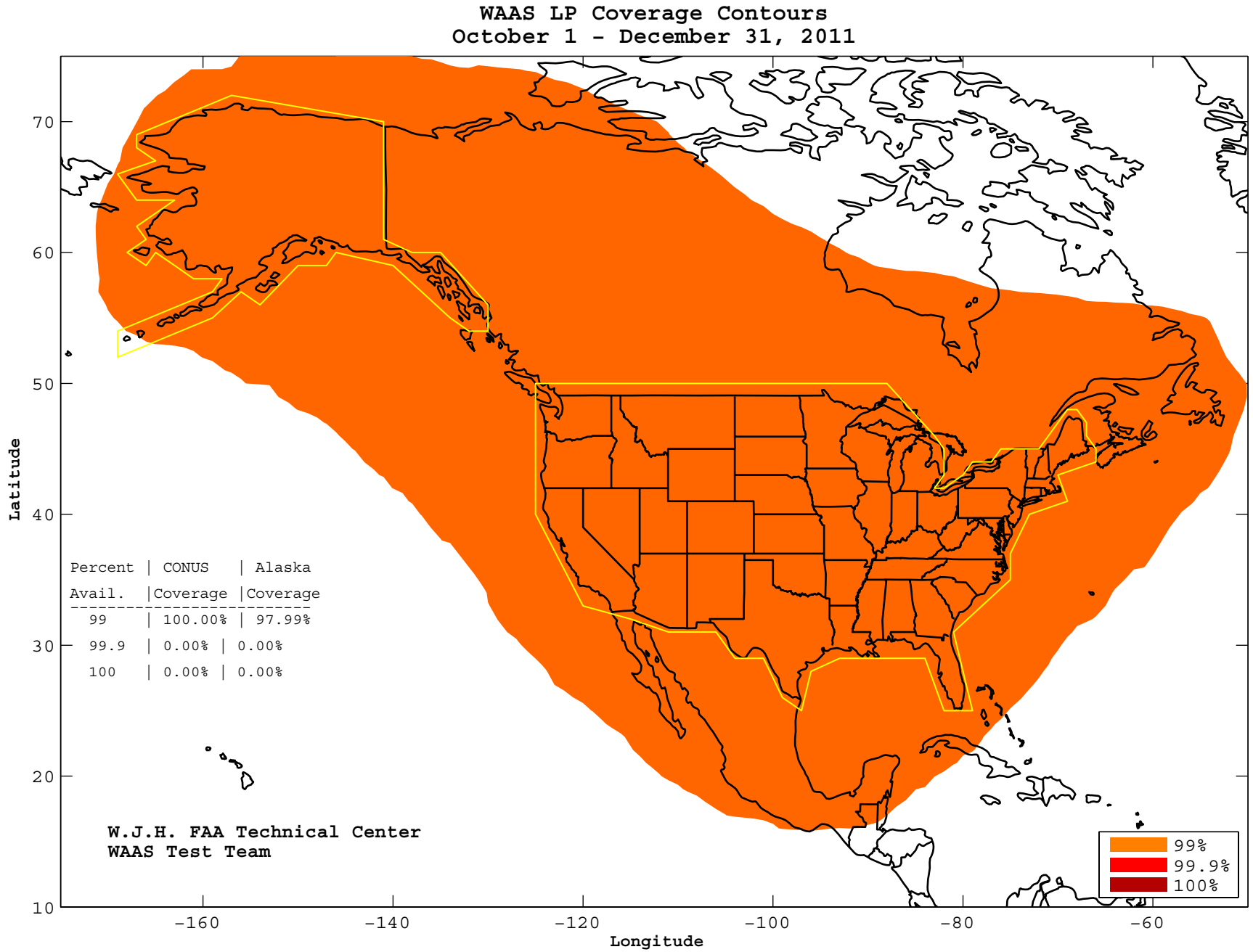


Figure 4-2 LPV North America Coverage for the Quarter

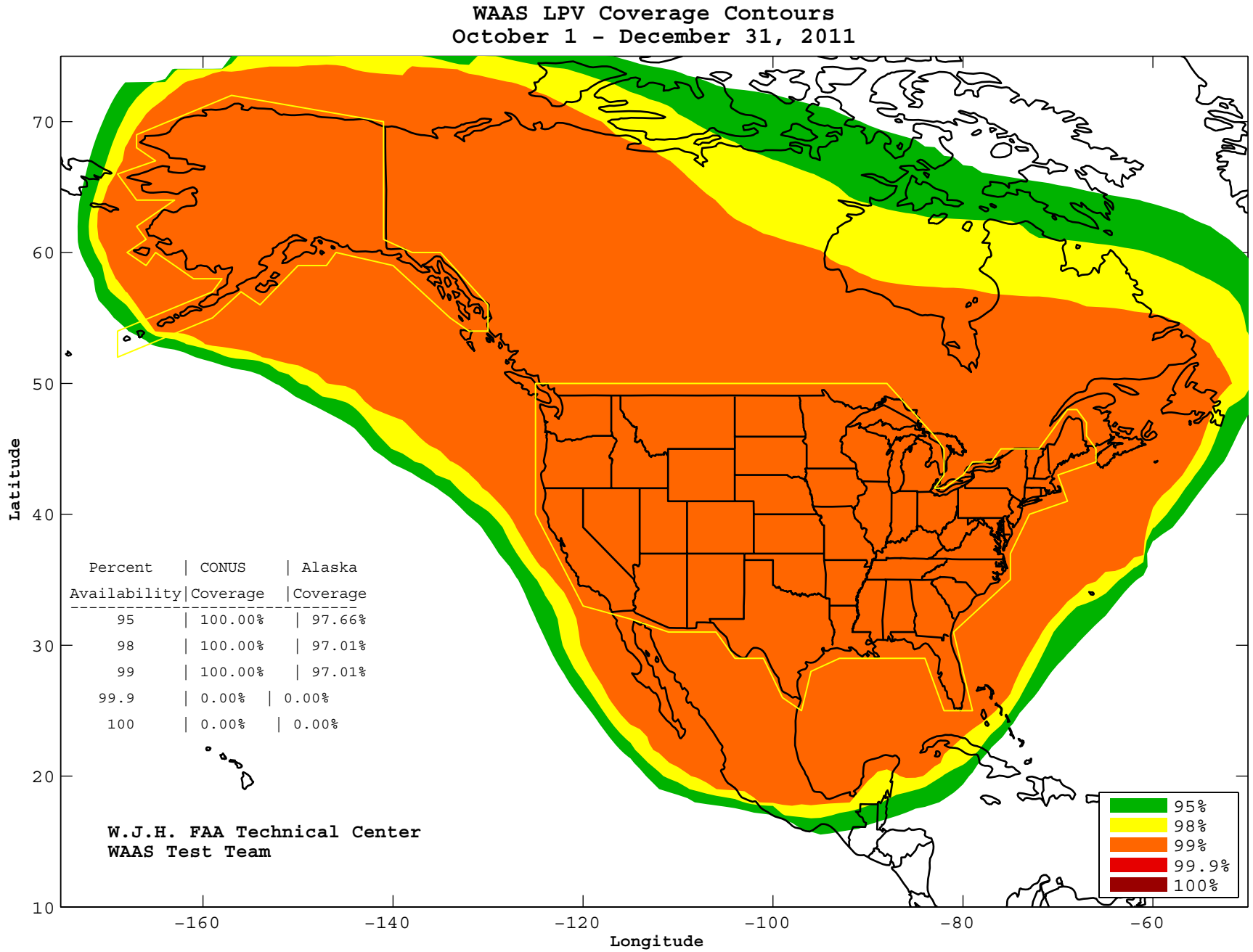


Figure 4-3 LPV 200 North America Coverage for the Quarter

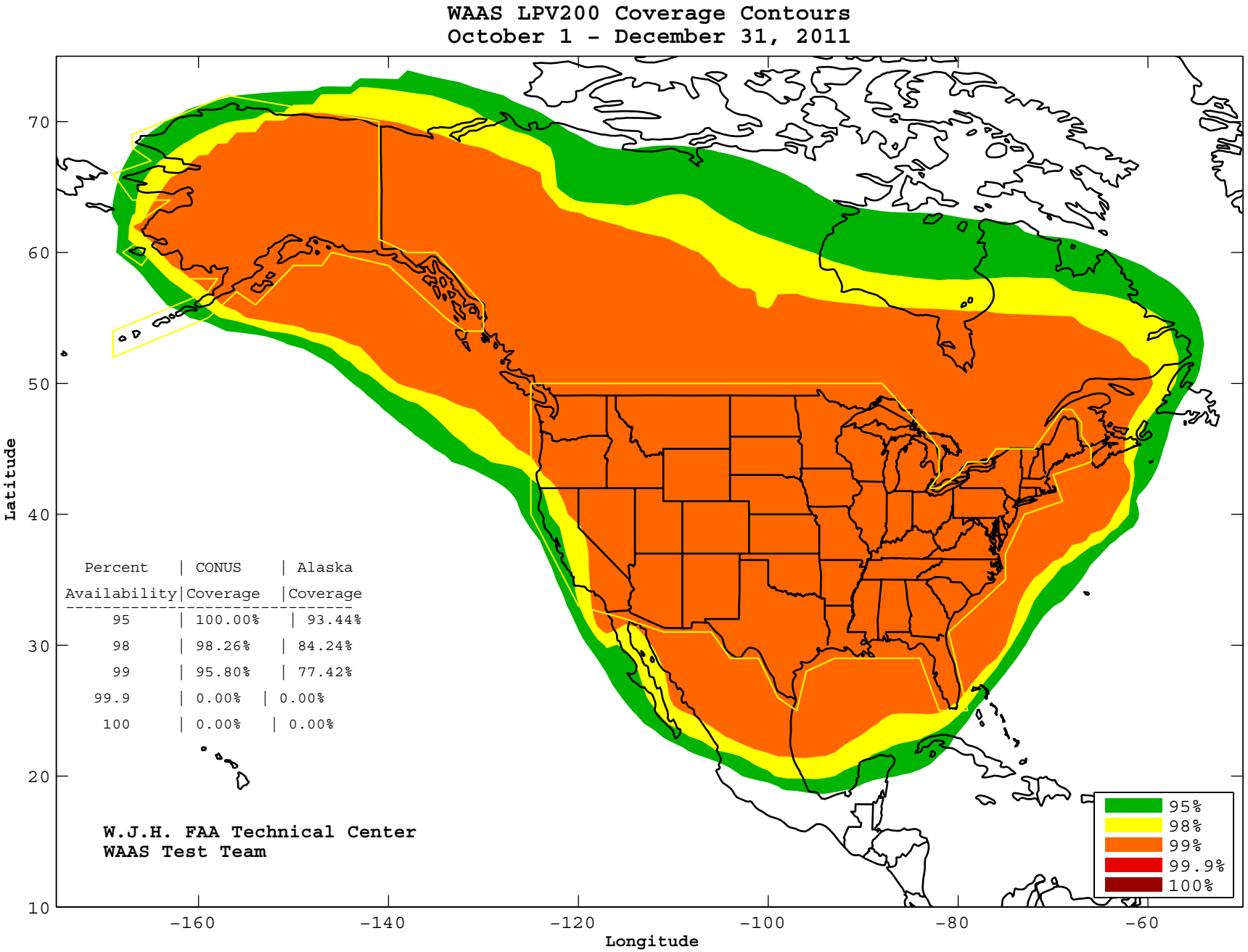


Figure 4-4 RNP 0.1 World Coverage for the Quarter

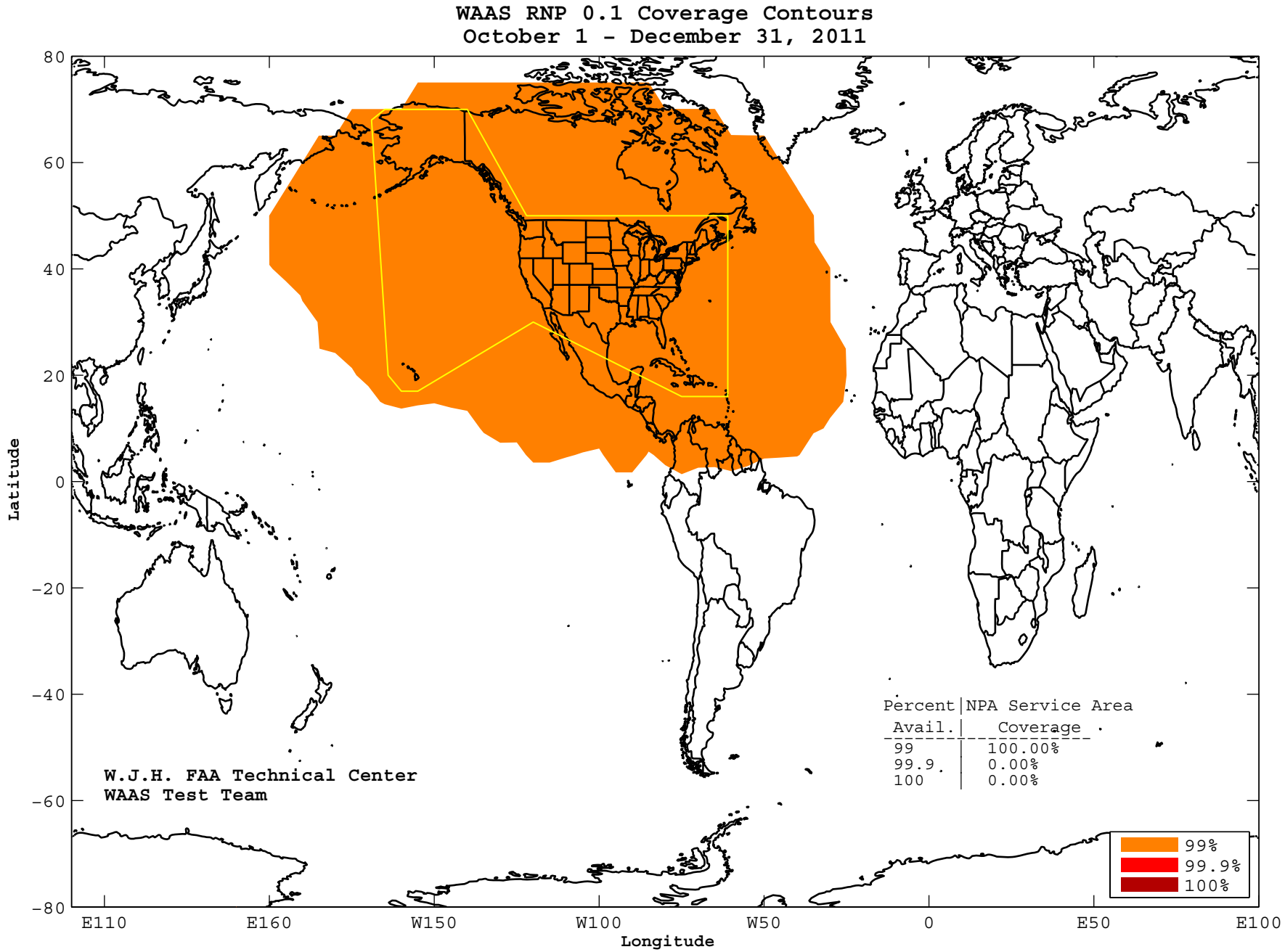


Figure 4-5 RNP 0.3 World Coverage for the Quarter

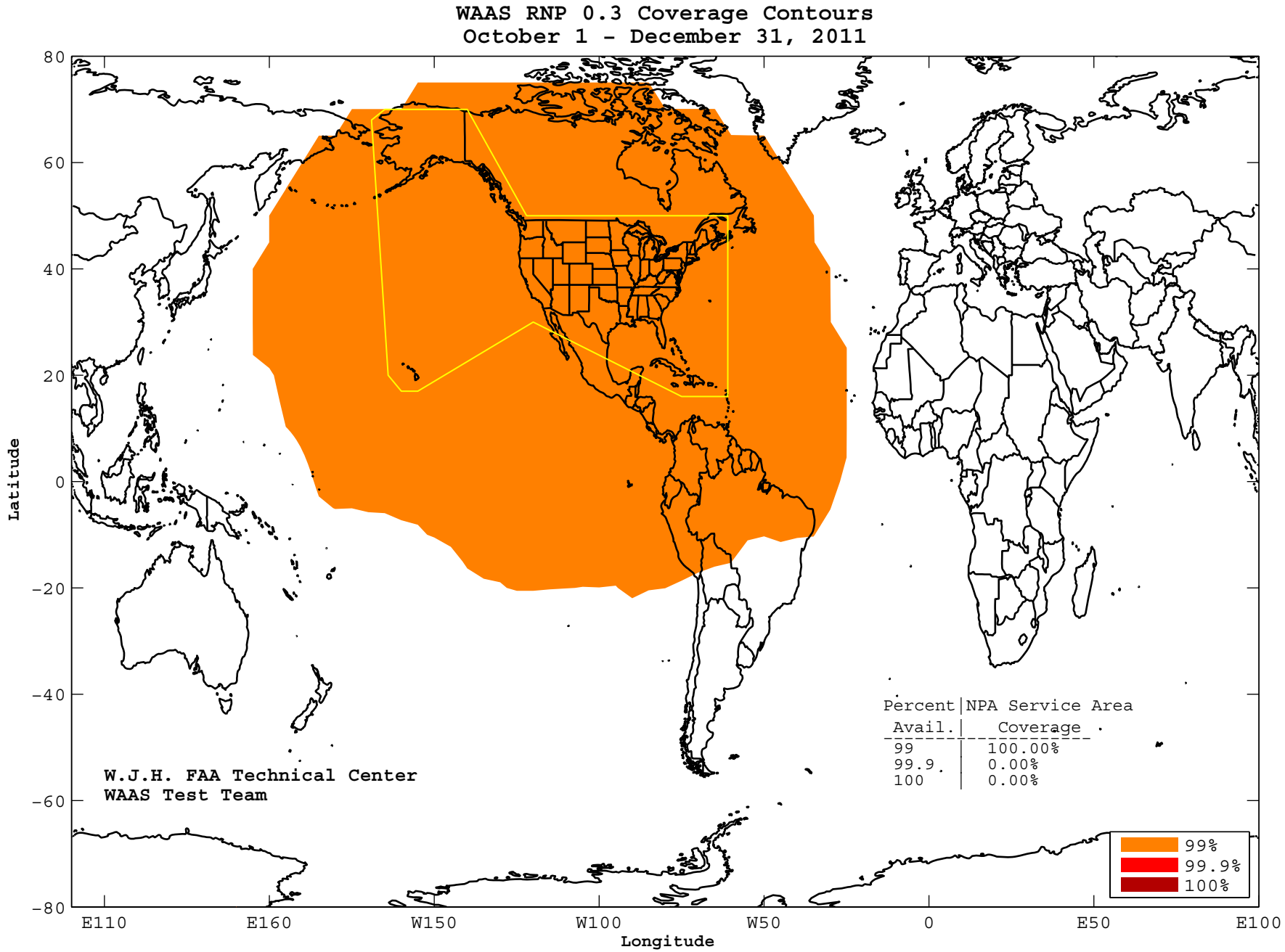


Figure 4-6 Daily LPV and LPV 200 CONUS Coverage

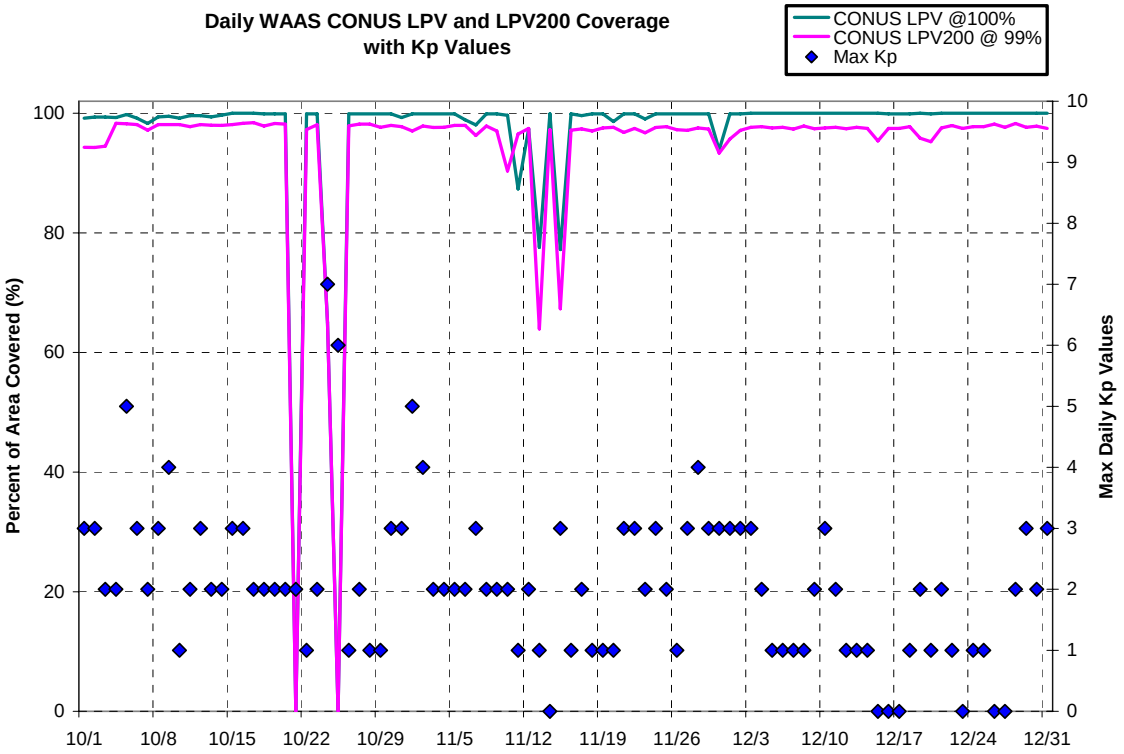


Figure 4-7 Daily LPV Alaska Coverage

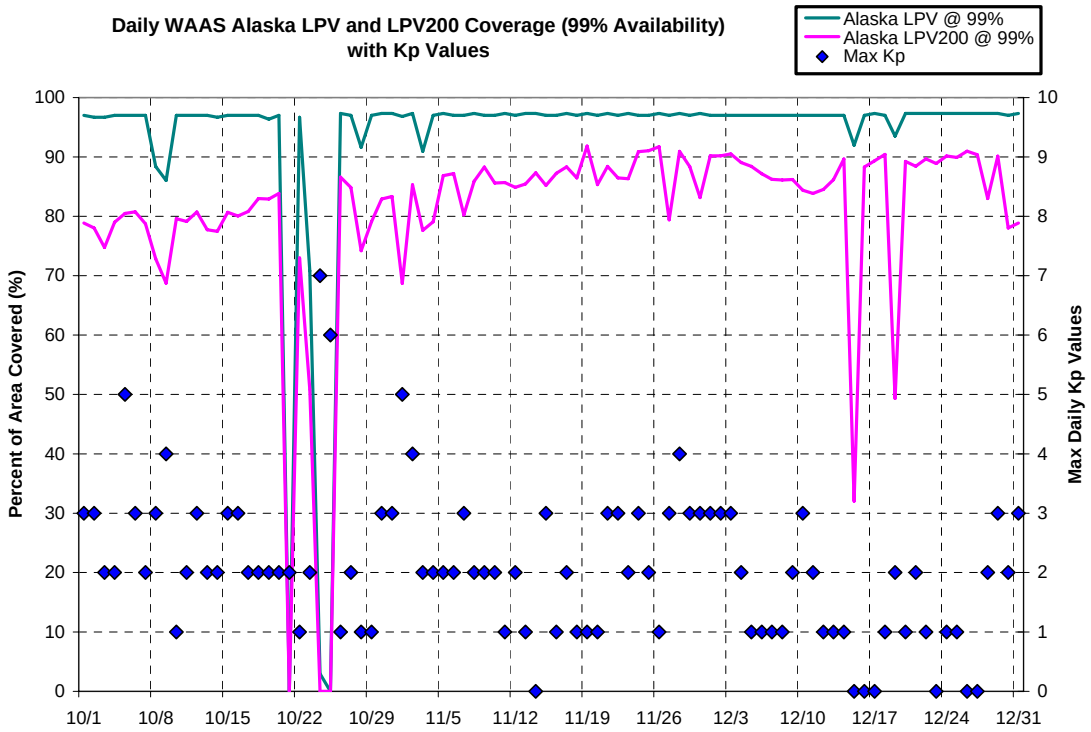
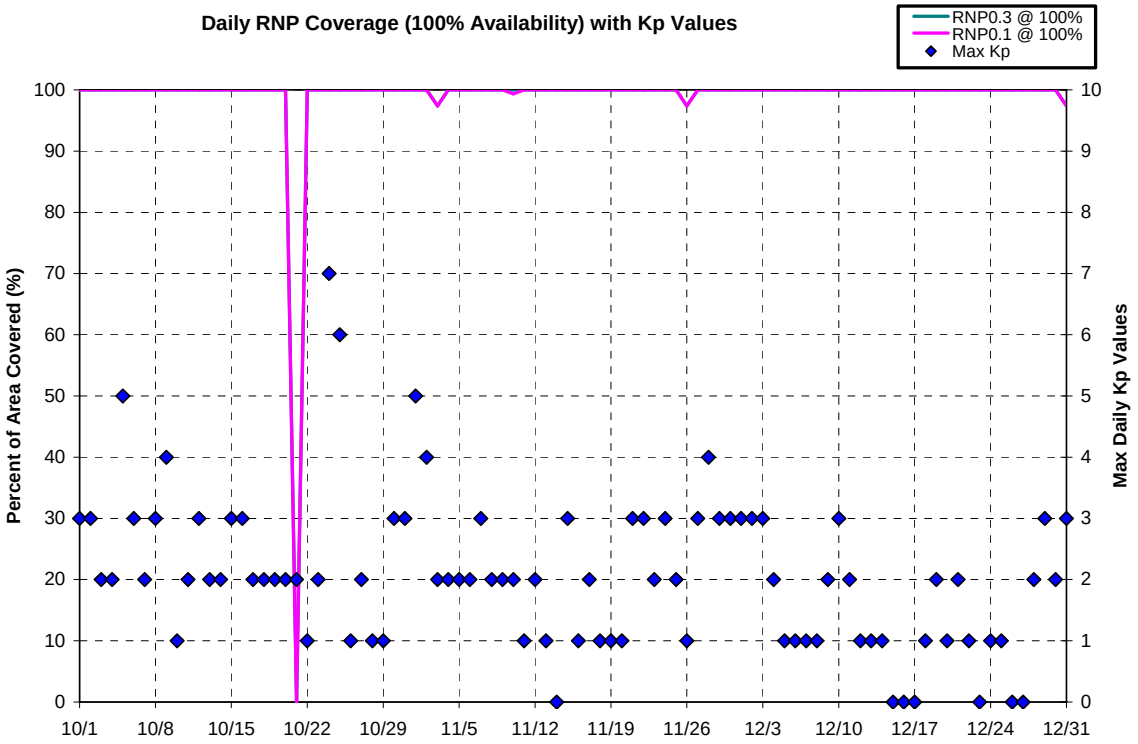


Figure 4-8 Daily RNP Coverage



5.0 INTEGRITY

5.1 HMI Analysis

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

Table 5.1 lists the safety index and the number of HMI events. For this evaluation period, the lowest safety margin index is 2.33 at Mexico City. 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	7.39	5.09	0
Grand Forks	3.47	5.31	0
Oklahoma City	5.62	3.98	0
Albuquerque	17.08	6.78	0
Anchorage	18.26	5.33	0
Atlanta	8.93	9.35	0
Barrow	6.40	4.75	0
Bethel	16.62	10.18	0
Billings	4.41	5.08	0
Boston	10.13	8.89	0
Chicago	11.42	6.71	0
Cleveland	13.44	8.75	0
Cold Bay	11.23	10.16	0
Dallas	15.68	8.31	0
Denver	9.84	8.17	0
Fairbanks	8.20	6.05	0
Gander	8.93	12.03	0
Goose Bay	9.96	8.19	0
Houston	4.26	3.15	0
Iqaluit	8.64	5.47	0
Jacksonville	5.18	8.23	0
Juneau	8.99	5.39	0
Kansas City	10.67	5.07	0
Kotzebue	7.70	8.84	0
Los Angeles	7.03	5.58	0
Memphis	13.43	5.52	0
Merida	5.38	6.49	0
Mexico City	2.33	3.94	0
Miami	14.03	7.29	0
Minneapolis	12.80	13.42	0
New York	11.93	10.36	0
Oakland	4.70	10.56	0
Puerto Vallarta	3.51	4.66	0
Salt Lake City	15.89	9.02	0
San Jose Del Cabo	4.28	5.14	0
Seattle	11.92	7.44	0
Tapachula	3.78	2.94	0
Washington DC	18.47	9.85	0
Winnipeg	11.53	4.60	0

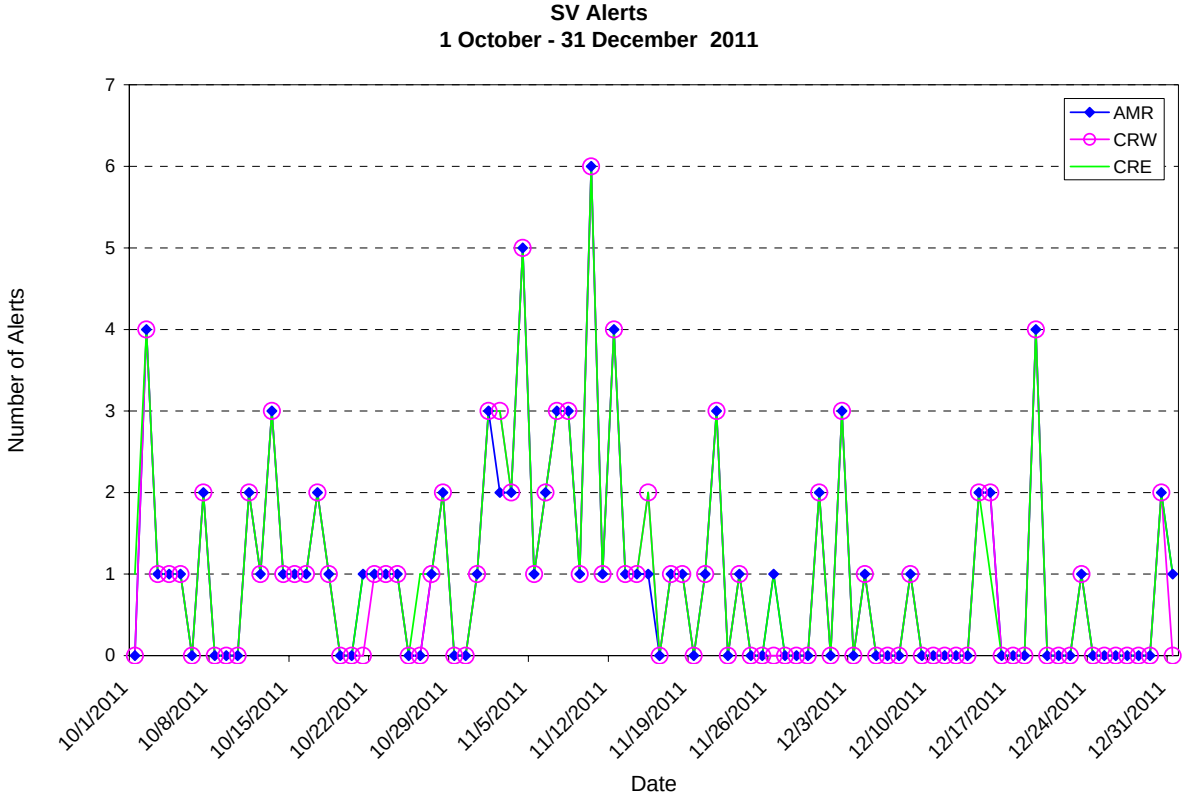
5.2 Broadcast Alerts

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	16	16	16	0.1739	0.1739	0.1739
3	25	25	25	0.2717	0.2717	0.2717
4	50	50	53	0.5435	0.5435	0.5761
5	0	0	0	0.0000	0.0000	0.0000
6	1	0	0	0.0109	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	92	91	94	1.0000	0.9891	1.0217
Days in Service	92	92	92			

Figure 5-1 SV Daily Alert Trend



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

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

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

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

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

Table 5-3 Update Rates for WAAS Messages

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

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

Message Type	On Time	Late	Max Late Length (seconds)
0	5824	452	518395
1	106765	8	14372
2	1323224	611	4037
3	1323254	607	4037
4	1323363	585	4037
7	99563	19	8083
9	93100	1	4186
10	99466	13	14419
17	31572	5	14463

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

SV	On Time	Late	Max Late Length (seconds)
1	43629	0	0
2	48265	0	0
3	51363	1	166
4	48518	1	166
5	49264	0	0
6	52260	0	0
7	48437	0	0
8	46372	0	0
9	50371	0	0
10	51209	0	0
11	52517	0	0
12	49601	2	128
13	48176	0	0
14	48618	0	0
15	50401	0	0
16	49357	0	0
17	48295	0	0
18	48371	0	0
19	51608	0	0
20	50785	0	0
21	48062	0	0
22	49446	0	0
23	47803	1	177
25	50857	0	0
26	50281	0	0
27	8607	0	0
28	49519	0	0
29	48544	0	0
30	45180	0	0
31	49065	0	0
32	48485	0	0

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

SV	On Time	Late	Max Late Length (seconds)
1	35836	0	0
2	39609	4	183
3	42192	1	145
4	39846	0	0
5	40399	0	0
6	42981	0	0
7	39748	0	0
8	38088	0	0
9	41363	1	163
10	42085	2	145
11	43175	0	0
12	40737	0	0
13	39546	1	128
14	39924	2	170
15	41366	0	0
16	40500	1	184
17	39693	0	0
18	39708	0	0
19	42347	0	0
20	41715	1	128
21	39463	1	192
22	40618	0	0
23	39236	0	0
25	41766	3	183
26	41287	1	206
27	7076	0	0
28	40691	3	215
29	39879	2	152
30	37095	1	141
31	40239	3	160
32	39771	1	123
133	54309	1	151
135	76024	4	4230

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

Band	Block	On Time	Late	Max Late Length (seconds)
0	0	27573	18	4487
0	1	27579	12	4483
0	2	27564	15	4480
1	0	27572	16	4474
1	1	27586	17	4172
1	2	27566	13	4151
1	3	27553	18	4151
1	4	27574	16	4143
2	0	27568	18	4139
2	1	27558	17	4109
2	2	27574	17	4104
2	3	27572	19	4108
2	4	27557	22	4104
2	5	27573	22	4086
3	0	27566	18	4085
3	1	27567	17	4077
3	2	27574	21	4357
9	0	27564	19	4336
9	1	27560	18	4320
9	2	27564	21	4324
9	3	27559	22	4308
9	4	27554	27	4305
9	5	27568	25	4301
9	6	27557	28	4304

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

Band	On Time	Late	Max Late Length (seconds)
0	36580	2	4150
1	35954	3	9922
2	35984	2	14102
3	35976	1	14120
9	35908	3	14120

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

Message Type	On Time	Late	Max Late Length (seconds)
0	5258	476	602807
1	106623	4	14102
2	1323286	643	3335
3	1323313	638	3335
4	1323424	618	3335
7	99468	15	9212
9	93111	2	3463
10	99358	5	9204
17	31552	3	14104

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

SV	On Time	Late	Max Late Length (seconds)
1	43638	0	0
2	48254	1	176
3	51368	1	151
4	48520	1	169
5	49263	0	0
6	52254	0	0
7	48449	1	155
8	46373	1	180
9	50373	0	0
10	51208	1	167
11	52532	0	0
12	49600	1	121
13	48180	1	151
14	48612	1	158
15	50416	1	175
16	49368	0	0
17	48288	2	168
18	48398	1	151
19	51598	0	0
20	50782	1	181
21	48057	1	167
22	49443	1	163
23	47793	1	180
25	50838	1	167
26	50295	2	180
27	8606	0	0
28	49528	1	151
29	48541	1	158
30	45187	0	0
31	49066	1	169
32	48491	3	169

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

SV	On Time	Late	Max Late Length (seconds)
1	35832	3	149
2	39604	3	142
3	42186	2	145
4	39858	2	204
5	40411	0	0
6	42977	1	128
7	39754	0	0
8	38097	1	128
9	41365	1	205
10	42082	2	205
11	43165	1	142
12	40730	1	128
13	39533	3	204
14	39921	2	169
15	41386	0	0
16	40496	1	184
17	39703	1	159
18	39719	0	0
19	42377	0	0
20	41725	1	122
21	39460	1	178
22	40620	0	0
23	39238	1	187
25	41769	1	209
26	41302	2	204
27	7074	0	0
28	40706	2	215
29	39859	5	209
30	37103	1	123
31	40252	2	209
32	39787	0	0
133	53754	2	208
135	76220	4	3517
138	76132	4	3522

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

Band	Block	On Time	Late	Max Late Length (seconds)
0	0	27579	13	3553
0	1	27581	13	3558
0	2	27569	18	3546
1	0	27575	17	3529
1	1	27577	16	3522
1	2	27570	15	3527
1	3	27566	19	3516
1	4	27571	14	3517
2	0	27567	20	3487
2	1	27569	16	3491
2	2	27564	21	3484
2	3	27569	20	3763
2	4	27562	19	3742
2	5	27572	21	3726
3	0	27572	17	3722
3	1	27570	19	3709
3	2	27568	20	3708
9	0	27566	18	3706
9	1	27569	22	3702
9	2	27572	20	3690
9	3	27564	20	3678
9	4	27564	20	3670
9	5	27575	20	3667
9	6	27557	23	3653

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

Band	On Time	Late	Max Late Length (seconds)
0	36563	3	3557
1	35932	3	9172
2	35921	2	9157
3	35956	2	14099
9	35939	2	14107

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

Message Type	On Time	Late	Max Late Length (seconds)
0	2356	619	431988
1	107877	3	14107
2	1323623	786	26
3	1323659	777	24
4	1323770	761	25
7	100486	10	13388
9	93150	1	135
10	100391	11	9188
17	31671	5	13381

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

SV	On Time	Late	Max Late Length (seconds)
1	43674	0	0
2	48255	0	0
3	51401	0	0
4	48525	0	0
5	49270	0	0
6	52279	0	0
7	48486	0	0
8	46417	0	0
9	50402	0	0
10	51203	1	168
11	52570	0	0
12	49594	1	121
13	48202	1	168
14	48610	0	0
15	50459	0	0
16	49364	0	0
17	48337	0	0
18	48450	0	0
19	51654	0	0
20	50792	0	0
21	48057	0	0
22	49485	0	0
23	47801	0	0
25	50852	1	168
26	50326	1	177
27	8607	0	0
28	49567	0	0
29	48539	0	0
30	45186	0	0
31	49070	0	0
32	48498	0	0

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

SV	On Time	Late	Max Late Length (seconds)
1	35867	2	160
2	39619	1	128
3	42223	2	144
4	39855	1	150
5	40424	1	122
6	42987	1	125
7	39787	0	0
8	38116	1	125
9	41402	0	0
10	42085	2	144
11	43200	1	142
12	40736	1	128
13	39566	0	0
14	39929	1	126
15	41425	0	0
16	40501	0	0
17	39721	2	159
18	39749	0	0
19	42405	0	0
20	41734	0	0
21	39441	0	0
22	40676	1	129
23	39242	0	0
25	41763	1	121
26	41354	0	0
27	7078	0	0
28	40707	0	0
29	39867	2	152
30	37092	2	146
31	40258	1	163
32	39779	0	0
133	54357	1	122
135	76043	1	122
138	76199	2	177

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

Band	Block	On Time	Late	Max Late Length (seconds)
0	0	27574	16	459
0	1	27582	15	464
0	2	27588	13	458
1	0	27583	16	576
1	1	27594	14	503
1	2	27594	14	491
1	3	27576	16	507
1	4	27576	15	506
2	0	27576	15	501
2	1	27587	16	496
2	2	27584	16	448
2	3	27590	18	451
2	4	27578	18	438
2	5	27572	20	418
3	0	27578	17	524
3	1	27585	18	512
3	2	27576	23	512
9	0	27581	22	512
9	1	27588	17	414
9	2	27590	15	407
9	3	27573	20	402
9	4	27580	17	398
9	5	27575	18	399
9	6	27592	21	366

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

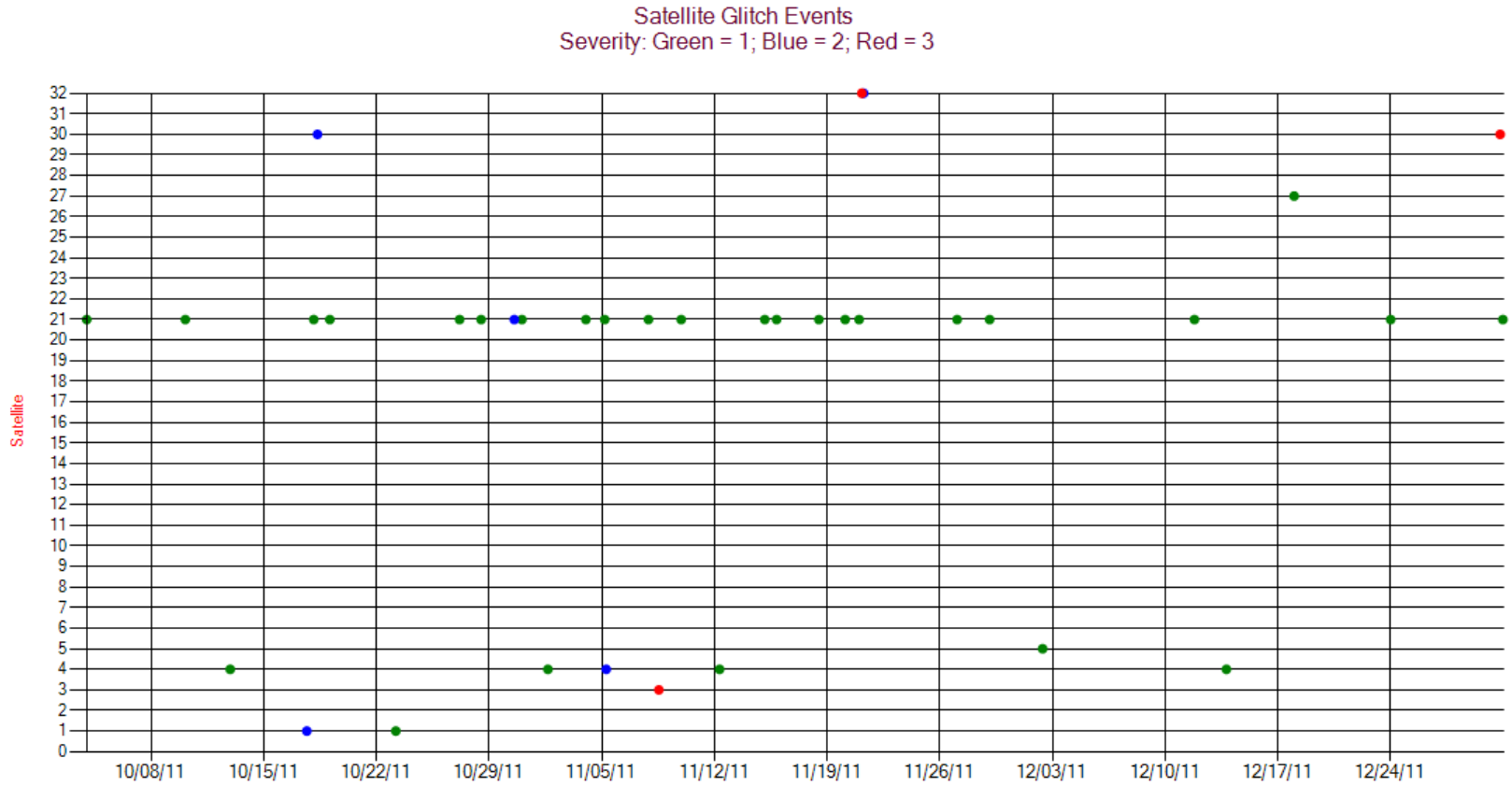
Band	On Time	Late	Max Late Length (seconds)
0	37078	1	398
1	36094	3	14114
2	36093	3	14093
3	36116	2	14098
9	36091	5	9179

5.4 Satellite Glitches

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

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

Figure 5-2 SV Glitch Trend



6.0 SV RANGE ACCURACY

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

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

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

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

For this reporting period, most satellites range errors were bounded 99.9% of the time by the UDRE except for PRN 9, 14, 18, 21, and 22 at Miami, Atlanta, and Kansas City which were bounded 99.7%. The unbounded range errors occurred during LPV service outages caused by geomagnetic activity.

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	2.407	99.9632	2.392	100	2.717	100	2.581	100	2.651	100	2.583	100
2	1.361	100	1.577	100	1.976	100	2.029	100	2.274	100	1.993	100
3	1.769	100	1.449	100	1.066	100	0.937	100	1.438	100	0.926	100
4	1.974	100	1.584	100	1.587	100	1.357	100	1.717	100	2.610	100
5	2.178	100	1.404	100	1.299	100	0.916	100	1.484	100	1.688	100
6	1.415	100	1.233	100	1.472	100	1.117	100	1.369	100	1.169	100
7	1.410	100	1.029	100	1.186	100	1.248	100	1.069	100	1.071	100
8	0.816	100	0.791	100	1.038	100	0.871	100	1.181	100	1.315	100
9	1.186	100	1.008	100	1.017	100	1.289	100	1.229	100	0.971	100
10	0.898	100	1.003	100	1.189	100	1.188	100	1.830	100	1.020	100
11	0.938	100	1.176	100	0.892	100	0.810	100	1.832	100	0.970	100
12	1.479	100	1.331	100	1.173	100	1.137	100	1.394	100	1.238	100
13	1.547	100	1.243	100	1.173	100	1.350	100	1.493	100	0.999	100
14	2.324	100	0.838	100	1.111	100	1.406	100	1.360	100	1.699	99.9527
15	1.349	100	1.476	100	1.328	100	0.994	100	1.415	100	1.397	99.9991
16	0.876	100	1.658	100	1.358	100	1.349	100	1.904	100	1.607	100
17	2.871	100	1.241	100	1.836	100	0.843	100	1.226	100	0.936	100
18	0.963	100	1.149	100	1.681	100	1.756	100	1.967	100	1.522	99.8966
19	2.601	100	2.163	100	2.392	100	2.428	100	2.898	100	2.908	99.9846
20	0.895	99.9774	1.480	100	1.750	100	1.694	100	1.583	100	1.647	100
21	1.447	99.9587	1.284	100	1.440	100	1.949	100	1.873	100	1.899	99.8595
22	2.452	100	2.277	100	2.512	100	2.954	100	3.551	99.9973	2.396	99.7982
23	1.406	99.9875	2.038	100	1.994	100	1.816	100	2.624	100	2.008	100
24	-	-	-	-	-	-	-	-	-	-	-	-
25	2.274	100	2.536	100	1.838	100	1.833	100	3.027	100	2.026	100
26	1.739	100	1.812	100	1.317	100	1.405	100	1.943	100	1.506	100
27	1.546	100	1.508	100	1.564	100	1.056	100	1.417	100	1.404	100
28	0.896	100	0.831	100	1.153	100	1.090	100	1.763	100	1.085	100
29	1.838	100	1.492	100	0.987	100	1.462	100	1.050	100	1.004	99.9948
30	1.044	99.9943	1.097	100	1.133	100	1.082	100	1.550	100	1.199	100
31	2.203	99.9743	1.204	100	0.927	100	0.805	100	1.210	100	1.004	100
32	1.412	99.9567	0.899	100	1.029	100	0.964	100	1.641	100	1.272	100
135	2.194	100	1.903	100	2.643	100	2.170	100	2.775	100	1.533	100
138	1.298	100	1.484	100	1.642	100	1.853	100	2.403	100	1.867	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	2.251	100	2.570	100	2.125	100	2.806	100.0000	2.240	100	2.421	100
2	1.510	100	1.450	100	2.605	100	1.461	100	2.087	100	1.554	100
3	1.474	100	1.090	100	1.033	100	2.256	100	0.847	100	1.416	100
4	1.484	100	1.764	100	1.791	100	1.517	100	1.084	100	1.604	100
5	1.461	100	1.831	100	1.192	100	1.921	100	0.892	100	1.754	100
6	0.943	100	1.638	100	1.080	99.9979	1.469	100	0.909	99.9996	1.777	100
7	1.002	100	1.508	100	1.329	100	1.242	100	0.880	100	1.616	100
8	0.729	100	0.865	100	1.192	100	1.588	100	1.114	100	1.128	100
9	1.151	100	1.085	100	1.627	99.9690	2.020	100	1.118	99.8920	1.120	100
10	0.946	100	0.859	100	1.788	100	1.010	100	1.294	100	1.107	100
11	0.949	100	0.881	100	2.643	100	0.994	100	1.288	100	1.124	100
12	0.926	100	1.207	100	1.302	100	1.168	100	1.455	100	1.218	100
13	0.919	100	1.754	100	1.180	100	1.435	100	0.868	100	1.418	100
14	1.037	100	1.046	100	2.174	99.9745	0.919	100	1.546	99.8807	0.945	100
15	1.741	100	1.471	100	1.297	99.9995	1.866	99.9728	0.897	99.9688	1.574	100
16	1.436	100	1.112	100	1.976	100	1.395	100	1.835	100	0.917	100
17	1.095	100	1.524	100	1.380	100	1.168	100	0.833	100	1.124	100
18	1.286	100	1.624	100	2.360	99.8578	1.038	100	2.014	99.8097	1.353	100
19	2.160	100	2.270	100	2.822	100	2.081	100	2.895	99.9914	2.673	99.9979
20	1.218	100	1.288	100	1.883	100	1.138	100	1.659	100	1.077	100
21	1.492	100	1.218	100	2.799	99.8223	1.000	100	1.976	99.7741	1.223	100
22	2.312	100	2.057	100	3.555	99.7488	2.436	100	3.045	99.7552	2.346	100
23	1.809	100	1.503	100	2.402	100	1.495	100	2.161	100	1.422	100
24	-	-	-	-	-	-	-	-	-	-	-	-
25	2.093	100	2.068	100	1.403	100	2.386	100	1.434	100	2.135	100
26	1.454	100	1.568	100	1.197	100	2.397	99.9856	1.128	100	1.473	100
27	1.489	100	1.476	100	1.422	100	1.539	100	0.946	100	1.693	100
28	1.079	100	0.896	100	2.139	100	0.965	100	1.477	100	1.160	100
29	1.376	100	2.817	100	1.316	99.9846	1.421	100	0.932	100	1.502	100
30	1.019	100	0.948	100	1.815	100	1.047	100	1.393	100	0.982	100
31	1.654	100	1.445	100	1.652	100	1.222	100	1.227	100	1.062	100
32	1.062	100	1.474	100	1.434	100	1.092	100	1.227	100	0.995	100
135	2.034	100	1.760	100	1.763	100	2.210	100	2.869	100	1.736	100
138	2.292	100	1.630	100	2.297	100	1.996	100	1.460	100	1.854	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	1.583	100	1.656	100	1.894	100	1.652	100	1.787	100	1.551	100
2	1.096	100	0.928	100	1.041	100	1.048	100	1.309	100	1.238	100
3	0.731	100	0.707	100	0.543	100	0.548	100	0.902	100	0.468	100
4	1.112	100	1.138	100	1.236	100	1.243	100	1.517	100	1.746	100
5	1.429	100	1.106	100	0.998	100	0.834	100	1.397	100	1.260	100
6	0.644	100	0.625	100	0.943	100	0.526	100	0.880	100	0.478	100
7	0.862	100	0.782	100	0.850	100	0.995	100	0.898	100	0.671	100
8	0.381	100	0.442	100	0.531	100	0.492	100	0.469	100	0.582	100
9	0.568	100	0.632	100	0.625	100	0.672	100	0.789	100	0.489	100
10	0.439	100	0.425	100	0.582	100	0.459	100	0.724	100	0.512	100
11	0.557	100	0.441	100	0.489	100	0.395	100	0.818	100	0.465	100
12	0.572	100	0.697	100	0.667	100	0.576	100	0.704	100	0.548	100
13	0.892	100	0.883	100	0.760	100	0.773	100	0.825	100	0.580	100
14	1.389	100	0.434	100	0.621	100	0.464	100	0.657	100	0.826	100
15	0.704	100	0.995	100	0.807	100	0.976	100	1.183	100	1.013	100
16	0.519	100	0.879	100	0.630	100	0.573	100	0.680	100	0.724	100
17	1.848	100	0.794	100	1.266	100	0.584	100	0.880	100	0.585	100
18	0.628	100	0.522	100	0.878	100	0.718	100	0.869	100	0.789	100
19	1.583	100	1.386	100	1.505	100	1.540	100	1.951	100	1.827	100
20	0.660	100	0.646	100	0.686	100	0.693	100	0.704	100	0.813	100
21	1.086	100	0.629	100	1.012	100	0.953	100	0.936	100	1.072	100
22	1.948	100	1.620	100	1.779	100	1.942	100	2.142	100	1.725	100
23	1.183	100	1.360	100	1.467	100	1.315	100	1.631	100	1.452	100
24	-	-	-	-	-	-	-	-	-	-	-	-
25	1.142	100	1.383	100	1.248	100	1.176	100	1.541	100	1.124	100
26	0.864	100	1.054	100	0.812	100	0.860	100	1.390	100	0.873	100
27	0.840	100	0.778	100	0.930	100	0.673	100	0.823	100	0.837	100
28	0.674	100	0.549	100	0.600	100	0.538	100	0.861	100	0.550	100
29	0.871	100	0.936	100	0.777	100	0.819	100	0.885	100	0.676	100
30	0.446	100	0.445	100	0.477	100	0.450	100	0.755	100	0.472	100
31	1.570	100	0.755	100	0.492	100	0.622	100	0.956	100	0.499	100
32	0.724	100	0.502	100	0.527	100	0.463	100	0.636	100	0.626	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	1.527	100	1.729	100	1.424	100	1.727	100	1.396	100	1.711	100
2	0.887	100	0.897	100	1.364	100	0.940	100	1.332	100	0.955	100
3	0.605	100	0.565	100	0.545	100	0.906	100	0.435	100	0.641	100
4	1.020	100	1.072	100	1.300	100	1.176	100	0.611	100	1.106	100
5	0.953	100	1.126	100	0.840	100	1.010	100	0.589	100	1.188	100
6	0.588	100	0.818	100	0.540	100	0.731	100	0.360	100	0.918	100
7	0.782	100	0.875	100	0.754	100	0.804	100	0.506	100	0.956	100
8	0.503	100	0.562	100	0.677	100	0.865	100	0.627	100	0.711	100
9	0.556	100	0.528	100	0.644	100	0.853	100	0.499	100	0.614	100
10	0.346	100	0.420	100	0.760	100	0.458	100	0.774	100	0.577	100
11	0.462	100	0.348	100	1.028	100	0.448	100	0.772	100	0.529	100
12	0.605	100	0.618	100	0.629	100	0.616	100	0.815	100	0.730	100
13	0.805	100	0.939	100	0.736	100	0.833	100	0.491	100	0.861	100
14	0.454	100	0.507	100	0.921	100	0.490	100	0.743	100	0.473	100
15	0.968	100	0.811	100	0.823	100	1.009	100	0.504	100	1.051	100
16	0.745	100	0.490	100	0.792	100	0.719	100	1.042	100	0.570	100
17	0.750	100	0.916	100	0.756	100	0.883	100	0.396	100	0.682	100
18	0.567	100	0.961	100	1.004	100	0.565	100	1.264	100	0.896	100
19	1.387	100	1.502	100	1.666	100	1.562	100	2.034	100	1.669	100
20	0.429	100	0.559	100	1.163	100	0.624	100	0.902	100	0.613	100
21	0.678	100	0.615	100	1.513	100	0.642	100	1.147	100	0.745	100
22	1.504	100	1.535	100	2.328	100	1.852	100	2.211	100	1.678	100
23	1.135	100	1.146	100	1.723	100	1.169	100	1.644	100	1.238	100
24	-	-	-	-	-	-	-	-	-	-	-	-
25	1.393	100	1.226	100	1.100	100	1.413	100	0.857	100	1.371	100
26	0.872	100	0.886	100	0.745	100	1.234	100	0.613	100	0.980	100
27	0.882	100	0.848	100	0.600	100	0.902	100	0.424	100	0.823	100
28	0.497	100	0.523	100	1.277	100	0.597	100	0.987	100	0.686	100
29	0.772	100	1.426	100	0.681	100	0.814	100	0.494	100	0.874	100
30	0.384	100	0.387	100	0.646	100	0.512	100	0.714	100	0.456	100
31	0.748	100	0.850	100	0.703	100	0.693	100	0.529	100	0.558	100
32	0.437	100	0.739	100	0.700	100	0.639	100	0.684	100	0.523	100

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

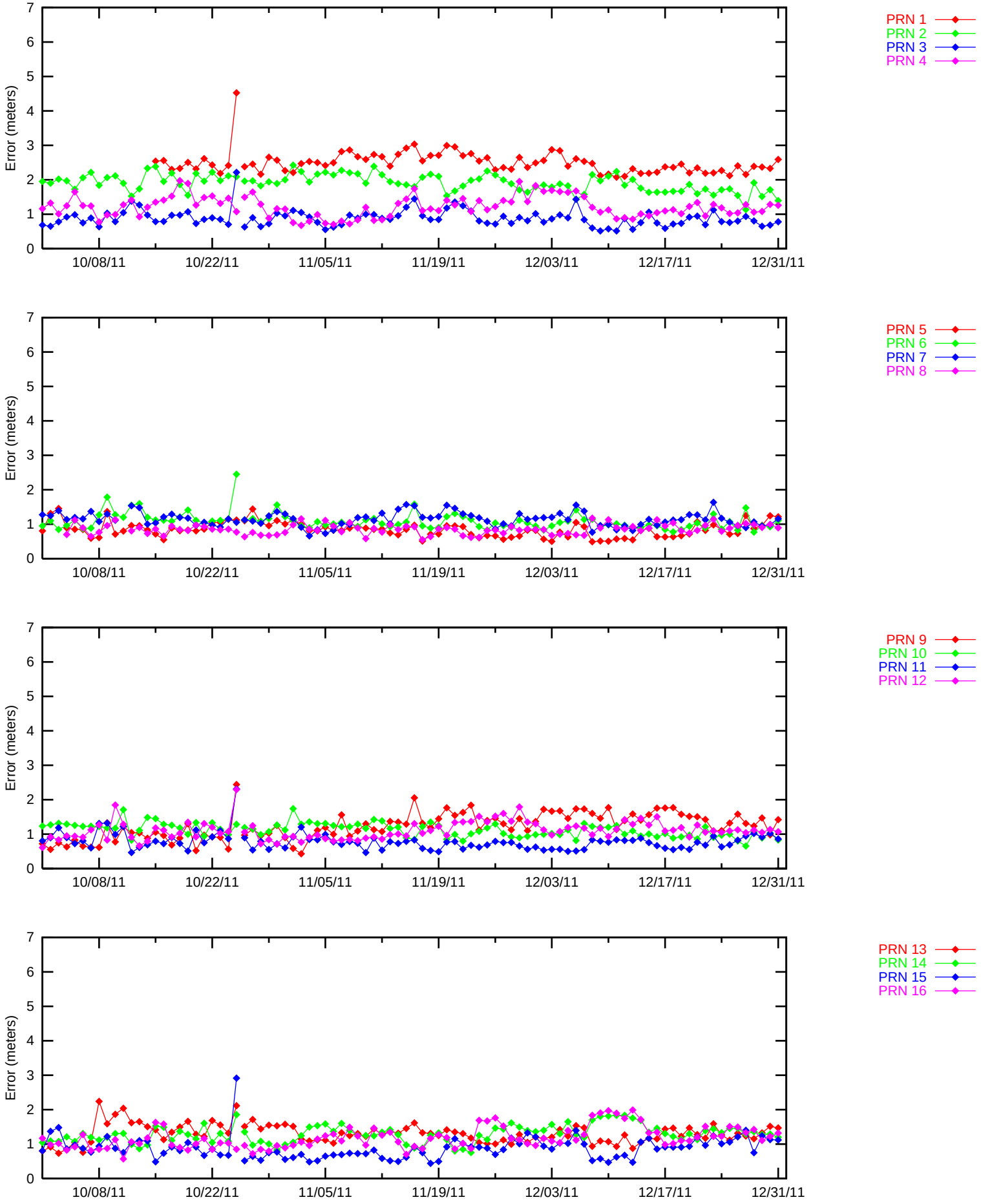


Figure 6-2 95% Range Error (PRN 17 - PRN 32) - Washington DC

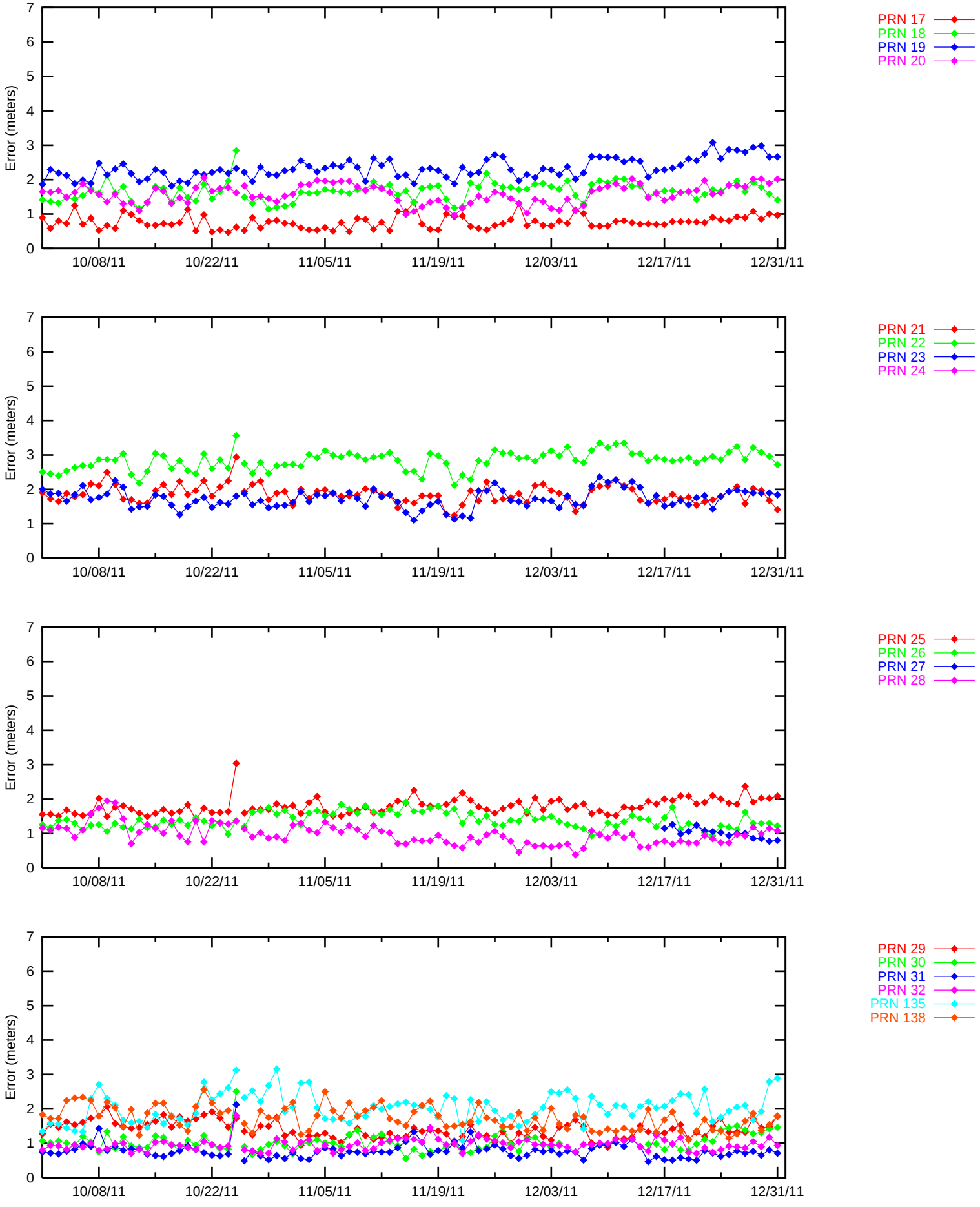


Figure 6-3 95% Ionospheric (PRN 1 - PRN 16) - Washington DC

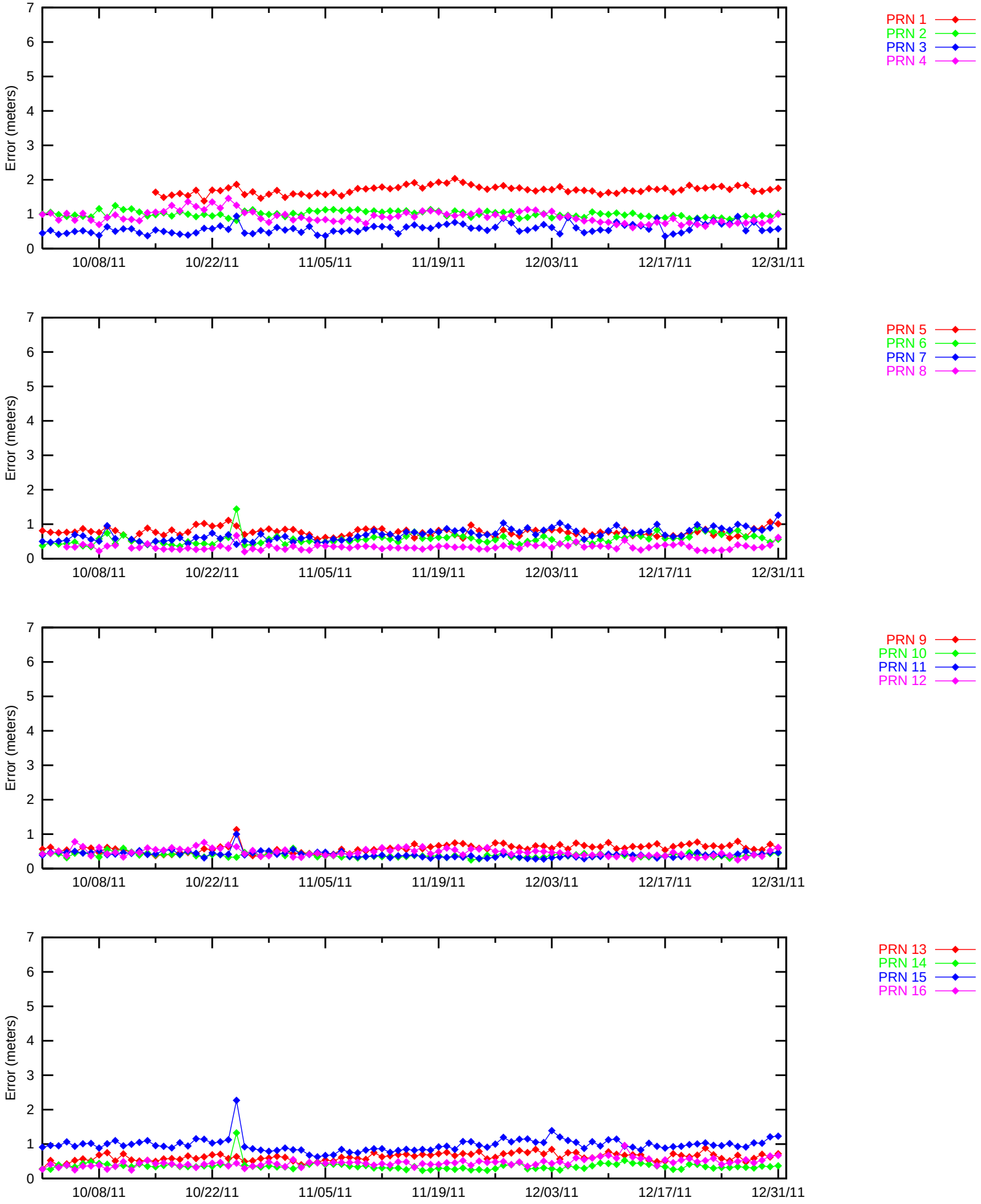
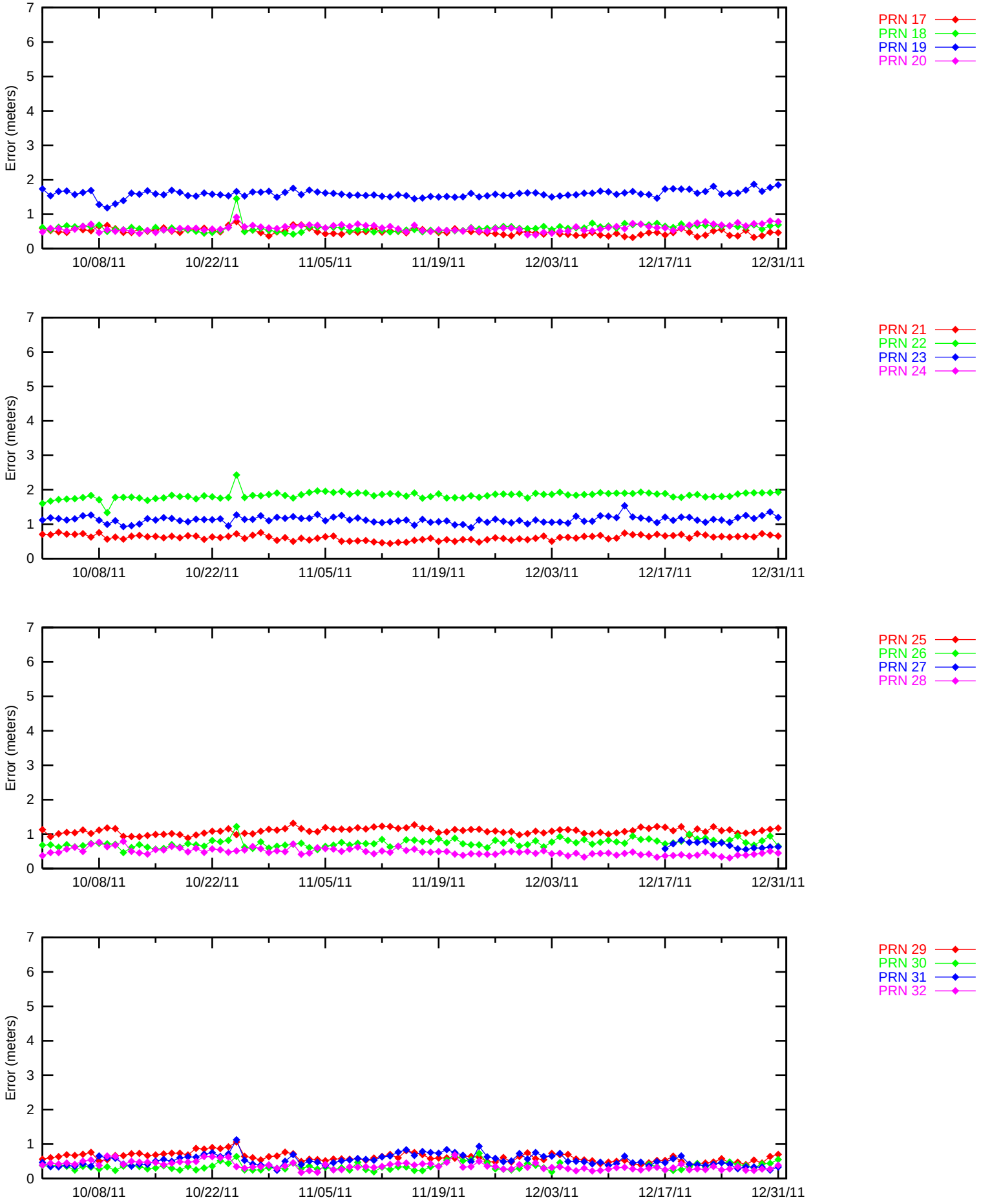


Figure 6-4 95% Ionospheric (PRN 17 - PRN 32) - Washington DC



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. Figure 7.2 shows the trend of CRE GEO PA Ranging Availability. Figure 7.3 shows the trend of AMR GEO NPA Ranging Availability. AMR GEO provides a non-precision approach (NPA) ranging service starting 10/20/11 after Release 3A upgrade.

Table 7-1 GEO Ranging Availability

GEO Source	GEO	PA (%)	NPA (%)	Not Monitored (%)	Do Not Use (%)
CRW 135	CRW	98.52	1.12	0.19	0.11
CRW 135	CRE	98.18	1.28	0.41	0.05
CRW 135	AMR	0.00	70.31	29.49	0.13
CRE 138	CRW	98.29	1.12	0.44	0.11
CRE 138	CRE	98.32	1.28	0.31	0.05
CRE 138	AMR	0.00	71.03	28.81	0.13
AMR 133	CRW	98.30	1.12	0.39	0.11
AMR 133	CRE	98.28	1.28	0.31	0.05
AMR 133	AMR	0.00	71.03	28.77	0.13

Figure 7-1 Daily PA CRW GEO Ranging Availability Trend

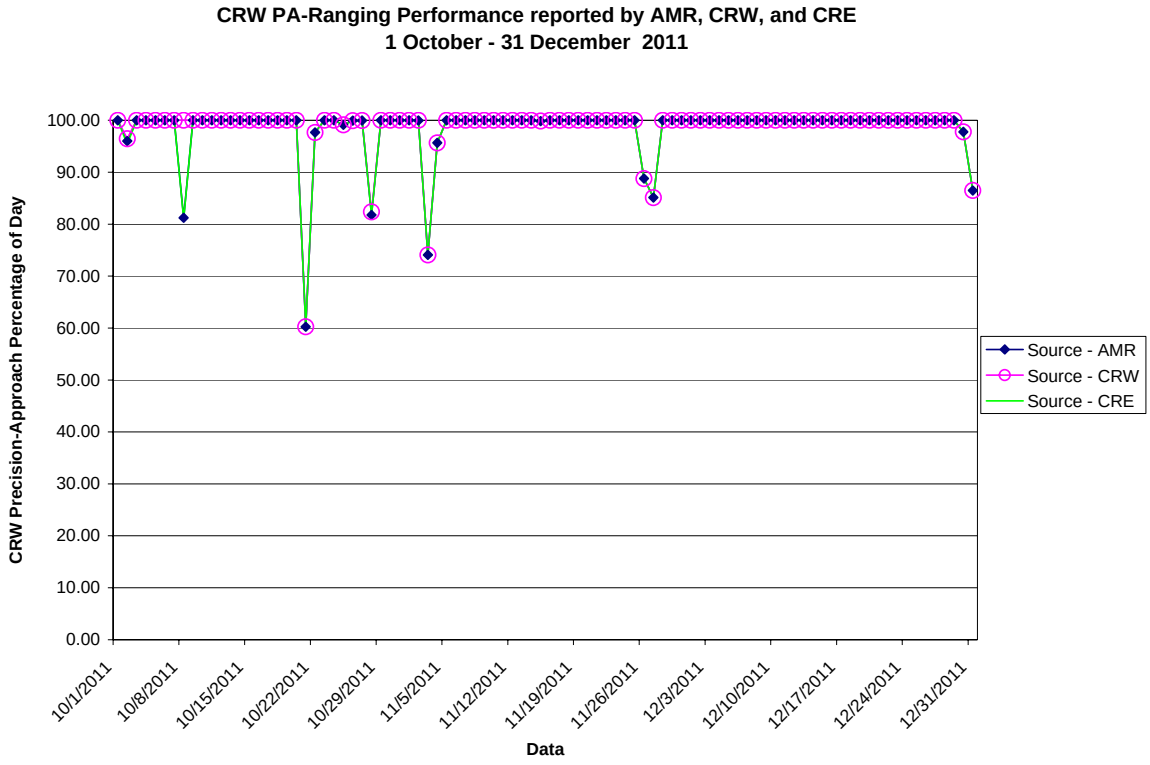


Figure 7-2 Daily PA CRE GEO Ranging Availability Trend

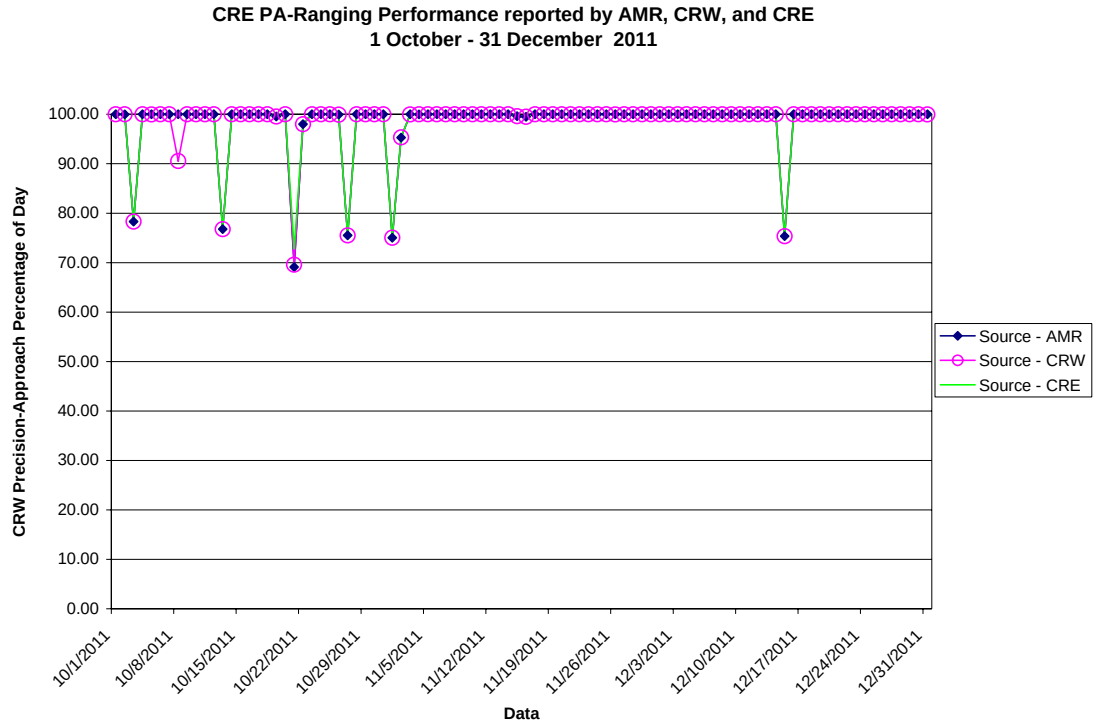
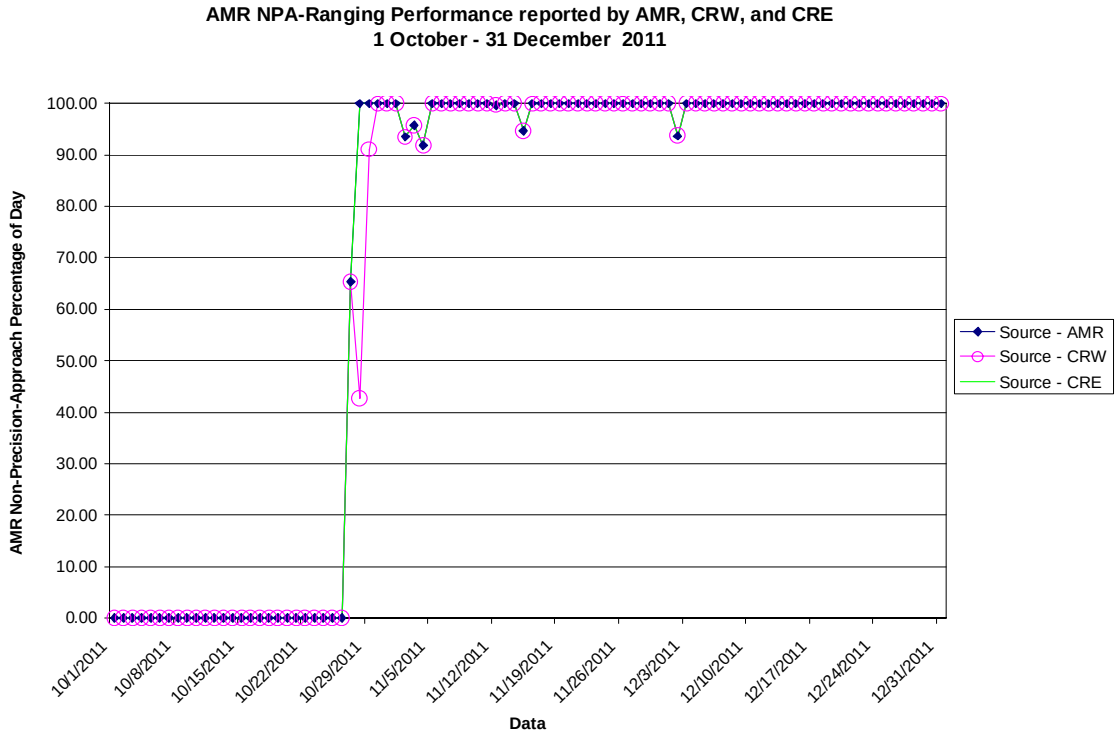


Figure 7-3 Daily NPA AMR GEO Ranging Availability Trend



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 every 30 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. Similar service analysis is completed for LP and LPV 200 services in accordance with HAL and VAL shown in Table 1.1. 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 8-6 provide the graphical representation of the LP, 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 the current quarter 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 LP or LPV 200 availability and the number of outage results as shown in Figure 8.3 to 8.6. 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 LP, LPV, and LPV200 Outages and Availability

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
2C7	SHAKTOOLIK	AK	LPV	4	0.9947	4	0.9947	12	0.9935
9A3	CHUATHBALUK	AK	LPV	3	0.9949	3	0.9948	11	0.9940
AKN	KING SALMON	AK	LPV	3	0.9949	3	0.9948	9	0.9941
ANC	TED STEVENS ANCHORAGE INTL	AK	LPV	3	0.9951	3	0.9951	6	0.9944
AQH	QUINHAGAK	AK	LPV	3	0.9950	3	0.9949	46	0.9925
BET	BETHEL	AK	LPV	3	0.9950	3	0.9949	16	0.9933
BRW	WILEY POST- WILL ROGERS MEMORIAL	AK	LPV	11	0.9953	19	0.9931	322	0.9616
CDB	COLD BAY	AK	LPV	6	0.9949	10	0.9944	494	0.9175
CLP	CLARKS POINT	AK	LPV	3	0.9949	3	0.9947	13	0.9939
D76	ROBERT/BOB/CURTIS MEMORIAL	AK	LPV	7	0.9950	9	0.9944	95	0.9881
ELI	ELIM	AK	LPV	4	0.9947	4	0.9947	14	0.9934
ENA	KENAI MUNICIPAL	AK	LPV	3	0.9949	3	0.9949	7	0.9944
ENM	EMMONAK	AK	LPV	4	0.9949	4	0.9947	18	0.9928
FAI	FAIRBANKS INTL	AK	LPV200	4	0.9952	3	0.9951	8	0.9946
GAL	EDWARD G. PITKA SR	AK	LPV	4	0.9951	4	0.9950	10	0.9939
GKN	GULKANA	AK	LPV	3	0.9950	3	0.9950	6	0.9947
HLA	HUSLIA	AK	LPV	3	0.9952	4	0.9948	12	0.9936
HOM	HOMER	AK	LPV	3	0.9948	3	0.9948	7	0.9943
ILI	ILIAMNA	AK	LPV	3	0.9949	3	0.9949	8	0.9942
KAL	KALTAG	AK	LPV	3	0.9947	3	0.9947	10	0.9939

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
KSM	ST MARY'S	AK	LPV	4	0.9948	4	0.9946	17	0.9930
KTN	KETCHIKAN INTL	AK	LPV	3	0.9943	3	0.9940	5	0.9933
KWT	KWETHLUK	AK	LPV	3	0.9950	3	0.9949	13	0.9935
KYU	KOYUKUK	AK	LPV	4	0.9950	4	0.9950	11	0.9938
OTZ	RALPH WIEN MEMORIAL	AK	LPV200	9	0.9949	14	0.9943	159	0.9845
RBY	RUBY	AK	LPV	3	0.9951	3	0.9950	10	0.9941
SCC	DEADHORSE	AK	LPV	6	0.9954	10	0.9940	33	0.9908
SHX	SHAGELUK	AK	LPV	3	0.9948	3	0.9948	10	0.9939
SMK	ST MICHAEL	AK	LPV	4	0.9947	4	0.9947	13	0.9936
WLK	SELAWIK	AK	LPV	5	0.9951	6	0.9947	15	0.9932
WNA	NAPAKIAK	AK	LPV	3	0.9950	3	0.9949	18	0.9933
YAK	YAKUTAT	AK	LPV200	3	0.9950	3	0.9948	5	0.9946
12J	BREWTON MUNICIPAL	AL	LPV	2	0.9957	2	0.9955	4	0.9954
2R5	ST ELMO	AL	LPV	2	0.9959	2	0.9957	7	0.9953
3A1	FOLSOM FIELD	AL	LPV	2	0.9955	2	0.9955	6	0.9952
4A9	ISBELL FIELD	AL	LPV	3	0.9958	3	0.9957	6	0.9952
4R4	H L SONNY CALLAHAN	AL	LPV	2	0.9959	2	0.9957	4	0.9953
5R4	FOLEY MUNICIPAL	AL	LPV	2	0.9959	2	0.9956	4	0.9953
79J	SOUTH ALABAMA RGNL	AL	LPV	2	0.9957	2	0.9955	3	0.9954
8A0	ALBERTVILLE RGNL- THOMAS J BRUMLIK FIELD	AL	LPV	3	0.9957	3	0.9957	6	0.9952
ANB	ANNISTON METROPOLITAN	AL	LPV	3	0.9955	3	0.9955	6	0.9953
ASN	TALLADEGA MUNICIPAL	AL	LPV	2	0.9955	2	0.9955	6	0.9953
AUO	AUBURN UNIVERSITY RGNL	AL	LPV	2	0.9956	3	0.9955	4	0.9954
BFM	MOBILE DOWNTOWN	AL	LPV200	2	0.9959	2	0.9957	7	0.9953
BHM	BIRMINGHAM- SHUTTLESWORTH INTL	AL	LPV200	2	0.9955	2	0.9955	6	0.9953
DCU	PRYOR FIELD RGNL	AL	LPV200	2	0.9955	2	0.9955	6	0.9952
DHN	DOTHAN RGNL	AL	LPV	2	0.9957	2	0.9954	3	0.9954
EDN	ENTERPRISE MUNICIPAL	AL	LPV	2	0.9957	2	0.9954	3	0.9954
EET	SHELBY COUNTY	AL	LPV	2	0.9956	2	0.9954	6	0.9953
EKY	BESSEMER	AL	LPV	2	0.9956	2	0.9954	6	0.9953
GAD	NORTHEAST ALABAMA RGNL	AL	LPV	4	0.9957	4	0.9957	6	0.9952
HAB	MARION COUNTY-RANKIN FITE	AL	LPV	2	0.9955	2	0.9955	6	0.9952
HSV	HUNTSVILLE INTL- CARL T JONES FIELD	AL	LPV200	3	0.9957	2	0.9955	6	0.9952
JKA	JACK EDWARDS	AL	LPV	2	0.9959	2	0.9956	4	0.9953
MDQ	MADISON COUNTY EXECUTIVE/ TOM SHARP JR FIELD	AL	LPV	3	0.9958	3	0.9956	6	0.9952
MGM	MONTGOMERY RGNL (DANNELLY FIELD)	AL	LPV	2	0.9956	2	0.9955	4	0.9954
MOB	MOBILE RGNL	AL	LPV	2	0.9959	2	0.9957	7	0.9953
MSL	NORTHWEST ALABAMA RGNL	AL	LPV200	2	0.9955	2	0.9955	6	0.9952
OZR	CAIRNS AAF (FORT RUCKER)	AL	LPV	2	0.9957	2	0.9954	4	0.9954
PLR	ST CLAIR COUNTY	AL	LPV	2	0.9955	2	0.9955	6	0.9953
SCD	MERKEL FIELD SYLACAUGA MUNICIPAL	AL	LPV	2	0.9956	2	0.9955	6	0.9953
SEM	CRAIG FIELD	AL	LPV	2	0.9956	2	0.9956	4	0.9954
TCL	TUSCALOOSA RGNL	AL	LPV	2	0.9956	2	0.9954	6	0.9952
TOI	TROY MUNICIPAL	AL	LPV	2	0.9956	2	0.9955	3	0.9954
4M3	CARLISLE MUNICIPAL	AR	LPV	2	0.9955	2	0.9953	6	0.9951
ASG	SPRINGDALE MUNICIPAL	AR	LPV	2	0.9955	2	0.9953	7	0.9950
AWM	WEST MEMPHIS MUNICIPAL	AR	LPV200	2	0.9955	2	0.9953	6	0.9951
BPK	OZARK RGNL	AR	LPV	2	0.9954	2	0.9953	8	0.9950
BVX	BATESVILLE RGNL	AR	LPV	2	0.9955	2	0.9953	6	0.9951
BYH	ARKANSAS INTL	AR	LPV200	2	0.9955	2	0.9953	6	0.9951

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
ELD	SOUTH ARKANSAS RGNL AT GOODWIN FIELD	AR	LPV	2	0.9957	2	0.9955	6	0.9953
FSM	FORT SMITH RGNL	AR	LPV200	2	0.9955	2	0.9954	7	0.9951
HRO	BOONE COUNTY	AR	LPV	2	0.9954	2	0.9953	9	0.9949
JBR	JONESBORO MUNICIPAL	AR	LPV	2	0.9955	2	0.9953	6	0.9951
LIT	ADAMS FIELD	AR	LPV200	2	0.9955	2	0.9953	6	0.9951
M19	NEWPORT MUNICIPAL	AR	LPV	2	0.9955	2	0.9953	6	0.9951
ORK	NORTH LITTLE ROCK MUNICIPAL	AR	LPV	2	0.9955	2	0.9953	6	0.9951
ROG	ROGERS MUNICIPAL-CARTER FIELD	AR	LPV	2	0.9955	2	0.9953	7	0.9950
RUE	RUSSELLVILLE RGNL	AR	LPV	2	0.9955	2	0.9953	8	0.9949
SGT	STUTTGART MUNICIPAL	AR	LPV	2	0.9955	2	0.9953	6	0.9952
SLG	SMITH FIELD	AR	LPV	2	0.9955	2	0.9953	6	0.9951
SRC	SEARCY MUNICIPAL	AR	LPV	2	0.9955	2	0.9953	7	0.9951
SUZ	SALINE COUNTY RGNL	AR	LPV	2	0.9956	2	0.9954	6	0.9951
TXK	TEXARKANA RGNL-WEBB FIELD	AR	LPV	2	0.9957	2	0.9955	6	0.9952
XNA	NORTHWEST ARKANSAS RGNL	AR	LPV	2	0.9955	2	0.9953	7	0.9950
DVT	PHOENIX DEER VALLEY	AZ	LPV	2	0.9980	4	0.9975	20	0.9964
FLG	FLAGSTAFF PULLIAM	AZ	LPV	2	0.9979	4	0.9976	16	0.9964
GEU	GLENDALE MUNICIPAL	AZ	LPV	2	0.9980	5	0.9975	21	0.9965
HII	LAKE HAVASU CITY	AZ	LPV	2	0.9981	7	0.9975	16	0.9963
IFP	LAUGHLIN/BULLHEAD INTL	AZ	LPV	2	0.9979	7	0.9974	16	0.9960
IGM	KINGMAN	AZ	LPV	2	0.9979	6	0.9975	13	0.9958
IWA	PHOENIX-MESA GATEWAY	AZ	LPV	2	0.9980	3	0.9975	20	0.9964
P33	COCHISE COUNTY	AZ	LPV	2	0.9980	3	0.9980	18	0.9968
PGA	PAGE MUNICIPAL	AZ	LPV	4	0.9965	6	0.9959	7	0.9947
PHX	PHOENIX SKY HARBOR INTL	AZ	LPV	2	0.9980	4	0.9975	20	0.9964
PRC	ERNEST A. LOVE FIELD	AZ	LPV	1	0.9981	6	0.9975	13	0.9965
SAD	SAFFORD RGNL	AZ	LPV	2	0.9981	3	0.9980	18	0.9969
SOW	SHOW LOW RGNL	AZ	LPV	2	0.9979	3	0.9978	11	0.9970
TUS	TUCSON INTL	AZ	LPV	3	0.9979	4	0.9977	29	0.9963
28J	PALATKA MUNICIPAL – LT. KAY LARKIN FIELD	CA	LPV	3	0.9952	3	0.9952	9	0.9948
ACV	ARCATA	CA	LPV	4	0.9958	9	0.9947	128	0.9674
APC	NAPA COUNTY	CA	LPV	3	0.9966	12	0.9956	111	0.9714
APV	APPLE VALLEY	CA	LPV	1	0.9981	7	0.9972	20	0.9957
AUN	AUBURN MUNICIPAL	CA	LPV	3	0.9966	7	0.9960	106	0.9816
BFL	MEADOWS FIELD	CA	LPV200	2	0.9979	8	0.9971	96	0.9885
C83	BYRON	CA	LPV	3	0.9967	9	0.9960	108	0.9746
CEC	JACK MC NAMARA FIELD	CA	LPV	4	0.9957	9	0.9946	129	0.9692
CIC	CHICO MUNICIPAL	CA	LPV	3	0.9964	7	0.9956	130	0.9809
CMA	CAMARILLO	CA	LPV	1	0.9981	8	0.9970	95	0.9877
CNO	CHINO	CA	LPV	1	0.9981	7	0.9973	49	0.9944
CRQ	MC CLELLAN-PALOMAR	CA	LPV	1	0.9981	6	0.9973	21	0.9946
CVH	HOLLISTER MUNICIPAL	CA	LPV	2	0.9973	10	0.9963	112	0.9751
DAG	BARSTOW-DAGGETT	CA	LPV	1	0.9981	7	0.9972	19	0.9959
DWA	YOLO COUNTY	CA	LPV	3	0.9966	8	0.9959	111	0.9744
FAT	FRESNO YOSEMITE INTL	CA	LPV	2	0.9973	6	0.9965	109	0.9869
HAF	HALF MOON BAY	CA	LPV	3	0.9967	16	0.9955	115	0.9695
HWD	HAYWARD EXECUTIVE	CA	LPV	3	0.9967	10	0.9959	112	0.9718
LAX	LOS ANGELES INTL	CA	LPV	1	0.9981	8	0.9972	87	0.9909
LGB	LONG BEACH / DAUGHERTY FIELD	CA	LPV	1	0.9981	8	0.9972	83	0.9919
LHM	LINCOLN RGNL/ KARL HARDER FIELD	CA	LPV200	3	0.9965	8	0.9960	108	0.9795
LSN	LOS BANOS MUNICIPAL	CA	LPV	3	0.9973	9	0.9964	108	0.9793
LVK	LIVERMORE MUNICIPAL	CA	LPV	3	0.9967	10	0.9960	109	0.9735

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
MAE	MADERA MUNICIPAL	CA	LPV	2	0.9973	6	0.9964	109	0.9845
MCE	MERCED RGNL// MACREADY FIELD	CA	LPV	3	0.9970	6	0.9964	108	0.9834
MER	CASTLE	CA	LPV200	3	0.9969	6	0.9964	108	0.9832
MHR	SACRAMENTO MATHER	CA	LPV	3	0.9966	8	0.9960	109	0.9786
MIT	SHAFTER-MINTER FIELD	CA	LPV	3	0.9978	9	0.9970	97	0.9879
MOD	MODESTO CITY-CO-HARRY SHAM FIELD	CA	LPV	3	0.9969	7	0.9963	108	0.9801
MRY	MONTEREY PENINSULA	CA	LPV	2	0.9973	17	0.9962	121	0.9721
MYF	MONTGOMERY FIELD	CA	LPV200	1	0.9981	6	0.9974	23	0.9945
MYV	YUBA COUNTY	CA	LPV200	3	0.9965	8	0.9958	108	0.9776
O02	NERVINO	CA	LPV	3	0.9963	7	0.9957	97	0.9904
OAK	METROPOLITAN OAKLAND INTL	CA	LPV	3	0.9967	14	0.9958	112	0.9712
ONT	ONTARIO INTL	CA	LPV	1	0.9981	7	0.9972	45	0.9945
OXR	OXNARD	CA	LPV	1	0.9981	8	0.9970	96	0.9872
PRB	PASO ROBLES MUNICIPAL	CA	LPV200	3	0.9977	10	0.9967	116	0.9794
RAL	RIVERSIDE MUNICIPAL	CA	LPV	1	0.9981	7	0.9973	21	0.9949
RBL	RED BLUFF MUNICIPAL	CA	LPV	3	0.9963	8	0.9954	154	0.9819
RDD	REDDING MUNICIPAL	CA	LPV	4	0.9962	8	0.9953	158	0.9835
RHV	REID-HILLVIEW OF SANTA CLARA COUNTY	CA	LPV	3	0.9967	10	0.9960	113	0.9731
SAC	SACRAMENTO EXECUTIVE	CA	LPV200	3	0.9966	8	0.9959	110	0.9764
SBA	SANTA BARBARA MUNICIPAL	CA	LPV	1	0.9981	9	0.9969	108	0.9839
SCK	STOCKTON METROPOLITAN	CA	LPV	3	0.9967	8	0.9961	108	0.9775
SFO	SAN FRANCISCO INTL	CA	LPV	3	0.9967	15	0.9956	113	0.9703
SJC	NORMAN Y. MINETA SAN JOSE INTL	CA	LPV	3	0.9967	11	0.9960	113	0.9726
SMF	SACRAMENTO INTL	CA	LPV	3	0.9966	8	0.9959	110	0.9760
SNA	JOHN WAYNE AIRPORT-ORANGE COUNTY	CA	LPV	1	0.9981	8	0.9973	77	0.9934
SNS	SALINAS MUNICIPAL	CA	LPV200	2	0.9973	11	0.9963	114	0.9737
STS	CHARLES M. SCHULZ – SONOMA COUNTY	CA	LPV	3	0.9964	16	0.9954	115	0.9688
TCY	TRACY MUNICIPAL	CA	LPV	3	0.9967	9	0.9961	108	0.9756
VCB	NUT TREE	CA	LPV	3	0.9966	9	0.9958	109	0.9734
VCV	SOUTHERN CALIFORNIA LOGISTICS	CA	LPV	1	0.9981	7	0.9972	21	0.9955
WJF	GENERAL WM J FOX AIRFIELD	CA	LPV	1	0.9981	7	0.9972	86	0.9921
ALS	SAN LUIS VALLEY RGNL/ BERGMAN FIELD	CO	LPV200	3	0.9956	3	0.9953	8	0.9947
APA	CENTENNIAL	CO	LPV	2	0.9950	2	0.9949	9	0.9946
BJC	ROCKY MOUNTAIN METROPOLITAN	CO	LPV200	2	0.9950	2	0.9949	10	0.9945
CEZ	CORTEZ MUNICIPAL	CO	LPV	3	0.9958	3	0.9957	5	0.9949
COS	CITY OF COLORADO SPRINGS MUNICIPAL	CO	LPV200	3	0.9952	2	0.9950	9	0.9947
DEN	DENVER INTL	CO	LPV200	2	0.9950	2	0.9949	9	0.9945
DRO	DURANGO-LA PLATA COUNTY	CO	LPV200	3	0.9958	3	0.9957	6	0.9949
FNL	FORT COLLINS-LOVELAND MUNICIPAL	CO	LPV200	2	0.9950	2	0.9949	4	0.9947
FTG	FRONT RANGE	CO	LPV	2	0.9950	2	0.9949	9	0.9946
GJT	GRAND JUNCTION REGIONAL	CO	LPV200	3	0.9956	2	0.9952	5	0.9949
GXY	GREELEY-WELD COUNTY	CO	LPV	2	0.9950	2	0.9949	7	0.9945
HDN	YAMPA VALLEY	CO	LPV	2	0.9951	2	0.9951	3	0.9948
ITR	KIT CARSON COUNTY	CO	LPV	2	0.9950	2	0.9948	7	0.9947
LAA	LAMAR MUNICIPAL	CO	LPV	2	0.9951	2	0.9950	6	0.9947
LHX	LA JUNTA MUNICIPAL	CO	LPV	2	0.9951	2	0.9950	7	0.9947
MTJ	MONTROSE RGNL	CO	LPV	3	0.9955	3	0.9953	7	0.9948
PUB	PUEBLO MEMORIAL	CO	LPV200	4	0.9955	2	0.9950	9	0.9947

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
RIL	GARFIELD COUNTY RGNL	CO	LPV	3	0.9954	2	0.9951	3	0.9948
BDL	BRADLEY INTL	CT	LPV200	2	0.9963	6	0.9959	6	0.9954
GON	GROTON-NEW LONDON	CT	LPV	2	0.9963	5	0.9959	6	0.9954
HVN	TWEED-NEW HAVEN	CT	LPV	2	0.9963	5	0.9959	6	0.9954
OXC	WATERBURY-OXFORD	CT	LPV	2	0.9963	5	0.9959	6	0.9954
DCA	RONALD REAGAN WASHINGTON NATIONAL	DC	LPV	2	0.9963	4	0.9959	5	0.9955
EVY	SUMMIT	DE	LPV	2	0.9963	4	0.9959	6	0.9954
GED	SUSSEX COUNTY	DE	LPV	2	0.9963	4	0.9961	7	0.9955
ILG	NEW CASTLE	DE	LPV	2	0.9963	4	0.9959	6	0.9954
40J	PERRY-FOLEY	FL	LPV	3	0.9956	3	0.9954	8	0.9951
AAF	APALACHICOLA REGIONAL	FL	LPV	3	0.9956	3	0.9953	9	0.9950
APF	NAPLES MUNICIPAL	FL	LPV	3	0.9938	4	0.9934	18	0.9921
AVO	AVON PARK EXECUTIVE	FL	LPV	5	0.9946	6	0.9940	12	0.9931
BCT	BOCA RATON	FL	LPV	5	0.9941	6	0.9935	27	0.9918
BKV	HERNANDO COUNTY	FL	LPV	4	0.9953	4	0.9947	8	0.9938
BOW	BARTOW MUNICIPAL	FL	LPV	5	0.9947	5	0.9942	9	0.9935
CEW	BOB SIKES	FL	LPV	2	0.9957	2	0.9955	4	0.9953
COI	MERRITT ISLAND	FL	LPV	5	0.9950	7	0.9945	11	0.9935
CRG	CRAIG MUNICIPAL	FL	LPV200	4	0.9958	4	0.9955	8	0.9950
CTY	CROSS CITY	FL	LPV	3	0.9955	3	0.9954	10	0.9949
DAB	DAYTONA BEACH INTL	FL	LPV	5	0.9953	5	0.9953	11	0.9946
DED	DELAND MUNICIPAL-SIDNEY H TAYLOR FIELD	FL	LPV	5	0.9952	5	0.9952	11	0.9945
ECP	NORTHWEST FLORIDA BEACHES INTL	FL	LPV200	2	0.9957	2	0.9954	5	0.9953
EVB	NEW SMYRNA BEACH MUNICIPAL	FL	LPV	5	0.9953	5	0.9952	11	0.9945
EYW	KEY WEST INTL	FL	LPV	4	0.9934	7	0.9931	92	0.9879
F45	NORTH PALM BEACH COUNTY GENERAL	FL	LPV	5	0.9944	7	0.9939	20	0.9922
FHB	FERNANDINA BEACH MUNICIPAL	FL	LPV	3	0.9958	3	0.9956	7	0.9951
FLL	FORT LAUDERDALE/ HOLLYWOOD INTL	FL	LPV	5	0.9939	6	0.9934	35	0.9911
FPR	ST LUCIE COUNTY INTL	FL	LPV	5	0.9944	6	0.9940	16	0.9926
FXE	FORT LAUDERDALE EXECUTIVE	FL	LPV200	5	0.9940	6	0.9935	30	0.9914
GIF	WINTER HAVEN'S GILBERT	FL	LPV	5	0.9947	5	0.9943	9	0.9935
GNV	GAINESVILLE RGNL	FL	LPV	4	0.9954	4	0.9954	8	0.9948
IMM	IMMOKALEE RGNL	FL	LPV	5	0.9942	4	0.9934	16	0.9924
ISM	KISSIMMEE GATEWAY	FL	LPV200	6	0.9951	6	0.9946	9	0.9936
JAX	JACKSONVILLE INTL	FL	LPV	4	0.9956	4	0.9955	8	0.9950
LAL	LAKELAND LINDER RGNL	FL	LPV200	5	0.9947	5	0.9942	8	0.9935
LCQ	LAKE CITY MUNICIPAL	FL	LPV	4	0.9956	4	0.9955	7	0.9951
LEE	LEESBURG INTL	FL	LPV	4	0.9953	5	0.9951	11	0.9942
MCO	ORLANDO INTL	FL	LPV200	4	0.9952	6	0.9947	9	0.9937
MIA	MIAMI INTL	FL	LPV	4	0.9937	6	0.9933	50	0.9906
MKY	MARCO ISLAND	FL	LPV	3	0.9937	4	0.9934	20	0.9920
MLB	MELBOURNE INTL	FL	LPV	6	0.9948	8	0.9944	14	0.9932
MTH	THE FLORIDA KEYS MARATHON	FL	LPV	4	0.9934	8	0.9931	108	0.9871
OBE	OKEECHOBEE COUNTY	FL	LPV	5	0.9945	6	0.9941	15	0.9926
OCF	OCALA INTL-JIM TAYLOR FIELD	FL	LPV200	4	0.9954	4	0.9953	11	0.9945
PBI	PALM BEACH INTL	FL	LPV	5	0.9942	6	0.9937	21	0.9921
PGD	CHARLOTTE COUNTY	FL	LPV	4	0.9941	4	0.9936	14	0.9926
PHK	PALM BEACH CO GLADES	FL	LPV	5	0.9944	6	0.9940	18	0.9922
PIE	ST PETERSBURG-CLEARWATER INTL	FL	LPV200	5	0.9947	4	0.9939	10	0.9936
PMP	POMPANO BEACH AIRPARK	FL	LPV	5	0.9940	6	0.9935	29	0.9915
PNS	PENSACOLA GULF COAST RGNL	FL	LPV	2	0.9958	2	0.9955	4	0.9953

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
RSW	SOUTHWEST FLORIDA INTL	FL	LPV	4	0.9940	4	0.9936	16	0.9925
SEF	SEBRING RGNL	FL	LPV	5	0.9945	6	0.9940	12	0.9928
SFB	ORLANDO SANFORD INTL	FL	LPV200	4	0.9951	4	0.9949	10	0.9941
SGJ	ST AUGUSTINE	FL	LPV	4	0.9957	4	0.9955	8	0.9949
SRQ	SARASOTA/BRADENTON INTL	FL	LPV200	4	0.9942	3	0.9936	10	0.9932
SUA	WITHAM FIELD	FL	LPV	5	0.9944	6	0.9940	19	0.9923
TIX	SPACE COAST RGNL	FL	LPV200	4	0.9951	7	0.9947	10	0.9936
TLH	TALLAHASSEE RGNL	FL	LPV	2	0.9957	2	0.9954	6	0.9953
TMB	KENDALL-TAMIAMI EXECUTIVE	FL	LPV200	4	0.9937	6	0.9933	55	0.9903
TPA	TAMPA INTL	FL	LPV200	5	0.9947	4	0.9940	9	0.9937
TPF	PETER O KNIGHT	FL	LP	5	0.9947	4	0.9940	9	0.9936
VDF	TAMPA EXECUTIVE	FL	LPV	5	0.9947	5	0.9942	8	0.9936
VQQ	CECIL FIELD	FL	LPV	3	0.9954	3	0.9954	8	0.9950
VRB	VERO BEACH MUNICIPAL	FL	LPV	5	0.9945	6	0.9941	15	0.9927
X14	LA BELLE MUNICIPAL	FL	LPV	5	0.9943	5	0.9937	15	0.9925
XFL	FLAGLER COUNTY	FL	LPV	5	0.9954	5	0.9953	10	0.9947
ZPH	ZEPHYRHILLS MUNICIPAL	FL	LPV	5	0.9951	5	0.9945	8	0.9937
15J	COOK COUNTY	GA	LPV	3	0.9956	2	0.9955	6	0.9953
18A	FRANKLIN COUNTY	GA	LPV	2	0.9961	2	0.9961	7	0.9953
19A	JACKSON COUNTY	GA	LPV	3	0.9960	3	0.9960	7	0.9954
2J5	MILLEN	GA	LPV	2	0.9961	2	0.9959	6	0.9951
3J7	GREENE COUNTY RGNL	GA	LPV	4	0.9961	3	0.9960	7	0.9954
47A	CHEROKEE COUNTY	GA	LPV	3	0.9959	3	0.9959	7	0.9954
48A	COCHRAN	GA	LPV	3	0.9958	2	0.9956	4	0.9953
4J6	ST MARYS	GA	LPV	3	0.9959	3	0.9956	6	0.9951
9A1	COVINGTON MUNICIPAL	GA	LPV	3	0.9959	3	0.9959	7	0.9953
ABY	SOUTHWEST GEORGIA RGNL	GA	LPV200	2	0.9956	2	0.9954	4	0.9954
AGS	AUGUSTA RGNL AT BUSH FIELD	GA	LPV	2	0.9961	2	0.9961	7	0.9952
AHN	ATHENS/BEN EPPS	GA	LPV	3	0.9960	3	0.9960	7	0.9954
ATL	HARTSFIELD - JACKSON ATLANTA INTNL	GA	LPV200	3	0.9959	3	0.9959	6	0.9953
AYS	WAYCROSS-WARE COUNTY	GA	LPV	2	0.9956	2	0.9956	5	0.9952
BGE	DECATUR COUNTY INDUSTRIAL AIR PARK	GA	LPV200	2	0.9957	2	0.9954	6	0.9953
BIJ	EARLY COUNTY	GA	LPV	2	0.9956	2	0.9954	3	0.9954
BQK	BRUNSWICK GOLDEN ISLES	GA	LPV200	3	0.9960	3	0.9958	5	0.9951
CCO	NEWNAN COWETA COUNTY	GA	LPV	3	0.9958	3	0.9957	6	0.9953
CKF	CRISP COUNTY-CORDELE	GA	LPV	2	0.9956	3	0.9956	4	0.9954
CSG	COLUMBUS METROPOLITAN	GA	LPV	2	0.9956	3	0.9955	4	0.9953
CTJ	WEST GEORGIA RGNL – O V GRAY FIELD	GA	LPV	3	0.9957	3	0.9957	6	0.9953
CWV	CLAXTON-EVANS COUNTY	GA	LPV	2	0.9961	2	0.9959	6	0.9951
DNN	DALTON MUNICIPAL	GA	LPV	3	0.9959	3	0.9959	8	0.9953
EZM	HEART OF GEORGIA RGNL	GA	LPV	3	0.9958	2	0.9956	5	0.9953
FFC	ATLANTA RGNL FALCON FIELD	GA	LPV200	3	0.9959	3	0.9957	6	0.9953
FTY	FULTON COUNTY AIRPORT-BROWN FIELD	GA	LPV	3	0.9959	3	0.9958	6	0.9953
GVL	LEE GILMER MEMORIAL	GA	LPV	3	0.9960	3	0.9960	7	0.9953
HOE	HOMERVILLE	GA	LPV	2	0.9956	2	0.9956	6	0.9952
IIY	WASHINGTON-WILKES COUNTY	GA	LPV	2	0.9961	2	0.9961	7	0.9953
JES	JESUP-WAYNE COUNTY	GA	LPV	3	0.9960	3	0.9957	5	0.9952
JYL	PLANTATION ARPK	GA	LPV	2	0.9961	2	0.9959	6	0.9951
JZP	PICKENS COUNTY	GA	LPV	3	0.9959	3	0.9959	7	0.9953
LGC	LAGRANGE-CALLAWAY	GA	LPV200	3	0.9956	3	0.9955	5	0.9953
MCN	MIDDLE GEORGIA RGNL	GA	LPV	3	0.9959	2	0.9955	4	0.9954
MGR	MOULTRIE MUNICIPAL	GA	LPV	3	0.9956	2	0.9954	6	0.9953

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
MLJ	BALDWIN COUNTY	GA	LPV	3	0.9960	3	0.9958	6	0.9953
MQW	TELFAIR-WHEELER	GA	LPV	3	0.9958	2	0.9956	5	0.9953
OPN	THOMASTON-UPSON COUNTY	GA	LPV200	3	0.9959	2	0.9955	5	0.9953
PIM	HARRIS COUNTY	GA	LPV	3	0.9956	3	0.9955	5	0.9953
PUJ	PAULDING NORTHWEST ATLANTA	GA	LPV200	3	0.9959	3	0.9958	6	0.9953
PXE	PERRY-HOUSTON COUNTY	GA	LPV	3	0.9958	2	0.9956	4	0.9954
RMG	RICHARD B RUSSELL	GA	LPV	3	0.9959	3	0.9958	8	0.9953
RYY	COBB COUNTY- MC COLLUM FIELD	GA	LPV200	3	0.9959	3	0.9959	7	0.9953
SAV	SAVANNAH/HILTON HEAD INTL	GA	LPV200	2	0.9961	2	0.9959	7	0.9951
SBO	EMANUEL COUNTY	GA	LPV	2	0.9961	2	0.9958	6	0.9951
TBR	STATESBORO- BULLOCH COUNTY	GA	LPV	2	0.9961	2	0.9959	6	0.9951
TMA	HENRY TIFT MYERS	GA	LPV	3	0.9956	2	0.9955	5	0.9954
TOC	TOCCOA RG LETOURNEAU FIELD	GA	LPV	2	0.9961	2	0.9961	7	0.9953
TVI	THOMASVILLE RGNL	GA	LPV	3	0.9956	2	0.9954	6	0.9953
VDI	VIDALIA RGNL	GA	LPV	3	0.9960	3	0.9957	5	0.9952
VLD	VALDOSTA RGNL	GA	LPV	3	0.9956	2	0.9955	6	0.9952
VPC	CARTERSVILLE	GA	LPV	3	0.9959	3	0.9958	7	0.9953
WDR	BARROW COUNTY	GA	LPV	3	0.9960	3	0.9960	7	0.9954
ALO	WATERLOO RGNL	IA	LPV	2	0.9950	2	0.9949	5	0.9946
AMW	AMES MUNICIPAL	IA	LPV	2	0.9950	3	0.9948	5	0.9946
AWG	WASHINGTON MUNICIPAL	IA	LPV200	2	0.9953	3	0.9952	7	0.9948
BRL	SOUTHEAST IOWA RGNL	IA	LPV200	2	0.9951	2	0.9951	6	0.9949
CBF	COUNCIL BLUFFS MUNICIPAL	IA	LPV200	2	0.9950	2	0.9949	3	0.9948
CID	THE EASTERN IOWA	IA	LPV200	2	0.9951	2	0.9951	5	0.9946
CKP	CHEROKEE COUNTY RGNL	IA	LPV	2	0.9948	3	0.9948	3	0.9945
CWI	CLINTON MUNICIPAL	IA	LPV200	3	0.9953	2	0.9951	6	0.9945
DBQ	DUBUQUE RGNL	IA	LPV200	3	0.9953	2	0.9951	6	0.9945
DNS	DENISON MUNICIPAL	IA	LPV	2	0.9948	2	0.9948	3	0.9945
DSM	DES MOINES INTL	IA	LPV	2	0.9949	2	0.9949	5	0.9947
DVN	DAVENPORT MUNICIPAL	IA	LPV200	3	0.9953	2	0.9951	6	0.9945
EBS	WEBSTER CITY MUNICIPAL	IA	LPV	2	0.9949	3	0.9947	6	0.9946
EFW	JEFFERSON MUNICIPAL	IA	LPV	2	0.9949	3	0.9948	4	0.9945
EOK	KEOKUK MUNICIPAL	IA	LPV	2	0.9951	2	0.9951	6	0.9948
EST	ESTHERVILLE MUNICIPAL	IA	LPV	2	0.9949	3	0.9949	5	0.9946
FFL	FAIRFIELD MUNICIPAL	IA	LPV	2	0.9950	2	0.9950	6	0.9947
FOD	FORT DODGE RGNL	IA	LPV200	2	0.9949	3	0.9947	5	0.9946
FXY	FOREST CITY MUNICIPAL	IA	LPV	2	0.9950	3	0.9948	5	0.9946
GGI	GRINNELL RGNL	IA	LPV	2	0.9950	3	0.9950	5	0.9946
ICL	SCHENCK FIELD	IA	LPV	2	0.9951	2	0.9951	3	0.9949
IKV	ANKENY RGNL	IA	LPV	2	0.9948	2	0.9948	5	0.9945
IOW	IOWA CITY MUNICIPAL	IA	LPV	2	0.9951	2	0.9951	6	0.9947
LRJ	LE MARS MUNICIPAL	IA	LPV	2	0.9948	3	0.9947	3	0.9945
MPZ	MOUNT PLEASANT MUNICIPAL	IA	LPV	2	0.9950	2	0.9950	6	0.9949
MUT	MUSCATINE MUNICIPAL	IA	LPV	2	0.9951	2	0.9951	7	0.9947
OOA	OSKALOOSA MUNICIPAL	IA	LPV	2	0.9950	2	0.9950	7	0.9949
OTM	OTTUMWA RGNL	IA	LPV	2	0.9950	2	0.9950	6	0.9949
OXV	KNOXVILLE MUNICIPAL	IA	LPV	2	0.9950	2	0.9950	7	0.9948
PEA	PELLA MUNICIPAL	IA	LPV	2	0.9949	2	0.9949	6	0.9946
PRO	PERRY MUNICIPAL	IA	LPV	2	0.9949	3	0.9948	4	0.9945
SDA	SHENANDOAH MUNICIPAL	IA	LPV	2	0.9951	2	0.9950	3	0.9949
SLB	STORM LAKE MUNICIPAL	IA	LPV	2	0.9949	3	0.9948	3	0.9945
SPW	SPENCER MUNICIPAL	IA	LPV200	2	0.9949	3	0.9947	4	0.9946
SUX	SIOUX GATEWAY/ COL. BUD DAY FIELD	IA	LPV200	2	0.9948	2	0.9947	4	0.9944

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
TNU	NEWTON MUNICIPAL	IA	LPV	2	0.9950	2	0.9949	6	0.9947
TVK	CENTERVILLE MUNICIPAL	IA	LPV	2	0.9951	2	0.9951	5	0.9949
VTI	VINTON VETERANS MEMORIAL AIRPARK	IA	LPV	2	0.9951	3	0.9950	5	0.9946
BOI	BOISE AIR TERMINAL/ GOWEN FIELD	ID	LPV	2	0.9948	2	0.9948	6	0.9943
COE	COEUR D'ALENE – PAPPY BOYINGTON	ID	LPV200	2	0.9945	3	0.9943	7	0.9940
EUL	CALDWELL INDUSTRIAL	ID	LPV	2	0.9947	2	0.9947	6	0.9943
GNG	GOODING MUNICIPAL	ID	LPV	2	0.9948	5	0.9947	5	0.9944
IDA	IDAHO FALLS RGNL	ID	LPV200	2	0.9948	2	0.9948	5	0.9944
JER	JEROME COUNTY	ID	LPV	2	0.9948	5	0.9947	5	0.9944
LWS	LEWISTON-NEZ PERCE COUNTY	ID	LPV200	2	0.9946	3	0.9946	6	0.9939
MAN	NAMPA MUNICIPAL	ID	LPV	2	0.9948	2	0.9947	6	0.9943
MYL	MC CALL MUNICIPAL	ID	LPV	2	0.9946	2	0.9946	7	0.9943
PIH	POCATELLO RGNL	ID	LPV200	2	0.9948	2	0.9948	4	0.9944
TWF	JOSLIN FIELD – MAGIC VALLEY RGNL	ID	LPV200	2	0.9948	5	0.9947	5	0.9944
U76	MOUNTAIN HOME MUNICIPAL	ID	LPV	2	0.9948	4	0.9947	5	0.9943
3LF	LITCHFIELD MUNICIPAL	IL	LPV	2	0.9954	2	0.9952	7	0.9950
3MY	MOUNT HAWLEY AUXILIARY	IL	LPV	3	0.9956	2	0.9954	6	0.9950
AJG	MOUNT CARMEL MUNICIPAL	IL	LPV	3	0.9959	2	0.9954	7	0.9951
ALN	ST LOUIS RGNL	IL	LPV	2	0.9954	2	0.9952	7	0.9950
ARR	AURORA MUNICIPAL	IL	LPV	2	0.9954	3	0.9954	6	0.9948
BLV	SCOTT AFB/MIDAMERICA	IL	LPV200	2	0.9954	2	0.9952	6	0.9949
BMI	CENTRAL IL RGNL ARPT AT BLOOMINGTON	IL	LPV	3	0.9957	2	0.9954	6	0.9950
C15	PEKIN MUNICIPAL	IL	LPV	3	0.9957	2	0.9954	6	0.9950
C73	DIXON MUNICIPAL- CHARLES R. WALGREEN	IL	LPV	3	0.9953	2	0.9952	6	0.9947
CMI	UNIVERSITY OF ILLINOIS-WILLARD	IL	LPV200	3	0.9959	2	0.9954	6	0.9952
DEC	DECATUR	IL	LPV	3	0.9958	2	0.9954	6	0.9950
DKB	DE KALB TAYLOR MUNICIPAL	IL	LPV	2	0.9954	3	0.9954	6	0.9948
DNV	VERMILION REGIONAL	IL	LPV	2	0.9958	3	0.9956	6	0.9952
DPA	DUPAGE	IL	LPV200	2	0.9954	3	0.9954	7	0.9949
FEP	ALBERTUS	IL	LPV	3	0.9953	2	0.9951	6	0.9946
HSB	HARRISBURG-RALEIGH	IL	LPV	2	0.9954	2	0.9954	8	0.9951
I63	MOUNT STERLING MUNICIPAL	IL	LPV	3	0.9953	2	0.9951	8	0.9947
IGQ	LANSING MUNICIPAL	IL	LPV	2	0.9954	3	0.9954	7	0.9949
IKK	GREATER KANKAKEE	IL	LPV	2	0.9956	3	0.9956	6	0.9951
LOT	LEWIS UNIVERSITY	IL	LPV200	2	0.9954	3	0.9954	6	0.9949
MDW	CHICAGO MIDWAY INTL	IL	LPV	2	0.9954	3	0.9954	6	0.9949
MLI	QUAD CITY INTL	IL	LPV	3	0.9953	2	0.9951	6	0.9945
MTO	COLES COUNTY MEMORIAL	IL	LPV	3	0.9959	2	0.9954	6	0.9950
MVN	MOUNT VERNON	IL	LPV	2	0.9954	3	0.9953	6	0.9949
MWA	WILLIAMSON COUNTY RGNL	IL	LPV	2	0.9954	2	0.9954	7	0.9950
ORD	CHICAGO O'HARE INTL	IL	LPV200	2	0.9954	3	0.9954	6	0.9949
PIA	GENERAL DOWNING – PEORIA INTL	IL	LPV	3	0.9957	2	0.9954	6	0.9950
PNT	PONTIAC MUNICIPAL	IL	LPV	3	0.9956	2	0.9954	6	0.9952
RFD	CHICAGO/ROCKFORD INTL	IL	LPV200	3	0.9954	3	0.9953	6	0.9947
RSV	CRAWFORD CO	IL	LPV	2	0.9959	2	0.9954	6	0.9952
SPI	ABRAHAM LINCOLN CAPITAL	IL	LPV	4	0.9958	3	0.9953	6	0.9950
SQI	WHITESIDE CO ARPT- JOS H BITTORF FIELD	IL	LPV	3	0.9953	2	0.9951	6	0.9945
UGN	WAUKEGAN RGNL	IL	LPV	2	0.9954	3	0.9954	7	0.9947
UIN	QUINCY RGNL-BALDWIN FIELD	IL	LPV200	3	0.9952	2	0.9951	7	0.9948

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
4I7	PUTNAM COUNTY	IN	LPV	2	0.9958	2	0.9957	6	0.9953
AID	ANDERSON MUNICIPAL-DARLINGTON FIELD	IN	LPV	2	0.9959	2	0.9957	6	0.9955
ASW	WARSAW MUNICIPAL	IN	LPV	2	0.9958	2	0.9957	7	0.9953
BAK	COLUMBUS MUNICIPAL	IN	LPV	2	0.9958	2	0.9957	6	0.9955
BMG	MONROE COUNTY	IN	LPV200	2	0.9958	2	0.9957	6	0.9954
CEV	METTEL FIELD	IN	LPV	2	0.9959	2	0.9957	6	0.9955
EKM	ELKHART MUNICIPAL	IN	LPV	2	0.9956	2	0.9955	7	0.9951
EVV	EVANSVILLE RGNL	IN	LPV200	3	0.9959	2	0.9956	7	0.9950
EYE	EAGLE CREEK AIRPARK	IN	LPV	2	0.9958	2	0.9957	6	0.9955
FRH	FRENCH LICK MUNICIPAL	IN	LPV	2	0.9958	2	0.9958	7	0.9952
FWA	FORT WAYNE INTL	IN	LPV200	2	0.9958	2	0.9957	7	0.9953
GEZ	SHELBYVILLE MUNICIPAL	IN	LPV	2	0.9958	2	0.9957	6	0.9955
GGP	LOGANSPORT/CASS COUNTY	IN	LPV	2	0.9957	2	0.9957	7	0.9953
GSH	GOSHEN MUNICIPAL	IN	LPV	2	0.9958	2	0.9957	7	0.9952
GWB	DE KALB COUNTY	IN	LPV	2	0.9958	2	0.9957	7	0.9953
HFY	GREENWOOD MUNICIPAL	IN	LPV	2	0.9958	2	0.9957	6	0.9955
HNB	HUNTINGBURG	IN	LPV	2	0.9959	3	0.9958	7	0.9952
HUF	TERRE HAUTE INTL-HULMAN FIELD	IN	LPV	2	0.9958	3	0.9957	6	0.9952
I22	RANDOLPH COUNTY	IN	LPV	2	0.9959	2	0.9957	7	0.9955
IMS	MADISON MUNICIPAL	IN	LPV	2	0.9959	2	0.9958	6	0.9955
IND	INDIANAPOLIS INTL	IN	LPV	2	0.9958	2	0.9957	6	0.9955
LAF	PURDUE UNIVERSITY	IN	LPV	2	0.9958	2	0.9957	6	0.9952
MIE	DELAWARE COUNTY RGNL	IN	LPV	2	0.9959	2	0.9957	7	0.9955
MQJ	MOUNT COMFORT	IN	LPV	2	0.9958	2	0.9957	6	0.9955
MZZ	MARION MUNICIPAL	IN	LPV	2	0.9958	2	0.9957	7	0.9954
OKK	KOKOMO MUNICIPAL	IN	LPV	2	0.9957	2	0.9957	7	0.9954
OVO	NORTH VERNON	IN	LPV	2	0.9958	2	0.9957	6	0.9955
OXI	STARKE COUNTY	IN	LPV	2	0.9956	2	0.9956	7	0.9951
RCR	FULTON COUNTY	IN	LPV	2	0.9957	2	0.9957	7	0.9953
RID	RICHMOND MUNICIPAL	IN	LPV200	2	0.9959	2	0.9957	6	0.9955
SBN	SOUTH BEND RGNL	IN	LPV	2	0.9955	2	0.9955	7	0.9950
SER	FREEMAN MUNICIPAL	IN	LPV	2	0.9958	2	0.9958	7	0.9955
SMD	SMITH FIELD	IN	LPV	2	0.9958	2	0.9957	7	0.9953
TYQ	INDIANAPOLIS EXECUTIVE	IN	LPV	2	0.9958	2	0.9957	6	0.9955
VPZ	PORTER COUNTY MUNICIPAL	IN	LPV	2	0.9955	2	0.9955	8	0.9949
3K3	SYRACUSE-HAMILTON COUNTY MUNICIPAL	KS	LPV	2	0.9951	2	0.9950	4	0.9948
AAO	COLONEL JAMES JABARA	KS	LPV	3	0.9952	3	0.9952	2	0.9948
ADT	ATWOOD-RAWLINS COUNTY CITY-COUNTY	KS	LPV	2	0.9950	2	0.9948	7	0.9946
CBK	SHALZ FIELD	KS	LPV	2	0.9950	2	0.9948	6	0.9947
DDC	DODGE CITY RGNL	KS	LPV	3	0.9952	2	0.9950	3	0.9949
EGT	WELLINGTON MUNICIPAL	KS	LPV	3	0.9952	3	0.9952	2	0.9948
EHA	ELKHART-MORTON COUNTY	KS	LPV	3	0.9954	3	0.9952	5	0.9950
EMP	EMPORIA MUNICIPAL	KS	LPV	3	0.9952	3	0.9952	2	0.9948
EWK	NEWTON-CITY-COUNTY	KS	LPV	3	0.9952	3	0.9952	3	0.9948
FOE	FORBES FIELD	KS	LPV	2	0.9950	2	0.9950	4	0.9949
FSK	FORT SCOTT MUNICIPAL	KS	LPV	3	0.9952	3	0.9952	5	0.9948
GBD	GREAT BEND MUNICIPAL	KS	LPV200	2	0.9950	2	0.9950	3	0.9948
GCK	GARDEN CITY RGNL	KS	LPV	2	0.9951	2	0.9950	3	0.9948
GLD	RENNER FIELD / GOODLAND MUNICIPAL	KS	LPV200	2	0.9950	2	0.9948	7	0.9947
HQG	HUGOTON MUNICIPAL	KS	LPV	3	0.9953	3	0.9952	4	0.9950
HUT	HUTCHINSON MUNICIPAL	KS	LPV	3	0.9952	2	0.9950	3	0.9948
HYS	HAYS RGNL	KS	LPV200	2	0.9950	2	0.9950	3	0.9948

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
ICT	WICHITA MID-CONTINENT	KS	LPV200	3	0.9952	3	0.9952	2	0.9948
IDP	INDEPENDENCE MUNICIPAL	KS	LPV	3	0.9953	3	0.9952	4	0.9949
IXD	NEW CENTURY AIRCENTER	KS	LPV	2	0.9950	2	0.9950	4	0.9949
LBL	LIBERAL MID-AMERICA RGNL	KS	LPV	3	0.9953	3	0.9952	3	0.9951
LWC	LAWRENCE MUNICIPAL	KS	LPV200	2	0.9950	2	0.9950	4	0.9949
MHK	MANHATTAN RGNL	KS	LPV200	2	0.9950	2	0.9950	2	0.9948
MPR	MC PHERSON	KS	LPV	2	0.9950	2	0.9950	2	0.9948
MYZ	MARYSVILLE MUNICIPAL	KS	LPV	2	0.9950	2	0.9950	2	0.9948
NRN	NORTON MUNICIPAL	KS	LPV	2	0.9950	2	0.9948	2	0.9947
OEL	OAKLEY MUNICIPAL	KS	LPV	2	0.9950	2	0.9948	5	0.9947
OJC	JOHNSON COUNTY EXECUTIVE	KS	LPV	3	0.9951	2	0.9950	4	0.9949
PPF	TRI-CITY	KS	LPV	3	0.9953	3	0.9952	5	0.9948
PTS	ATKINSON MUNICIPAL	KS	LPV	3	0.9953	3	0.9952	5	0.9947
PTT	PRATT RGNL	KS	LPV	3	0.9952	2	0.9951	3	0.9948
RSL	RUSSELL MUNICIPAL	KS	LPV	2	0.9950	2	0.9950	3	0.9948
SLN	SALINA MUNICIPAL	KS	LPV	2	0.9950	2	0.9950	2	0.9948
TQK	SCOTT CITY MUNICIPAL	KS	LPV	2	0.9950	2	0.9950	4	0.9948
ULS	ULYSSES	KS	LPV	3	0.9952	2	0.9951	3	0.9950
27K	GEORGETOWN SCOTT COUNTY – MARSHALL FIELD	KY	LPV200	2	0.9959	2	0.9958	5	0.9955
2I0	MADISONVILLE MUNICIPAL	KY	LPV	3	0.9960	2	0.9957	6	0.9949
BRY	SAMUELS FIELD	KY	LPV	2	0.9959	2	0.9958	8	0.9955
BWG	BOWLING GREEN-WARREN COUNTY RGNL	KY	LPV	2	0.9960	2	0.9960	8	0.9952
CVG	CINCINNATI/ NORTHERN KENTUCKY INTL	KY	LPV200	2	0.9959	2	0.9957	6	0.9955
DVK	STUART POWELL FIELD	KY	LPV	2	0.9959	2	0.9958	6	0.9956
EHR	HENDERSON CITY-COUNTY	KY	LPV	3	0.9958	2	0.9956	5	0.9948
EKX	ADDINGTON FIELD	KY	LPV	2	0.9959	2	0.9959	8	0.9955
FGX	FLEMING-MASON	KY	LPV	2	0.9959	2	0.9958	5	0.9955
GLW	GLASGOW MUNICIPAL	KY	LPV	2	0.9960	2	0.9960	8	0.9953
HOP	CAMPBELL AAF (FORT CAMPBELL)	KY	LPV	3	0.9956	2	0.9955	7	0.9950
I39	MADISON	KY	LPV	2	0.9959	2	0.9958	6	0.9955
K22	BIG SANDY RGNL	KY	LPV	3	0.9961	2	0.9959	5	0.9956
LEX	BLUE GRASS	KY	LPV	2	0.9959	2	0.9958	6	0.9955
LOU	BOWMAN FIELD	KY	LPV	2	0.9958	2	0.9958	6	0.9954
LOZ	LONDON-CORBIN ARPT-MAGEE FIELD	KY	LPV	2	0.9960	2	0.9959	6	0.9955
M97	MOREHEAD-ROWAN COUNTY CLYDE A. THOMAS RGNL	KY	LPV	2	0.9959	2	0.9959	5	0.9955
OWB	OWENSBORO-DAVIESS COUNTY	KY	LPV200	2	0.9959	2	0.9956	7	0.9950
PAH	BARKLEY RGNL	KY	LPV	2	0.9955	2	0.9954	6	0.9950
SDF	LOUISVILLE INTL-STANDIFORD FIELD	KY	LPV200	2	0.9958	2	0.9958	7	0.9954
SME	LAKE CUMBERLAND RGNL	KY	LPV	2	0.9960	2	0.9959	6	0.9955
TWT	STURGIS MUNICIPAL	KY	LPV	4	0.9957	2	0.9954	6	0.9948
TZV	TOMPKINSVILLE-MONROE COUNTY	KY	LPV	2	0.9961	2	0.9960	9	0.9952
W38	WILLIAMSBURG-WHITLEY COUNTY	KY	LPV	2	0.9960	2	0.9959	6	0.9955
1L0	ST JOHN THE BAPTIST PARISH	LA	LPV	3	0.9963	2	0.9959	6	0.9951
3R4	HART	LA	LPV	3	0.9963	2	0.9959	7	0.9954
ACP	ALLEN PARISH	LA	LPV	3	0.9962	2	0.9959	5	0.9952
AEX	ALEXANDRIA INTL	LA	LPV200	3	0.9962	2	0.9959	5	0.9951
ARA	ACADIANA RGNL	LA	LPV	3	0.9964	2	0.9960	6	0.9951
BQP	MOREHOUSE MEMORIAL	LA	LPV	2	0.9958	2	0.9955	8	0.9952

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
BTR	BATON ROUGE METROPOLITAN RYAN FIELD	LA	LPV200	3	0.9963	2	0.9959	6	0.9952
BXA	GEORGE R CARR MEMORIAL AIR FIELD	LA	LPV	3	0.9960	2	0.9957	6	0.9952
CWF	CHENNAULT INTL	LA	LPV200	4	0.9966	2	0.9960	5	0.9953
DTN	SHREVEPORT DOWNTOWN	LA	LPV	2	0.9961	2	0.9958	7	0.9953
ESF	ESLER RGNL	LA	LPV200	3	0.9962	2	0.9959	5	0.9952
GAO	SOUTH LAFOURCHE LEONARD MILLER JR	LA	LPV	4	0.9961	3	0.9958	7	0.9949
HDC	HAMMOND NORTHSHORE RGNL	LA	LPV200	3	0.9963	3	0.9960	6	0.9952
HUM	HOUMA-TERREBONNE	LA	LPV200	5	0.9963	4	0.9960	8	0.9951
HZR	FALSE RIVER RGNL	LA	LPV	3	0.9962	2	0.9959	5	0.9952
IER	NATCHITOCHES RGNL	LA	LPV	3	0.9962	2	0.9959	7	0.9953
LCH	LAKE CHARLES RGNL	LA	LPV	3	0.9966	2	0.9961	5	0.9953
LFT	LAFAYETTE RGNL	LA	LPV	3	0.9964	3	0.9960	6	0.9951
M79	JOHN H HOOKS JR MEMORIAL	LA	LPV	2	0.9959	2	0.9958	8	0.9952
MLU	MONROE RGNL	LA	LPV200	2	0.9959	2	0.9958	8	0.9952
MSY	LOUIS ARMSTRONG NEW ORLEANS INTL	LA	LPV200	3	0.9963	2	0.9959	7	0.9951
NEW	LAKEFRONT	LA	LPV	3	0.9963	2	0.9959	7	0.9951
SHV	SHREVEPORT RGNL	LA	LPV200	2	0.9961	2	0.9958	7	0.9953
TVR	VICKSBURG TALLULAH RGNL	LA	LPV	2	0.9959	2	0.9956	8	0.9951
UXL	SOUTHLAND FIELD	LA	LPV	3	0.9966	2	0.9961	6	0.9953
3B0	SOUTHBRIDGE MUNICIPAL	MA	LPV	2	0.9963	6	0.9959	6	0.9953
ACK	NANTUCKET MEMORIAL	MA	LPV200	2	0.9963	5	0.9959	6	0.9954
BAF	BARNES MUNICIPAL	MA	LPV	2	0.9963	6	0.9959	6	0.9954
BED	LAURENCE G HANSCOM FLD	MA	LPV200	2	0.9963	6	0.9959	6	0.9953
HYA	BARNSTABLE MUNICIPAL-BOARDMAN/POLAN	MA	LPV200	2	0.9963	6	0.9959	6	0.9954
MVY	MARTHAS VINEYARD	MA	LPV200	2	0.9963	6	0.9959	6	0.9954
ORH	WORCESTER RGNL	MA	LPV	2	0.9963	6	0.9959	6	0.9953
OWD	NORWOOD MEMORIAL	MA	LPV	2	0.9963	6	0.9959	6	0.9953
2W6	ST. MARY'S COUNTY RGNL	MD	LPV	2	0.9963	4	0.9958	5	0.9955
BWI	BALTIMORE/WASHINGTON INTL THURGOOD MARSHALL	MD	LPV200	2	0.9963	4	0.9959	6	0.9954
DMW	CARROLL COUNTY RGNL/JACK B POAGE FIELD	MD	LPV200	2	0.9963	4	0.9959	6	0.9954
ESN	EASTON/NEWNAM FIELD	MD	LPV	2	0.9963	4	0.9958	6	0.9954
FDK	FREDERICK MUNICIPAL	MD	LPV	2	0.9963	3	0.9959	5	0.9954
GAI	MONTGOMERY COUNTY AIRPARK	MD	LPV	2	0.9963	4	0.9959	5	0.9954
HGR	HAGERSTOWN RGNL-RICHARD A HENS	MD	LPV200	2	0.9963	2	0.9959	5	0.9954
MTN	MARTIN STATE	MD	LPV	2	0.9963	4	0.9958	6	0.9954
OXB	OCEAN CITY MUNICIPAL	MD	LPV	2	0.9963	5	0.9961	8	0.9958
SBY	SALISBURY-OCEAN CITY WICOMICO RGNL	MD	LPV200	2	0.9963	4	0.9961	7	0.9956
AUG	AUGUSTA STATE	ME	LPV	2	0.9962	6	0.9958	5	0.9952
BGR	BANGOR INTL	ME	LPV	2	0.9963	6	0.9957	5	0.9950
BHB	HANCOCK COUNTY-BAR HARBOR	ME	LPV200	2	0.9963	6	0.9957	5	0.9953
FVE	NORTHERN AROOSTOOK RGNL	ME	LPV	2	0.9957	5	0.9954	5	0.9950
LEW	AUBURN/LEWISTON MUNICIPAL	ME	LPV200	2	0.9962	6	0.9958	6	0.9953
PQI	NORTHERN MAINE RGNL ARPT AT PRESQUE ISLE	ME	LPV200	2	0.9957	5	0.9954	5	0.9951
PWM	PORTLAND INTL JETPORT	ME	LPV	2	0.9961	6	0.9958	6	0.9954
RKD	KNOX COUNTY RGNL	ME	LPV	2	0.9963	6	0.9958	5	0.9953
WVL	WATERVILLE ROBERT LAFLEUR	ME	LPV200	2	0.9962	6	0.9957	5	0.9952

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
ACB	ANTRIM COUNTY	MI	LPV	3	0.9952	2	0.9951	6	0.9947
ADG	LENAWEE COUNTY	MI	LPV	2	0.9958	2	0.9957	7	0.9950
APN	ALPENA COUNTY RGNL	MI	LPV	4	0.9956	3	0.9955	6	0.9949
ARB	ANN ARBOR MUNICIPAL	MI	LPV	2	0.9957	3	0.9956	7	0.9949
AZO	KALAMAZOO/ BATTLE CREEK INTL	MI	LPV	2	0.9955	2	0.9954	7	0.9949
BAX	HURON COUNTY MEMORIAL	MI	LPV	2	0.9956	3	0.9954	7	0.9949
BEH	SOUTHWEST MICHIGAN RGNL	MI	LPV	2	0.9954	2	0.9954	7	0.9949
BIV	TULIP CITY	MI	LPV	2	0.9955	3	0.9954	7	0.9949
BTL	W K KELLOGG	MI	LPV	2	0.9955	3	0.9954	7	0.9949
CAD	WEXFORD COUNTY	MI	LPV200	3	0.9955	3	0.9953	6	0.9946
CIU	CHIPPEWA COUNTY INTL	MI	LPV	2	0.9952	2	0.9952	6	0.9949
CMX	HOUGHTON COUNTY MEMORIAL	MI	LPV	2	0.9950	2	0.9949	7	0.9943
CVX	CHARLEVOIX MUNICIPAL	MI	LPV	3	0.9952	2	0.9950	6	0.9947
DET	COLEMAN A. YOUNG MUNICIPAL	MI	LPV	2	0.9957	3	0.9957	7	0.9949
DTW	DETROIT METROPOLITAN WAYNE COUNTY	MI	LPV	2	0.9957	2	0.9957	7	0.9949
ERY	LUCE COUNTY	MI	LPV	2	0.9952	2	0.9952	6	0.9947
ESC	DELTA COUNTY	MI	LPV200	2	0.9950	2	0.9950	6	0.9945
FFX	FREMONT MUNICIPAL	MI	LPV	2	0.9955	3	0.9953	6	0.9946
FNT	BISHOP INTL	MI	LPV200	2	0.9957	3	0.9955	7	0.9949
GRR	GERALD R. FORD INTL	MI	LPV200	2	0.9955	3	0.9954	7	0.9949
HYX	SAGINAW COUNTY H.W. BROWNE	MI	LPV	3	0.9956	3	0.9952	7	0.9948
IKW	JACK BARSTOW	MI	LPV	2	0.9955	3	0.9952	7	0.9948
IMT	FORD	MI	LPV	2	0.9949	2	0.9949	6	0.9944
IRS	KIRSCH MUNICIPAL	MI	LPV	2	0.9956	2	0.9956	7	0.9951
IWD	GOGEBIC-IRON COUNTY	MI	LPV200	2	0.9949	2	0.9949	6	0.9942
JXN	JACKSON COUNTY-REYNOLDS FIELD	MI	LPV200	2	0.9957	3	0.9956	7	0.9949
LAN	CAPITAL REGION INTL	MI	LPV200	2	0.9955	3	0.9953	7	0.9949
LDM	MASON COUNTY	MI	LPV	3	0.9954	3	0.9953	6	0.9946
MBS	MBS INTL	MI	LPV200	2	0.9955	3	0.9952	7	0.9948
MKG	MUSKEGON COUNTY	MI	LPV200	2	0.9955	3	0.9954	7	0.9948
MNM	MENOMINEE-MARINETTE TWIN COUNTY	MI	LPV200	2	0.9950	2	0.9949	6	0.9945
MOP	MOUNT PLEASANT MUNICIPAL	MI	LPV	2	0.9955	3	0.9953	6	0.9946
OEB	BRANCH COUNTY MEMORIAL	MI	LPV	2	0.9958	2	0.9957	7	0.9950
OSC	OSCODA-WURTSMITH	MI	LPV200	2	0.9957	3	0.9954	6	0.9947
OZW	LIVINGSTON COUNTY SPENCER J. HARDY	MI	LPV	2	0.9957	3	0.9955	7	0.9949
PLN	PELLSTON RGNL AIRPORT OF EMMET	MI	LPV200	3	0.9953	2	0.9952	6	0.9948
PTK	OAKLAND COUNTY INTL	MI	LPV200	2	0.9957	3	0.9956	7	0.9949
RNP	OWOSSO COMMUNITY	MI	LPV	3	0.9956	3	0.9954	7	0.9949
SAW	SAWYER INTL	MI	LPV200	2	0.9950	2	0.9949	6	0.9945
TTF	CUSTER	MI	LPV	2	0.9958	2	0.9957	7	0.9950
TVC	CHERRY CAPITAL	MI	LPV	4	0.9954	3	0.9953	6	0.9946
YIP	WILLOW RUN	MI	LPV	2	0.9957	3	0.9957	7	0.9949
AEL	ALBERT LEA MUNICIPAL	MN	LPV	2	0.9950	2	0.9949	5	0.9946
ANE	ANOKA COUNTY-BLAINE ARPT(JANES FIELD)	MN	LPV	3	0.9951	3	0.9950	6	0.9944
AUM	AUSTIN MUNICIPAL	MN	LPV	2	0.9950	2	0.9949	5	0.9946
AXN	CHANDLER FIELD	MN	LPV	3	0.9950	2	0.9948	5	0.9941
BBB	BENSON MUNICIPAL	MN	LPV	2	0.9952	3	0.9950	5	0.9942
BDE	BAUDETTE INTL	MN	LPV	3	0.9950	2	0.9948	8	0.9945

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
BDH	WILLMAR MUNICIPAL- JOHN L RICE FIELD	MN	LPV	2	0.9951	3	0.9950	5	0.9942
BJI	BEMIDJI RGNL	MN	LPV200	2	0.9949	2	0.9948	7	0.9944
BRD	BRAINERD LAKES RGNL	MN	LPV200	2	0.9949	2	0.9948	6	0.9943
CKN	CROOKSTON MUNICIPAL KIRKWOOD FIELD	MN	LPV	2	0.9949	2	0.9948	6	0.9941
CNB	MYERS FIELD	MN	LPV	3	0.9951	3	0.9949	5	0.9942
DLH	DULUTH INTL	MN	LPV200	2	0.9949	2	0.9948	8	0.9945
DTL	DETROIT LAKES-WETHING FIELD	MN	LPV	2	0.9949	2	0.9948	6	0.9941
FCM	FLYING CLOUD	MN	LPV200	2	0.9952	3	0.9951	6	0.9944
FFM	FERGUS FALLS MUNICIPAL-EINAR MICKEL	MN	LPV200	2	0.9948	2	0.9948	6	0.9941
FRM	FAIRMONT MUNICIPAL	MN	LPV	2	0.9950	2	0.9948	5	0.9946
GPZ	GRAND RAPIDS/ITASCA CO-GORDON NEWSTROM FIELD	MN	LPV	2	0.9949	2	0.9948	8	0.9944
INL	FALLS INTL	MN	LPV	3	0.9951	3	0.9948	8	0.9945
LJF	LITCHFIELD MUNICIPAL	MN	LPV	2	0.9952	3	0.9950	5	0.9943
LVN	AIRLAKE	MN	LPV	3	0.9951	4	0.9951	6	0.9944
LYV	QUENTIN AANENSON FIELD	MN	LPV200	2	0.9948	2	0.9946	4	0.9943
MKT	MANKATO RGNL	MN	LPV200	2	0.9950	2	0.9949	6	0.9944
MML	SOUTHWEST MINNESOTA RGNL	MN	LPV	2	0.9949	2	0.9948	7	0.9944
MSP	MINNEAPOLIS-ST PAUL INTL	MN	LPV	2	0.9952	3	0.9951	7	0.9944
ROS	RUSH CITY RGNL	MN	LPV	2	0.9948	2	0.9948	6	0.9943
ROX	ROSEAU MUNICIPAL/ RUDY BILLBERG FIELD	MN	LPV	2	0.9949	2	0.9948	7	0.9945
RRT	WARROAD INTL MEMORIAL	MN	LPV	2	0.9949	2	0.9948	8	0.9945
RST	ROCHESTER INTL	MN	LPV	3	0.9951	3	0.9950	8	0.9947
RWF	REDWOOD FALLS MUNICIPAL	MN	LPV	2	0.9950	2	0.9949	5	0.9943
STC	ST CLOUD RGNL	MN	LPV200	3	0.9950	2	0.9948	6	0.9943
STP	ST PAUL DOWNTOWN HOLMAN FIELD	MN	LPV	2	0.9952	3	0.9951	6	0.9944
TVF	THIEF RIVER FALLS RGNL	MN	LPV	2	0.9949	2	0.9948	7	0.9943
1H0	CREVE COEUR	MO	LPV	2	0.9954	2	0.9951	7	0.9948
6M6	LEWIS COUNTY RGNL	MO	LPV	2	0.9951	2	0.9951	5	0.9948
8WC	WASHINGTON COUNTY	MO	LPV	2	0.9954	3	0.9953	8	0.9948
AIZ	LEE C FINE MEMORIAL	MO	LPV	2	0.9954	3	0.9952	8	0.9948
BBG	BRANSON	MO	LPV200	2	0.9954	2	0.9953	8	0.9949
CGI	CAPE GIRARDEAU RGNL	MO	LPV	2	0.9955	2	0.9954	7	0.9950
CHT	CHILLICOTHE MUNICIPAL	MO	LPV	2	0.9951	2	0.9951	5	0.9950
COU	COLUMBIA RGNL	MO	LPV	2	0.9953	3	0.9952	7	0.9948
DMO	SEDALIA MEMORIAL	MO	LPV	3	0.9953	3	0.9952	6	0.9949
DXE	DEXTER MUNICIPAL	MO	LPV	2	0.9955	2	0.9954	5	0.9951
EIW	COUNTY MEMORIAL	MO	LPV	2	0.9955	2	0.9954	6	0.9951
EOS	NEOSHO HUGH ROBINSON	MO	LPV	3	0.9954	3	0.9952	6	0.9949
EVU	NORTHWEST MISSOURI RGNL	MO	LPV	2	0.9951	2	0.9951	3	0.9949
EZZ	CAMERON MEMORIAL	MO	LPV	2	0.9951	2	0.9951	3	0.9950
FAM	FARMINGTON RGNL	MO	LPV	2	0.9954	3	0.9953	7	0.9949
FTT	ELTON HENSLEY MEMORIAL	MO	LPV	2	0.9953	3	0.9952	7	0.9948
FYG	WASHINGTON RGNL	MO	LPV	2	0.9953	3	0.9952	7	0.9948
GPH	MIDWEST NATIONAL AIR CNTR	MO	LPV	2	0.9950	2	0.9950	4	0.9950
H21	CAMDENTON MEMORIAL	MO	LPV	2	0.9954	3	0.9952	8	0.9948
HAE	HANNIBAL RGNL	MO	LPV	3	0.9952	2	0.9951	8	0.9948
HFJ	MONETT MUNICIPAL	MO	LPV	3	0.9954	3	0.9952	7	0.9949
HIG	HIGGINSVILLE INDUSTRIAL MUNICIPAL	MO	LPV	2	0.9950	2	0.9950	4	0.9950
IRK	KIRKSVILLE RGNL	MO	LPV200	2	0.9951	2	0.9951	5	0.9948
JEF	JEFFERSON CITY MEMORIAL	MO	LPV	2	0.9954	3	0.9952	7	0.9948

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
JLN	JOPLIN RGNL	MO	LPV	3	0.9953	3	0.9952	6	0.9949
K02	PERRYVILLE MUNICIPAL	MO	LPV	2	0.9954	3	0.9954	7	0.9949
K57	GOULD PETERSON MUNICIPAL	MO	LPV	2	0.9950	2	0.9950	3	0.9949
LRY	LAWRENCE SMITH MEMORIAL	MO	LPV	3	0.9952	2	0.9950	4	0.9948
LXT	LEE'S SUMMIT MUNICIPAL	MO	LPV	2	0.9950	2	0.9950	4	0.9950
M05	CARUTHERSVILLE MEMORIAL	MO	LPV	2	0.9955	2	0.9953	6	0.9951
M17	BOLIVAR MUNICIPAL	MO	LPV	3	0.9954	3	0.9952	8	0.9948
MAW	MALDEN RGNL	MO	LPV	2	0.9955	2	0.9954	5	0.9951
MCI	KANSAS CITY INTL	MO	LPV	2	0.9950	2	0.9950	4	0.9950
MHL	MARSHALL MEMORIAL MUNICIPAL	MO	LPV	2	0.9951	2	0.9951	6	0.9949
MKC	CHARLES B. WHEELER DOWNTOWN	MO	LPV	2	0.9950	2	0.9950	4	0.9950
MO8	NORTH CENTRAL MISSOURI RGNL	MO	LPV	2	0.9951	2	0.9951	5	0.9950
MYJ	MEXICO MEMORIAL	MO	LPV	3	0.9953	2	0.9951	7	0.9948
NVD	NEVADA MUNICIPAL	MO	LPV200	3	0.9952	3	0.9952	6	0.9948
PLK	M. GRAHAM CLARK – TANEY COUNTY	MO	LPV200	2	0.9954	2	0.9953	8	0.9949
POF	POPLAR BLUFF MUNICIPAL	MO	LPV	2	0.9955	2	0.9953	6	0.9951
RCM	SKYHAVEN	MO	LPV	3	0.9952	2	0.9950	5	0.9949
SGF	SPRINGFIELD-BRANSON NATIONAL	MO	LPV	2	0.9954	3	0.9952	9	0.9949
SIK	SIKESTON MEMORIAL MUNICIPAL	MO	LPV	2	0.9955	2	0.9954	5	0.9951
STJ	ROSECRANS MEMORIAL	MO	LPV200	2	0.9951	2	0.9951	3	0.9950
STL	LAMBERT-ST LOUIS INTL	MO	LPV	2	0.9954	2	0.9951	7	0.9948
SUS	SPIRIT OF ST LOUIS	MO	LPV200	2	0.9954	2	0.9951	7	0.9948
TBN	WAYNESVILLE-ST. ROBERT RGNL FORNEY FIELD	MO	LPV	2	0.9954	3	0.9952	8	0.9948
UBX	CUBA MUNICIPAL	MO	LPV	2	0.9954	3	0.9952	8	0.9948
UNO	WEST PLAINS RGNL	MO	LPV	2	0.9954	2	0.9953	8	0.9948
UUV	SULLIVAN RGNL	MO	LPV	2	0.9954	3	0.9952	8	0.9948
VER	JESSE VIERTEL MEMORIAL	MO	LPV	3	0.9953	2	0.9950	6	0.9950
VIH	ROLLA NATIONAL	MO	LPV200	2	0.9954	3	0.9952	8	0.9948
CRX	ROSCOE TURNER	MS	LPV200	2	0.9955	2	0.9955	6	0.9952
GLH	MID DELTA RGNL	MS	LPV200	2	0.9958	2	0.9954	6	0.9952
GNF	GRENADA MUNICIPAL	MS	LPV	3	0.9956	2	0.9953	7	0.9952
GPT	GULFPORT-BILOXI INTL	MS	LPV200	2	0.9959	3	0.9958	7	0.9952
GTR	GOLDEN TRIANGLE RGNL	MS	LPV	2	0.9956	2	0.9954	7	0.9952
GWO	GREENWOOD-LEFLORE	MS	LPV	2	0.9958	2	0.9954	9	0.9952
HBG	HATTIESBURG BOBBY L CHAIN MUNICIPAL	MS	LPV200	2	0.9959	2	0.9957	6	0.9952
HEZ	HARDY-ANDERS FIELD NATCHEZ-ADA	MS	LPV	3	0.9960	2	0.9958	5	0.9952
HKS	HAWKINS FIELD	MS	LPV200	2	0.9958	2	0.9956	9	0.9952
HSA	STENNIS INTL	MS	LPV	3	0.9960	2	0.9958	7	0.9952
IDL	INDIANOLA MUNICIPAL	MS	LPV	2	0.9958	2	0.9954	6	0.9952
JAN	JACKSON-EVERS INTL	MS	LPV200	2	0.9958	2	0.9956	8	0.9952
LUL	HESLER-NOBLE FIELD	MS	LPV	2	0.9959	2	0.9956	6	0.9952
M16	JOHN BELL WILLIAMS	MS	LPV	2	0.9959	2	0.9956	8	0.9952
M40	MONROE COUNTY	MS	LPV	2	0.9955	2	0.9953	6	0.9952
M43	PRENTISS-JEFFERSON DAVIS COUNTY	MS	LPV	2	0.9959	2	0.9957	6	0.9952
MCB	MC COMB/PIKE COUNTY/ JOHN E LEWIS FIELD	MS	LPV	2	0.9959	2	0.9957	6	0.9953
MEI	KEY FIELD	MS	LPV200	2	0.9958	2	0.9956	7	0.9952
MJD	PICAYUNE MUNICIPAL	MS	LPV	3	0.9960	2	0.9958	7	0.9952
MPE	PHILADELPHIA MUNICIPAL	MS	LPV	2	0.9958	2	0.9956	9	0.9952
OLV	OLIVE BRANCH	MS	LPV	2	0.9955	2	0.9953	6	0.9952

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
PIB	HATTIESBURG-LAUREL RGNL	MS	LPV200	2	0.9959	2	0.9956	6	0.9952
PQL	TRENT LOTT INTL	MS	LPV200	2	0.9959	2	0.9957	7	0.9953
STF	GEORGE M BRYAN	MS	LPV200	2	0.9956	2	0.9954	8	0.9952
TUP	TUPELO RGNL	MS	LPV200	2	0.9955	2	0.9954	6	0.9952
UOX	UNIVERSITY-OXFORD	MS	LPV	2	0.9955	2	0.9953	6	0.9952
UTA	TUNICA MUNICIPAL	MS	LPV200	2	0.9955	2	0.9953	6	0.9952
7S0	RONAN	MT	LPV	2	0.9945	3	0.9943	7	0.9938
BIL	BILLINGS LOGAN INTL	MT	LPV	2	0.9947	3	0.9947	4	0.9939
BTM	BERT MOONEY	MT	LPV	2	0.9946	3	0.9945	7	0.9941
BZN	GALLATIN FIELD	MT	LPV	2	0.9946	3	0.9946	7	0.9942
GPI	GLACIER PARK INTL	MT	LPV	2	0.9944	3	0.9942	7	0.9936
GTF	GREAT FALLS INTL	MT	LPV	2	0.9944	3	0.9941	7	0.9937
HLN	HELENA RGNL	MT	LPV	2	0.9946	3	0.9945	6	0.9938
HVR	HAVRE CITY-COUNTY	MT	LPV	2	0.9944	3	0.9941	7	0.9937
LWT	LEWISTOWN MUNICIPAL	MT	LPV	2	0.9945	3	0.9942	4	0.9938
MLS	FRANK WILEY FIELD	MT	LPV	2	0.9946	3	0.9943	4	0.9939
MSO	MISSOULA INTL	MT	LPV	2	0.9946	3	0.9943	7	0.9939
SDY	SIDNEY-RICHLAND MUNICIPAL	MT	LPV	3	0.9944	3	0.9940	4	0.9937
WYS	YELLOWSTONE	MT	LPV200	2	0.9947	2	0.9947	5	0.9945
AFP	ANSON COUNTY – JEFF CLOUD FIELD	NC	LPV	3	0.9964	2	0.9959	5	0.9956
AKH	GASTONIA MUNICIPAL	NC	LPV	2	0.9961	2	0.9960	5	0.9956
AVL	ASHEVILLE RGNL	NC	LPV	2	0.9961	2	0.9959	6	0.9955
BUY	BURLINGTON-ALAMANCE RGNL	NC	LPV200	2	0.9963	2	0.9959	5	0.9955
CLT	CHARLOTTE/DOUGLAS INTL	NC	LPV200	3	0.9962	3	0.9961	5	0.9956
ECG	ELIZABETH CITY CG AIR STATION	NC	LPV	2	0.9963	6	0.9961	24	0.9952
EDE	NORTHEASTERN RGNL	NC	LPV	2	0.9963	5	0.9961	16	0.9953
EQY	CHARLOTTE-MONROE EXECUTIVE	NC	LPV	3	0.9962	2	0.9960	5	0.9956
EWN	COASTAL CAROLINA REGIONAL	NC	LPV	2	0.9963	4	0.9963	7	0.9953
EYF	CURTIS L BROWN JR FIELD	NC	LPV200	2	0.9965	3	0.9961	5	0.9955
FAY	FAYETTEVILLE RGNL/ GRANNIS FIELD	NC	LPV	3	0.9965	3	0.9962	5	0.9955
FQD	RUTHERFORD CO – MARCHMAN FIELD	NC	LPV	2	0.9961	2	0.9959	5	0.9955
GSO	PIEDMONT TRIAD INTL	NC	LPV200	2	0.9962	2	0.9959	5	0.9956
GWW	GOLDSBORO-WAYNE MUNICIPAL	NC	LPV	2	0.9963	3	0.9961	9	0.9955
HNZ	HENDERSON-OXFORD	NC	LPV	2	0.9963	2	0.9960	5	0.9955
HRJ	HARNETT RGNL JETPORT	NC	LPV	2	0.9963	3	0.9961	5	0.9955
ILM	WILMINGTON INTL	NC	LPV	2	0.9965	3	0.9961	7	0.9955
INT	SMITH REYNOLDS	NC	LPV200	2	0.9962	2	0.9959	5	0.9956
IPJ	LINCOLNTON-LINCOLN COUNTY RGNL	NC	LPV	3	0.9962	2	0.9959	5	0.9956
ISO	KINSTON RGNL JETPORT AT STALLI	NC	LPV	2	0.9963	4	0.9963	8	0.9954
JNX	JOHNSTON COUNTY	NC	LPV200	2	0.9963	2	0.9961	5	0.9955
JQF	CONCORD RGNL	NC	LPV	3	0.9963	2	0.9959	5	0.9956
LHZ	TRIANGLE NORTH EXECUTIVE	NC	LPV	2	0.9963	2	0.9960	5	0.9955
MRH	MICHAEL J. SMITH FIELD	NC	LPV	2	0.9963	5	0.9962	9	0.9954
MWK	MOUNT AIRY/SURRY COUNTY	NC	LPV	3	0.9961	2	0.9959	5	0.9956
OAJ	ALBERT J ELLIS	NC	LPV	2	0.9963	6	0.9962	7	0.9954
OCW	WARREN FIELD	NC	LPV	2	0.9963	5	0.9962	10	0.9954
ONX	CURRITUCK COUNTY RGNL	NC	LPV	2	0.9963	6	0.9961	30	0.9951
PGV	PITT-GREENVILLE	NC	LPV	2	0.9963	5	0.9962	11	0.9954
RCZ	RICHMOND COUNTY	NC	LPV	3	0.9965	2	0.9959	5	0.9956
RDU	RALEIGH-DURHAM INTL	NC	LPV200	2	0.9963	2	0.9960	5	0.9955
RWI	ROCKY MOUNT-WILSON RGNL	NC	LPV200	2	0.9963	4	0.9960	10	0.9954

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
SUT	CAPE FEAR RGNL JETPORT/HOWIE FIELD	NC	LPV	2	0.9965	3	0.9961	6	0.9955
SVH	STATESVILLE RGNL	NC	LPV	4	0.9963	2	0.9959	5	0.9956
TDF	PERSON COUNTY	NC	LPV200	2	0.9963	2	0.9960	5	0.9955
VUJ	STANLY COUNTY	NC	LPV200	4	0.9964	3	0.9960	5	0.9956
5H4	HARVEY MUNICIPAL	ND	LPV	3	0.9946	2	0.9944	6	0.9938
5N8	CASSELTON ROBERT MILLER RGNL	ND	LPV	2	0.9948	2	0.9947	5	0.9942
BAC	BARNES COUNTY MUNICIPAL	ND	LPV	3	0.9948	2	0.9945	5	0.9942
BIS	BISMARCK MUNICIPAL	ND	LPV	2	0.9943	2	0.9943	4	0.9940
D09	BOTTINEAU MUNICIPAL	ND	LPV	2	0.9948	3	0.9943	8	0.9936
D55	ROBERTSON FIELD	ND	LPV	2	0.9949	2	0.9947	7	0.9938
DIK	DICKINSON – THEODORE ROOSEVELT	ND	LPV200	2	0.9943	2	0.9942	3	0.9941
DVL	DEVILS LAKE RGNL	ND	LPV	2	0.9948	3	0.9945	7	0.9938
FAR	HECTOR INTL	ND	LPV200	2	0.9948	2	0.9948	6	0.9942
GAF	HUTSON FIELD	ND	LPV	2	0.9949	2	0.9948	7	0.9939
GFK	GRAND FORKS INTL	ND	LPV	2	0.9949	2	0.9948	7	0.9940
GWR	GWINNER- ROGER MELROE FIELD	ND	LPV200	4	0.9950	2	0.9945	4	0.9942
HZE	MERCER COUNTY RGNL	ND	LPV	2	0.9944	2	0.9942	3	0.9938
ISN	SLOULIN FLD INTL	ND	LPV200	3	0.9944	2	0.9940	4	0.9936
JMS	JAMESTOWN RGNL	ND	LPV200	3	0.9946	2	0.9945	5	0.9942
MOT	MINOT INTL	ND	LPV	2	0.9944	4	0.9942	5	0.9936
S25	WATFORD CITY MUNICIPAL	ND	LPV	3	0.9944	3	0.9940	3	0.9937
0V3	PIONEER VILLAGE FIELD	NE	LPV	2	0.9950	2	0.9950	2	0.9947
4V9	ANTELOPE COUNTY	NE	LPV	2	0.9950	2	0.9947	2	0.9945
93Y	DAVID CITY MUNICIPAL	NE	LPV	2	0.9949	2	0.9949	3	0.9948
9V5	MODISETT	NE	LPV	2	0.9947	2	0.9947	2	0.9944
AFK	NEBRASKA CITY MUNICIPAL	NE	LPV	2	0.9950	2	0.9950	3	0.9949
AHQ	WAHOO MUNICIPAL	NE	LPV	2	0.9950	2	0.9949	4	0.9948
AIA	ALLIANCE MUNICIPAL	NE	LPV200	2	0.9947	2	0.9947	2	0.9944
ANW	AINSWORTH RGNL	NE	LPV200	2	0.9948	2	0.9948	2	0.9944
AUH	AURORA MUNICIPAL – AL POTTER FIELD	NE	LPV	2	0.9950	2	0.9950	2	0.9947
BBW	BROKEN BOW MUNICIPAL	NE	LPV	2	0.9948	2	0.9948	3	0.9946
BFF	WESTERN NEB. RGNL/ WILLIAM B. HEILIG FIELD	NE	LPV	2	0.9947	2	0.9947	3	0.9945
BIE	BEATRICE MUNICIPAL	NE	LPV	2	0.9950	2	0.9950	2	0.9948
BVN	ALBION MUNICIPAL	NE	LPV	2	0.9950	2	0.9948	2	0.9945
CDR	CHADRON MUNICIPAL	NE	LPV	2	0.9947	2	0.9947	2	0.9944
CEK	CRETE MUNICIPAL	NE	LPV	2	0.9950	2	0.9950	2	0.9948
CZD	COZAD MUNICIPAL	NE	LPV	2	0.9949	2	0.9949	2	0.9947
EAR	KEARNEY RGNL	NE	LPV	2	0.9950	2	0.9950	2	0.9947
FBY	FAIRBURY MUNICIPAL	NE	LPV	2	0.9950	2	0.9950	2	0.9948
FET	FREMONT MUNICIPAL	NE	LPV	2	0.9949	2	0.9948	4	0.9946
FMZ	FAIRMONT STATE AIRFIELD	NE	LPV	2	0.9950	2	0.9950	2	0.9948
FNB	BRENNER FIELD	NE	LPV	2	0.9950	2	0.9950	3	0.9949
GGF	GRANT MUNICIPAL	NE	LPV	2	0.9949	2	0.9947	4	0.9947
GRI	CENTRAL NEBRASKA RGNL	NE	LPV	2	0.9949	2	0.9949	2	0.9947
GRN	GORDON MUNICIPAL	NE	LPV	2	0.9947	2	0.9947	2	0.9944
HDE	BREWSTER FIELD	NE	LPV	2	0.9950	2	0.9950	2	0.9947
HSI	HASTINGS MUNICIPAL	NE	LPV	2	0.9950	2	0.9950	2	0.9947
IBM	KIMBALL MUNICIPAL/ ROBERT E ARRAJ FIELD	NE	LPV	2	0.9949	2	0.9948	7	0.9944
IML	IMPERIAL MUNICIPAL	NE	LPV	2	0.9950	2	0.9948	7	0.9946
JYR	YORK MUNICIPAL	NE	LPV	2	0.9950	2	0.9950	2	0.9948

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
LBF	NORTH PLATTE RGNL AIRPORT	NE	LPV	2	0.9949	2	0.9947	3	0.9947
LCG	WAYNE MUNICIPAL	NE	LPV	2	0.9948	2	0.9947	4	0.9945
LNK	LINCOLN	NE	LPV	2	0.9950	2	0.9950	3	0.9949
LXN	JIM KELLY FIELD	NE	LPV	2	0.9950	2	0.9950	2	0.9947
MCK	MC COOK BEN NELSON RGNL	NE	LPV	2	0.9950	2	0.9948	2	0.9947
MLE	MILLARD	NE	LPV	2	0.9950	2	0.9949	4	0.9948
ODX	EVELYN SHARP FIELD	NE	LPV	2	0.9948	2	0.9948	2	0.9944
OFK	NORFOLK RGNL/ KARL STEFAN MEMORIAL	NE	LPV	2	0.9948	2	0.9947	2	0.9945
OGA	SEARLE FIELD	NE	LPV	2	0.9949	2	0.9947	3	0.9947
OKS	GARDEN COUNTY	NE	LPV	2	0.9948	2	0.9947	5	0.9945
OLU	COLUMBUS MUNICIPAL	NE	LPV	2	0.9949	2	0.9948	3	0.9946
OMA	EPPLEY AIRFIELD	NE	LPV	2	0.9950	2	0.9949	5	0.9948
ONL	THE O'NEILL MUNICIPAL- JOHN L BAKER	NE	LPV	2	0.9949	2	0.9947	2	0.9944
PMV	PLATTSMOUTH MUNICIPAL	NE	LPV	2	0.9950	2	0.9949	3	0.9949
RBE	ROCK COUNTY	NE	LPV	2	0.9948	3	0.9947	2	0.9944
SNY	SIDNEY MUNICIPAL/ LLOYD W. CARR FIELD	NE	LPV	2	0.9949	2	0.9947	8	0.9943
SWT	SEWARD MUNICIPAL	NE	LPV	2	0.9950	2	0.9950	2	0.9948
TIF	THOMAS COUNTY	NE	LPV	2	0.9948	2	0.9947	2	0.9944
VTN	MILLER FIELD	NE	LPV	2	0.9948	2	0.9948	2	0.9944
ASH	BOIRE FIELD	NH	LPV	2	0.9963	6	0.9959	6	0.9954
CON	CONCORD MUNICIPAL	NH	LPV	2	0.9962	6	0.9959	6	0.9953
DAW	SKYHAVEN	NH	LPV	2	0.9962	6	0.9959	6	0.9954
EEN	DILLANT-HOPKINS	NH	LPV	2	0.9963	6	0.9959	6	0.9954
HIE	MOUNT WASHINGTON RGNL	NH	LPV	2	0.9963	6	0.9959	6	0.9953
LCI	LACONIA MUNICIPAL	NH	LPV	2	0.9962	6	0.9959	6	0.9953
LEB	LEBANON MUNICIPAL	NH	LPV	2	0.9962	6	0.9959	6	0.9954
MHT	MANCHESTER	NH	LPV200	2	0.9963	6	0.9959	6	0.9953
PSM	PORTSMOUTH INTL AT PEASE	NH	LPV200	2	0.9962	6	0.9959	6	0.9954
39N	PRINCETON	NJ	LPV	2	0.9962	5	0.9960	6	0.9956
ACY	ATLANTIC CITY INTL	NJ	LPV200	2	0.9963	5	0.9960	6	0.9957
EWR	NEWARK LIBERTY INTL	NJ	LPV	2	0.9963	5	0.9959	6	0.9955
MIV	MILLVILLE MUNICIPAL	NJ	LPV	2	0.9963	5	0.9960	6	0.9957
TEB	TETERBORO	NJ	LPV	2	0.9963	5	0.9959	6	0.9955
WWD	CAPE MAY COUNTY	NJ	LPV	2	0.9963	5	0.9960	6	0.9957
ABQ	ALBUQUERQUE INTL SUNPORT	NM	LPV	5	0.9977	7	0.9972	14	0.9961
CVN	CLOVIS MUNICIPAL	NM	LPV	4	0.9970	5	0.9965	7	0.9957
DMN	DEMING MUNICIPAL	NM	LPV	2	0.9980	4	0.9979	12	0.9968
FMN	FOUR CORNERS RGNL	NM	LPV200	4	0.9960	4	0.9959	5	0.9949
HOB	LEA COUNTY RGNL	NM	LPV200	3	0.9979	4	0.9972	10	0.9962
ONM	SOCORRO MUNICIPAL	NM	LPV	2	0.9979	3	0.9977	10	0.9966
ROW	ROSWELL INTL AIR CENTER	NM	LPV	4	0.9978	6	0.9973	9	0.9962
SVC	GRANT COUNTY	NM	LPV	1	0.9981	2	0.9980	12	0.9966
LAS	MC CARRAN INTL	NV	LPV	3	0.9976	9	0.9970	15	0.9953
RNO	RENO/TAHOE INTL	NV	LPV	4	0.9966	7	0.9958	85	0.9902
RTS	RENO/STEAD	NV	LPV	3	0.9964	7	0.9958	83	0.9913
WMC	WINNEMUCCA MUNICIPAL	NV	LPV	4	0.9956	4	0.9950	7	0.9943
1B1	COLUMBIA COUNTY	NY	LPV	2	0.9963	6	0.9959	6	0.9955
44N	SKY ACRES	NY	LPV	2	0.9963	5	0.9959	6	0.9955
4B6	TICONDEROGA MUNICIPAL	NY	LPV	2	0.9962	6	0.9960	6	0.9955
5B2	SARATOGA COUNTY	NY	LPV	2	0.9963	6	0.9958	6	0.9955
ALB	ALBANY INTL	NY	LPV	2	0.9963	6	0.9958	6	0.9955
ART	WATERTOWN INTL	NY	LPV	2	0.9962	4	0.9960	8	0.9954

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
BGM	GREATER BINGHAMTON/ EDWIN A LINK FIELD	NY	LPV200	2	0.9962	4	0.9960	9	0.9952
BUF	BUFFALO NIAGARA INTL	NY	LPV	2	0.9961	2	0.9958	6	0.9952
ELZ	WELLSVILLE MUNICIPAL ARPT TARANTINE	NY	LPV	2	0.9961	2	0.9959	6	0.9953
FOK	FRANCIS S GABRESKI	NY	LPV	2	0.9963	5	0.9959	6	0.9955
FRG	REPUBLIC	NY	LPV200	2	0.9963	5	0.9959	6	0.9955
GFL	FLOYD BENNETT MEMORIAL	NY	LPV	2	0.9962	6	0.9958	6	0.9955
GTB	WHEELER-SACK AAF	NY	LPV200	2	0.9962	5	0.9959	8	0.9955
GVQ	GENESEE COUNTY	NY	LPV	2	0.9961	2	0.9960	6	0.9952
HPN	WESTCHESTER COUNTY	NY	LPV	2	0.9963	5	0.9959	6	0.9955
HTO	EAST HAMPTON	NY	LPV	2	0.9963	5	0.9959	6	0.9954
HWV	BROOKHAVEN	NY	LPV	2	0.9963	5	0.9959	6	0.9955
ISP	LONG ISLAND MAC ARTHUR	NY	LPV200	2	0.9963	5	0.9959	6	0.9955
ITH	ITHACA TOMPKINS RGNL	NY	LPV	2	0.9962	4	0.9960	9	0.9952
JFK	JOHN F KENNEDY INTL	NY	LPV	2	0.9963	5	0.9959	6	0.9955
JHW	CHAUTAUQUA COUNTY/ JAMESTOWN	NY	LPV200	2	0.9961	2	0.9958	6	0.9953
LGA	LA GUARDIA	NY	LPV	2	0.9963	5	0.9959	6	0.9955
MGJ	ORANGE COUNTY	NY	LPV	2	0.9963	5	0.9959	6	0.9955
MSS	MASSENA INTL-RICHARDS FIELD	NY	LPV	2	0.9962	6	0.9956	5	0.9952
MSV	SULLIVAN COUNTY INTL	NY	LPV	2	0.9962	5	0.9959	6	0.9955
N66	ONEONTA MUNICIPAL	NY	LPV	2	0.9962	4	0.9959	6	0.9954
NY0	FULTON COUNTY	NY	LPV	2	0.9963	5	0.9958	6	0.9955
OLE	CATTARAUGUS COUNTY-OLEAN	NY	LPV	2	0.9961	2	0.9958	6	0.9953
PBG	PLATTSBURGH INTL	NY	LPV	2	0.9962	6	0.9957	5	0.9952
PEO	PENN YAN	NY	LPV	2	0.9962	3	0.9960	9	0.9951
POU	DUTCHESS COUNTY	NY	LPV	2	0.9963	5	0.9959	6	0.9955
RME	GRIFFISS INTL	NY	LPV200	2	0.9962	4	0.9960	7	0.9954
ROC	GREATER ROCHESTER INTL	NY	LPV200	2	0.9962	2	0.9961	7	0.9952
SDC	WILLIAMSON-SODUS	NY	LPV	2	0.9962	3	0.9961	9	0.9952
SWF	STEWART INTL	NY	LPV200	2	0.9963	5	0.9959	6	0.9955
SYR	SYRACUSE HANCOCK INTL	NY	LPV200	2	0.9962	4	0.9960	7	0.9954
VGC	HAMILTON MUNICIPAL	NY	LPV	2	0.9962	4	0.9960	8	0.9954
16G	SENECA COUNTY	OH	LPV	2	0.9958	2	0.9957	7	0.9953
1G0	WOOD COUNTY	OH	LPV	2	0.9958	2	0.9957	7	0.9952
1G3	KENT STATE UNIV	OH	LPV	2	0.9958	2	0.9958	6	0.9953
AOH	LIMA ALLEN COUNTY	OH	LPV	2	0.9958	2	0.9957	7	0.9953
AXV	NEIL ARMSTRONG	OH	LPV	2	0.9958	2	0.9957	7	0.9953
BJJ	WAYNE COUNTY	OH	LPV	2	0.9958	2	0.9958	6	0.9953
CAK	AKRON-CANTON RGNL	OH	LPV200	2	0.9958	2	0.9958	6	0.9954
CLE	CLEVELAND-HOPKINS INTL	OH	LPV	2	0.9958	2	0.9958	6	0.9952
CMH	PORT COLUMBUS INTL	OH	LPV200	2	0.9959	2	0.9957	6	0.9954
CQA	LAKEFIELD	OH	LPV	2	0.9958	2	0.9957	7	0.9953
CXY	CAPITAL CITY	OH	LPV	2	0.9962	2	0.9959	6	0.9954
DAY	JAMES M COX DAYTON INTL	OH	LPV200	2	0.9959	2	0.9957	7	0.9954
DLZ	DELAWARE MUNICIPAL	OH	LPV	2	0.9959	2	0.9957	7	0.9954
FDY	FINDLAY	OH	LPV	2	0.9958	2	0.9957	7	0.9953
FZI	FOSTORIA METROPOLITAN	OH	LPV	2	0.9958	2	0.9957	7	0.9952
HAO	BUTLER CO RGNL	OH	LPV	2	0.9959	2	0.9957	6	0.9955
HZY	ASHTABULA COUNTY	OH	LPV	3	0.9960	2	0.9958	5	0.9955
I19	GREENE COUNTY- LEWIS A. JACKSON	OH	LPV	2	0.9959	2	0.9957	6	0.9954
I66	CLINTON FIELD	OH	LPV	2	0.9959	2	0.9957	6	0.9955
I74	GRIMES FIELD	OH	LPV	2	0.9959	2	0.9957	7	0.9954
ILN	AIRBORNE AIRPARK	OH	LPV200	2	0.9959	2	0.9957	6	0.9955

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
LCK	RICKENBACKER INTL	OH	LPV200	2	0.9959	2	0.9957	5	0.9954
LHQ	FAIRFIELD COUNTY	OH	LPV	2	0.9959	2	0.9958	5	0.9955
LNN	WILLOUGHBY LOST NATION MUNICIPAL	OH	LPV	2	0.9958	2	0.9958	6	0.9953
LPR	LORAIN COUNTY RGNL	OH	LPV200	2	0.9958	2	0.9958	7	0.9952
LUK	CINCINNATI MUNICIPAL AIRPORT LUNKEN	OH	LPV	2	0.9959	2	0.9957	6	0.9955
MFD	MANSFIELD LAHM RGNL	OH	LPV200	2	0.9958	2	0.9958	7	0.9953
MGY	DAYTON-WRIGHT BROTHERS	OH	LPV	2	0.9959	2	0.9957	6	0.9954
MNN	MARION MUNICIPAL	OH	LPV	2	0.9958	2	0.9957	7	0.9953
OSU	OHIO STATE UNIVERSITY	OH	LPV200	2	0.9959	2	0.9957	6	0.9954
OWX	PUTNAM COUNTY	OH	LPV	2	0.9958	2	0.9957	7	0.9953
PCW	CARL R KELLER FIELD	OH	LPV	2	0.9958	2	0.9957	7	0.9952
PMH	GREATER PORTSMOUTH RGNL	OH	LPV	2	0.9959	2	0.9958	5	0.9955
SGH	SPRINGFIELD-BECKLEY MUNICIPAL	OH	LPV200	2	0.9959	2	0.9957	6	0.9954
TOL	TOLEDO EXPRESS	OH	LPV200	2	0.9958	2	0.9957	7	0.9951
TZR	BOLTON FIELD	OH	LPV200	2	0.9959	2	0.9957	6	0.9954
UNI	OHIO UNIVERSITY SNYDER FIELD	OH	LPV200	2	0.9959	2	0.9958	5	0.9955
UYF	MADISON COUNTY	OH	LPV	2	0.9959	2	0.9957	7	0.9954
YNG	YOUNGSTOWN-WARREN RGNL	OH	LPV	3	0.9959	2	0.9958	5	0.9955
ADH	ADA MUNICIPAL	OK	LPV	2	0.9957	2	0.9956	2	0.9952
AXS	ALTUS/QUARTZ MOUNTAIN RGNL	OK	LPV	4	0.9962	2	0.9957	3	0.9954
BKN	BLACKWELL-TONKAWA MUNICIPAL	OK	LPV	3	0.9953	3	0.9953	3	0.9949
BVO	BARTLESVILLE MUNICIPAL	OK	LPV	3	0.9953	3	0.9953	4	0.9950
CSM	CLINTON-SHERMAN	OK	LPV200	3	0.9959	2	0.9956	3	0.9955
DUA	DURANT RGNL - EAKER FIELD	OK	LPV	3	0.9960	2	0.9957	2	0.9953
DUC	HALLIBURTON FIELD	OK	LPV	3	0.9960	2	0.9957	3	0.9952
ELK	ELK CITY RGNL BUSINESS	OK	LPV	3	0.9959	3	0.9955	3	0.9954
FDR	FREDERICK RGNL	OK	LPV200	5	0.9961	3	0.9957	3	0.9955
GCM	CLAREMORE RGNL	OK	LPV	3	0.9954	3	0.9953	5	0.9950
GMJ	GROVE MUNICIPAL	OK	LPV	3	0.9954	3	0.9951	6	0.9949
GOK	GUTHRIE-EDMOND RGNL	OK	LPV	3	0.9955	3	0.9954	3	0.9951
HBR	HOBART RGNL	OK	LPV	4	0.9961	2	0.9956	3	0.9954
MKO	DAVIS FIELD	OK	LPV	2	0.9956	2	0.9955	4	0.9952
MLC	MC ALESTER RGNL	OK	LPV	2	0.9956	2	0.9955	2	0.9952
OKC	WILL ROGERS WORLD	OK	LPV200	2	0.9956	2	0.9955	3	0.9952
OKM	OKMULGEE RGNL	OK	LPV	2	0.9956	2	0.9955	2	0.9952
OUN	UNIVERSITY OF OKLAHOMA WESTHEIMER	OK	LPV	2	0.9957	2	0.9955	3	0.9952
OWP	WILLIAM R. POGUE MUNICIPAL	OK	LPV	3	0.9954	3	0.9953	3	0.9950
PNC	PONCA CITY RGNL	OK	LPV	3	0.9953	3	0.9953	3	0.9950
PVJ	PAULS VALLEY MUNICIPAL	OK	LPV200	3	0.9959	2	0.9956	2	0.9952
PWA	WILEY POST	OK	LPV200	2	0.9956	2	0.9955	3	0.9952
RCE	CLARENCE E PAGE MUNICIPAL	OK	LPV	2	0.9956	2	0.9955	3	0.9952
RVS	RICHARD LLOYD JONES JR	OK	LPV	3	0.9954	3	0.9953	4	0.9950
SNL	SHAWNEE RGNL	OK	LPV200	2	0.9956	2	0.9955	2	0.9952
SWO	STILLWATER RGNL	OK	LPV	3	0.9954	3	0.9953	3	0.9950
TQH	TAHLEQUAH MUNICIPAL	OK	LPV	2	0.9955	2	0.9953	5	0.9951
TUL	TULSA INTL	OK	LPV200	3	0.9954	3	0.9953	4	0.9950
WDG	ENID WOODRING RGNL	OK	LPV200	3	0.9954	3	0.9953	3	0.9950
WWR	WEST WOODWARD	OK	LPV	3	0.9953	3	0.9953	3	0.9952
AST	ASTORIA RGNL	OR	LPV	3	0.9946	8	0.9944	22	0.9931
BDN	BEND MUNICIPAL	OR	LPV	3	0.9948	3	0.9946	8	0.9938
CVO	CORVALLIS MUNICIPAL	OR	LPV200	2	0.9947	7	0.9944	37	0.9932

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
EUG	MAHLON SWEET FIELD	OR	LPV200	2	0.9947	7	0.9944	43	0.9930
GCD	GRANT CO RGNL/OGILVIE FIELD	OR	LPV	2	0.9946	2	0.9946	7	0.9941
HIO	PORTLAND-HILLSBORO	OR	LPV200	2	0.9946	7	0.9944	15	0.9934
LGD	LA GRANDE/UNION COUNTY	OR	LPV	2	0.9946	2	0.9946	8	0.9940
LMT	KLAMATH FALLS	OR	LPV	4	0.9955	5	0.9946	64	0.9919
MMV	MC MINNVILLE MUNICIPAL	OR	LPV	2	0.9946	7	0.9944	17	0.9933
ONO	ONTARIO MUNICIPAL	OR	LPV	2	0.9947	2	0.9946	6	0.9943
PDT	EASTERN OREGON RGNL AT PENDLET	OR	LPV200	2	0.9946	2	0.9946	8	0.9940
PDX	PORTLAND INTL	OR	LPV200	2	0.9946	7	0.9945	13	0.9935
RDM	ROBERTS FIELD	OR	LPV200	3	0.9948	3	0.9946	8	0.9939
S33	MADRAS MUNICIPAL	OR	LPV	3	0.9948	3	0.9946	9	0.9939
SLE	MCNARY FLD	OR	LPV200	2	0.9946	7	0.9944	18	0.9933
UAO	AURORA STATE	OR	LPV	2	0.9946	7	0.9944	15	0.9934
2G9	SOMERSET COUNTY	PA	LPV	2	0.9962	2	0.9958	8	0.9955
8G2	CORRY-LAWRENCE	PA	LPV	2	0.9961	2	0.9958	6	0.9953
9D4	DECK	PA	LPV	2	0.9962	4	0.9958	6	0.9954
ABE	LEHIGH VALLEY INTL	PA	LPV	2	0.9962	4	0.9959	6	0.9954
AFJ	WASHINGTON COUNTY	PA	LPV	3	0.9961	2	0.9958	5	0.9955
AGC	ALLEGHENY COUNTY	PA	LPV	2	0.9961	2	0.9958	5	0.9955
AOO	ALTOONA-BLAIR COUNTY	PA	LPV	2	0.9961	2	0.9959	5	0.9954
AVP	WILKES-BARRE/SCRANTON INTL	PA	LPV	2	0.9962	4	0.9960	6	0.9953
AXQ	CLARION COUNTY	PA	LPV	2	0.9961	2	0.9958	5	0.9954
BFD	BRADFORD RGNL	PA	LPV200	2	0.9961	2	0.9958	6	0.9954
BTP	BUTLER COUNTY/ K W SCHOLTER FIELD	PA	LPV	2	0.9961	2	0.9958	5	0.9955
DUJ	DUBOIS RGNL	PA	LPV200	2	0.9961	2	0.9958	5	0.9954
ERI	ERIE INTL/TOM RIDGE FIELD	PA	LPV	2	0.9961	2	0.9958	6	0.9953
FKL	VENANGO RGNL	PA	LPV	2	0.9961	2	0.9958	5	0.9955
FWQ	ROSTRAVER	PA	LPV	2	0.9961	2	0.9958	5	0.9955
HMZ	BEDFORD COUNTY	PA	LPV	2	0.9961	2	0.9958	5	0.9955
HZL	HAZLETON MUNICIPAL	PA	LPV	2	0.9962	4	0.9960	6	0.9953
JST	JOHN MURTHA JOHNSTOWN-CAMBRIA	PA	LPV200	2	0.9961	2	0.9958	5	0.9955
LBE	ARNOLD PALMER RGNL	PA	LPV	2	0.9961	2	0.9958	5	0.9955
LNS	LANCASTER	PA	LPV	2	0.9962	4	0.9958	6	0.9954
LOM	WINGS FIELD	PA	LPV	2	0.9962	5	0.9958	6	0.9955
MDT	HARRISBURG INTL	PA	LPV	2	0.9962	4	0.9959	6	0.9954
MPO	POCONO MOUNTAINS MUNICIPAL	PA	LPV	2	0.9962	5	0.9959	6	0.9954
MQS	CHESTER COUNTY G O CARLSON	PA	LPV	2	0.9963	4	0.9958	6	0.9954
OYM	ST MARYS MUNICIPAL	PA	LPV	2	0.9961	2	0.9958	5	0.9954
PHL	PHILADELPHIA INTL	PA	LPV	2	0.9963	5	0.9959	6	0.9955
PIT	PITTSBURGH INTL	PA	LPV200	3	0.9960	2	0.9958	5	0.9955
PNE	NORTHEAST PHILADELPHIA	PA	LPV	2	0.9963	5	0.9960	6	0.9956
RDG	READING RGNL/ CARL A SPAATZ FIELD	PA	LPV	2	0.9962	4	0.9958	6	0.9954
RVL	MIFFLIN COUNTY	PA	LPV	2	0.9961	2	0.9959	5	0.9954
UCP	NEW CASTLE MUNICIPAL	PA	LPV	3	0.9960	2	0.9958	5	0.9955
UNV	UNIVERSITY PARK	PA	LPV200	2	0.9961	2	0.9959	5	0.9954
WAY	GREENE COUNTY	PA	LPV	3	0.9961	2	0.9958	5	0.9955
ZER	SCHUYLKILL COUNTY / JOE ZERBEY	PA	LPV200	2	0.9962	4	0.9959	6	0.9954
BID	BLOCK ISLAND STATE	RI	LPV	2	0.9963	5	0.9959	6	0.9953
OQU	QUONSET STATE	RI	LPV	2	0.9963	6	0.9959	6	0.9953
PVD	THEODORE FRANCIS GREEN STATE	RI	LPV	2	0.9963	6	0.9959	6	0.9953
AIK	AIKEN MUNICIPAL	SC	LPV	2	0.9961	2	0.9961	6	0.9954

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
AND	ANDERSON RGNL	SC	LPV200	2	0.9961	2	0.9961	8	0.9954
ARW	BEAUFORT COUNTY	SC	LPV200	2	0.9961	2	0.9960	6	0.9951
BBP	MARLBORO COUNTY JETPORT	SC	LPV	3	0.9965	3	0.9961	5	0.9956
BNL	BARNWELL RGNL	SC	LPV	2	0.9961	2	0.9961	6	0.9953
CAE	COLUMBIA METROPOLITAN	SC	LPV200	2	0.9961	2	0.9960	7	0.9954
CDN	WOODWARD FIELD	SC	LPV	2	0.9961	2	0.9960	6	0.9955
CEU	OCONEE COUNTY RGNL	SC	LPV	2	0.9961	2	0.9961	8	0.9955
CHS	CHARLESTON AFB/INTL	SC	LPV200	3	0.9962	3	0.9962	7	0.9952
CRE	GRAND STRAND	SC	LPV200	2	0.9965	3	0.9961	5	0.9954
DCM	CHESTER CATAWBA RGNL	SC	LPV	2	0.9961	2	0.9960	6	0.9954
DYB	SUMMERVILLE	SC	LPV200	3	0.9962	2	0.9960	7	0.9953
FLO	FLORENCE RGNL	SC	LPV	3	0.9965	3	0.9961	5	0.9954
GGE	GEORGETOWN COUNTY	SC	LPV200	3	0.9964	3	0.9961	7	0.9953
GMU	GREENVILLE DOWNTOWN	SC	LPV200	2	0.9961	2	0.9961	6	0.9955
GSP	GREENVILLE SPARTANBURG INTL	SC	LPV200	2	0.9961	2	0.9960	6	0.9955
GYH	DONALDSON CENTER	SC	LPV	2	0.9961	2	0.9961	6	0.9955
JZI	CHARLESTON EXECUTIVE	SC	LPV200	3	0.9962	3	0.9962	7	0.9952
LKR	LANCASTER COUNTY-MC WHIRTER FIELD	SC	LPV200	2	0.9961	2	0.9960	5	0.9956
LQK	PICKENS COUNTY	SC	LPV	2	0.9961	2	0.9961	7	0.9955
LRO	MT PLEASANT RGNL-FAISON FIELD	SC	LPV	3	0.9962	3	0.9962	7	0.9952
MKS	BERKELEY COUNTY	SC	LPV	3	0.9962	3	0.9962	7	0.9953
MYR	MYRTLE BEACH INTL	SC	LPV200	2	0.9965	3	0.9961	5	0.9954
OGB	ORANGEBURG MUNICIPAL	SC	LPV200	2	0.9961	2	0.9960	7	0.9953
RBW	LOWCOUNTRY RGNL	SC	LPV200	2	0.9961	2	0.9960	7	0.9953
SMS	SUMTER	SC	LPV200	3	0.9963	2	0.9960	7	0.9954
UDG	DARLINGTON COUNTY JETPORT	SC	LPV	3	0.9965	3	0.9961	5	0.9956
ABR	ABERDEEN RGNL	SD	LPV200	2	0.9948	3	0.9947	4	0.9943
ATY	WATERTOWN RGNL	SD	LPV200	3	0.9950	3	0.9949	5	0.9942
BKX	BROOKINGS RGNL	SD	LPV	2	0.9949	2	0.9948	5	0.9945
HON	HURON RGNL	SD	LPV200	2	0.9948	2	0.9948	4	0.9945
ICR	WINNER RGNL	SD	LPV	2	0.9948	2	0.9946	2	0.9945
MHE	MITCHELL MUNICIPAL	SD	LPV	2	0.9949	2	0.9946	4	0.9945
PIR	PIERRE RGNL	SD	LPV	2	0.9948	2	0.9947	2	0.9946
RAP	RAPID CITY RGNL	SD	LPV200	2	0.9948	3	0.9947	2	0.9945
VMR	HAROLD DAVIDSON FIELD	SD	LPV	2	0.9948	2	0.9947	4	0.9944
YKN	CHAN GURNEY MUNICIPAL	SD	LPV	2	0.9948	2	0.9946	4	0.9945
0M4	BENTON COUNTY	TN	LPV	2	0.9955	2	0.9955	6	0.9951
3M7	LAFAYETTE MUNICIPAL	TN	LPV	2	0.9961	2	0.9960	6	0.9950
BGF	WINCHESTER MUNICIPAL	TN	LPV	3	0.9959	3	0.9957	7	0.9952
BNA	NASHVILLE INTL	TN	LPV200	3	0.9959	3	0.9957	8	0.9952
CHA	LOVELL FIELD	TN	LPV200	3	0.9959	3	0.9959	8	0.9953
CKV	OUTLAW FIELD	TN	LPV	3	0.9956	2	0.9955	7	0.9950
CSV	CROSSVILLE MEMORIAL-WHITSON FIELD	TN	LPV200	2	0.9961	2	0.9961	8	0.9951
DKX	KNOXVILLE DOWNTOWN ISLAND	TN	LPV	2	0.9961	2	0.9959	8	0.9954
FYM	FAYETTEVILLE MUNICIPAL	TN	LPV	3	0.9958	3	0.9956	6	0.9952
GKT	GATLINBURG-PIGEON FORGE	TN	LPV	2	0.9961	2	0.9959	7	0.9954
HZD	CARROLL COUNTY	TN	LPV	2	0.9955	2	0.9955	6	0.9951
LUG	ELLINGTON	TN	LPV	3	0.9958	3	0.9956	6	0.9952
M54	LEBANON MUNICIPAL	TN	LPV	3	0.9959	3	0.9959	8	0.9952
MBT	MURFREESBORO MUNICIPAL	TN	LPV	3	0.9959	3	0.9957	8	0.9953
MEM	MEMPHIS INTL	TN	LPV200	2	0.9955	2	0.9953	6	0.9951
MKL	MC KELLAR-SIPES RGNL	TN	LPV200	2	0.9955	2	0.9954	6	0.9951

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
MMI	MCMINN COUNTY	TN	LPV	2	0.9961	2	0.9961	8	0.9951
MQY	SMYRNA	TN	LPV	3	0.9959	3	0.9957	8	0.9952
MRC	MAURY COUNTY	TN	LPV	2	0.9955	2	0.9955	6	0.9951
NQA	MILLINGTON RGNL JETPORT	TN	LPV	2	0.9955	2	0.9953	6	0.9951
PHT	HENRY COUNTY	TN	LPV200	2	0.9955	2	0.9955	6	0.9951
PVE	BEECH RIVER RGNL	TN	LPV	2	0.9955	2	0.9955	6	0.9951
SNH	SAVANNAH-HARDIN COUNTY	TN	LPV	2	0.9955	2	0.9955	6	0.9951
SRB	UPPER CUMBERLAND RGNL	TN	LPV200	3	0.9960	3	0.9960	8	0.9951
SYI	BOMAR FIELD- SHELBYVILLE MUNICIPAL	TN	LPV	3	0.9959	3	0.9957	7	0.9952
SZY	ROBERT SIBLEY	TN	LPV	2	0.9955	2	0.9955	6	0.9951
TYS	MC GHEE TYSON	TN	LPV	2	0.9961	2	0.9959	8	0.9952
UCY	EVERETT-STEWART RGNL	TN	LPV	2	0.9955	2	0.9955	6	0.9951
11R	BRENHAM MUNICIPAL	TX	LPV	4	0.9977	5	0.9977	8	0.9957
5T9	MAVERICK COUNTY MEMORIAL INTL	TX	LPV	3	0.9974	4	0.9973	8	0.9967
ABI	ABILENE RGNL	TX	LPV200	5	0.9974	5	0.9971	9	0.9962
ACT	WACO RGNL	TX	LPV200	5	0.9973	6	0.9969	5	0.9956
ADS	ADDISON	TX	LPV	4	0.9965	4	0.9960	3	0.9954
ALI	ALICE INTL	TX	LPV	2	0.9970	4	0.9969	9	0.9951
AMA	RICK HUSBAND AMARILLO INTL	TX	LPV200	5	0.9963	5	0.9959	6	0.9954
ARM	WHARTON RGNL	TX	LPV	4	0.9973	5	0.9971	11	0.9960
AXH	HOUSTON-SOUTHWEST	TX	LPV	5	0.9975	6	0.9974	12	0.9958
BAZ	NEW BRAUNFELS MUNICIPAL	TX	LPV	5	0.9975	5	0.9974	10	0.9966
BBD	CURTIS FIELD	TX	LPV	3	0.9977	4	0.9974	9	0.9966
BPG	BIG SPRING MC MAHON-WRINKLE	TX	LPV	4	0.9976	5	0.9972	9	0.9966
BPT	JACK BROOKS RGNL	TX	LPV200	2	0.9969	4	0.9967	7	0.9954
BWD	BROWNWOOD RGNL	TX	LPV	4	0.9974	4	0.9971	7	0.9960
CFD	COULTER FIELD	TX	LPV	5	0.9975	7	0.9970	7	0.9955
CRP	CORPUS CHRISTI INTL	TX	LPV200	2	0.9970	4	0.9968	11	0.9955
CXO	LONE STAR EXECUTIVE	TX	LPV200	4	0.9973	6	0.9971	9	0.9956
DAL	DALLAS LOVE FIELD	TX	LPV	4	0.9966	4	0.9961	3	0.9954
DFW	DALLAS/FORT WORTH INTL	TX	LPV200	4	0.9966	4	0.9961	4	0.9954
DRT	DEL RIO INTL	TX	LPV	3	0.9974	4	0.9972	9	0.9968
DTO	DENTON MUNICIPAL	TX	LPV	4	0.9965	4	0.9960	3	0.9954
DUX	MOORE COUNTY	TX	LPV200	3	0.9958	4	0.9954	7	0.9952
DWH	DAVID WAYNE HOOKS MEMORIAL	TX	LPV	3	0.9976	3	0.9974	10	0.9957
E11	ANDREWS COUNTY	TX	LPV	4	0.9977	4	0.9971	9	0.9965
E30	BRUCE FIELD	TX	LPV	4	0.9977	5	0.9974	8	0.9966
EBG	SOUTH TEXAS INTL AT EDINBURG	TX	LPV	3	0.9966	5	0.9963	11	0.9947
EDC	AUSTIN EXECUTIVE	TX	LPV200	4	0.9976	5	0.9975	11	0.9960
EFD	ELLINGTON FIELD	TX	LPV	5	0.9976	5	0.9973	11	0.9956
ERV	KERRVILLE MUNICIPAL/ LOUIS SCHREINER	TX	LPV	3	0.9976	3	0.9975	9	0.9970
F05	WILBARGER COUNTY	TX	LPV	5	0.9963	4	0.9958	5	0.9955
FST	FORT STOCKTON- PECOS COUNTY	TX	LPV	2	0.9976	3	0.9974	8	0.9965
FTW	FORT WORTH MEACHAM INTL	TX	LPV200	4	0.9966	5	0.9961	4	0.9955
FWS	FORT WORTH SPINKS	TX	LPV	5	0.9969	5	0.9962	4	0.9955
GDJ	GRANBURY RGNL	TX	LPV	5	0.9970	6	0.9966	5	0.9956
GGG	EAST TEXAS RGNL	TX	LPV	2	0.9961	2	0.9958	5	0.9955
GKY	ARLINGTON MUNICIPAL	TX	LPV200	3	0.9967	4	0.9962	5	0.9955
GLE	GAINESVILLE MUNICIPAL	TX	LPV	3	0.9962	2	0.9957	3	0.9953
GLS	SCHOLES INTL AT GALVESTON	TX	LPV	6	0.9972	6	0.9970	12	0.9955
GNC	GAINES COUNTY	TX	LPV	4	0.9976	4	0.9971	9	0.9962
GRK	ROBERT GRAY AAF	TX	LPV200	3	0.9977	6	0.9974	5	0.9958

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
GVT	MAJORS	TX	LPV	3	0.9963	2	0.9957	3	0.9954
HBV	JIM HOGG COUNTY	TX	LPV	3	0.9967	4	0.9964	9	0.9950
HDO	HONDO MUNICIPAL	TX	LPV	4	0.9974	4	0.9973	7	0.9968
HOU	WILLIAM P HOBBY	TX	LPV	5	0.9976	5	0.9974	10	0.9956
HQZ	MESQUITE METRO	TX	LPV	3	0.9964	3	0.9959	3	0.9954
HRX	HEREFORD MUNICIPAL	TX	LPV200	5	0.9967	5	0.9964	5	0.9955
IAH	GEORGE BUSH INTERCONTINENTAL	TX	LPV	4	0.9976	3	0.9974	10	0.9956
IKG	KLEBERG COUNTY	TX	LPV	2	0.9970	5	0.9968	10	0.9951
INJ	HILLSBORO MUNICIPAL	TX	LPV	5	0.9969	6	0.9965	5	0.9956
JAS	JASPER COUNTY-BELL FIELD	TX	LPV	4	0.9966	3	0.9961	6	0.9956
JWY	MID-WAY RGNL	TX	LPV200	3	0.9967	4	0.9962	5	0.9955
LBB	LUBBOCK PRESTON SMITH INTL	TX	LPV200	4	0.9969	6	0.9966	7	0.9958
LBX	TEXAS GULF COAST RGNL	TX	LPV	5	0.9973	7	0.9972	11	0.9956
LFK	ANGELINA COUNTY	TX	LPV	5	0.9968	4	0.9962	8	0.9957
LLN	LEVELLAND MUNICIPAL	TX	LPV	5	0.9971	7	0.9968	7	0.9960
LNC	LANCASTER RGNL	TX	LPV200	3	0.9966	4	0.9962	5	0.9955
LRD	LAREDO INTL	TX	LPV	3	0.9970	4	0.9966	8	0.9955
LUD	DECATUR MUNICIPAL	TX	LPV	4	0.9965	4	0.9961	4	0.9954
MAF	MIDLAND INTL	TX	LPV	4	0.9977	5	0.9974	8	0.9966
MFE	MC ALLEN MILLER INTL	TX	LPV	3	0.9966	5	0.9963	12	0.9946
ODO	ODESSA-SCHLEMEYER FIELD	TX	LPV200	4	0.9978	5	0.9973	8	0.9966
ORG	ORANGE COUNTY	TX	LPV	3	0.9968	4	0.9966	7	0.9954
PIL	PORT ISABEL- CAMERON COUNTY	TX	LPV	3	0.9966	4	0.9961	13	0.9946
PRX	COX FIELD	TX	LPV	3	0.9958	2	0.9955	2	0.9954
PVW	HALE COUNTY	TX	LPV	4	0.9968	5	0.9965	7	0.9959
RAS	MUSTANG BEACH	TX	LPV	2	0.9971	3	0.9967	10	0.9955
RBD	DALLAS EXECUTIVE	TX	LPV	3	0.9966	4	0.9961	5	0.9955
RKP	ARANSAS CO	TX	LPV	2	0.9971	4	0.9968	9	0.9956
SAT	SAN ANTONIO INTL	TX	LPV200	5	0.9975	5	0.9974	9	0.9967
SGR	SUGAR LAND RGNL	TX	LPV	5	0.9976	6	0.9976	11	0.9960
SJT	SAN ANGELO RGNL/ MATHIS FIELD	TX	LPV	3	0.9977	4	0.9974	7	0.9968
TFP	T P MC CAMPBELL	TX	LPV	2	0.9971	4	0.9969	9	0.9956
TKI	COLLIN COUNTY RGNL AT MC KINNEY	TX	LPV200	3	0.9963	2	0.9957	3	0.9953
TME	HOUSTON EXECUTIVE	TX	LPV	5	0.9977	6	0.9976	11	0.9960
TPL	DRAUGHON-MILLER CENTRAL TEXAS	TX	LPV200	4	0.9976	6	0.9972	4	0.9956
TRL	TERRELL MUNICIPAL	TX	LPV	3	0.9964	3	0.9959	3	0.9954
TYR	TYLER POUNDS RGNL	TX	LPV	3	0.9964	2	0.9958	2	0.9956
UTS	HUNTSVILLE MUNICIPAL	TX	LPV	4	0.9972	6	0.9969	8	0.9956
VCT	VICTORIA RGNL	TX	LPV	4	0.9974	4	0.9971	8	0.9959
XBP	BRIDGEPORT MUNICIPAL	TX	LPV	5	0.9966	5	0.9961	5	0.9955
BCE	BRYCE CANYON	UT	LPV	5	0.9964	6	0.9957	6	0.9948
DXZ	ST GEORGE MUNICIPAL	UT	LPV	3	0.9969	6	0.9961	10	0.9950
FOM	FILLMORE MUNICIPAL	UT	LPV	4	0.9958	5	0.9954	6	0.9947
LGU	LOGAN-CACHE	UT	LPV	2	0.9950	3	0.9950	4	0.9945
OGD	OGDEN-HINCKLEY	UT	LPV	2	0.9951	2	0.9951	4	0.9946
PVU	PROVO MUNICIPAL	UT	LPV	3	0.9952	4	0.9951	4	0.9946
0VG	LEE COUNTY	VA	LPV	2	0.9960	2	0.9959	6	0.9956
AVC	MECKLENBURG- BRUNSWICK RGNL	VA	LPV	2	0.9963	3	0.9960	13	0.9955
BCB	VIRGINIA TECH/ MONTGOMERY EXECUTIVE	VA	LPV	3	0.9961	2	0.9959	5	0.9956
CHO	CHARLOTTESVILLE-ALBEMARLE	VA	LPV	2	0.9963	2	0.9959	7	0.9955
CJR	CULPEPER RGNL	VA	LPV	2	0.9963	3	0.9959	8	0.9954

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
DAN	DANVILLE RGNL	VA	LPV200	2	0.9963	3	0.9959	5	0.9955
FCI	CHESTERFIELD COUNTY	VA	LPV	2	0.9963	4	0.9959	20	0.9953
FVX	FARMVILLE RGNL	VA	LPV	2	0.9963	3	0.9959	6	0.9955
FYJ	MIDDLE PENINSULA RGNL	VA	LPV	2	0.9963	4	0.9959	27	0.9953
HEF	MANASSAS RGNL/ HARRY P. DAVIS FIELD	VA	LPV	2	0.9963	3	0.9959	8	0.9955
HSP	INGALLS FIELD	VA	LPV	2	0.9962	2	0.9959	5	0.9956
IAD	WASHINGTON DULLES INTL	VA	LPV200	2	0.9963	4	0.9959	5	0.9955
JYO	LEESBURG EXECUTIVE	VA	LPV	2	0.9963	2	0.9959	5	0.9955
LKU	LOUISA COUNTY/ FREEMAN FIELD	VA	LPV	2	0.9963	3	0.9959	8	0.9955
LNP	LONESOME PINE	VA	LPV	3	0.9960	2	0.9959	5	0.9956
LYH	LYNCHBURG RGNL/ PRESTON GLENN FIELD	VA	LPV	2	0.9963	3	0.9959	5	0.9956
MFV	ACCOMACK COUNTY	VA	LPV	2	0.9963	4	0.9961	7	0.9956
MKJ	MOUNTAIN EMPIRE	VA	LPV	3	0.9961	2	0.9959	5	0.9957
MTV	BLUE RIDGE	VA	LPV	3	0.9962	2	0.9959	5	0.9956
OFP	HANOVER COUNTY MUNICIPAL	VA	LPV	2	0.9963	4	0.9959	20	0.9953
OKV	WINCHESTER RGNL	VA	LPV200	2	0.9962	2	0.9959	8	0.9954
PHF	NEWPORT NEWS/ WILLIAMSBURG INTL	VA	LPV200	2	0.9963	5	0.9961	35	0.9950
PSK	NEW RIVER VALLEY	VA	LPV	3	0.9961	2	0.9959	5	0.9956
PTB	DINWIDDIE COUNTY	VA	LPV	2	0.9963	4	0.9959	20	0.9953
RIC	RICHMOND INTL	VA	LPV200	2	0.9963	4	0.9959	22	0.9952
RMN	STAFFORD RGNL	VA	LPV	2	0.9963	4	0.9959	8	0.9955
SHD	SHENANDOAH VALLEY RGNL	VA	LPV200	2	0.9962	2	0.9959	5	0.9956
VJI	VIRGINIA HIGHLANDS	VA	LPV	3	0.9961	2	0.9959	5	0.9956
W78	WILLIAM M TUCK	VA	LPV	2	0.9963	3	0.9959	5	0.9955
XSA	TAPPAHANNOCK- ESSEX COUNTY	VA	LPV	2	0.9963	4	0.9959	8	0.9955
FSO	FRANKLIN COUNTY STATE	VT	LPV	2	0.9962	6	0.9957	5	0.9952
MPV	EDWARD F KNAPP STATE	VT	LPV	2	0.9962	6	0.9959	6	0.9954
ALW	WALLA WALLA RGNL	WA	LPV	2	0.9946	3	0.9946	8	0.9939
BLI	BELLINGHAM INTL	WA	LPV	3	0.9942	3	0.9940	7	0.9939
BVS	SKAGIT RGNL	WA	LPV	3	0.9942	3	0.9940	7	0.9938
CLM	WILLIAM R FAIRCHILD INTL	WA	LPV	3	0.9942	5	0.9940	10	0.9937
DEW	DEER PARK	WA	LPV	2	0.9945	3	0.9941	7	0.9940
EPH	EPHRATA MUNICIPAL	WA	LPV	2	0.9944	3	0.9942	9	0.9940
FHR	FRIDAY HARBOR	WA	LPV	3	0.9942	4	0.9940	8	0.9938
GEG	SPOKANE INTL	WA	LPV200	2	0.9945	3	0.9943	7	0.9940
HQM	BOWERMAN	WA	LPV200	3	0.9944	7	0.9940	21	0.9934
MWH	GRANT CO INTL	WA	LPV200	2	0.9944	3	0.9943	8	0.9938
OLM	OLYMPIA RGNL	WA	LPV	3	0.9945	7	0.9941	10	0.9936
OTH	SOUTHWEST OREGON RGNL	WA	LPV	3	0.9950	6	0.9944	121	0.9881
PAE	SNOHOMISH COUNTY (PAINE FLD)	WA	LPV	3	0.9943	5	0.9941	10	0.9938
PSC	TRI-CITIES	WA	LPV200	2	0.9946	2	0.9946	8	0.9936
PUW	PULLMAN/MOSCOW RGNL	WA	LPV	2	0.9946	3	0.9945	7	0.9940
PWT	BREMERTON NATIONAL	WA	LPV	3	0.9943	6	0.9941	10	0.9937
RLD	RICHLAND	WA	LPV	2	0.9946	2	0.9946	8	0.9937
RNT	RENTON MUNICIPAL	WA	LPV	3	0.9944	5	0.9941	10	0.9938
SEA	SEATTLE-TACOMA INTL	WA	LPV200	3	0.9944	5	0.9941	10	0.9937
TDO	ED CARLSON MEMORIAL FIELD	WA	LPV	2	0.9946	8	0.9944	9	0.9935
TIW	TACOMA NARROWS	WA	LPV	3	0.9943	6	0.9941	10	0.9937
YKM	YAKIMA AIR TERMINAL MCALLISTER	WA	LPV	2	0.9946	2	0.9945	8	0.9937

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
ARV	LAKELAND/ NOBLE F. LEE MEMORIAL	WI	LPV	2	0.9949	2	0.9949	6	0.9944
ASX	JOHN F KENNEDY MEMORIAL	WI	LPV	2	0.9949	2	0.9949	6	0.9942
ATW	OUTAGAMIE COUNTY RGNL	WI	LPV200	2	0.9949	2	0.9949	6	0.9945
C29	MIDDLETON MUNICIPAL – MOREY FIELD	WI	LPV	2	0.9954	4	0.9953	6	0.9947
CLI	CLINTONVILLE MUNICIPAL	WI	LPV	2	0.9949	2	0.9949	6	0.9945
DLL	BARABOO WISCONSIN DELLS	WI	LPV	2	0.9953	3	0.9951	7	0.9946
EAU	CHIPPEWA VALLEY RGNL	WI	LPV200	2	0.9949	2	0.9949	7	0.9945
EGV	EAGLE RIVER UNION	WI	LPV	2	0.9949	2	0.9949	6	0.9944
ENW	KENOSHA RGNL	WI	LPV200	2	0.9954	3	0.9954	6	0.9946
ETB	WEST BEND MUNICIPAL	WI	LPV	2	0.9954	2	0.9954	7	0.9945
FLD	FOND DU LAC COUNTY	WI	LPV	2	0.9953	3	0.9953	7	0.9945
GRB	AUSTIN STRAUBEL INTL	WI	LPV200	2	0.9949	2	0.9949	6	0.9946
HYR	SAWYER COUNTY	WI	LPV	2	0.9949	2	0.9948	7	0.9944
JVL	SOUTHERN WISCONSIN RGNL	WI	LPV200	2	0.9954	3	0.9953	6	0.9947
LNR	TRI-COUNTY RGNL	WI	LPV	3	0.9953	3	0.9951	6	0.9947
LSE	LA CROSSE MUNICIPAL	WI	LPV	3	0.9952	3	0.9950	6	0.9943
LUM	MENOMONIE MUNICIPAL- SCORE FIELD	WI	LPV	3	0.9951	3	0.9950	7	0.9946
MDZ	TAYLOR COUNTY	WI	LPV	2	0.9949	2	0.9948	6	0.9944
MFI	MARSHFIELD MUNICIPAL	WI	LPV	2	0.9949	2	0.9949	7	0.9945
MKE	GENERAL MITCHELL INTL	WI	LPV200	2	0.9954	2	0.9954	6	0.9946
MTW	MANITOWOC COUNTY	WI	LPV200	3	0.9952	3	0.9952	6	0.9946
OSH	WITTMAN RGNL	WI	LPV	3	0.9952	3	0.9951	7	0.9944
OVS	BOSCOBEL	WI	LPV	3	0.9952	2	0.9949	7	0.9946
PBH	PRICE COUNTY	WI	LPV	2	0.9949	2	0.9949	6	0.9944
PVB	PLATTEVILLE MUNICIPAL	WI	LPV	3	0.9953	2	0.9950	6	0.9944
RAC	JOHN H BATTEN	WI	LPV	2	0.9954	2	0.9954	7	0.9947
RHI	RHINELANDER-ONEIDA COUNTY	WI	LPV200	2	0.9949	2	0.9949	6	0.9945
RPD	RICE LAKE RGNL - CARL'S FIELD	WI	LPV	2	0.9949	2	0.9948	7	0.9946
RRL	MERRILL MUNICIPAL	WI	LPV	2	0.9949	2	0.9948	6	0.9945
SBM	SHEBOYGAN COUNTY MEMORIAL	WI	LPV	2	0.9954	3	0.9954	7	0.9945
STE	STEVENS POINT MUNICIPAL	WI	LPV200	2	0.9949	2	0.9949	6	0.9945
SUE	DOOR COUNTY CHERRYLAND	WI	LPV	2	0.9950	2	0.9950	6	0.9945
TKV	TOMAHAWK RGNL	WI	LPV	2	0.9949	2	0.9949	6	0.9944
UES	WAUKESHA COUNTY	WI	LPV200	2	0.9954	3	0.9953	6	0.9947
UNU	DODGE COUNTY	WI	LPV	2	0.9954	3	0.9953	7	0.9946
3I2	MASON COUNTY	WV	LPV	2	0.9959	2	0.9958	5	0.9955
BKW	RALEIGH COUNTY MEMORIAL	WV	LPV200	3	0.9961	2	0.9959	5	0.9956
BLF	MERCER COUNTY	WV	LPV	3	0.9961	2	0.9959	5	0.9956
CKB	NORTH CENTRAL WEST VIRGINIA	WV	LPV200	3	0.9962	2	0.9958	5	0.9955
CRW	YEAGER	WV	LPV200	3	0.9960	2	0.9958	5	0.9956
HLG	WHEELING OHIO CO	WV	LPV200	3	0.9960	2	0.9958	5	0.9955
HTS	TRI-STATE/ MILTON J. FERGUSON FIELD	WV	LPV	2	0.9959	2	0.9959	5	0.9956
LWB	GREENBRIER VALLEY	WV	LPV	2	0.9962	2	0.9959	5	0.9956
MGW	MORGANTOWN MUNICIPAL-WALTER L. BILL	WV	LPV200	2	0.9962	2	0.9958	5	0.9955
MRB	EASTERN WV RGNL/ SHEPHERD FLD	WV	LPV	2	0.9962	2	0.9959	5	0.9955
PKB	MID-OHIO VALLEY RGNL	WV	LPV	2	0.9959	2	0.9958	5	0.9955
COD	YELLOWSTONE RGNL	WY	LPV	2	0.9947	2	0.9947	3	0.9946
CPR	CASPER/NATRONA COUNTY INTL	WY	LPV	2	0.9948	2	0.9948	2	0.9946
CYS	CHEYENNE RGNL/ JERRY OLSON FIELD	WY	LPV	2	0.9949	2	0.9948	2	0.9946
DGW	CONVERSE COUNTY	WY	LPV200	2	0.9947	2	0.9947	2	0.9946

Airport Id	Airport Name	State	Service	LP Outages	LP Avail	LPV Outages	LPV Avail	LPV 200 Outages	LPV 200 Avail
EVW	EVANSTON-UINTA COUNTY BURNS FIELD	WY	LPV	2	0.9950	2	0.9950	4	0.9945
GCC	GILLETTE-CAMPBELL COUNTY	WY	LPV	2	0.9948	3	0.9947	4	0.9946
JAC	JACKSON HOLE	WY	LPV	2	0.9948	2	0.9948	5	0.9945
LAR	LARAMIE RGNL	WY	LPV	2	0.9949	2	0.9949	2	0.9946
RIW	RIVERTON RGNL	WY	LPV200	2	0.9948	2	0.9947	2	0.9947
RKS	ROCK SPRINGS-SWEETWATER COUNTY	WY	LPV200	2	0.9949	2	0.9949	3	0.9947
RWL	RAWLINS MUNICIPAL/ HARVEY FIELD	WY	LPV	2	0.9949	2	0.9948	3	0.9946
SHR	SHERIDAN COUNTY	WY	LPV	2	0.9948	3	0.9948	4	0.9945

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

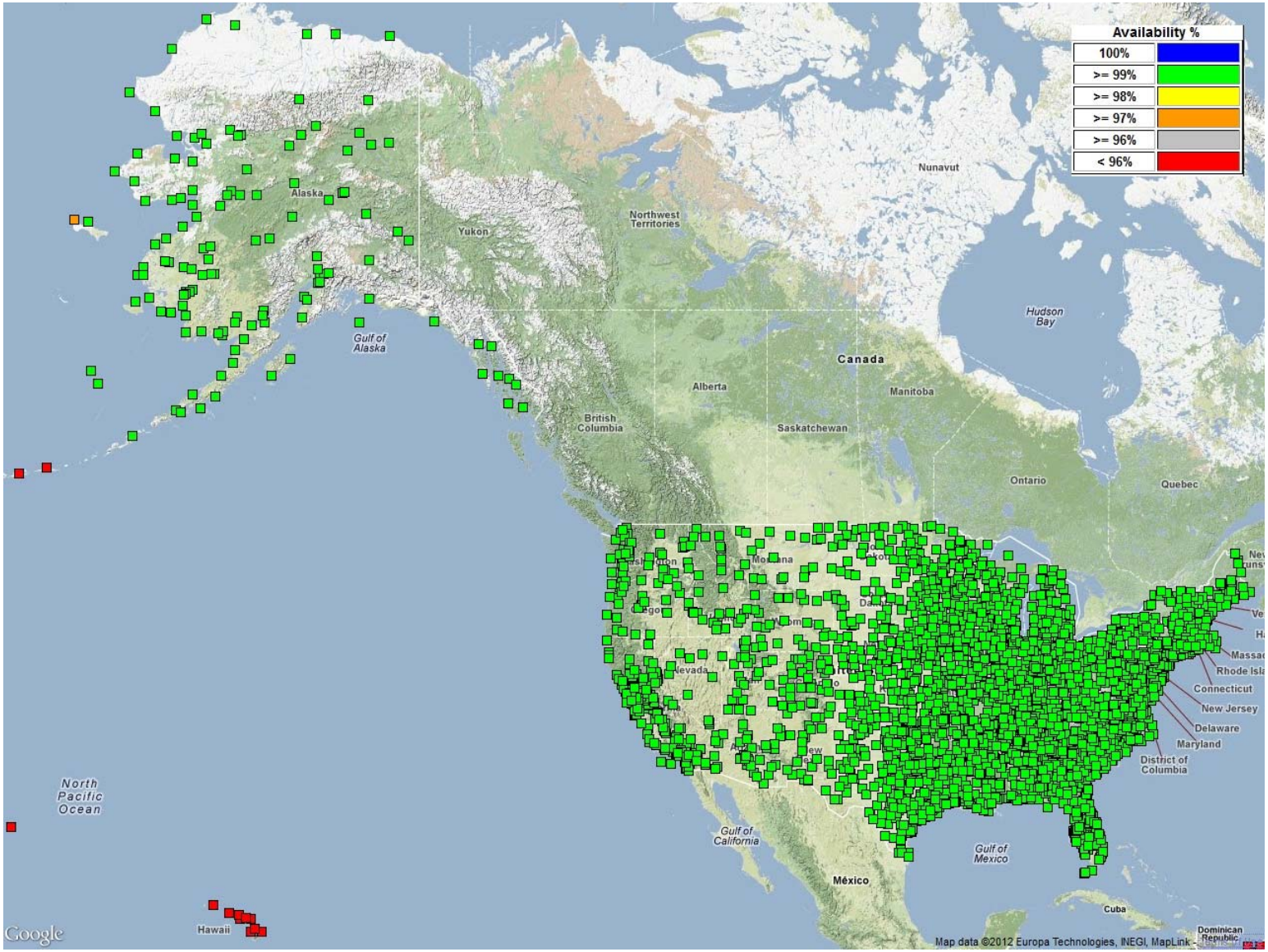


Figure 8-2 WAAS LP Outages at US Airports with GPS RNAV Instrument Approach Procedures

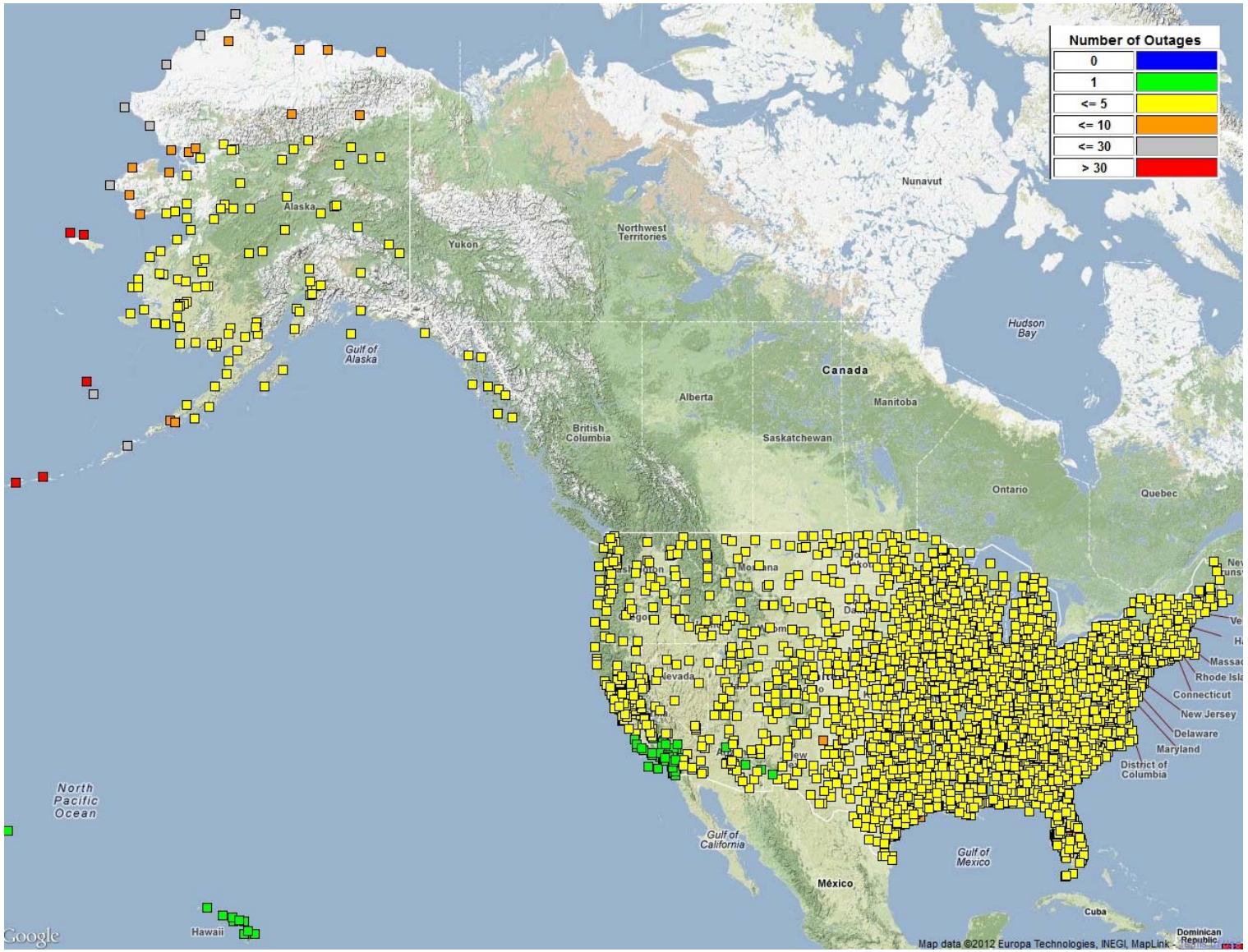


Figure 8-3 WAAS LPV Availability at US Airports with GPS RNAV Instrument Approach Procedures

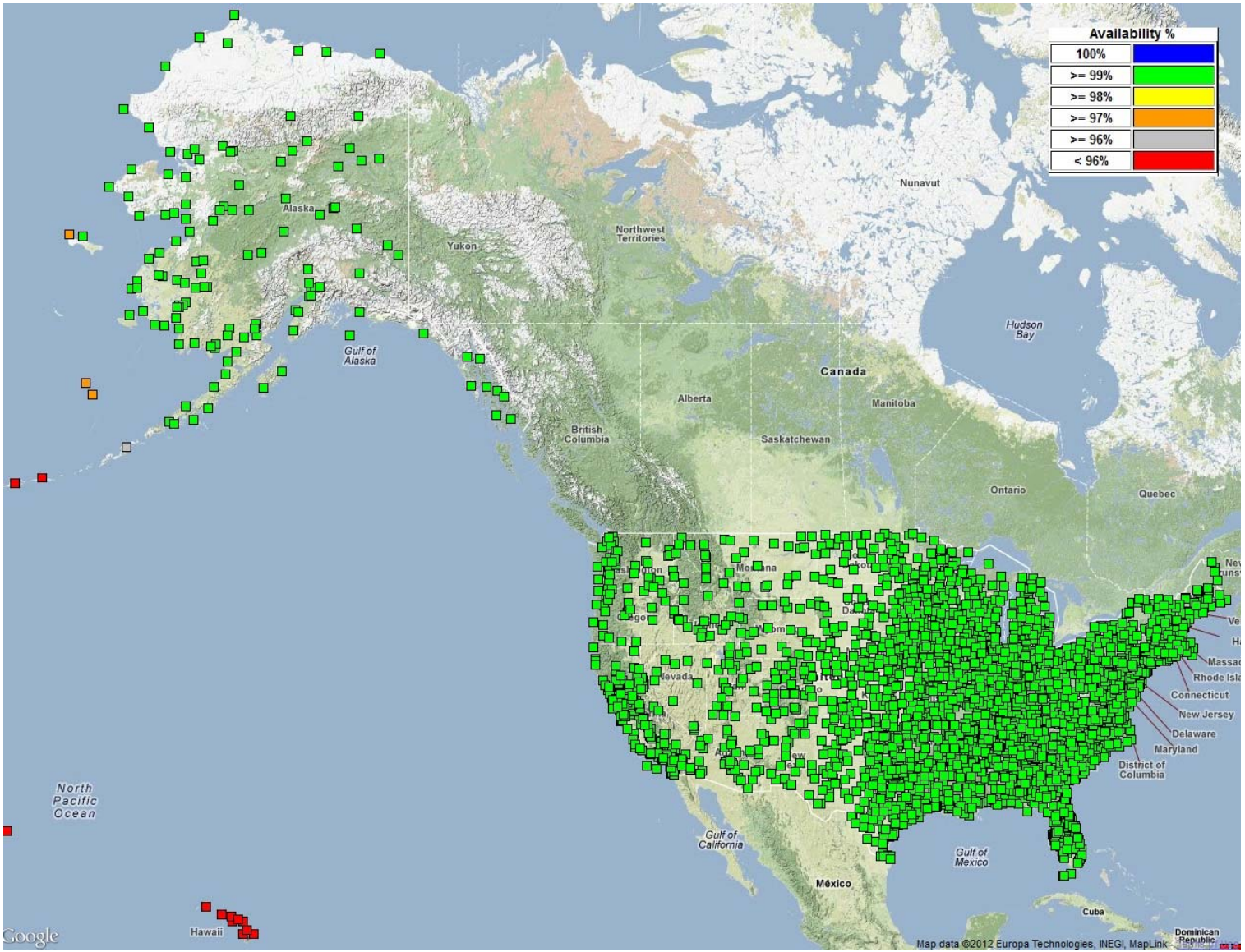


Figure 8-4 WAAS LPV Outages at US Airports with GPS RNAV Instrument Approach Procedures

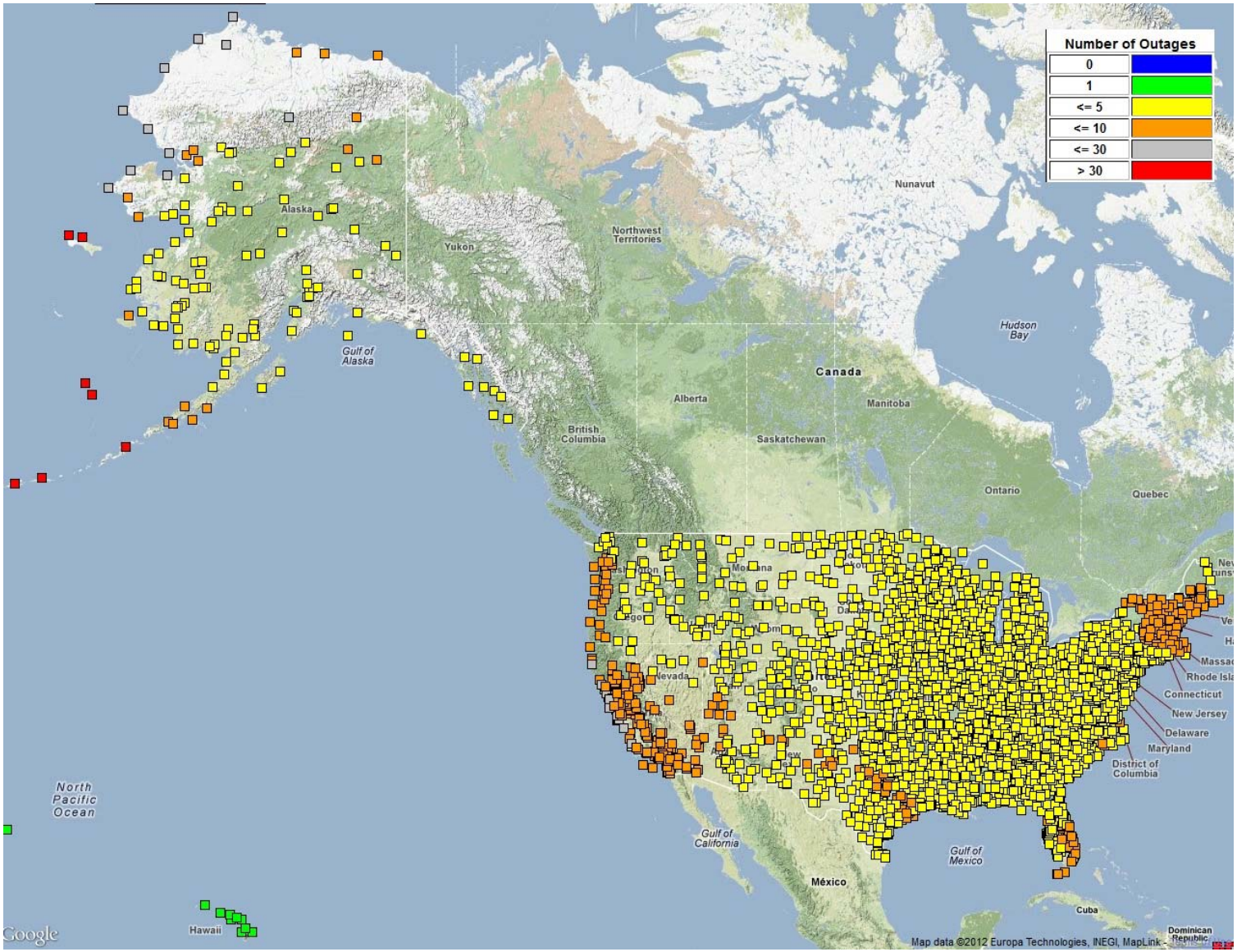


Figure 8-5 WAAS LPV 200 Availability at US Airports with GPS RNAV Instrument Approach Procedures

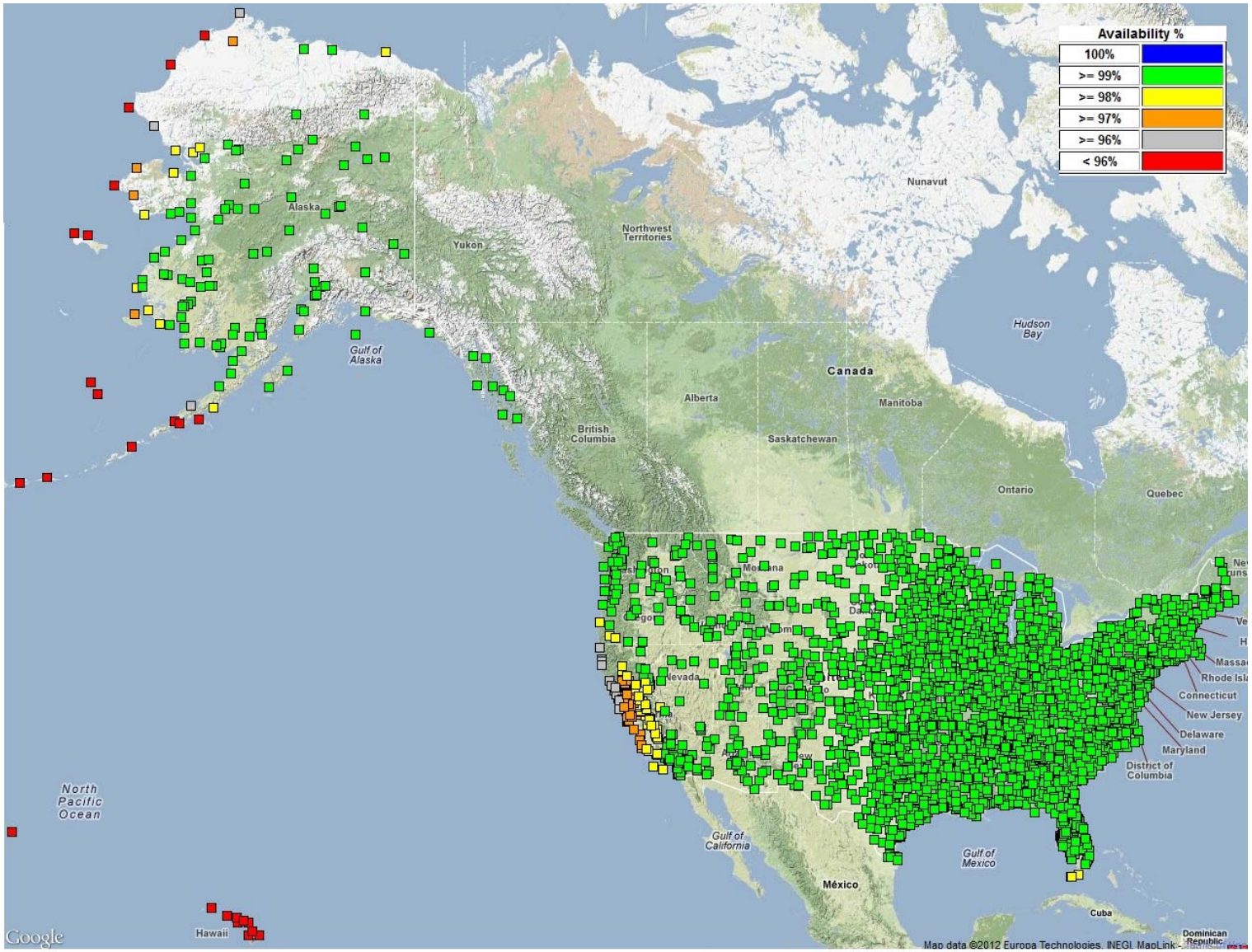
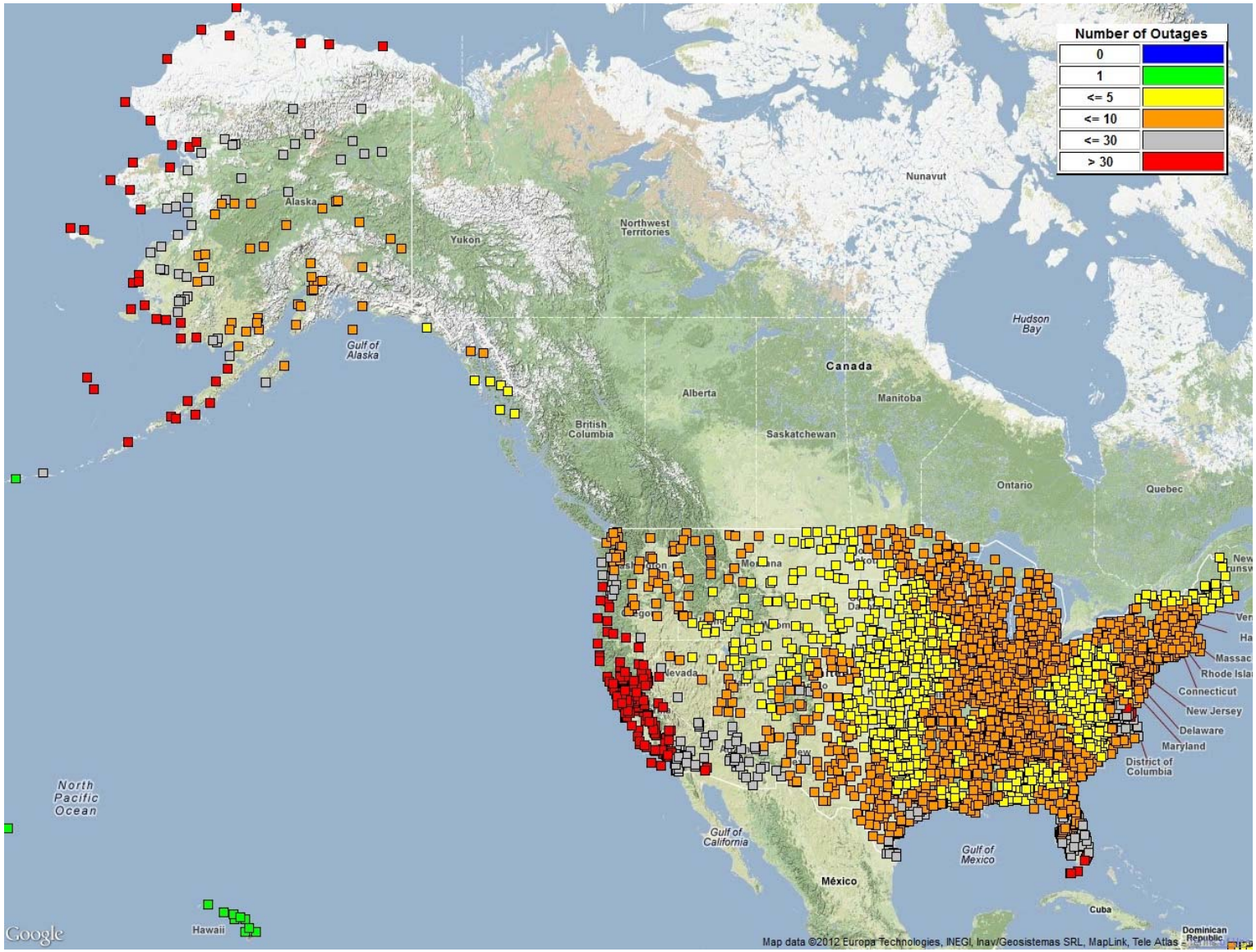


Figure 8-6 WAAS LPV 200 Outages at US Airports with GPS RNAV Instrument Approach Procedures



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	Jan 11	Feb 11	Mar 11	Apr 11	May 11	Jun 11	Jul 11	Aug 11	Sep 11	Oct 11	Nov 11	Dec 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	Jan 11	Feb 11	Mar 11	Apr 11	May 11	Jun 11	Jul 11	Aug 11	Sep 11	Oct 11	Nov 11	Dec 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 12/26/11 to 23:59:30 on 12/27/11 for all of the WAAS receivers. 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 IGS08 reference frame was selected for the OPUS solutions.

The following are the data set exceptions. ZSU (San Juan) was not processed because ZSU has been temporarily turned off because roof construction required the removal if it's antennas. ZSU will need a completely new survey and an update to the WAAS software before it is reintroduced into WAAS when the construction is completed. ZDV2 (Denver 2) used a 12/23 to 12/24 data set for OPUS because the OPUS overall RMS quality indication was above 3 cm for the 12/26 to 12/27 data set. CSRS did not have a problem with the ZDV2 12/26-12/27 data set. ZFW3 (Fort Worth 3) and ZMP3 (Minneapolis 3) needed the first 4 hours of the data sets removed before OPUS would return an overall RMS of less than 3 cm. Manual manipulation of the OPUS reference station selection was also required for: ZDC1 (Leesburg VA), ZMP2, ZFW1, ZFW2, and ZKC2 (Kansas City 2) to achieve overall RMS qualities below 3 cm.

The overall RMS quality metrics reported by OPUS were all less than or equal to 2.3 cm. The CSRS surveys' RSSs of the reported ECEF sigmas were all less than equal to 0.9 cm. The OPUS IGS08 and CSRS surveys agreed to an average of 1.2 cm with a maximum of 4.1 cm for BRW1 (Barrow AK 1).

The OPUS IGS08 positions were compared to the positions in the current WAAS software build 6.097 that was fielded in October 2011. The OPUS IGS08 surveys agree with the build 6.097 positions to better or equal 7.9 cm with the expected exception of Mexico City which was 12.6 cm because build 6.097 anticipates subsidence at MMX that has yet to occur. The "take action" threshold established by the WAAS Integrity Performance Panel (WIPP) is 25 cm for Mexico City and 10 cm for the remaining sites.

Table 10.1 lists the WAAS antenna L1 phase center positions as of 12/27/11. The positions are the OPUS IGS08 estimated positions. The values for ZSU are the WAAS software build 6.097 positions.

Figure 10.1 to 10.3 show the RSS of the ECEF differences between the 12/27/11 OPUS survey antenna phase center locations and the locations in the WAAS build 6.097 software which was fielded during October 2011. Each reference station has three independent strings of WAAS receiving equipment (WRE). A surveyed antenna phase center location is required for each WRE. All three strings of a reference station are shown in the three figures. For example, BET1 identifies the RSS delta for the Bethel WRE string 1(A). The next two bars in the chart are Bethel string 2(B) and Bethel string 3(C). Figure 10.4 to 10.6 shows the OPUS surveys 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 IGS08 and the CSRS positions are in ITRF-2008. Figures 10.10 to 10.12 show the RSS of the ECEF sigmas survey qualities reported by CSRS.

Table 10-1 WAAS Antenna Positions (OPUS IGS08) as of 12/27/11

WRE	X(m)	Y(m)	Z(m)	Latitude	Longitude	H(m)
BET1	-2965385.021	-972576.618	5543892.933	60.7879158194444	-161.8417248972220	52.201
BET2	-2965385.790	-972580.337	5543891.879	60.7878964000000	-161.8416644194440	52.204
BET3	-2965388.355	-972577.470	5543891.008	60.7878804916667	-161.8417291111110	52.197
BIL1	-1416445.861	-4223577.020	4550862.178	45.8037070305556	-108.5397228250000	1112.260
BIL2	-1416449.924	-4223574.881	4550862.896	45.8037162805556	-108.5397811166670	1112.261
BIL3	-1416441.554	-4223574.281	4550866.025	45.8037567361111	-108.5396815055560	1112.253
BRW1	-1886758.882	-809058.620	6018494.523	71.2827655222222	-156.7899254250000	15.598
BRW2	-1886756.304	-809055.921	6018495.686	71.2827980055555	-156.7899663000000	15.598
BRW3	-1886755.221	-809059.704	6018495.514	71.2827933055556	-156.7898573500000	15.594
CDB1	-3484099.025	-1084748.798	5213678.675	55.1923745333333	-162.7064043250000	49.722
CDB2	-3484105.669	-1084741.587	5213675.724	55.1923284277778	-162.7065434416670	49.697
CDB3	-3484111.932	-1084734.831	5213672.981	55.1922850722222	-162.7066739583330	49.712
FAI1	-2304741.780	-1448715.269	5748843.712	64.8096303694444	-147.8473407055560	149.946
FAI2	-2304741.305	-1448706.464	5748846.108	64.8096808111111	-147.8474922833330	149.949
FAI3	-2304732.778	-1448707.397	5748849.253	64.8097473805556	-147.8473801472220	149.933
HNL1	-5508637.096	-2234493.357	2303722.194	21.3129902416667	-157.9208270777780	24.683
HNL2	-5508656.265	-2234483.677	2303686.950	21.3126473305556	-157.9209829833330	25.032
HNL3	-5508647.681	-2234497.612	2303694.044	21.3127159388889	-157.9208274222220	25.079
JNU1	-2354254.866	-2388549.652	5407043.133	58.3625748333333	-134.5857066750000	16.107
JNU2	-2354252.785	-2388565.766	5407036.958	58.3624691972222	-134.5854881083330	16.104
JNU3	-2354239.566	-2388568.623	5407041.418	58.3625455777778	-134.5852930055560	16.101
MMD1	35070.439	-5959686.680	2264365.774	20.9319092805556	-89.6628405055556	29.134
MMD2	35065.501	-5959687.044	2264364.990	20.9319015861111	-89.6628879972222	29.167
MMD3	35065.164	-5959685.257	2264369.646	20.9319466361111	-89.6628911361111	29.159
MMX1	-948701.113	-5943935.705	2109212.747	19.4316535805556	-99.0683896361111	2235.703
MMX2	-948696.686	-5943935.534	2109215.171	19.4316768277778	-99.0683482777778	2235.692
MMX3	-948705.545	-5943935.898	2109210.322	19.4316302583333	-99.0684310055556	2235.735
MPR1	-1570142.211	-5759530.621	2238184.768	20.6790033833333	-105.2492030805560	10.995
MPR2	-1570139.388	-5759530.125	2238188.820	20.6790415166667	-105.2491781916670	11.284
MPR3	-1570143.498	-5759528.000	2238190.581	20.6790594916667	-105.2492216138890	10.999
MSD1	-1979519.709	-5523223.066	2493106.788	23.1604468527778	-109.7176479055560	104.292
MSD2	-1979521.276	-5523225.399	2493100.389	23.1603840527778	-109.7176546250000	104.280
MSD3	-1979525.725	-5523222.133	2493104.059	23.1604201083333	-109.7177062833330	104.277
MTP1	-254854.347	-6162909.183	1617805.116	14.7913663972222	-92.3679991166667	54.971
MTP2	-254850.728	-6162910.219	1617801.687	14.7913343916667	-92.3679651305555	54.952
MTP3	-254855.493	-6162910.325	1617800.162	14.7913203666667	-92.3680093138889	54.855
OTZ1	-2396055.996	-750356.161	5843502.549	66.8873324777778	-162.6113727527780	10.907
OTZ2	-2396052.827	-750354.333	5843504.077	66.8873673027778	-162.6113909500000	10.911
OTZ3	-2396052.808	-750358.268	5843503.589	66.8873560361111	-162.6113051277780	10.917
YFB1	1035381.474	-2634289.644	5696539.539	63.7314904138889	-68.5431829500000	10.032
YFB2	1035372.262	-2634296.045	5696538.184	63.7314642194444	-68.5434038972222	9.962
YFB3	1035366.188	-2634306.805	5696534.398	63.7313865027778	-68.5435980027778	10.016

WRE	X(m)	Y(m)	Z(m)	Latitude	Longitude	H(m)
YQX1	2430424.655	-3419640.393	4788223.836	48.9664899444444	-54.5976319333333	146.890
YQX2	2430432.617	-3419639.046	4788220.772	48.9664480166667	-54.5975326444444	146.886
YQX3	2430440.527	-3419637.680	4788217.775	48.9664067972222	-54.5974337833333	146.902
YWG1	-520164.341	-4083475.887	4855843.007	49.9005745416667	-97.2593972305556	222.039
YWG2	-520150.479	-4083468.834	4855850.379	49.9006773916667	-97.2592182416667	222.043
YWG3	-520152.342	-4083477.948	4855842.566	49.9005683555556	-97.2592279361111	222.042
YYR1	1885341.448	-3321428.358	5091171.652	53.3086470138889	-60.4194679722222	37.850
YYR2	1885344.412	-3321419.882	5091176.069	53.3087132944444	-60.4193665305556	37.861
YYR3	1885340.129	-3321413.064	5091182.073	53.3088034833333	-60.4193719166667	37.870
ZAB1	-1488636.822	-5003946.552	3654557.722	35.1735754638889	-106.5673495194440	1620.138
ZAB2	-1488631.483	-5003948.233	3654557.700	35.1735748416667	-106.5672880972220	1620.198
ZAB3	-1488632.263	-5003950.815	3654553.847	35.1735324583333	-106.5672882222220	1620.184
ZAN1	-2659536.617	-1549114.789	5567750.783	61.2292020333333	-149.7802503222220	80.710
ZAN2	-2659548.369	-1549110.834	5567746.293	61.2291184194444	-149.7804240527780	80.703
ZAN3	-2659541.322	-1549106.711	5567750.767	61.2292019666667	-149.7804243472220	80.695
ZAU1	138704.135	-4761244.152	4227763.945	41.7826580777778	-88.3313364611111	195.905
ZAU2	138704.401	-4761248.767	4227758.782	41.7825956944444	-88.3313348805555	195.911
ZAU3	138711.105	-4761248.507	4227758.863	41.7825966277778	-88.3312541833333	195.916
ZBW1	1490299.244	-4448983.179	4306010.508	42.7357204861111	-71.4804256166667	39.134
ZBW2	1490304.357	-4448981.170	4306010.851	42.7357244694444	-71.4803586222222	39.160
ZBW3	1490306.068	-4448984.790	4306006.540	42.7356716777778	-71.4803528500000	39.155
ZDC1	1069125.784	-4839598.990	4001126.511	39.1015958833333	-77.5427463000000	80.072
ZDC2	1069128.180	-4839603.621	4001120.303	39.1015238611111	-77.5427308027778	80.067
ZDC3	1069124.082	-4839602.719	4001122.502	39.1015492583333	-77.5427748111111	80.084
ZDV1	-1273628.589	-4711375.576	4094890.125	40.1873033916667	-105.1272240916670	1541.361
ZDV2	-1273622.888	-4711377.093	4094890.146	40.1873036722222	-105.1271548333330	1541.357
ZDV3	-1273624.900	-4711380.288	4094885.858	40.1872532083333	-105.1271678472220	1541.347
ZFW1	-659983.176	-5324060.798	3438276.491	32.8306497861111	-97.0664715194444	155.645
ZFW2	-659988.443	-5324063.344	3438271.491	32.8305963833333	-97.0665239972222	155.601
ZFW3	-659983.473	-5324063.873	3438271.700	32.8305983888889	-97.0664706277778	155.642
ZHU1	-513864.451	-5506451.747	3166720.499	29.9618963777778	-95.3314260222222	10.897
ZHU2	-513867.102	-5506455.143	3166714.335	29.9618318611111	-95.3314501000000	10.961
ZHU3	-513873.383	-5506457.788	3166708.735	29.9617736000000	-95.3315123444444	10.952
ZJX1	772646.473	-5434462.218	3237231.761	30.6988596444444	-81.9081848527778	2.174
ZJX2	772649.796	-5434463.756	3237228.353	30.6988240472222	-81.9081527722222	2.145
ZJX3	772645.736	-5434466.193	3237225.253	30.6987915250000	-81.9081983083333	2.146
ZKC1	-415247.488	-4954556.400	3982161.131	38.8801594666667	-94.7908334916667	305.914
ZKC2	-415231.100	-4954557.718	3982161.183	38.8801601444444	-94.7906440277778	305.904
ZKC3	-415237.219	-4954561.070	3982155.991	38.8801019638889	-94.7907110694444	305.643
ZLA1	-2474409.915	-4637294.683	3602183.542	34.6035182611111	-118.0838950000000	763.533
ZLA2	-2474404.635	-4637297.476	3602183.551	34.6035184388889	-118.0838298888890	763.520
ZLA3	-2474411.236	-4637297.152	3602179.562	34.6034744000000	-118.0838950333330	763.577

WRE	X(m)	Y(m)	Z(m)	Latitude	Longitude	H(m)
ZLC1	-1808273.192	-4486410.838	4145303.054	40.7860434944444	-111.9521772444440	1287.460
ZLC2	-1808274.590	-4486414.440	4145298.554	40.7859900972222	-111.9521766527780	1287.445
ZLC3	-1808270.385	-4486416.149	4145298.550	40.7859899916667	-111.9521228888890	1287.453
ZMA1	966042.322	-5662999.836	2761581.507	25.8246121944444	-80.3191896027778	-7.569
ZMA2	966029.349	-5662999.131	2761585.998	25.8246599944444	-80.3193159638889	-8.202
ZMA3	966037.426	-5662997.971	2761586.344	25.8246619611111	-80.3192346111111	-7.858
ZME1	4070.918	-5226189.309	3644028.438	35.0673941611111	-89.9553697055556	68.621
ZME2	4070.948	-5226186.764	3644032.551	35.0674376833333	-89.9553693527778	68.902
ZME3	4064.754	-5226186.638	3644032.710	35.0674395333333	-89.9554372583333	68.886
ZMP1	-249978.358	-4539297.515	4458955.073	44.6374633138889	-93.1520851777778	262.679
ZMP2	-249972.558	-4539297.853	4458955.070	44.6374631750000	-93.1520119555556	262.690
ZMP3	-249973.653	-4539302.133	4458950.598	44.6374071416667	-93.1520227694445	262.632
ZNY1	1406144.661	-4627343.992	4144322.061	40.7843285194444	-73.0971654194444	6.464
ZNY2	1406146.458	-4627347.022	4144317.279	40.7842757888889	-73.0971554888889	5.931
ZNY3	1406140.902	-4627348.683	4144317.320	40.7842762222222	-73.0972241888889	5.938
ZOA1	-2684436.840	-4293337.448	3865351.857	37.5430537305556	-122.0159472277780	-3.490
ZOA2	-2684433.834	-4293341.519	3865349.432	37.5430262027778	-122.0158939666670	-3.494
ZOA3	-2684438.201	-4293342.404	3865345.571	37.5429817888889	-122.0159305555560	-3.416
ZOB1	650770.209	-4754715.685	4187420.763	41.2971544416667	-82.2064444527778	223.702
ZOB2	650777.893	-4754714.861	4187422.781	41.2971667500000	-82.2063522277778	225.203
ZOB3	650776.216	-4754719.676	4187414.986	41.2970870250000	-82.2063798611111	223.472
ZSE1	-2308930.252	-3668169.683	4663526.510	47.2869934861111	-122.1883725722220	82.121
ZSE2	-2308934.651	-3668175.236	4663520.102	47.2869078444444	-122.1883826833330	82.190
ZSE3	-2308935.707	-3668179.510	4663516.154	47.2868561333333	-122.1883644000000	82.124
ZSU1	2462589.390	-5529371.537	2003724.624	18.4313386305556	-65.9934749361111	-28.575
ZSU2	2462587.306	-5529377.300	2003711.635	18.4312146833333	-65.9935151500000	-28.492
ZSU3	2462593.940	-5529375.092	2003709.581	18.4311951305556	-65.9934492833333	-28.494
ZTL1	529840.435	-5305248.824	3489342.858	33.3796885666667	-84.2967256833333	261.154
ZTL2	529846.807	-5305247.978	3489343.147	33.3796917777778	-84.2966566444444	261.138
ZTL3	529847.489	-5305251.418	3489337.909	33.3796350277778	-84.2966530250000	261.171

Figure 10-1 WAAS Build 6.097 Software Antenna Positions Deltas from 12/27/11 OPUS Survey

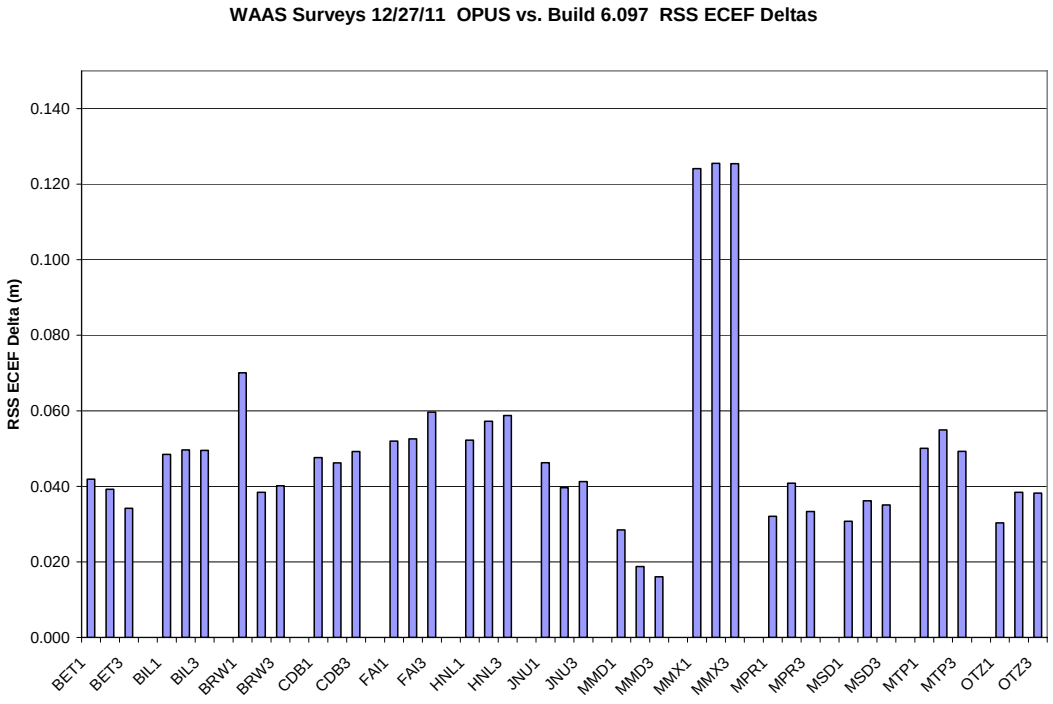


Figure 10-2 WAAS Build 6.097 Software Antenna Positions Deltas from 12/27/11 OPUS Survey

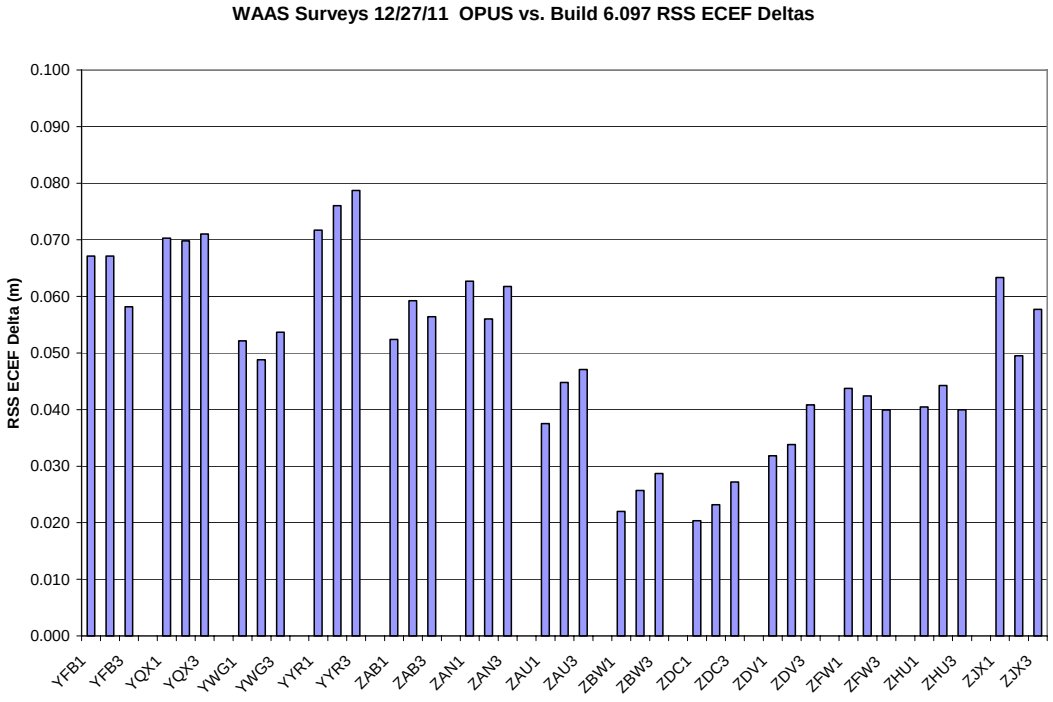


Figure 10-3 WAAS Build 6.097 Software Antenna Positions Deltas from 12/27/11 OPUS Survey

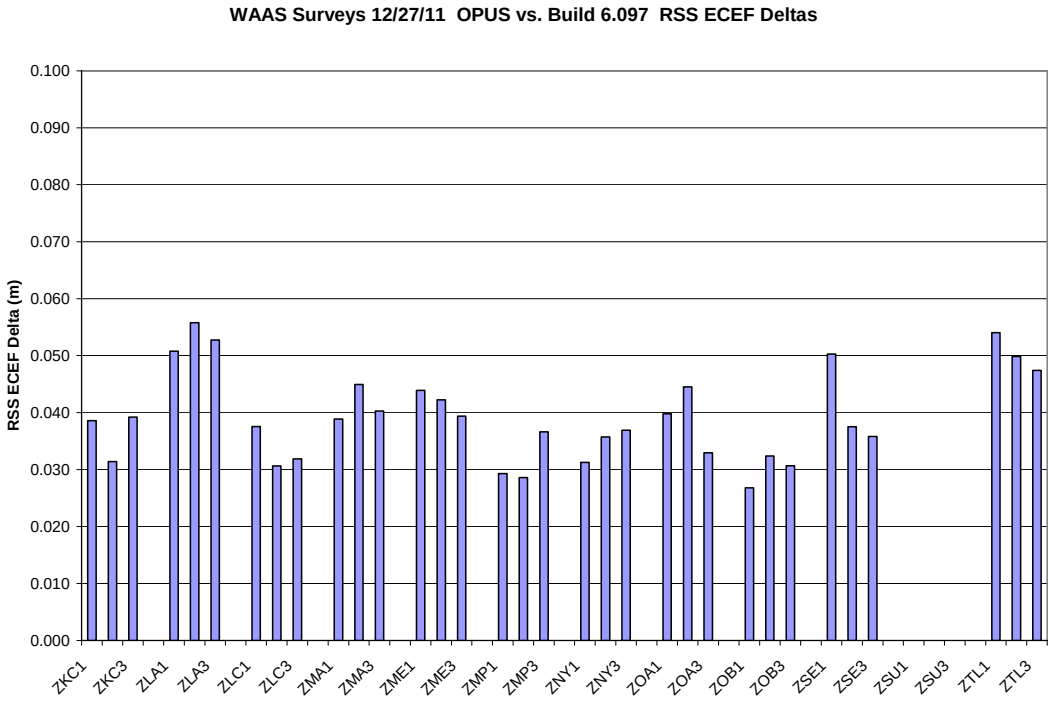


Figure 10-4 12/27/11 OPUS Survey Overall RMS Qualities

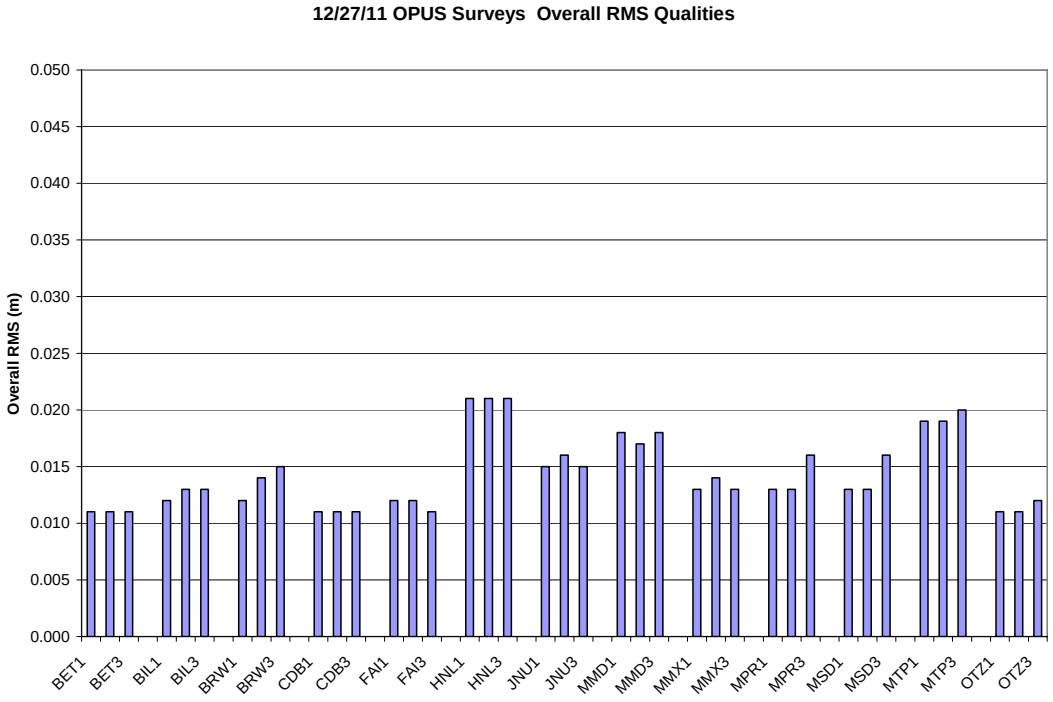


Figure 10-5 12/27/11 OPUS Survey Overall RMS Qualities

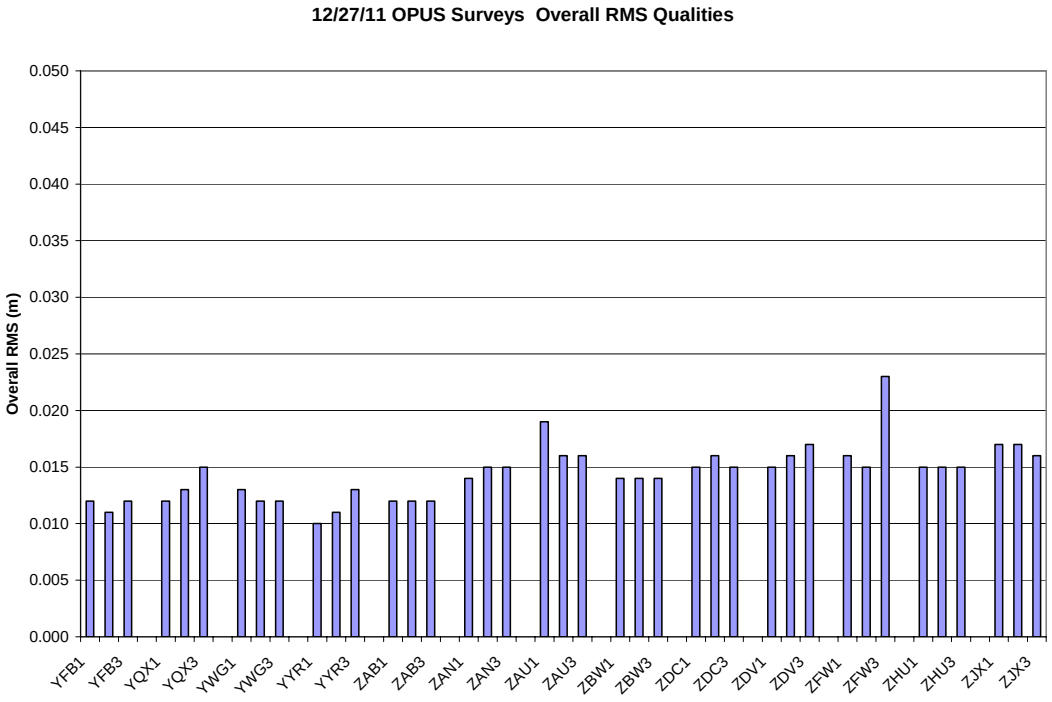


Figure 10-6 12/27/11 OPUS Survey Overall RMS Qualities

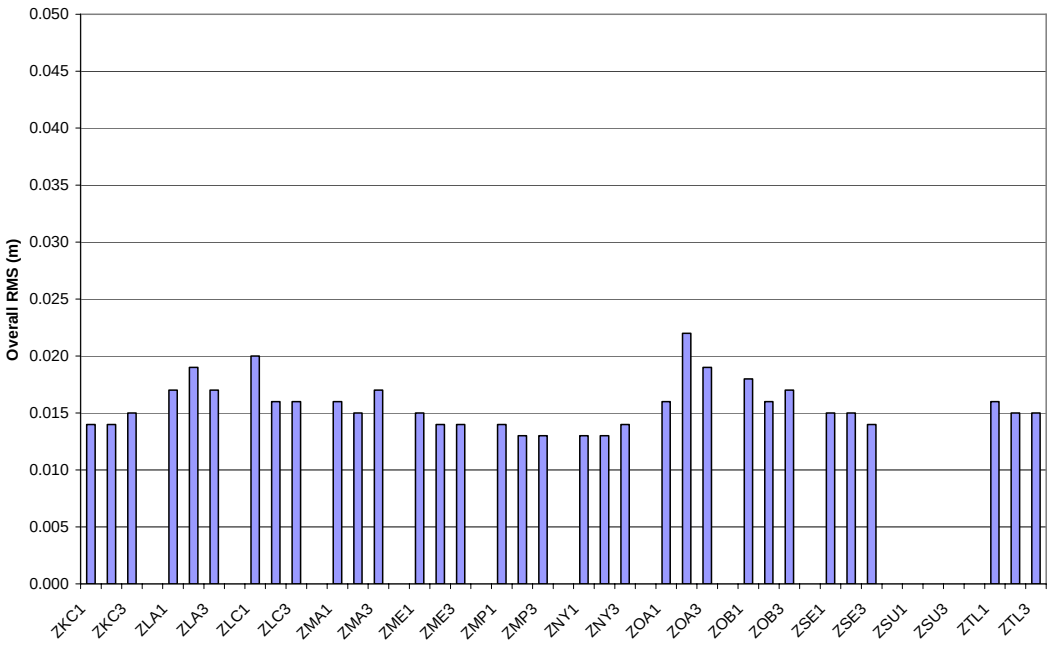


Figure 10-7 12/27/11 OPUS vs. CSRS RSS ECEF Deltas

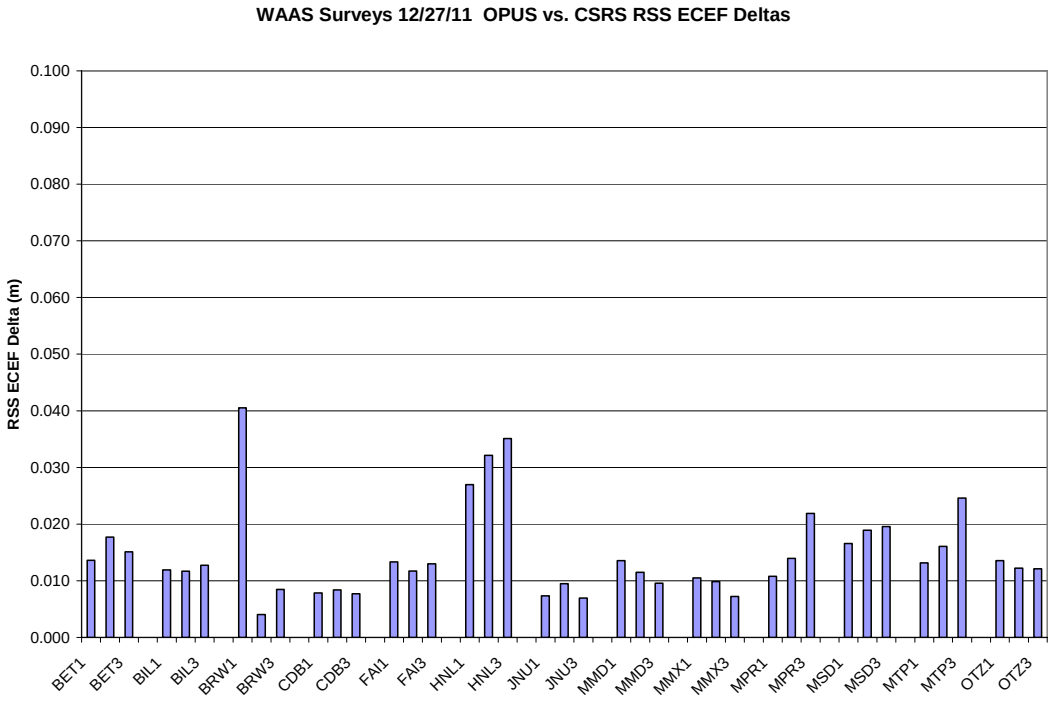


Figure 10-8 12/27/11 OPUS vs. CSRS RSS ECEF Deltas

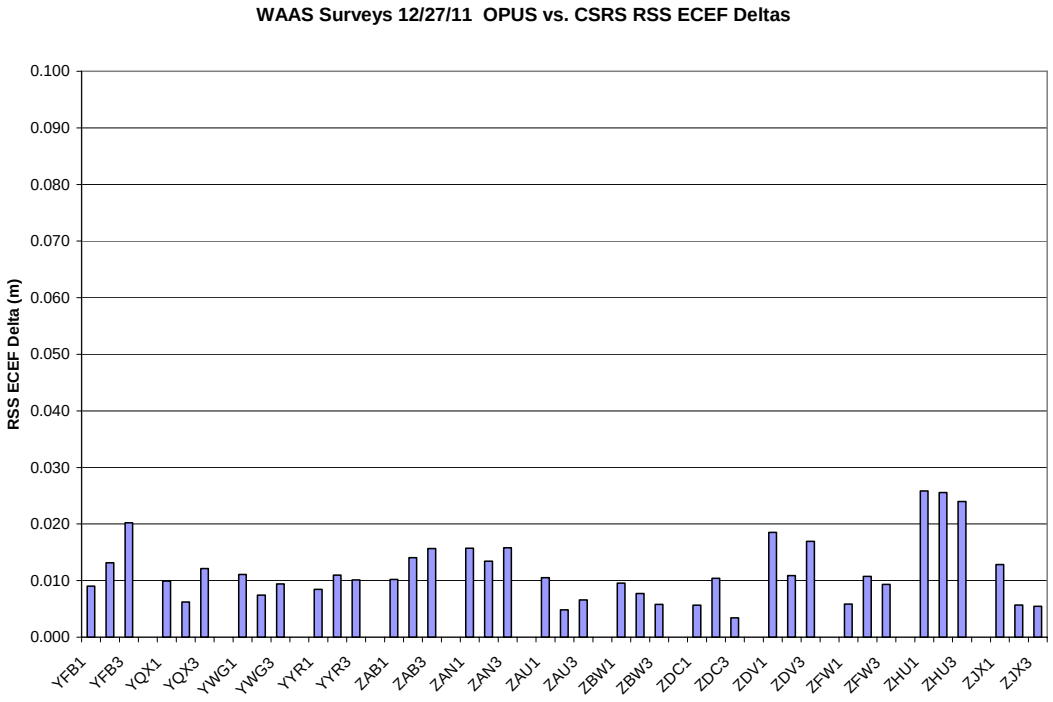


Figure 10-9 12/2711 OPUS vs. CSRS RSS ECEF Deltas

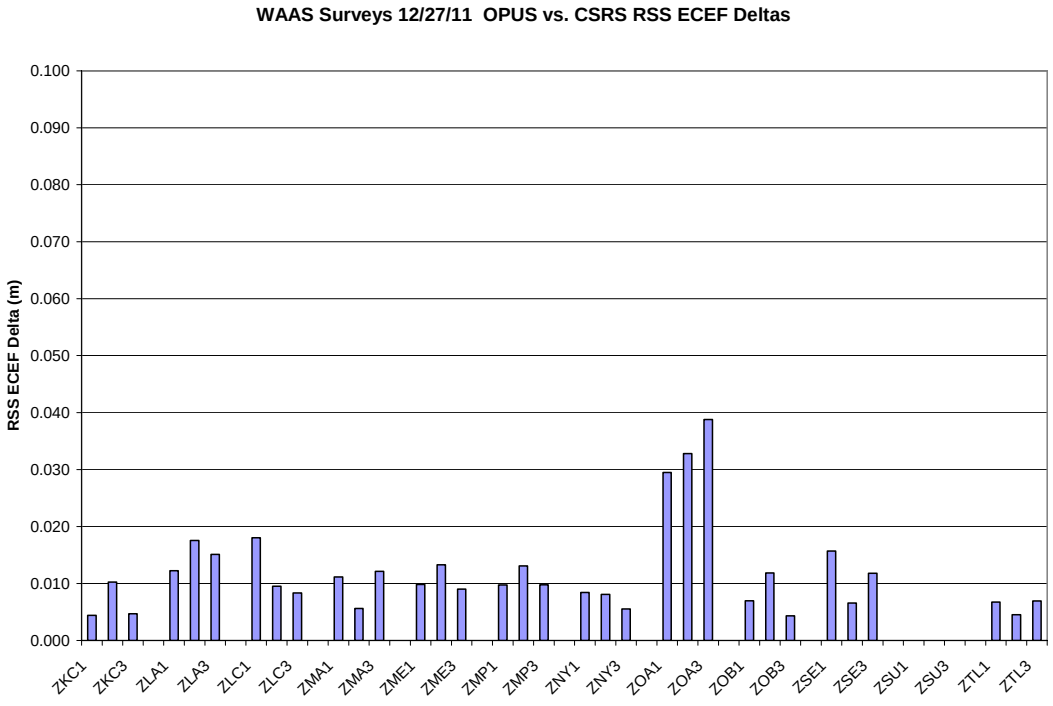


Figure 10-10 12/27/11 CSRS Survey Qualities

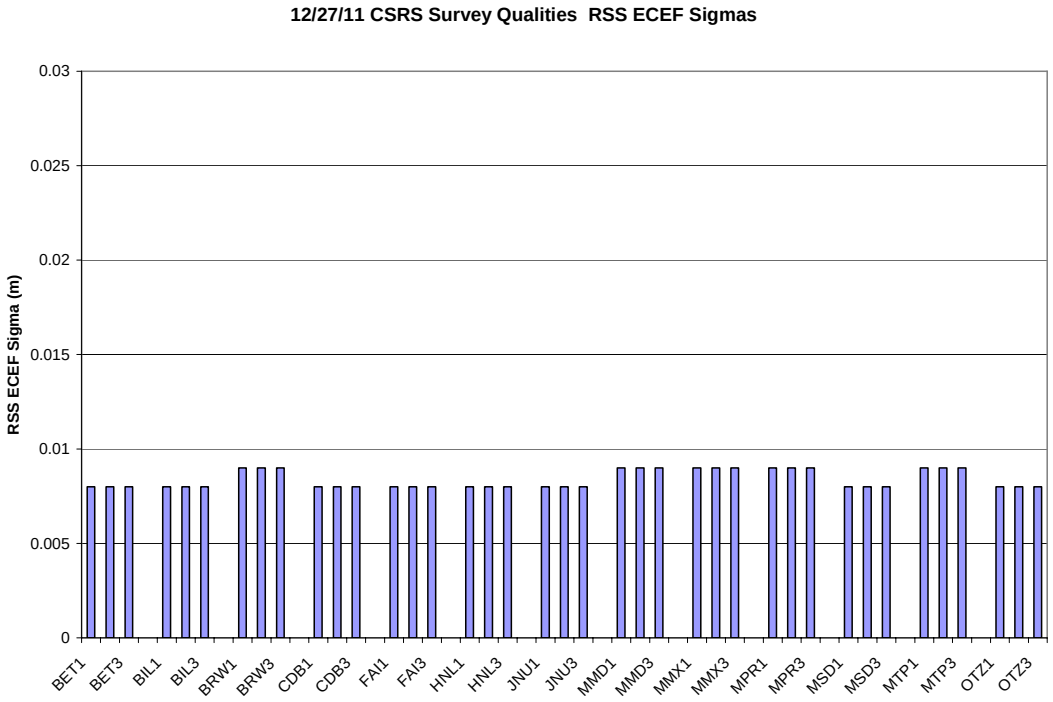


Figure 10-11 12/27/11 CSRS Survey Qualities

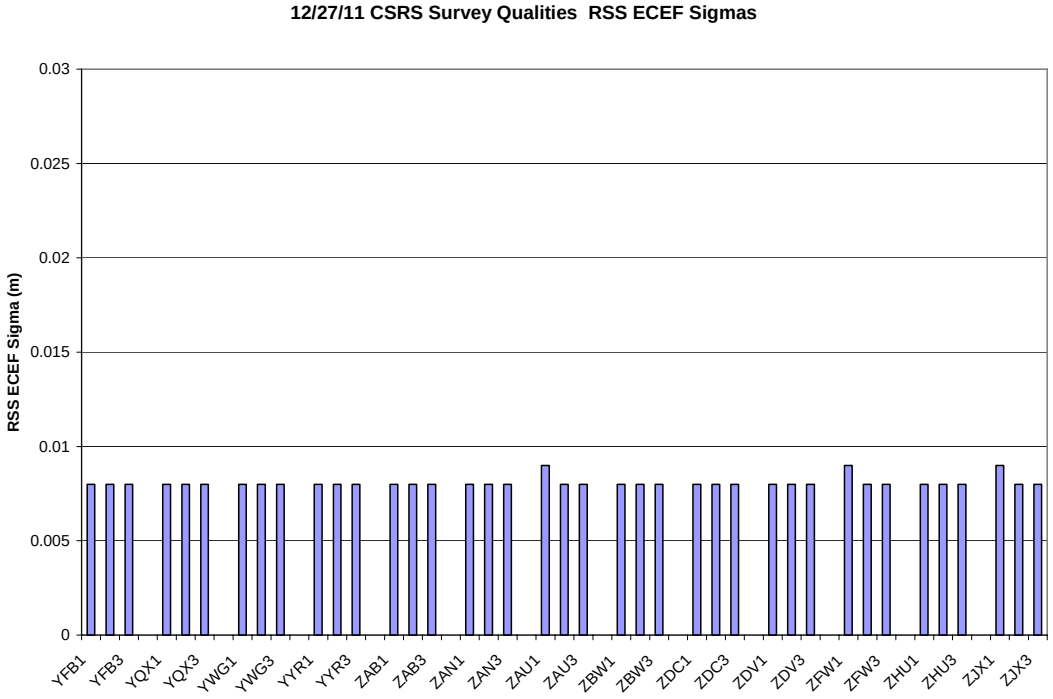
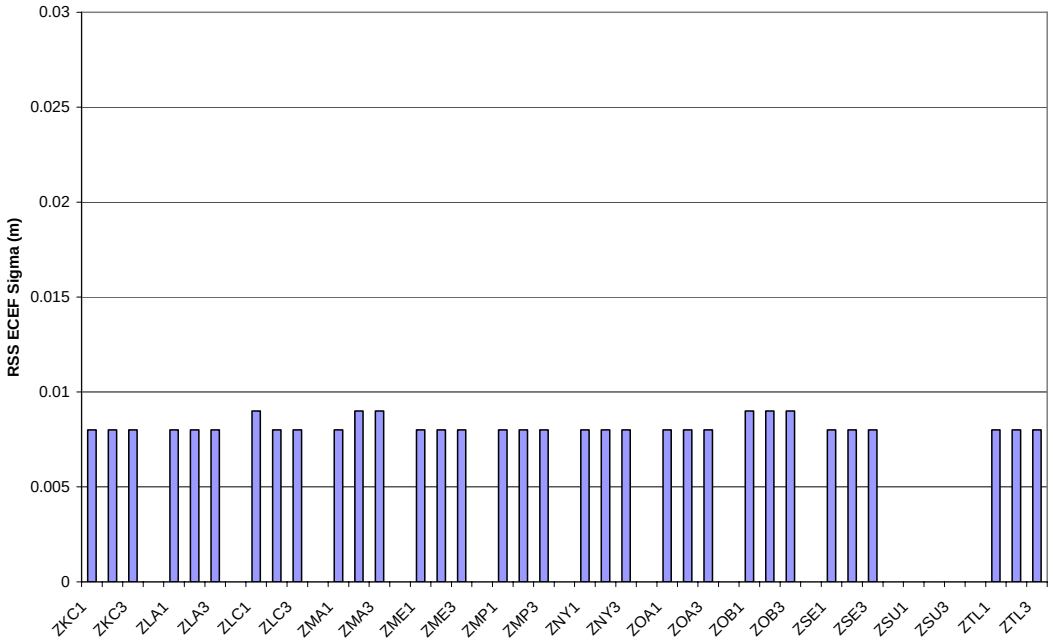


Figure 10-12 12/27/11 CSRS Survey Qualities



11.0 SIGNAL QUALITY MONITOR (SQM)

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

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

11.1 Alpha Metrics

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

Table 11-1 Alpha Metrics

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

11.2 Type Bias

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

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

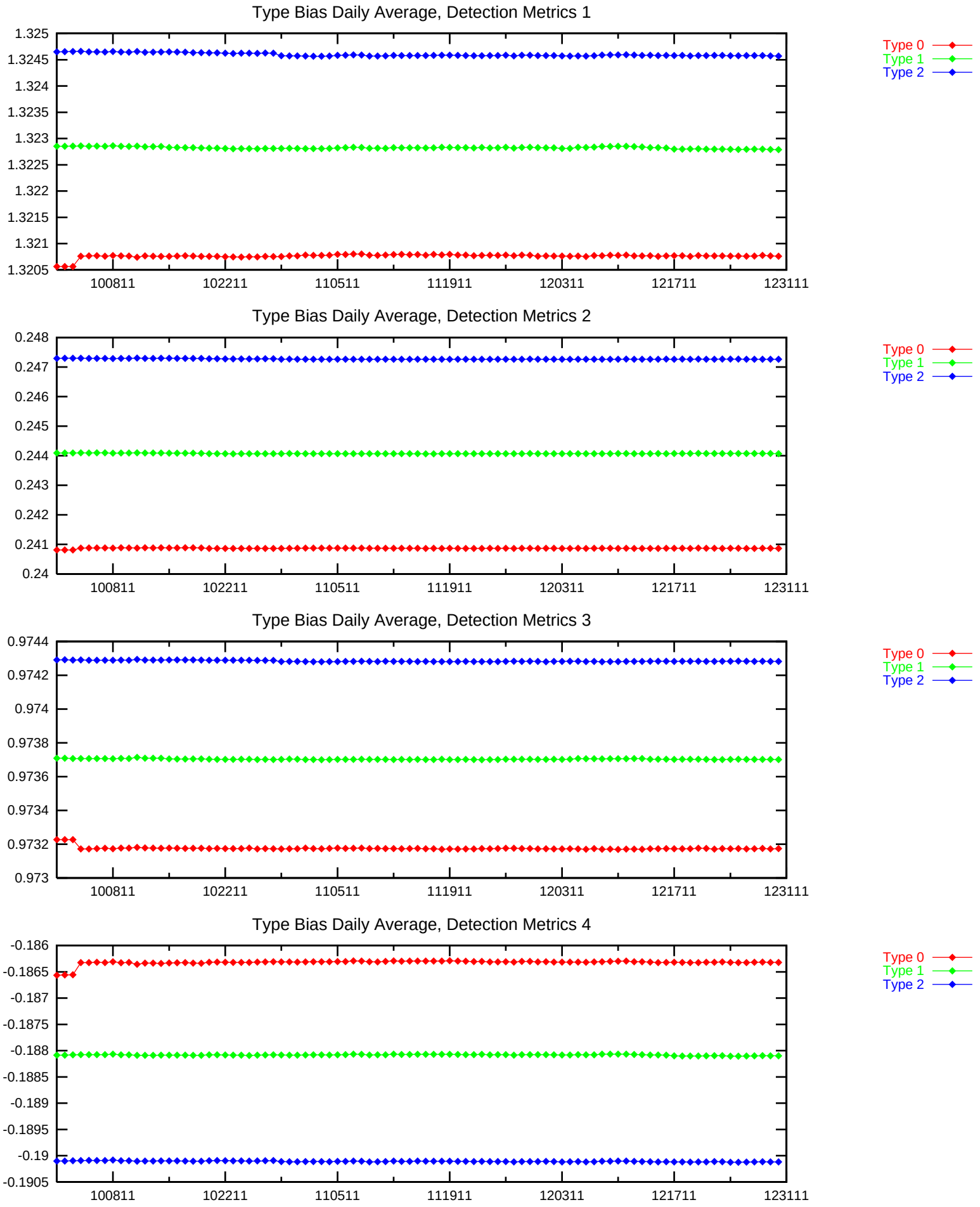
Table 11-2 Type Bias Average for the Quarter

Detection Metric	Type 0	Type 1	Type 2
DM 1	1.3207600	1.3228200	1.3246000
DM 2	0.2408670	0.2440740	0.2472710
DM 3	0.9731760	0.9737040	0.9742840
DM 4	-0.1863220	-0.1880820	-0.1901070

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

Detection Metric	Type 0	Type 1	Type 2
DM 1	1.3209800	1.3229000	1.3246100
DM 2	0.2408450	0.2441050	0.2472840
DM 3	0.9731760	0.9737120	0.9742770
DM 4	-0.1861730	-0.1880590	-0.1900920

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 0.0010074. The maximum average for DM2 is PRN 25 at 0.0002438. The maximum average for DM3 is PRN 10 at 0.0002766 and the maximum average for DM4 is PRN 23 at 0.0004287.

For this reporting period, geostationary satellite biases are not evaluated. Please refer to Table 1.5 for events that may have an impact on PRN bias statistics. The small spikes in PRN bias daily average are due to satellite outages. PRN 27 (SVN 27) was reactivated and set to healthy on 12/17/11. PRN 24 (SVN 24) went offline on 9/30/2011. PRN 1 (SVN 63) was set to usable on 10/14/2011.

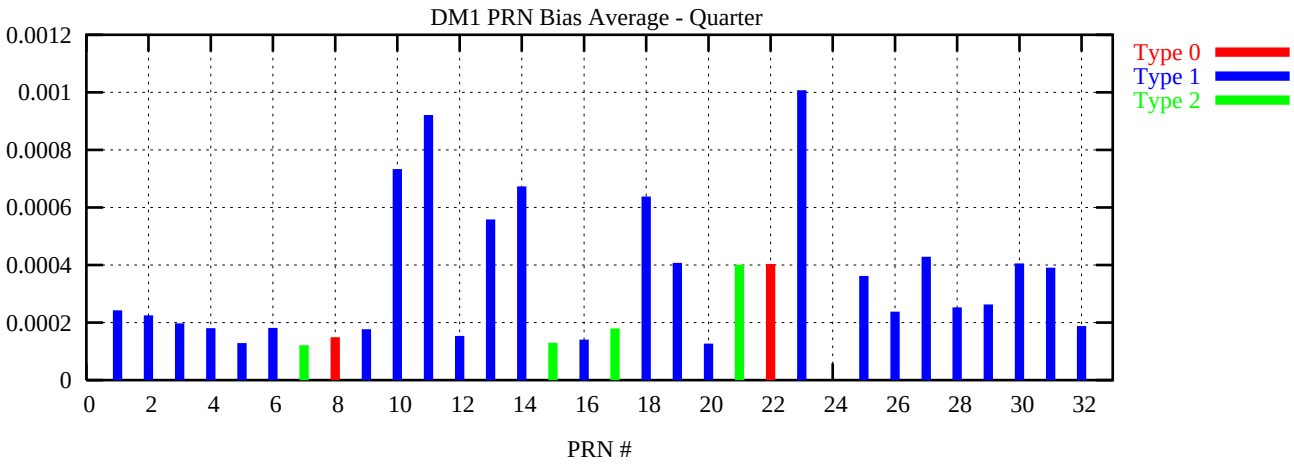
Table 11-4 PRN Bias Average for the Quarter

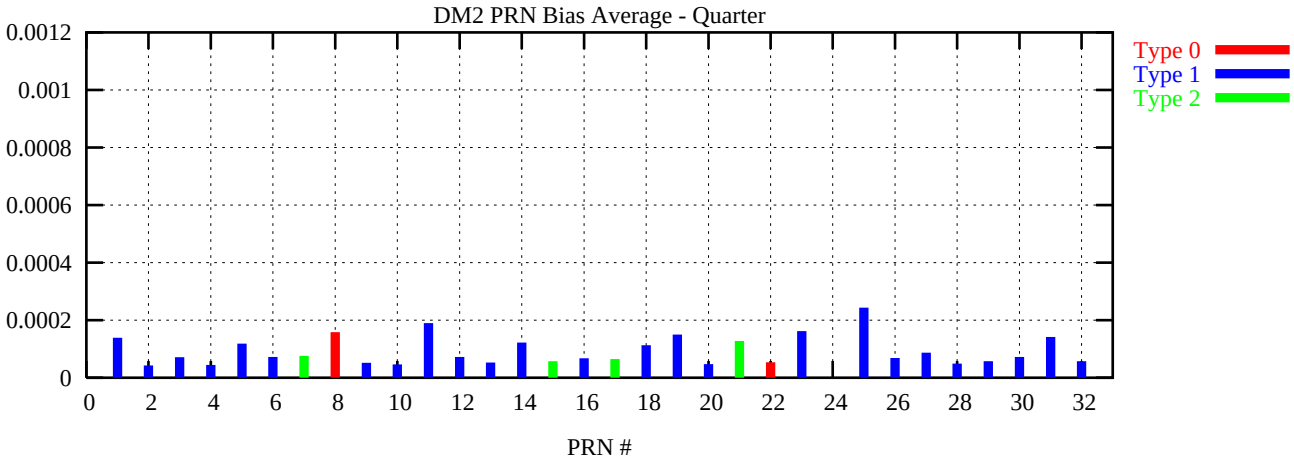
PRN	SVN	DM1	DM2	DM3	DM4
1	63	0.0002428	0.0001393	0.0000878	0.0000994
2	61	0.0002251	0.0000422	0.0000302	0.0000979
3	33	0.0001970	0.0000713	0.0001052	0.0003472
4	34	0.0001809	0.0000441	0.0000589	0.0001222
5	50	0.0001291	0.0001186	0.0000599	0.0001038
6	36	0.0001819	0.0000719	0.0000611	0.0001204
7	34	0.0001209	0.0000764	0.0000339	0.0001247
8	38	0.0001486	0.0001582	0.0000421	0.0001039
9	39	0.0001769	0.0000516	0.0000705	0.0001019
10	40	0.0007336	0.0000461	0.0002766	0.0001039
11	46	0.0009210	0.0001899	0.0000570	0.0002579
12	58	0.0001536	0.0000726	0.0000904	0.0000770
13	43	0.0005585	0.0000532	0.0000739	0.0001603
14	41	0.0006733	0.0001223	0.0001134	0.0001288
15	55	0.0001300	0.0000576	0.0000275	0.0001379
16	56	0.0001410	0.0000673	0.0001181	0.0003300
17	53	0.0001794	0.0000650	0.0000484	0.0001402
18	54	0.0006384	0.0001133	0.0000424	0.0002142
19	59	0.0004078	0.0001504	0.0000427	0.0000870
20	51	0.0001268	0.0000475	0.0000376	0.0001594
21	45	0.0004012	0.0001279	0.0001689	0.0001092
22	47	0.0004041	0.0000537	0.0000838	0.0003581
23	60	0.0010074	0.0001621	0.0000394	0.0004287
24	24				
25	62	0.0003624	0.0002438	0.0000584	0.0001155
26	26	0.0002383	0.0000684	0.0001402	0.0000914
27	27	0.0004284	0.0000873	0.0000569	0.0003205
28	44	0.0002531	0.0000489	0.0000377	0.0000943
29	57	0.0002632	0.0000576	0.0000973	0.0003053
30	30	0.0004059	0.0000726	0.0001398	0.0001220
31	52	0.0003910	0.0001418	0.0000387	0.0002449
32	23	0.0001875	0.0000570	0.0000992	0.0000871

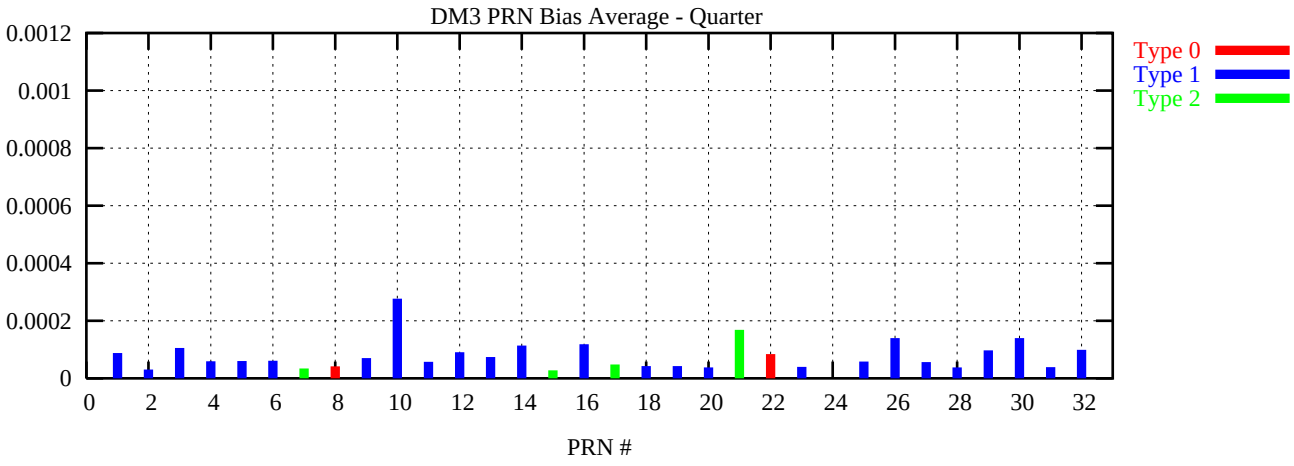
Table 11-5 PRN Bias Average Since January 1, 2008

PRN	SVN	DM1	DM2	DM3	DM4
1	32	0.0001936	0.0000943	0.0000811	0.0000902
2	61	0.0001930	0.0000552	0.0000245	0.0000939
3	33	0.0002140	0.0000586	0.0000921	0.0003538
4	34	0.0002274	0.0000448	0.0000714	0.0001309
5	35	0.0004283	0.0000655	0.0001190	0.0001572
5	50	0.0001443	0.0001295	0.0000622	0.0000993
6	36	0.0001595	0.0000578	0.0000481	0.0001275
7	34	0.0001321	0.0000885	0.0000352	0.0001233
8	38	0.0001641	0.0001281	0.0000442	0.0001016
9	39	0.0002108	0.0000531	0.0000677	0.0001101
10	40	0.0006768	0.0000639	0.0002699	0.0000968
11	46	0.0009055	0.0001837	0.0000563	0.0002407
12	58	0.0002163	0.0000850	0.0001027	0.0000803
13	43	0.0005206	0.0000549	0.0000632	0.0001576
14	41	0.0006528	0.0001201	0.0001128	0.0001247
15	55	0.0001248	0.0000665	0.0000276	0.0001340
16	56	0.0001620	0.0000735	0.0001117	0.0003418
17	53	0.0001411	0.0000748	0.0000369	0.0001255
18	54	0.0006196	0.0001049	0.0000417	0.0002156
19	59	0.0003884	0.0001381	0.0000367	0.0000847
20	51	0.0001538	0.0000480	0.0000386	0.0001378
21	45	0.0005982	0.0001804	0.0001990	0.0000921
22	47	0.0002233	0.0000827	0.0000971	0.0001767
23	60	0.0009675	0.0001476	0.0000358	0.0004244
24	24	0.0002973	0.0000492	0.0000356	0.0001077
25	25	0.0001583	0.0001133	0.0000814	0.0003055
25	62	0.0003652	0.0002201	0.0000730	0.0001233
26	26	0.0002657	0.0000864	0.0001503	0.0000900
27	27	0.0004749	0.0000833	0.0000637	0.0003297
28	44	0.0002488	0.0000534	0.0000335	0.0000918
29	57	0.0002322	0.0000648	0.0001039	0.0002896
30	30	0.0003088	0.0000922	0.0000373	0.0001170
31	52	0.0004541	0.0001548	0.0000383	0.0002541
32	23	0.0002721	0.0000503	0.0001081	0.0000966

Figure 11-2 PRN Bias Average for the Quarter







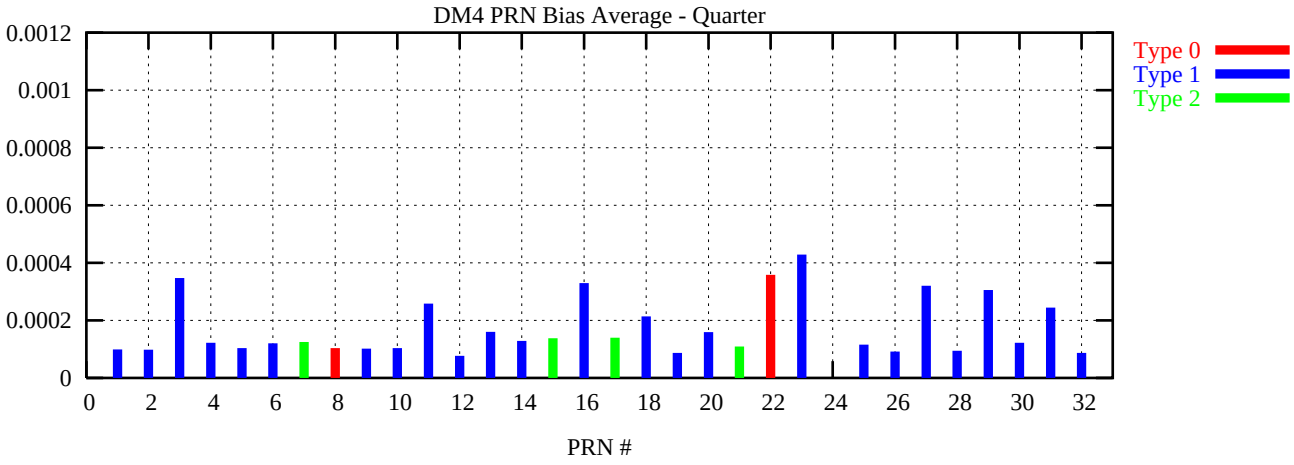


Figure 11-3 PRN Bias Average Trend (PRN 1 - PRN 4)

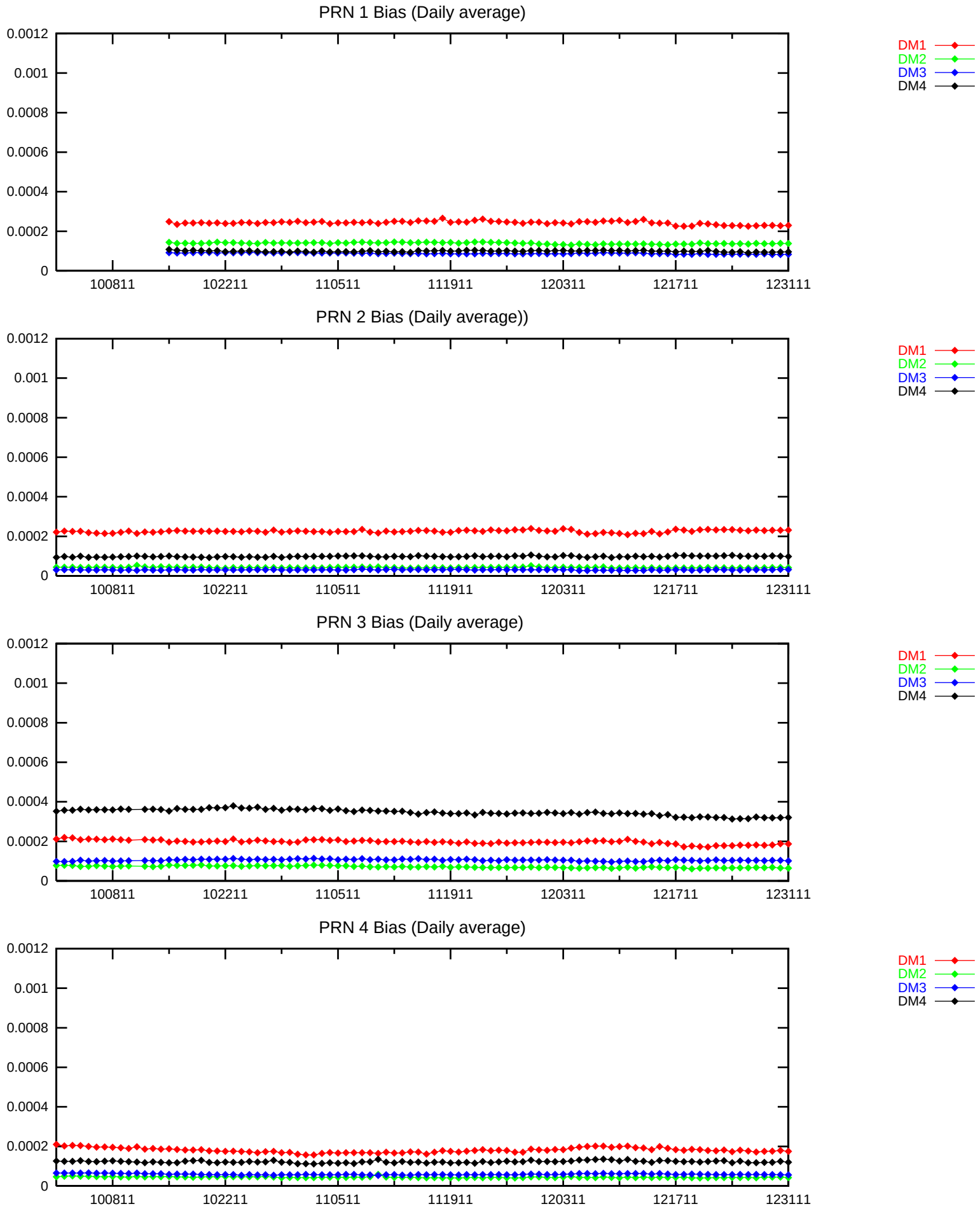


Figure 11-4 PRN Bias Average Trend (PRN 5 - PRN 8)

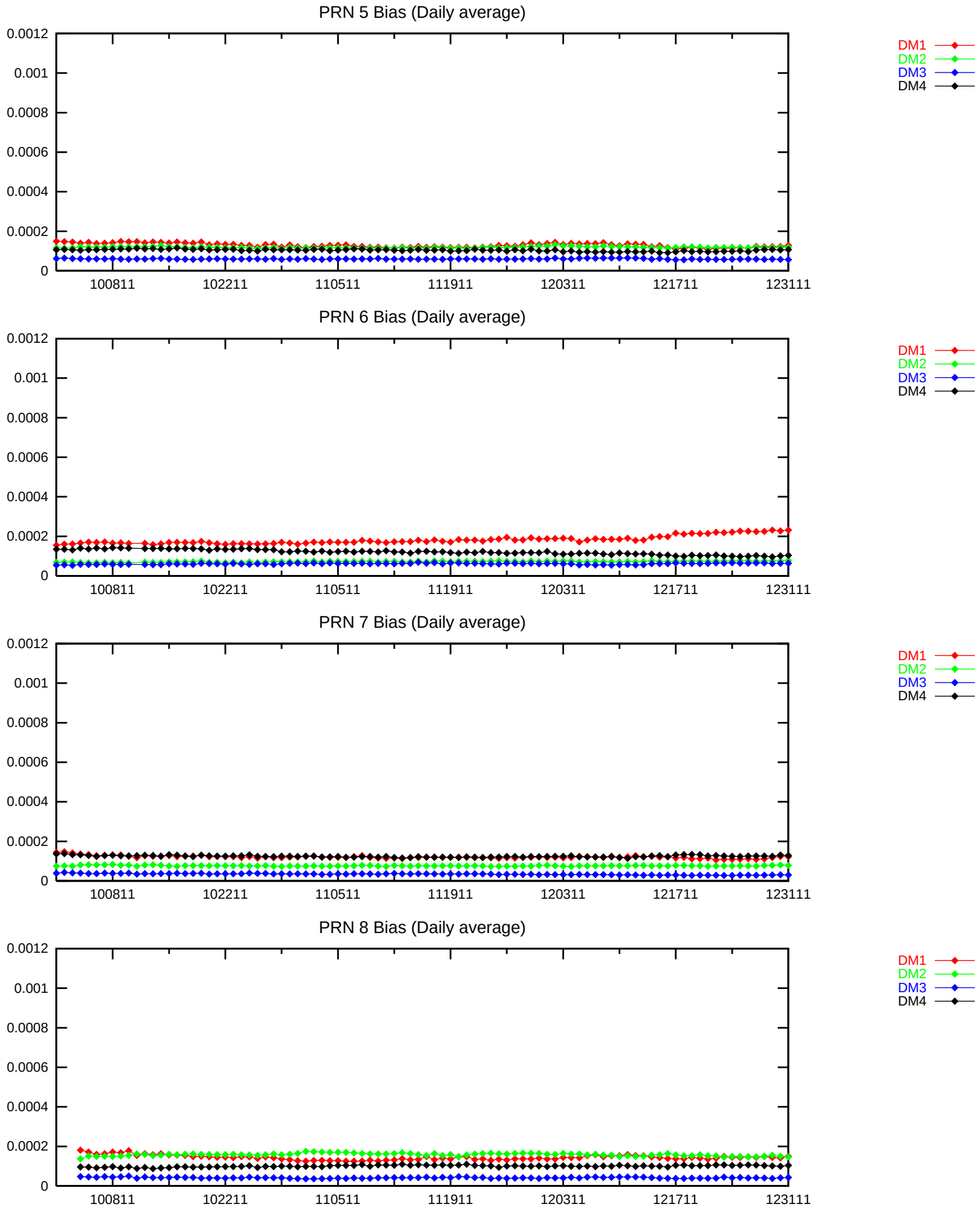


Figure 11-5 PRN Bias Average Trend (PRN 9 - PRN 12)

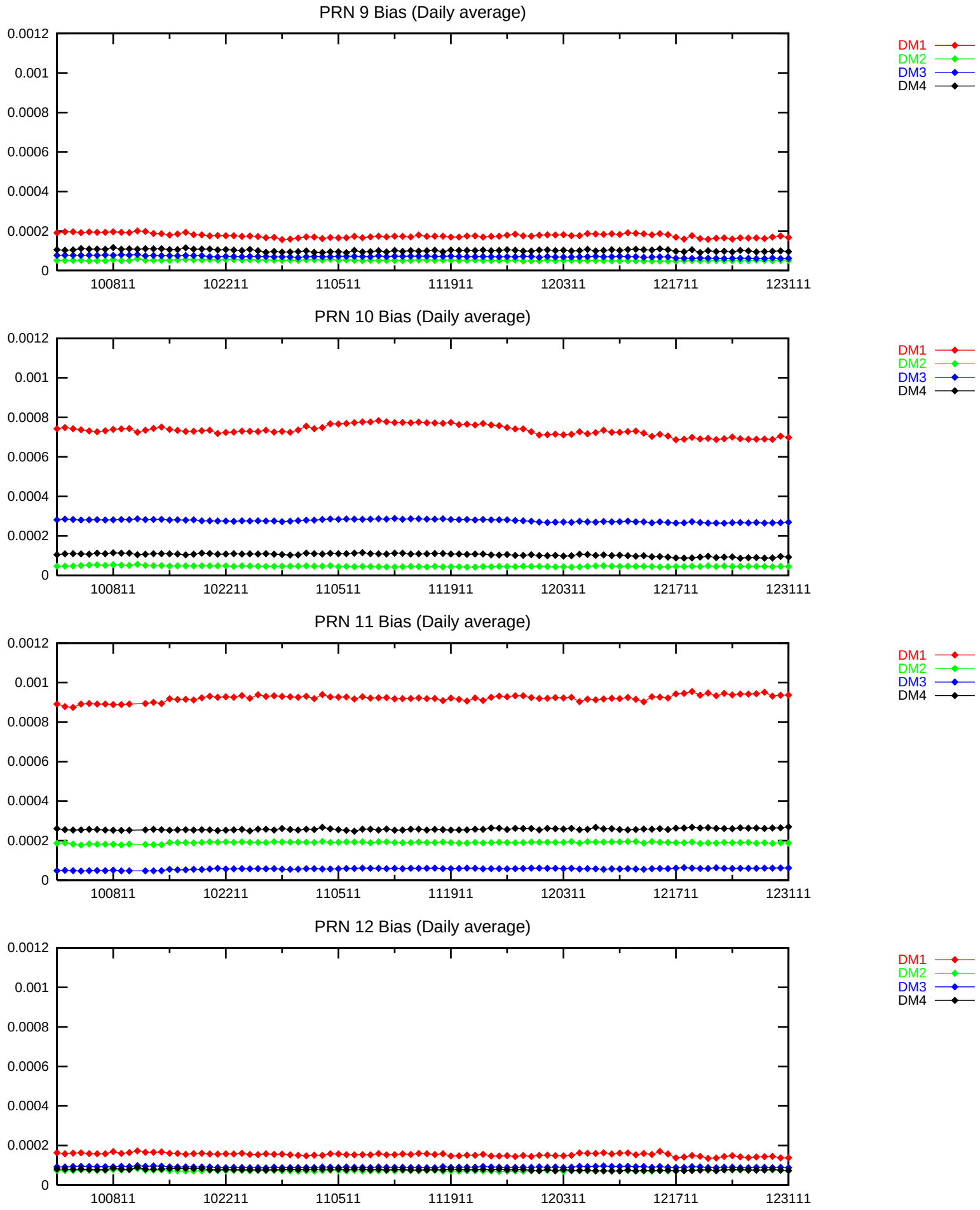


Figure 11-6 PRN Bias Average Trend (PRN 13 - PRN 16)

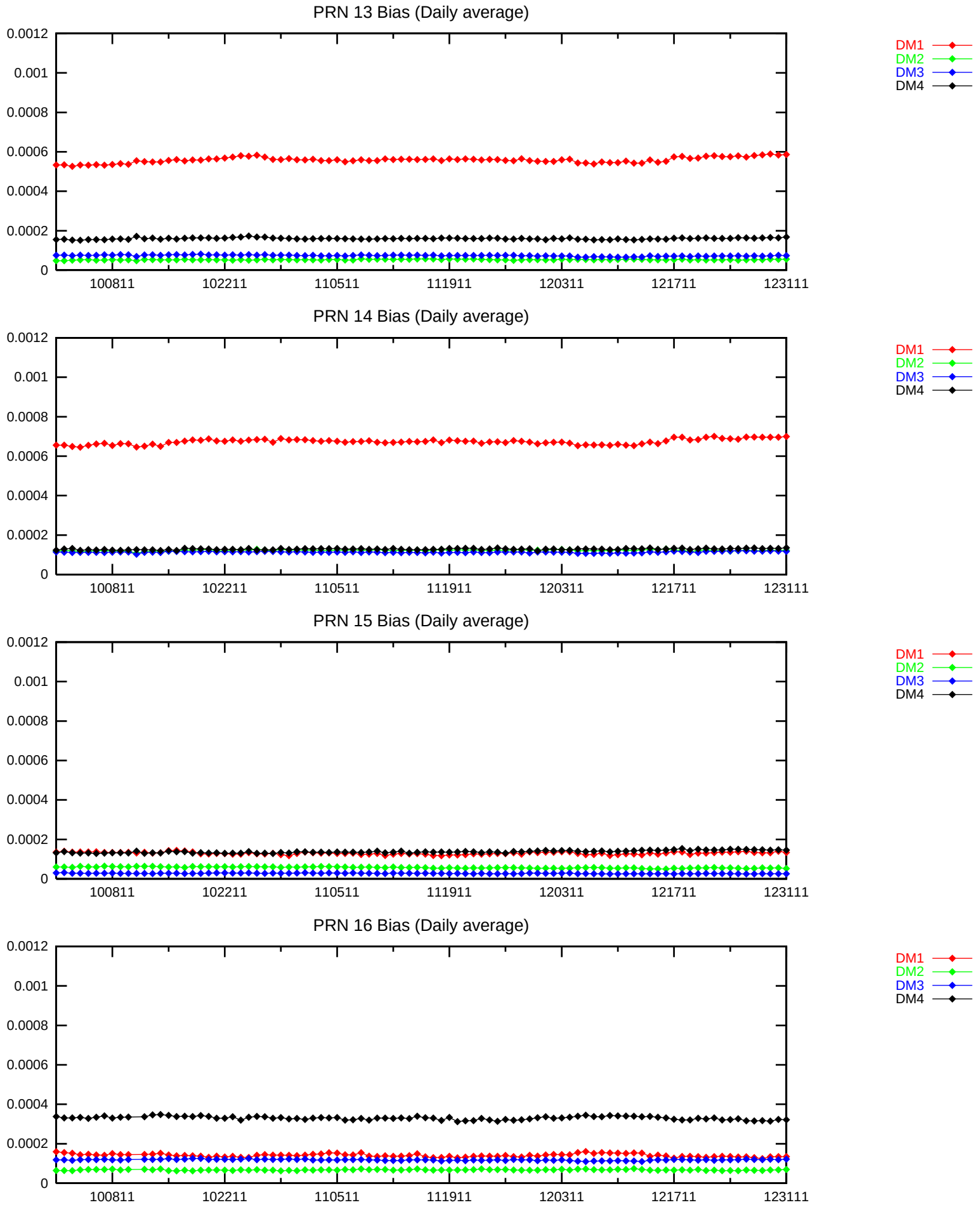


Figure 11-7 PRN Bias Average Trend (PRN 17 - PRN 20)

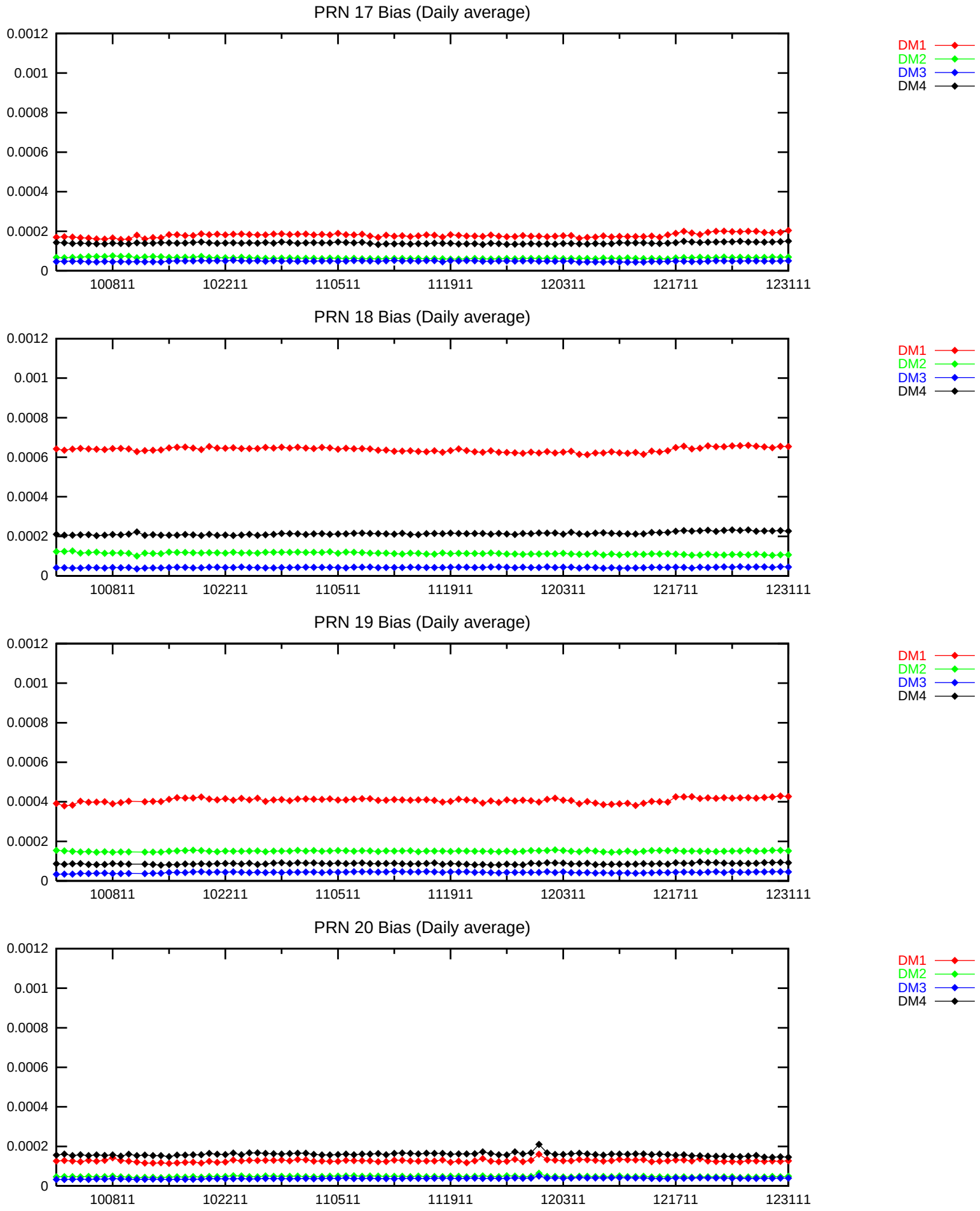


Figure 11-8 PRN Bias Average Trend (PRN 21 - PRN 24)

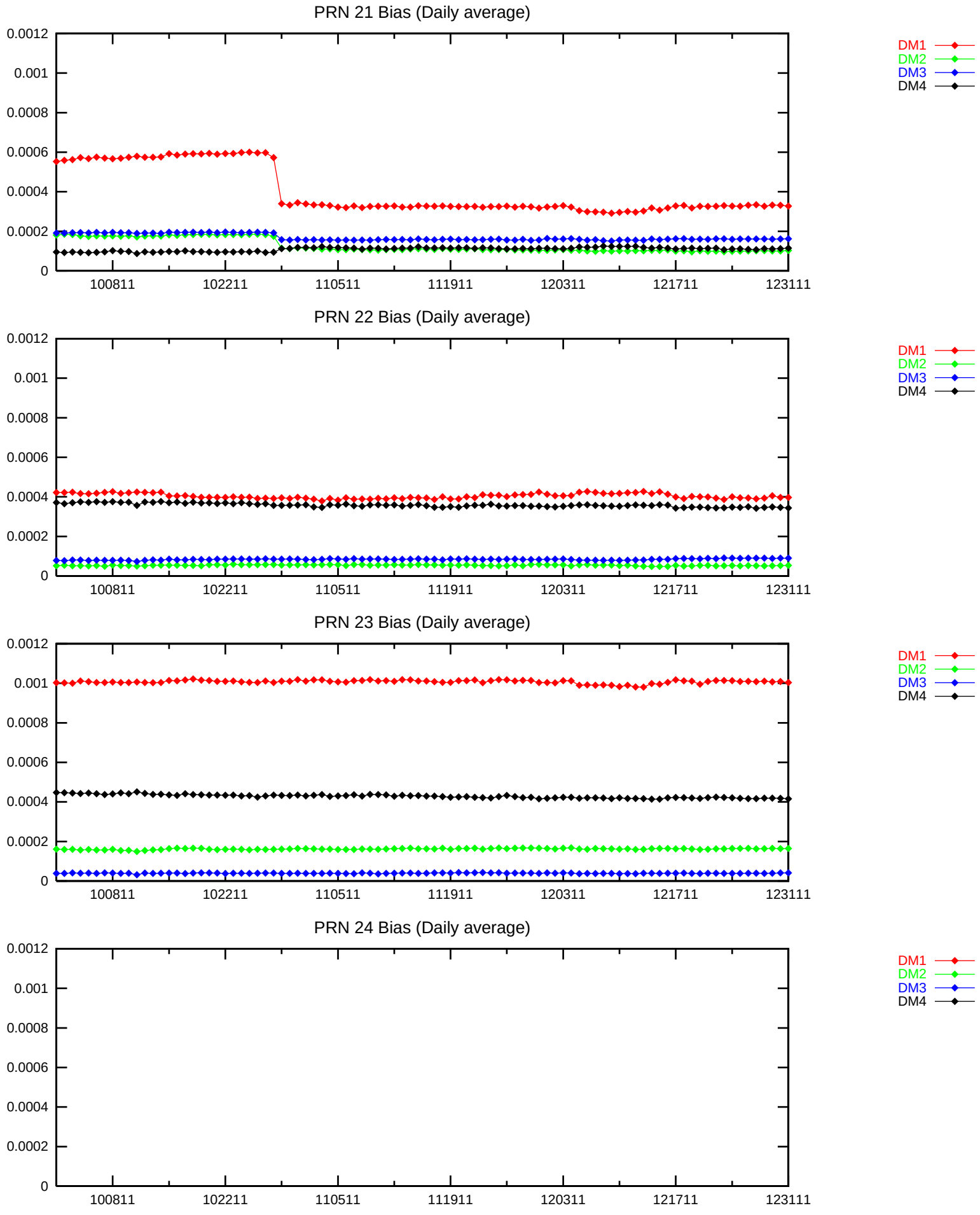


Figure 11-9 PRN Bias Average Trend (PRN 25 - PRN 28)

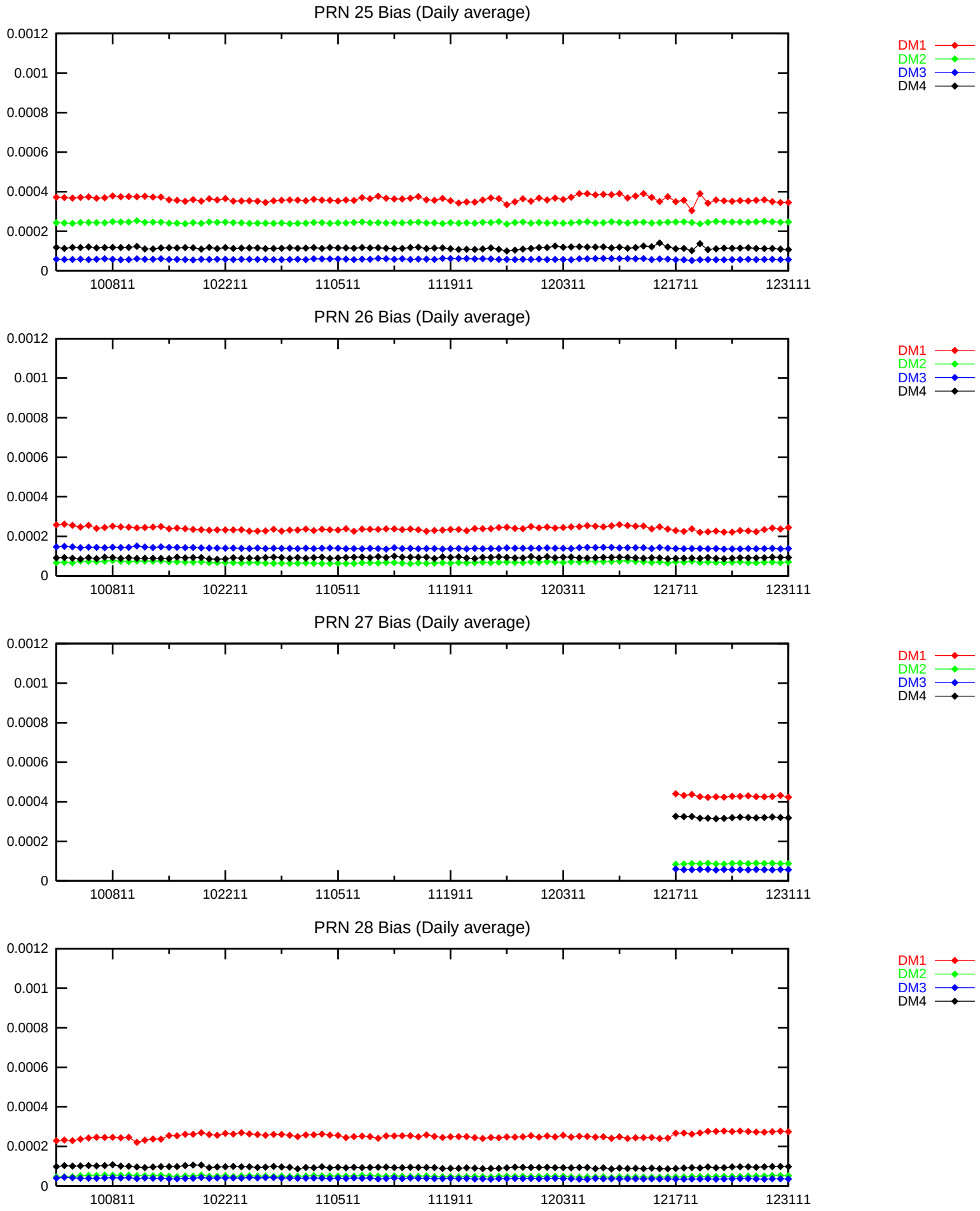
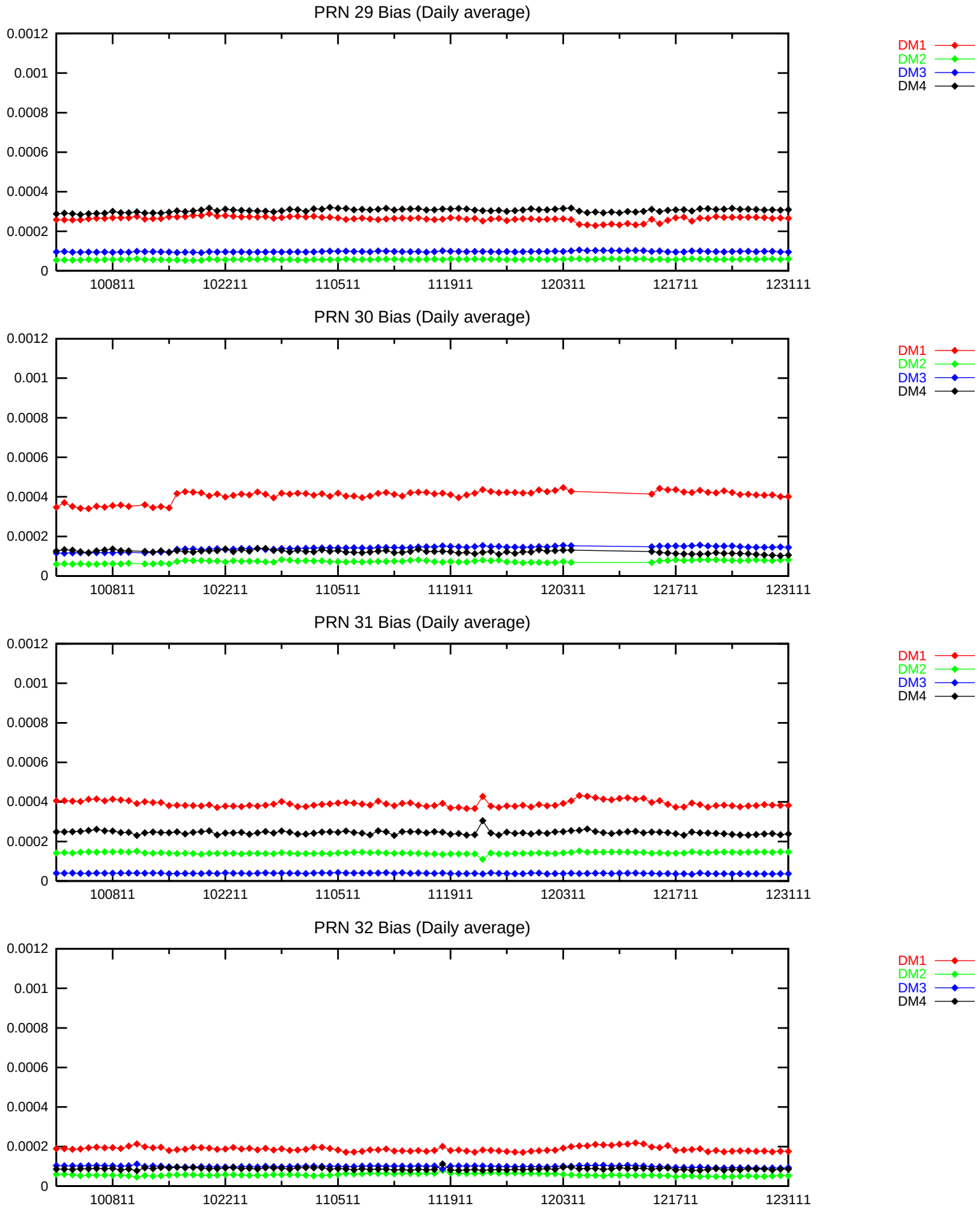


Figure 11-10 PRN Bias Average Trend (PRN 29 - PRN 32)



11.4 SQM Trips

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

12.0 GPS Broadcast Orbit vs. IGS Precise Orbits Analysis

As part of the WAAS off-line monitoring process, the accuracy of the GPS broadcast ephemeris is periodically compared to the NGA precise orbit information to monitor the validity of an a priori assumption concerning the accuracy of the GPS broadcast ephemeris information that is part of a brute force computer simulation analysis utilized as part of the safety proof of the WAAS MT-28 functionality. That brute force analysis searches a simulated error sphere around a GPS satellite for a worst-case projection of post correction ephemeris error to any user. A pessimistic extrapolation of historical data was used as an a priori to limit the radius of the searched sphere to a finite distance. This periodic off-line monitoring verifies that the original logic of the a priori assumption remains sound.

The assumption being validated is:

Height Error:	+/- 15 meters (standard deviation < 2.8 m),
Along Track Error:	+/- 65 meters (standard deviation < 12.2 m)
Cross Track Error:	+/- 30 meters (standard deviation < 5.6 m)

All NGA high rate 15 minute broadcast navigation data RINEX format files are downloaded and merged into 24 hour broadcast navigation data files. A majority voting algorithm is used to screen the high rate navigation data after a LSB recovery algorithm is applied. NGA APC precise ephemeris referenced to the GPS satellite antenna phase center is downloaded from the NGA site. GPS satellite positions are computed every 15 minutes and differenced with the precise orbits. The resulting error information is then segregated into the Height, Along Track, and Cross Track (HAC) error data. The standard deviation of the error is then computed for each dimension for each satellite.

The assumption is valid if a 5.33 scaling of the standard deviation across all satellites is within the a priori. Only data points where GPS is healthy and valid precise data is available are considered. Figure 11-3 shows the availability of data. There were no points where GPS was healthy and the NGA data was missing.

One year of data from 1/1/11 to 12/31/11 is presented. Figure 11-1 is a plot of the standard deviations. Figure 11-2 is a plot of the error means. The worst case standard deviations meet the criteria, therefore the assumption is validated.

The sign convention for this analysis is error = broadcast ECEF - precise ECEF. Along track is positive in the direction of the velocity vector. Cross track completes a right hand system with height and along track.

Figures 11-4 through 11-35 are plots of the height, along track, and cross track error relative to NGA precise orbits by PRN number. These plots do not include clock error.

Figures 11-36 through 11-44 are QQ plots of the largest URA normalized total range error (height, along track, cross track, and clock) projected onto the surface of the earth. +/- 13.8° from the boresight of the satellite is used to approximate the surface of the earth. The QQ plot axis's have been fixed at +/- 5

Figures 11-45 through 11-77 are histograms of the height error, along track error, cross track error, and URA normalized range error. Figures 11-78 to 11-110 are the timelines of the URA normalized range error and are also labeled with the pertinent NANUs.

Figure 12-1 GPS Broadcast Orbit Accuracy Standard Deviations

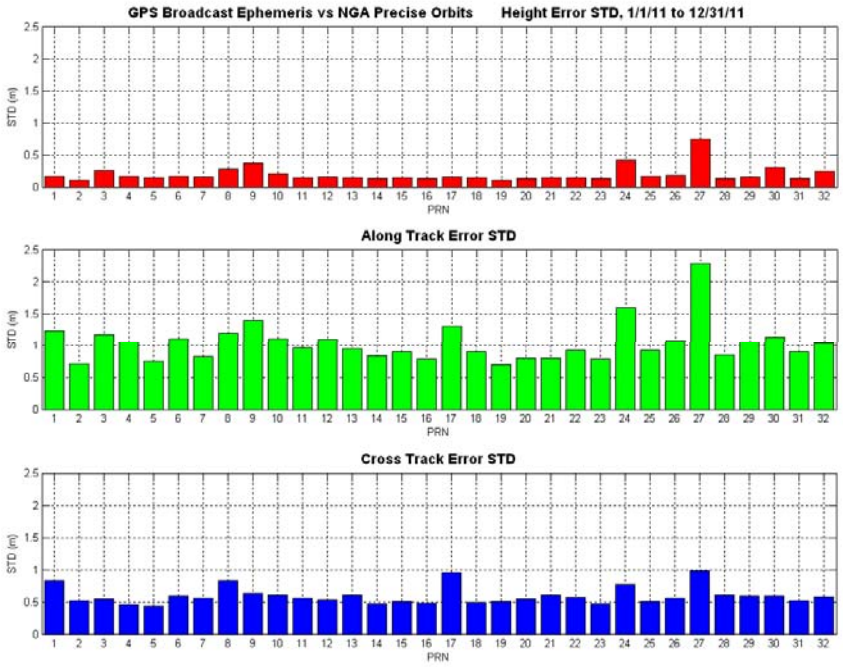


Figure 12-2 GPS Broadcast Orbit Error Means

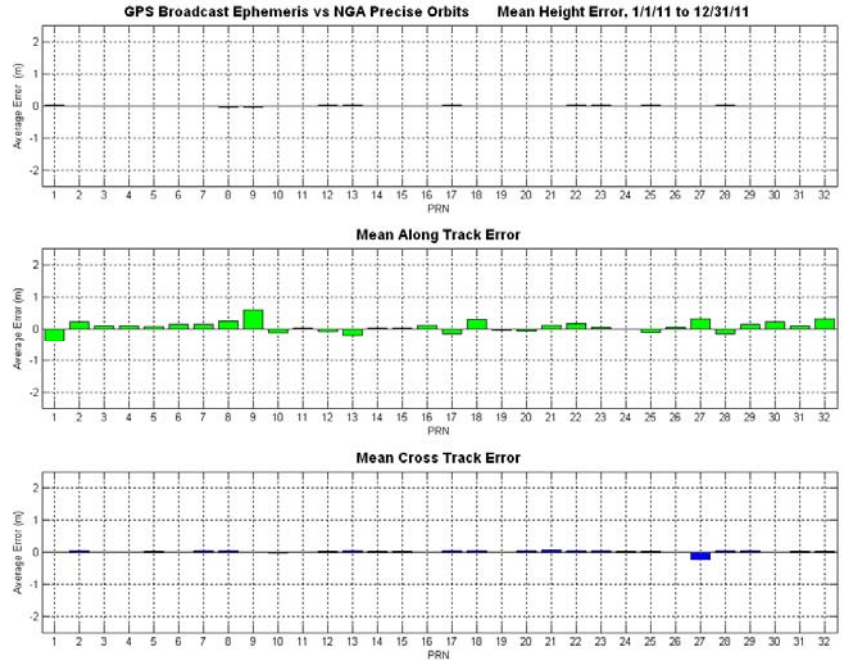


Figure 12-3 Broadcast Ephemeris vs. NGA Precise Data Availability

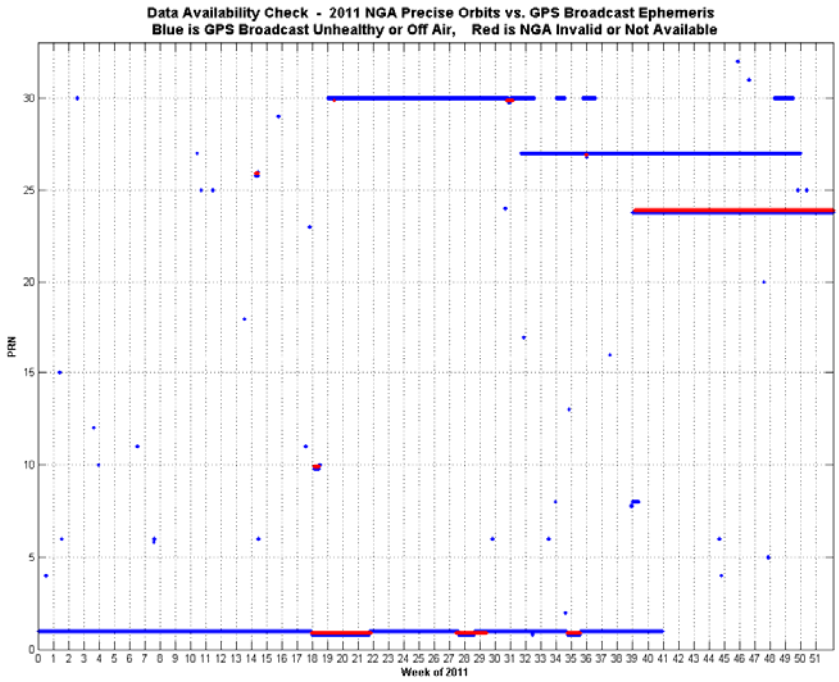


Figure 12-4 Orbit Error PRN-1 (SVN-63)

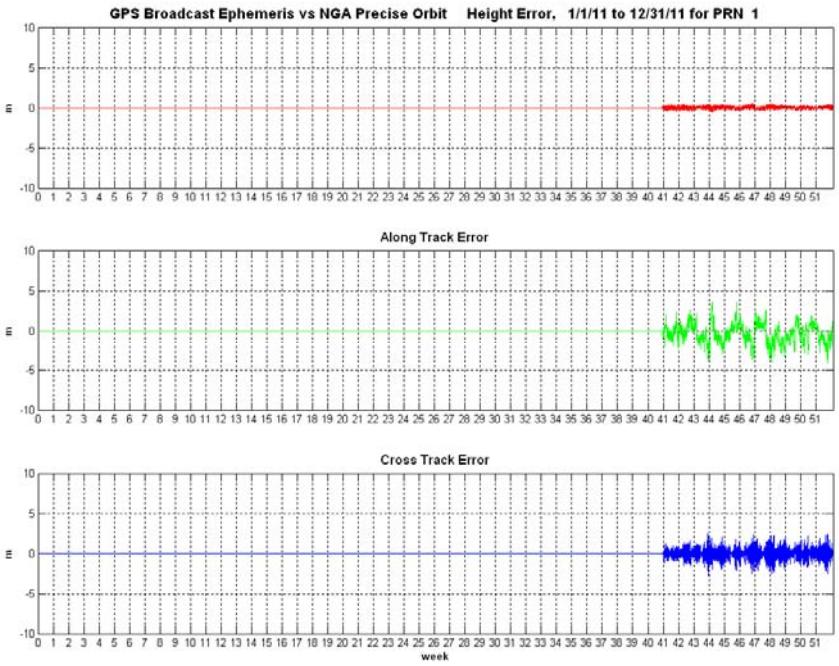


Figure 12-5 Orbit Error PRN-2 (SVN-61)

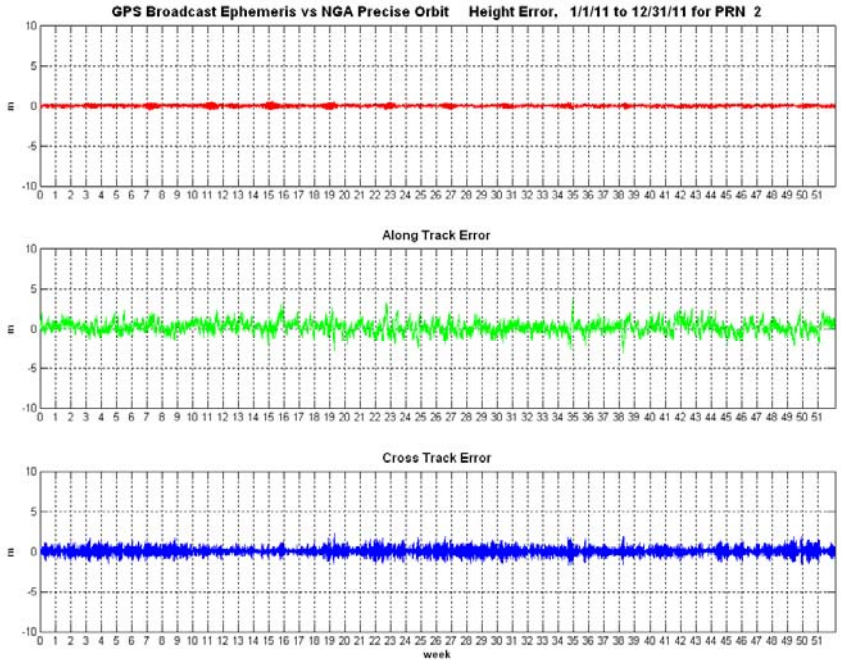


Figure 12-6 Orbit Error PRN-3 (SVN-33)

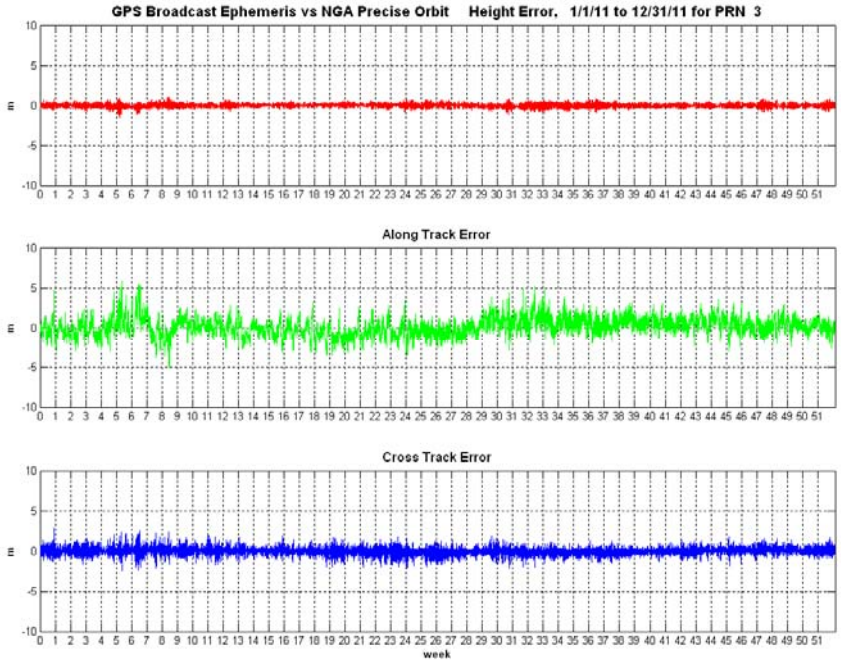


Figure 12-7 Orbit Error PRN-4 (SVN-34)

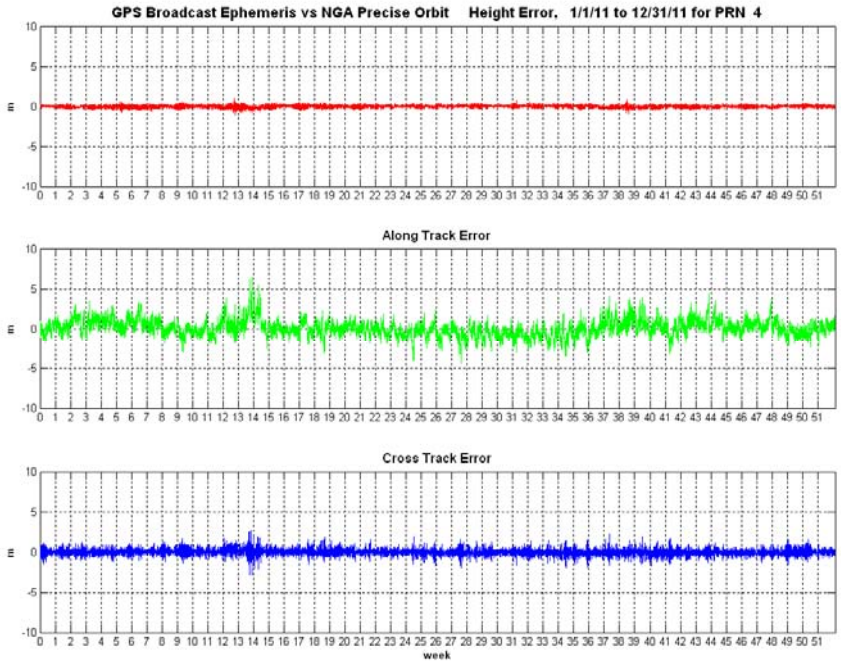


Figure 12-8 Orbit Error PRN-5 (SVN-50)

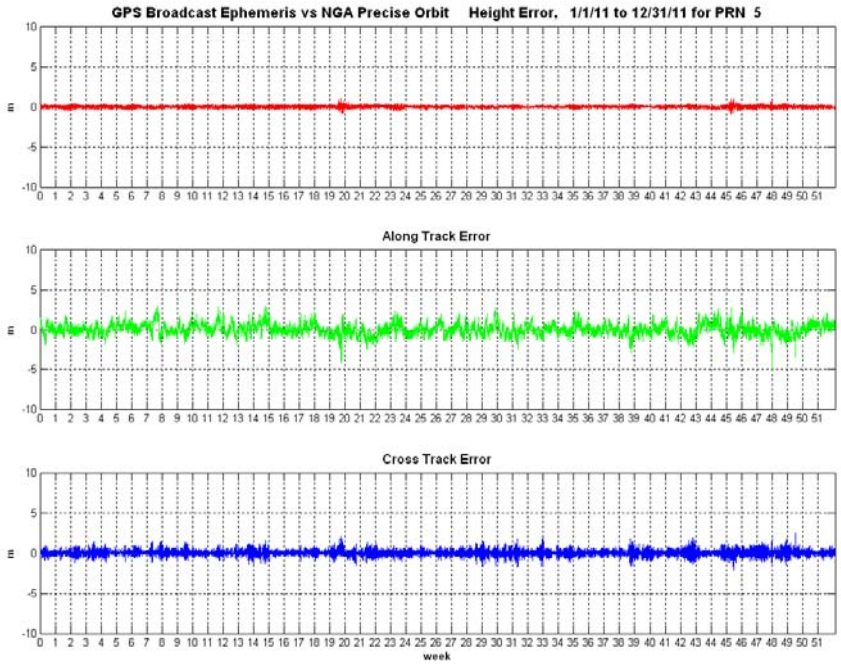


Figure 12-9 Orbit Error PRN-6 (SVN-36)

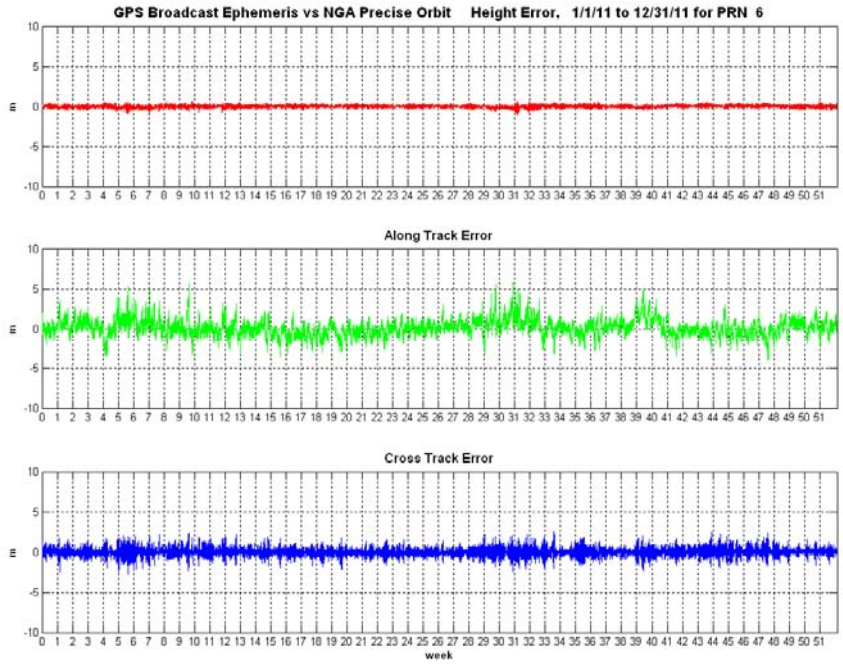


Figure 12-10 Orbit Error PRN-7 (SVN-48)

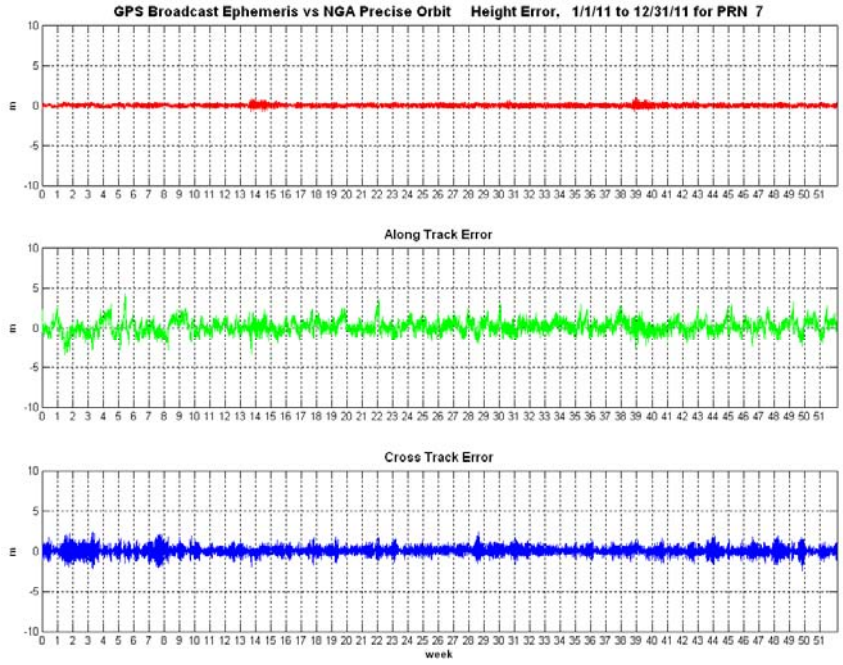


Figure 12-11 Orbit Error PRN-8 (SVN-38)

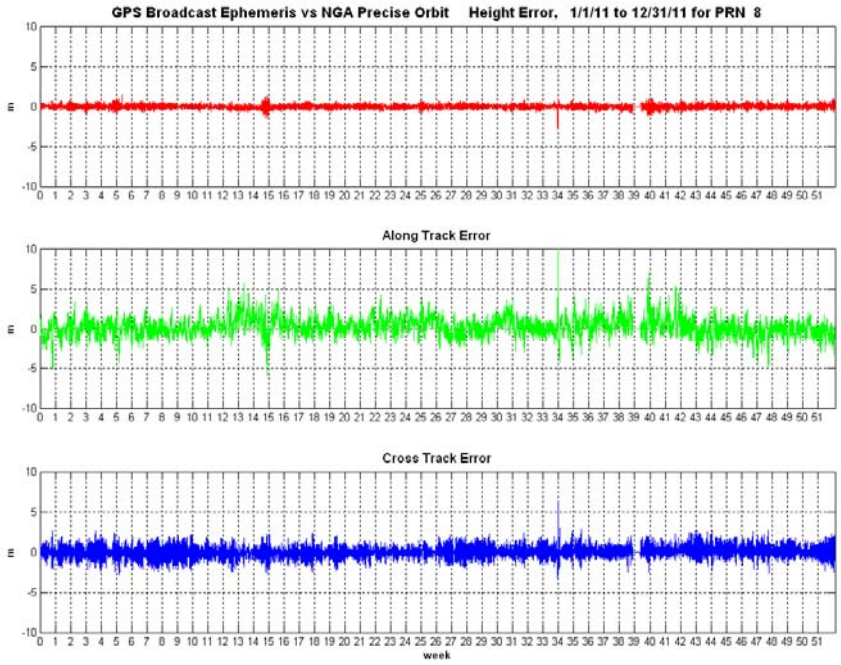


Figure 12-12 Orbit Error PRN-9 (SVN-39)

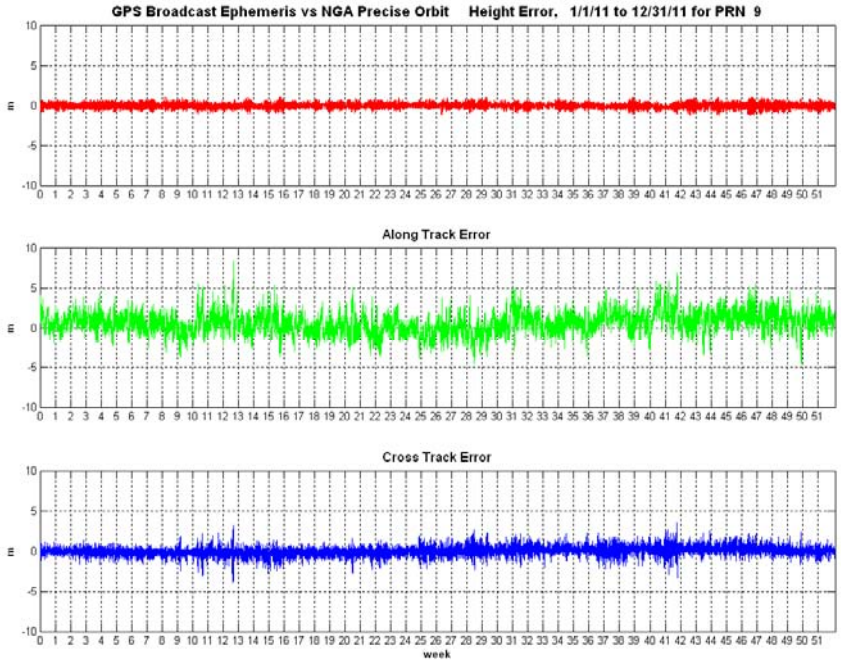


Figure 12-13 Orbit Error PRN-10 (SVN-40)

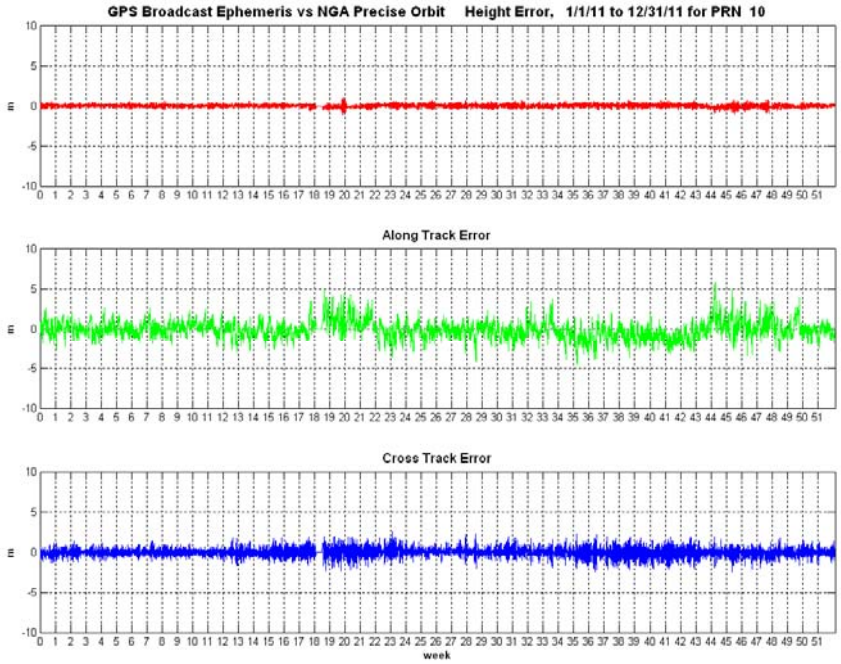


Figure 12-14 Orbit Error PRN-11 (SVN-46)

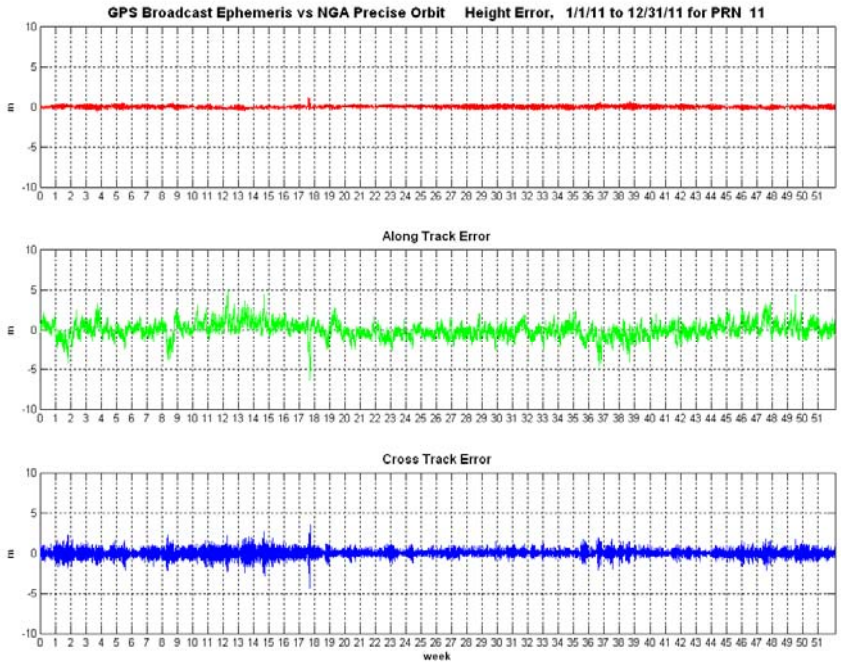


Figure 12-15 Orbit Error PRN-12 (SVN-58)

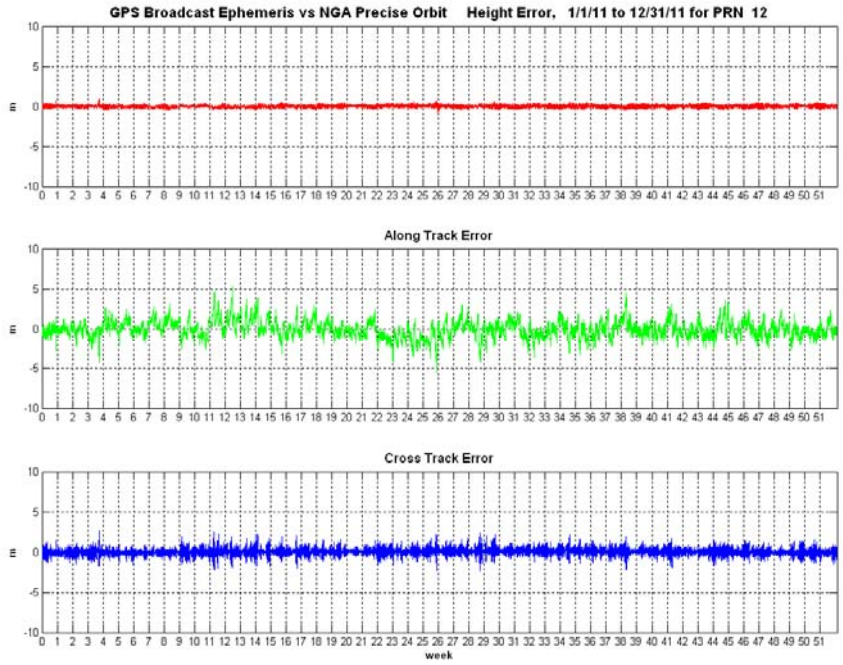


Figure 12-16 Orbit Error PRN-13 (SVN-43)

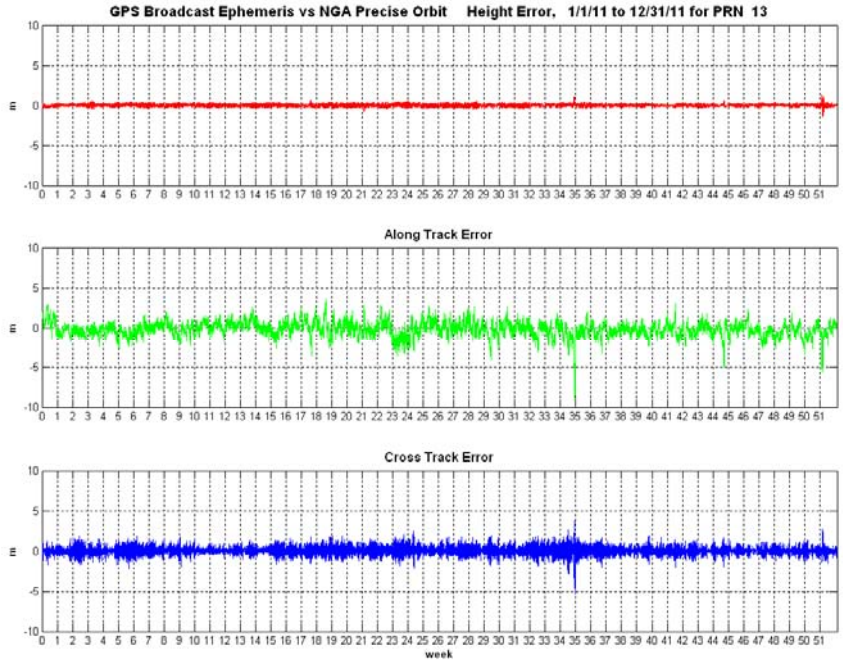


Figure 12-17 Orbit Error PRN-14 (SVN-41)

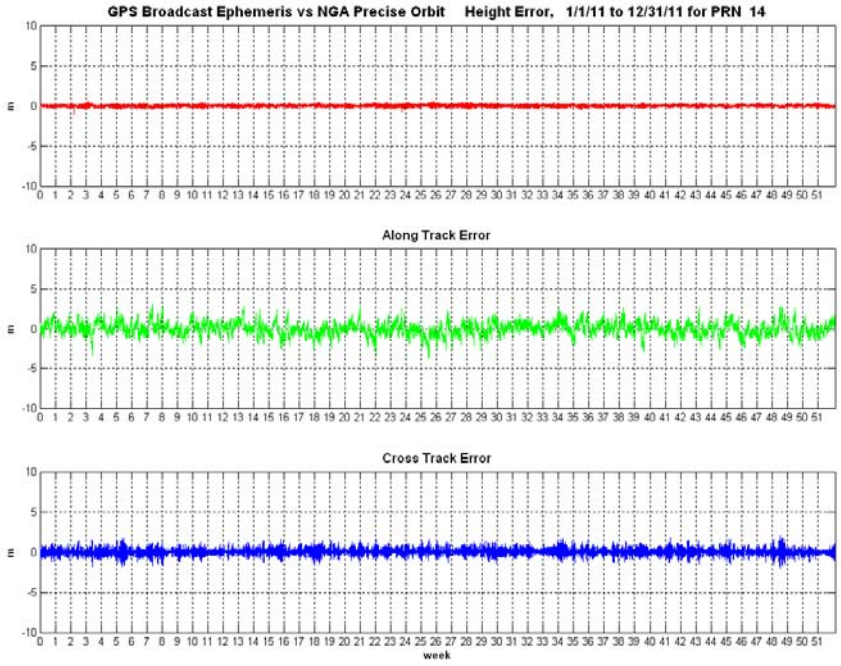


Figure 12-18 Orbit Error PRN-15 (SVN-55)

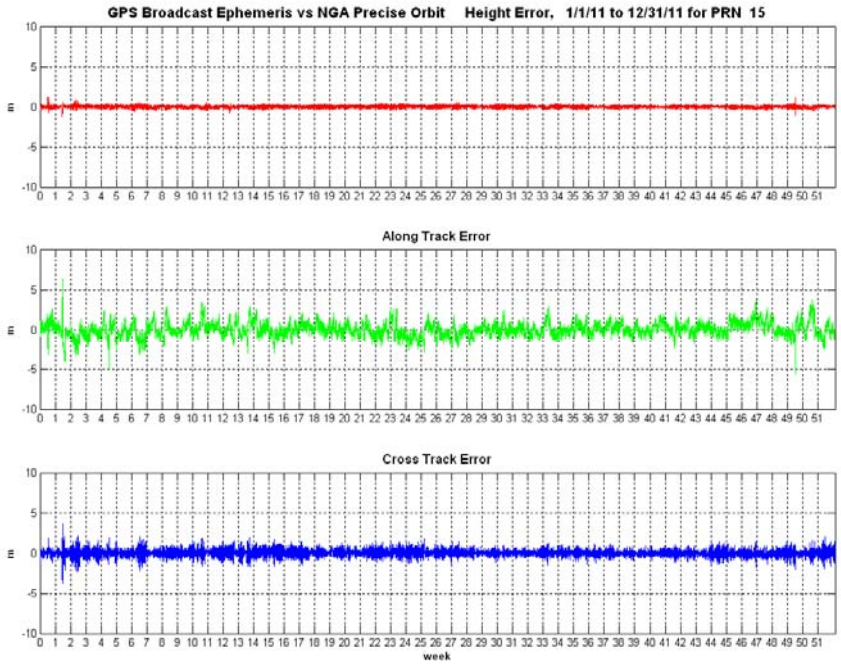


Figure 12-19 Orbit Error PRN-16 (SVN-56)

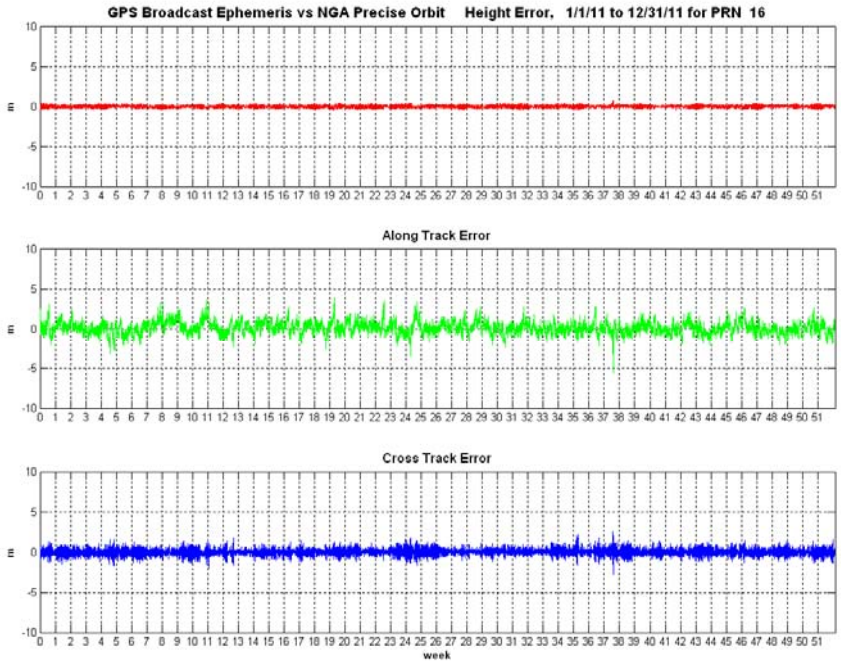


Figure 12-20 Orbit Error PRN-17 (SVN-53)

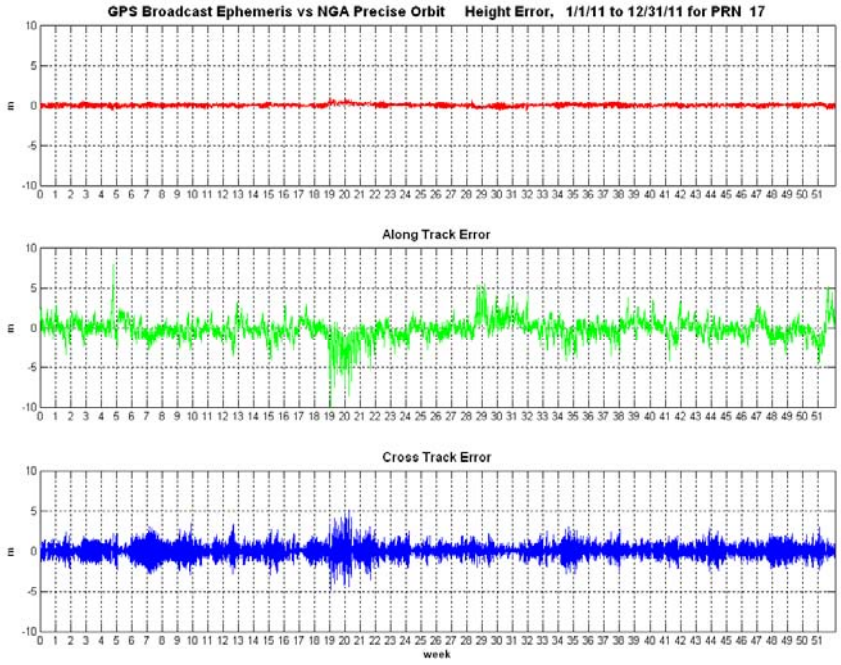


Figure 12-21 Orbit Error PRN-18 (SVN-54)

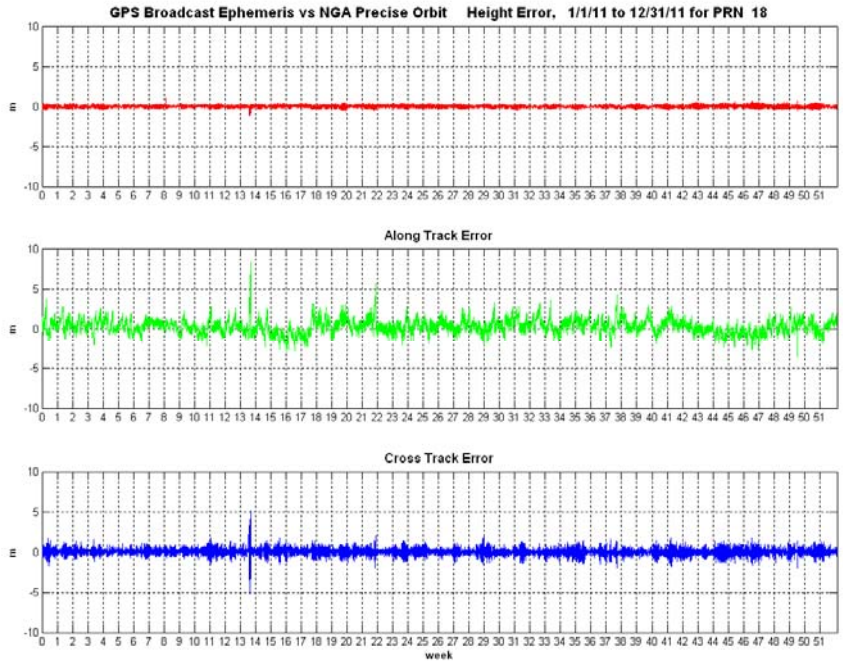


Figure 12-22 Orbit Error PRN-19 (SVN-59)

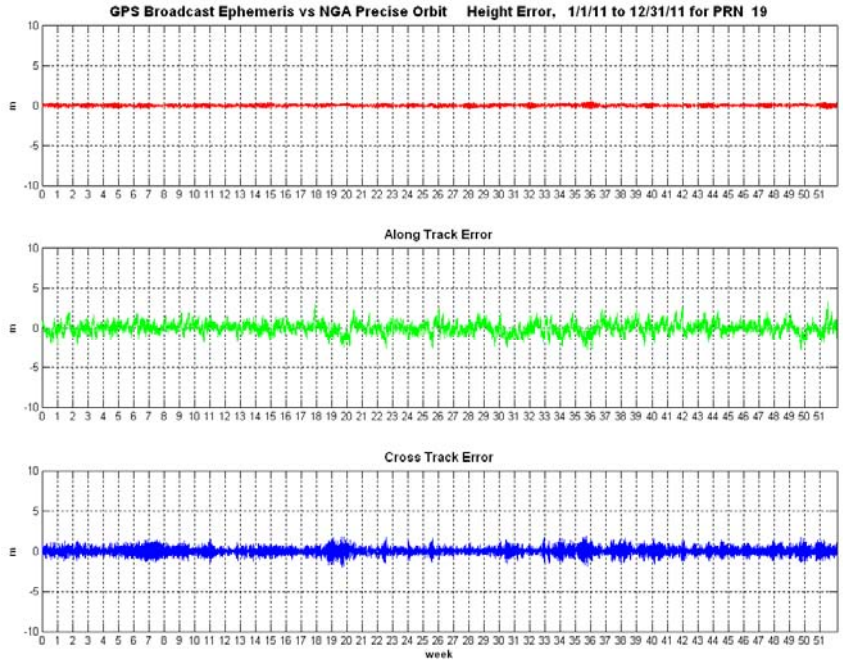


Figure 12-23 Orbit Error PRN-20 (SVN-51)

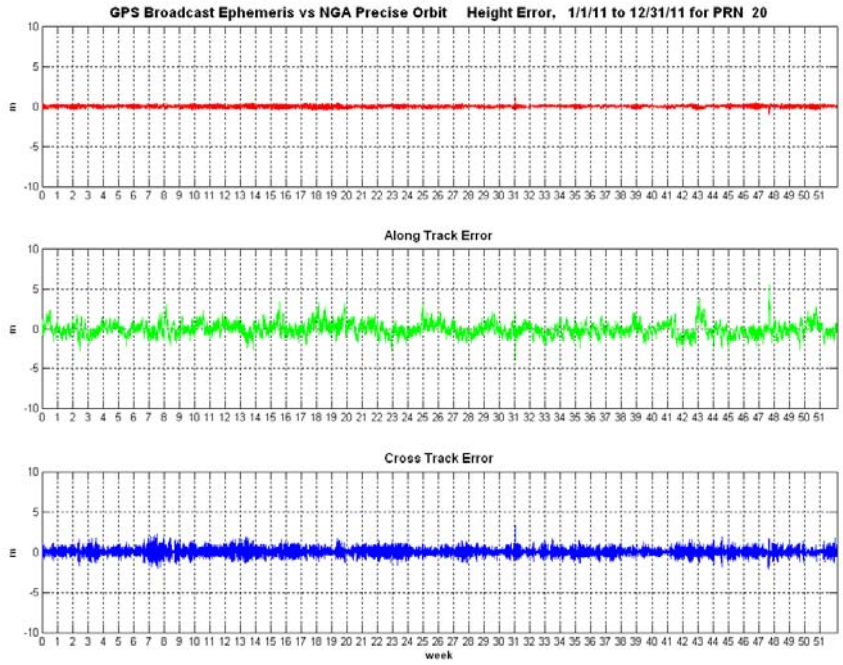


Figure 12-24 Orbit Error PRN-21 (SVN-45)

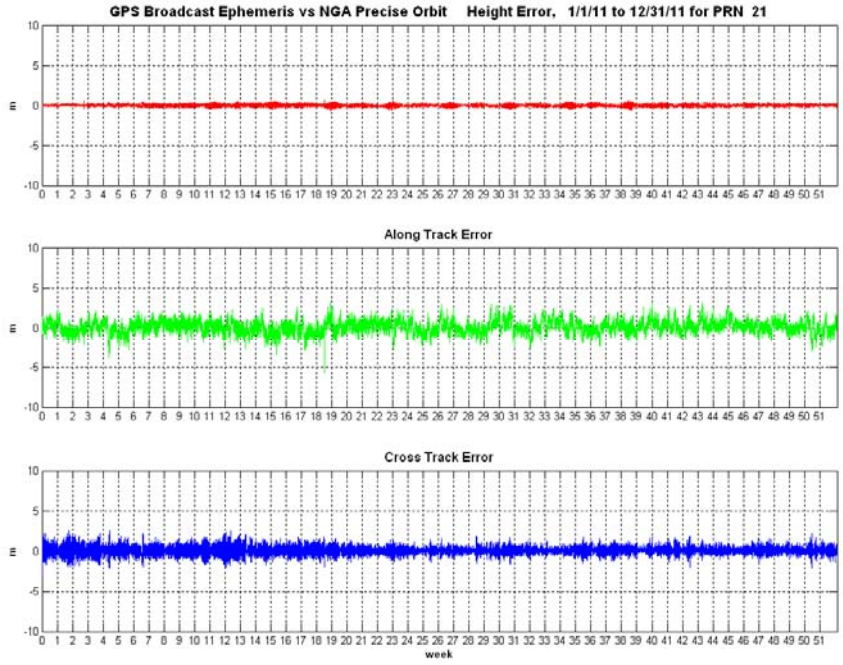


Figure 12-25 Orbit Error PRN-22 (SVN-47)

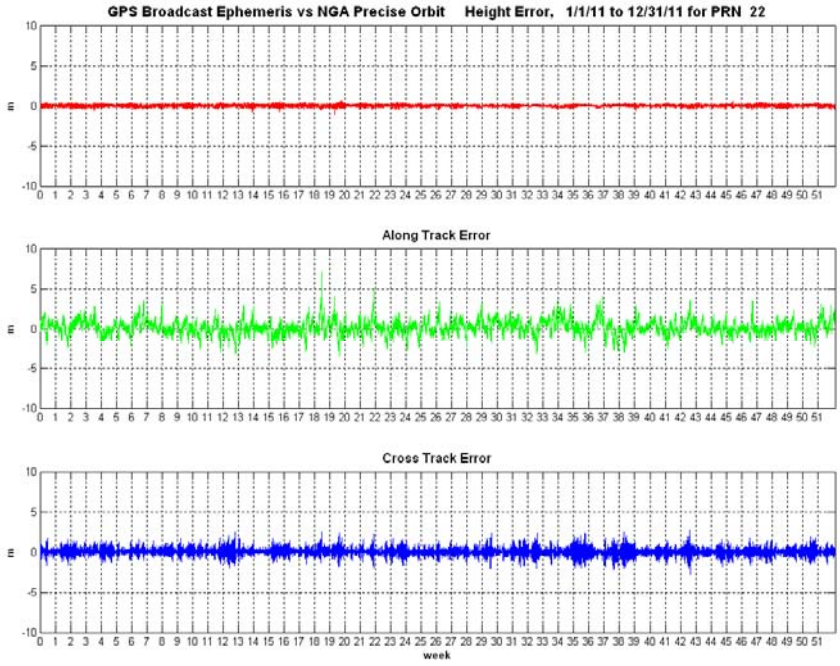


Figure 12-26 Orbit Error PRN-23 (SVN-60)

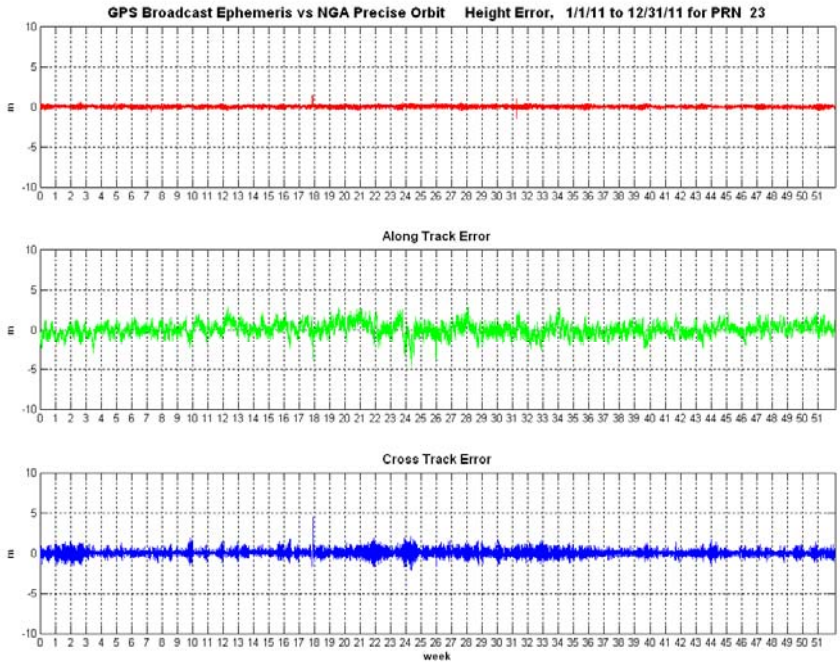


Figure 12-27 Orbit Error PRN-24 (SVN-24)

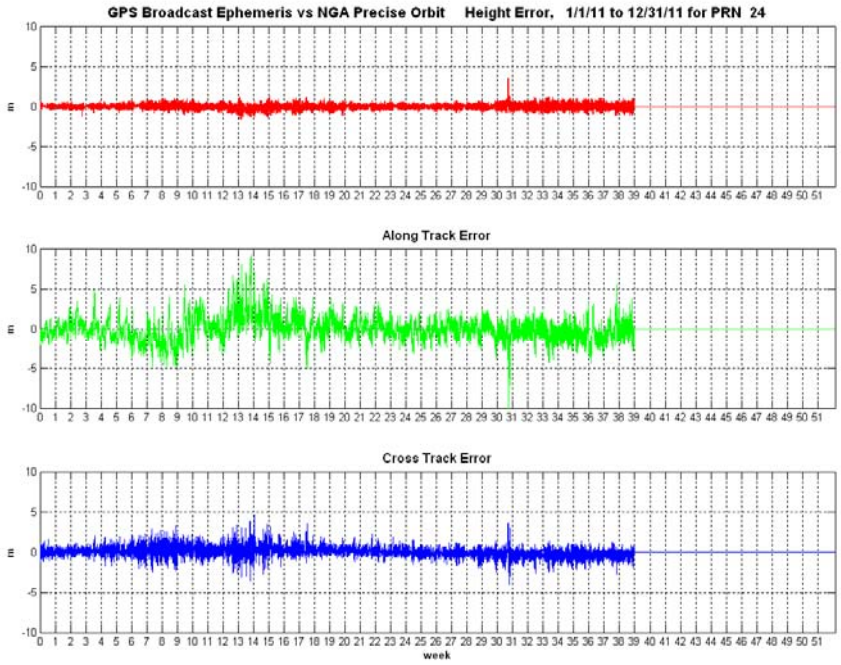


Figure 12-28 Orbit Error PRN-25 (SVN-62)

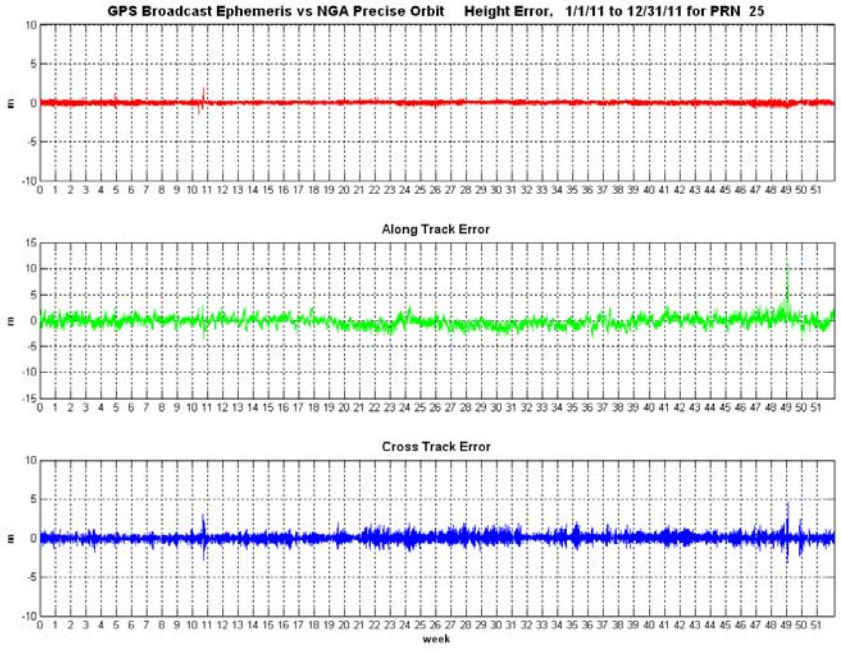


Figure 12-29 Orbit Error PRN-26 (SVN-26)

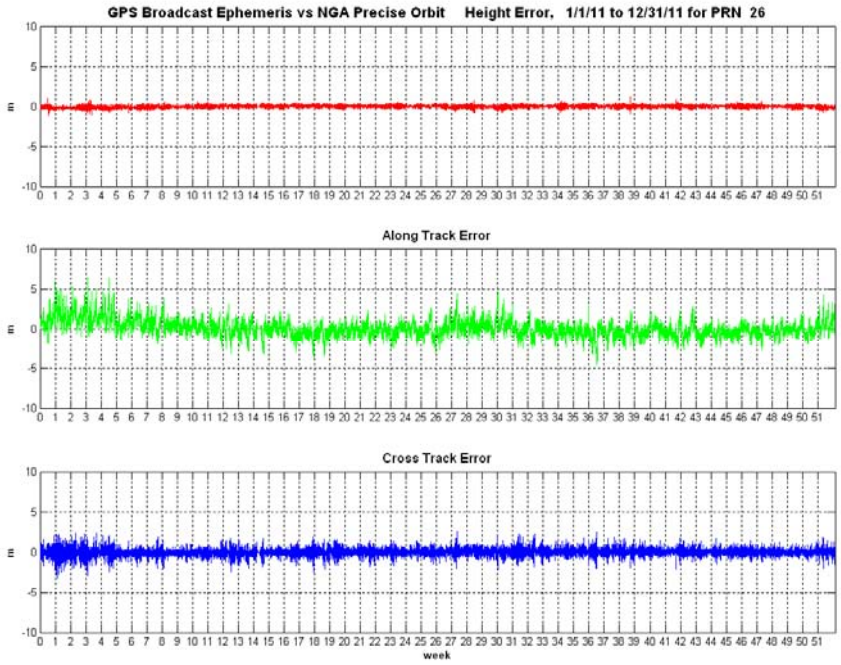


Figure 12-30 Orbit Error PRN-27 (SVN-27)

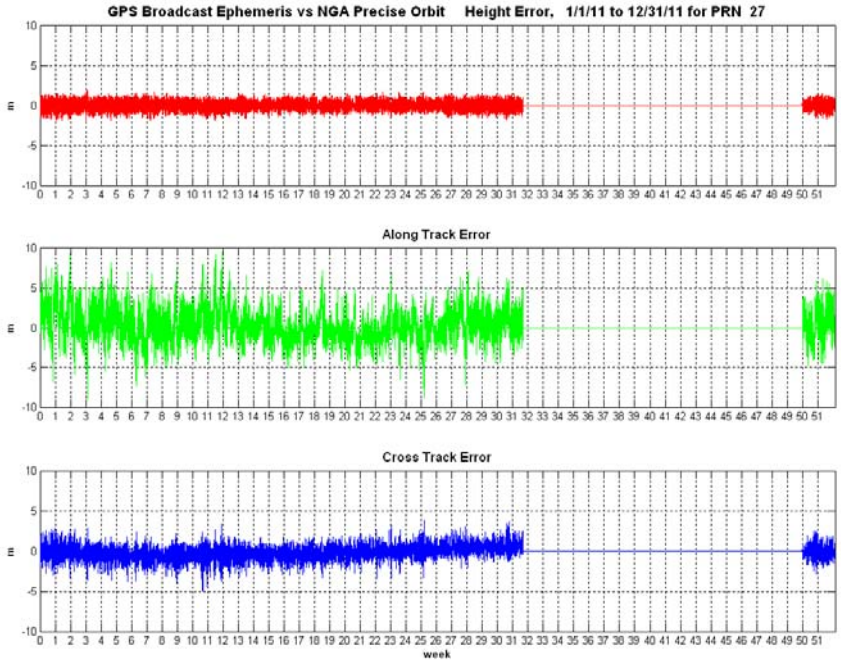


Figure 12-31 Orbit Error PRN-28 (SVN-44)

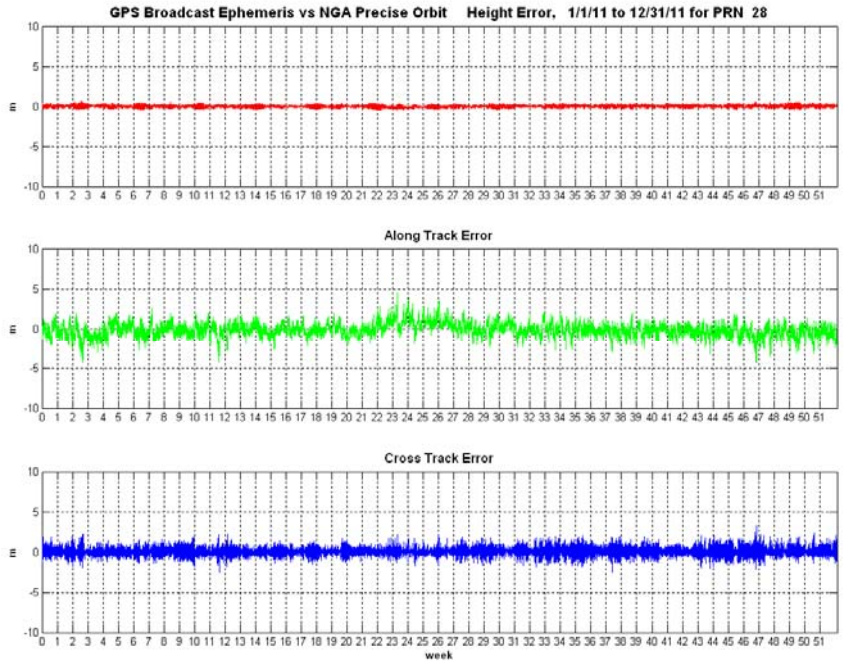


Figure 12-32 Orbit Error PRN-29 (SVN-57)

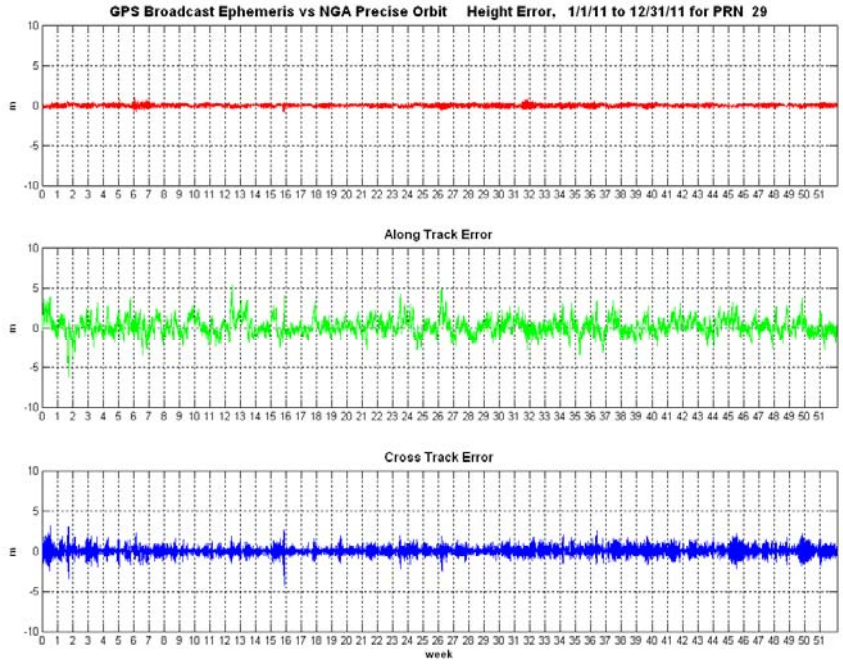


Figure 12-33 Orbit Error PRN-30 (SVN-30, SVN-35)

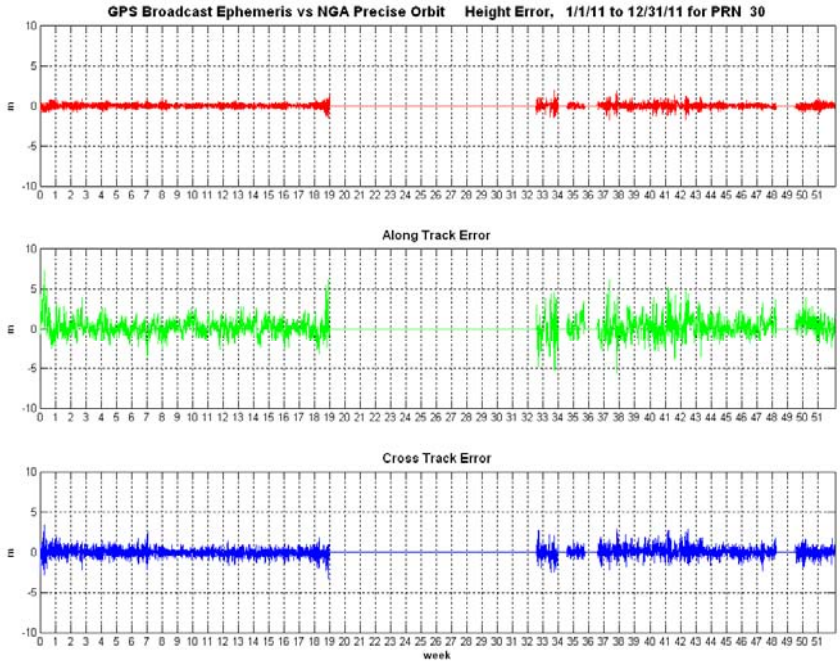


Figure 12-34 Orbit Error PRN-31 (SVN-52)

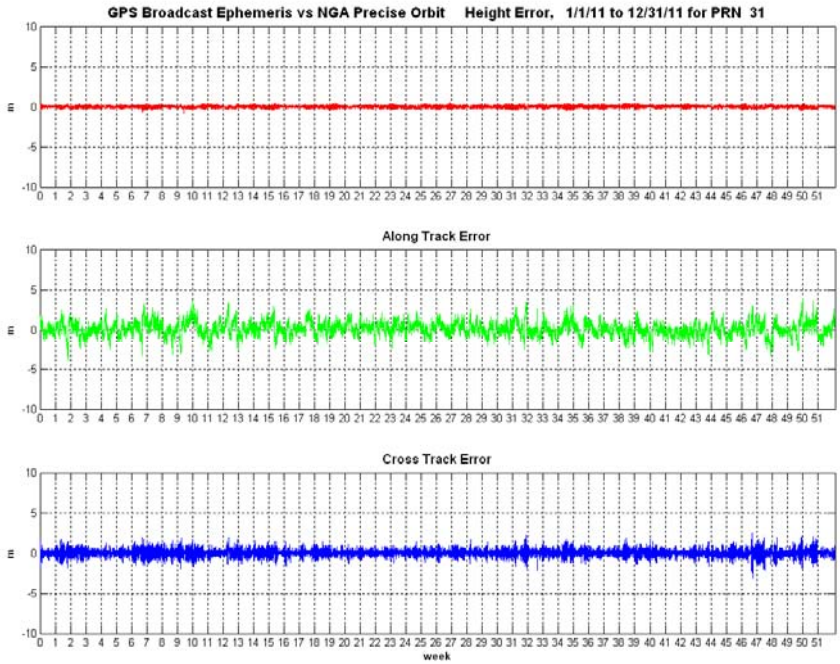


Figure 12-35 Orbit Error PRN-32 (SVN-23)

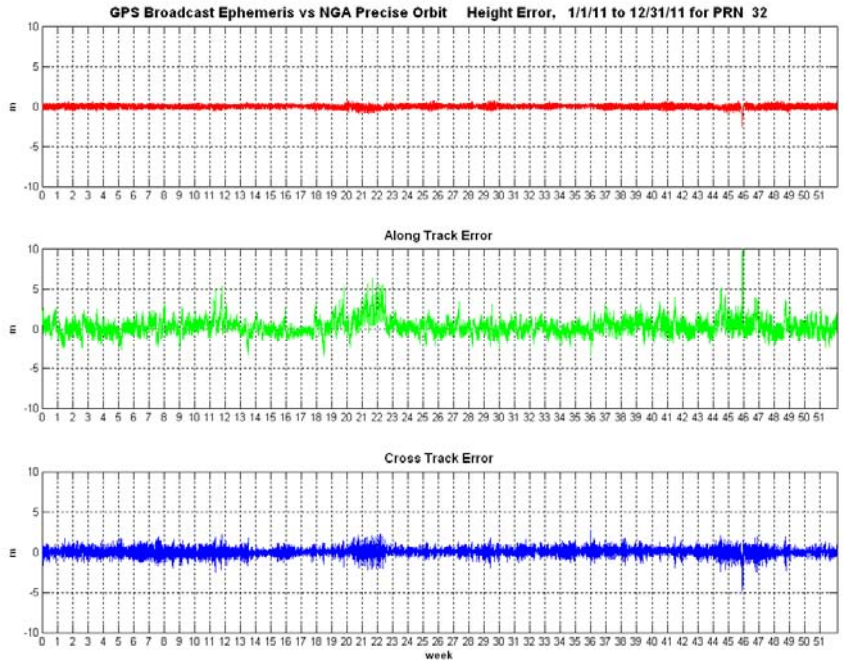


Figure 12-36 QQ Plots of Range Error PRNs 1 to 4

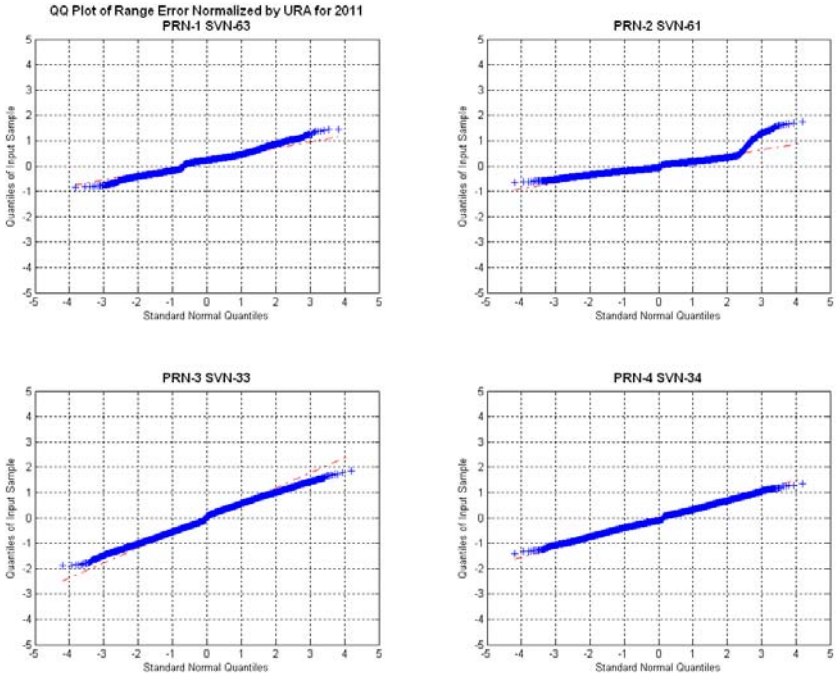


Figure 12-37 QQ Plots of Range Error PRNs 5 to 8

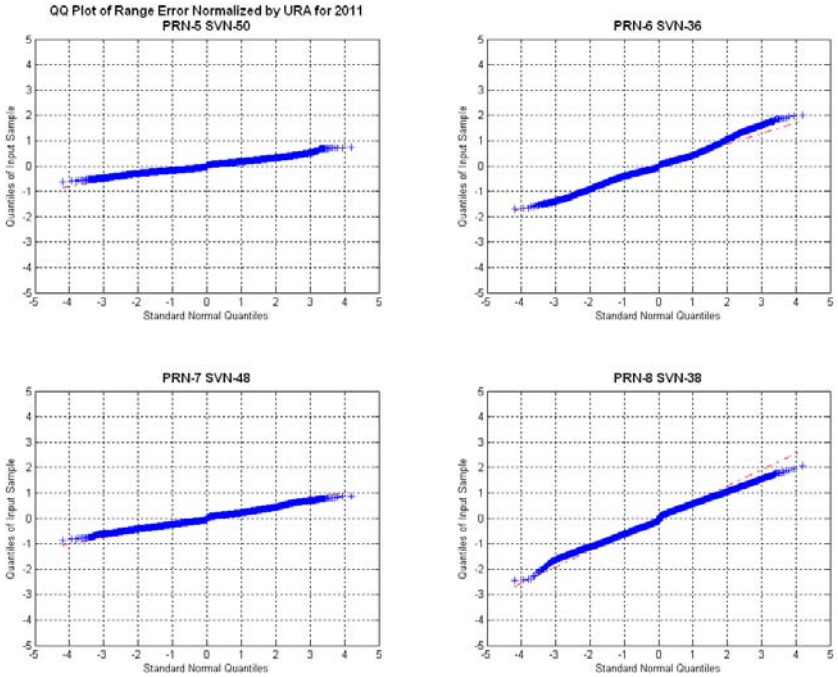


Figure 12-38 QQ Plots of Range Error PRNs 9 to 12

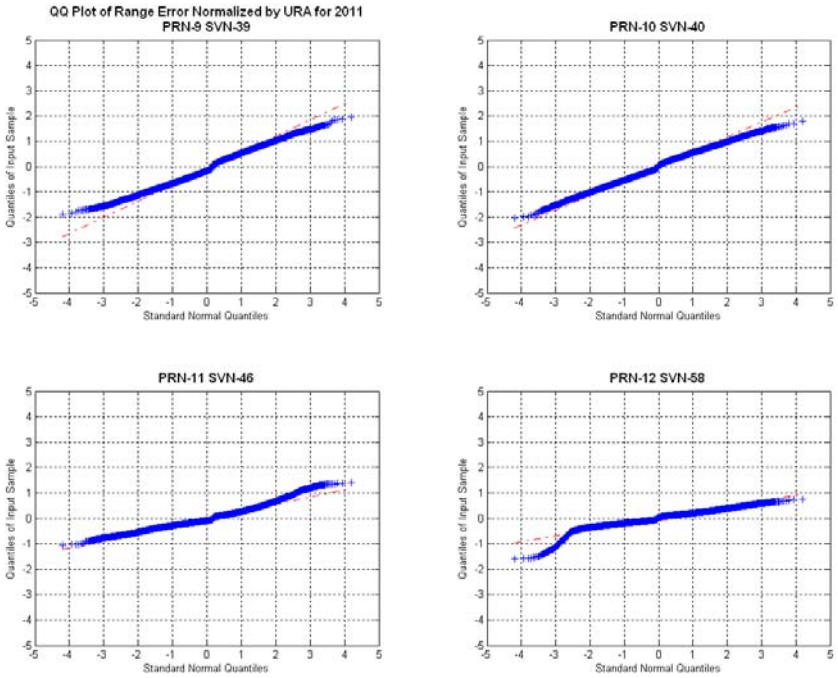


Figure 12-39 QQ Plots of Range Error PRNs 13 to 16

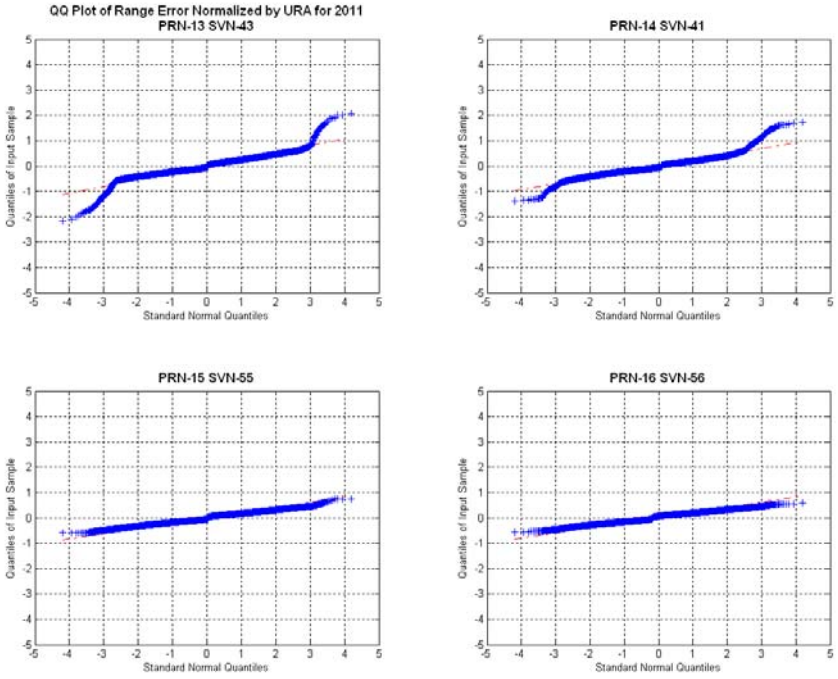


Figure 12-40 QQ Plots of Range Error PRNs 17 to 20

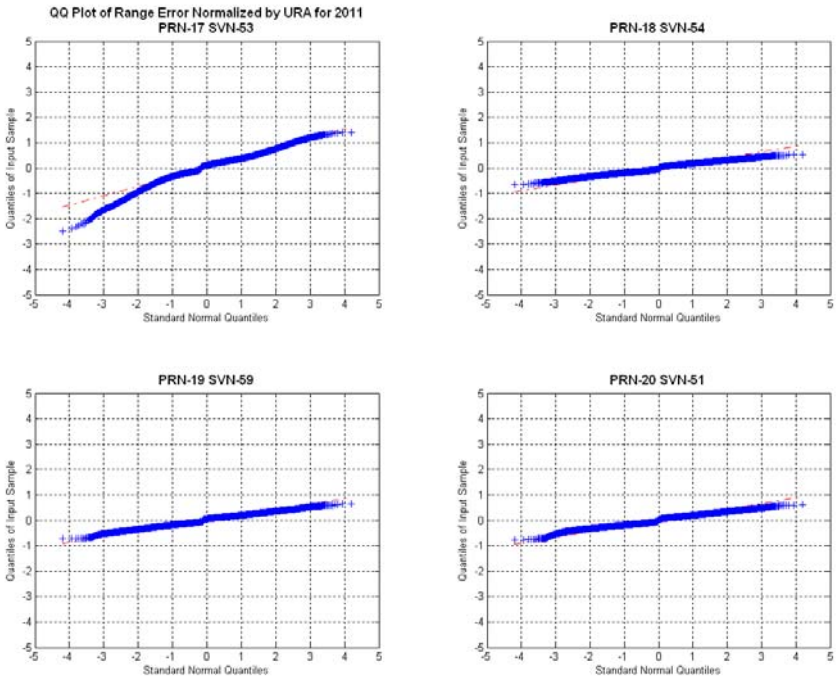


Figure 12-41 QQ Plots of Range Error PRNs 21 to 24

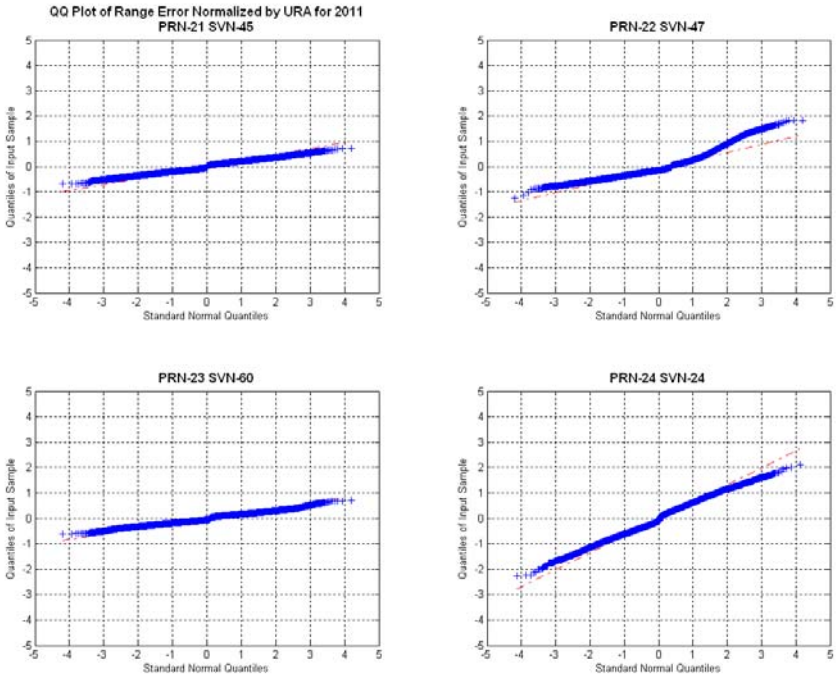


Figure 12-42 QQ Plots of Range Error PRNs 25 to 28

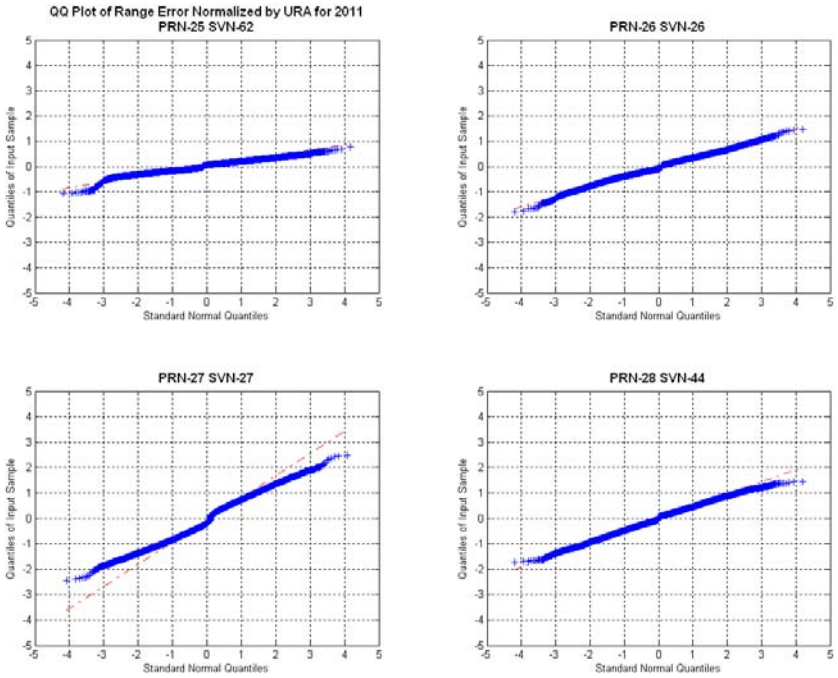


Figure 12-43 QQ Plots of Range Error PRNs 29 to 31

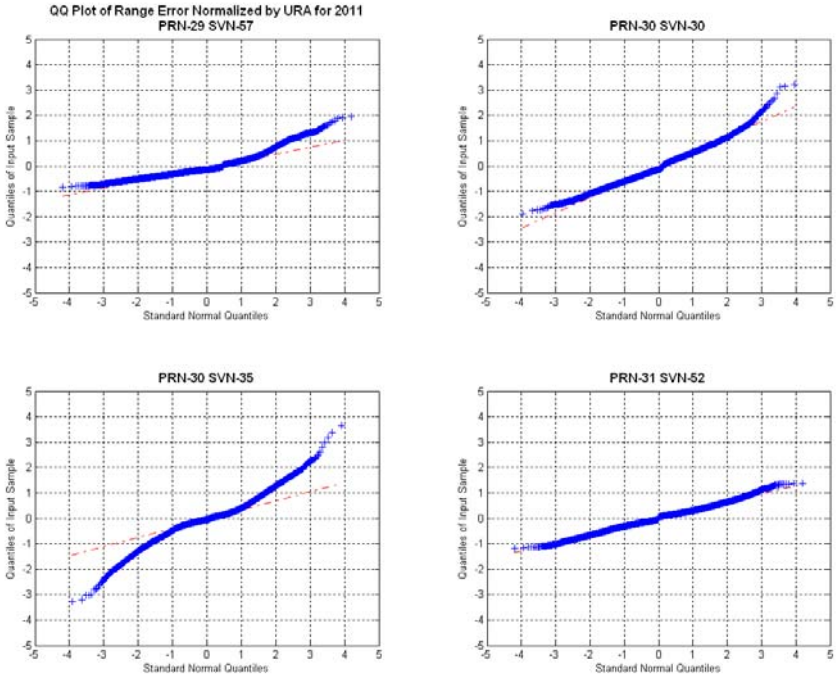


Figure 12-44 QQ Plots of Range Error PRN 32

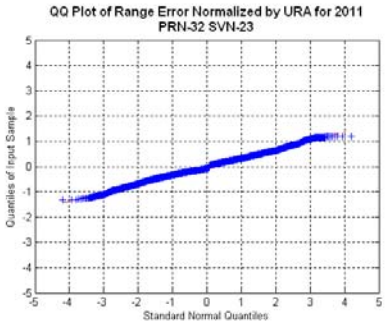


Figure 12-45 Histograms of H, A, C, and Range Error PRN-1

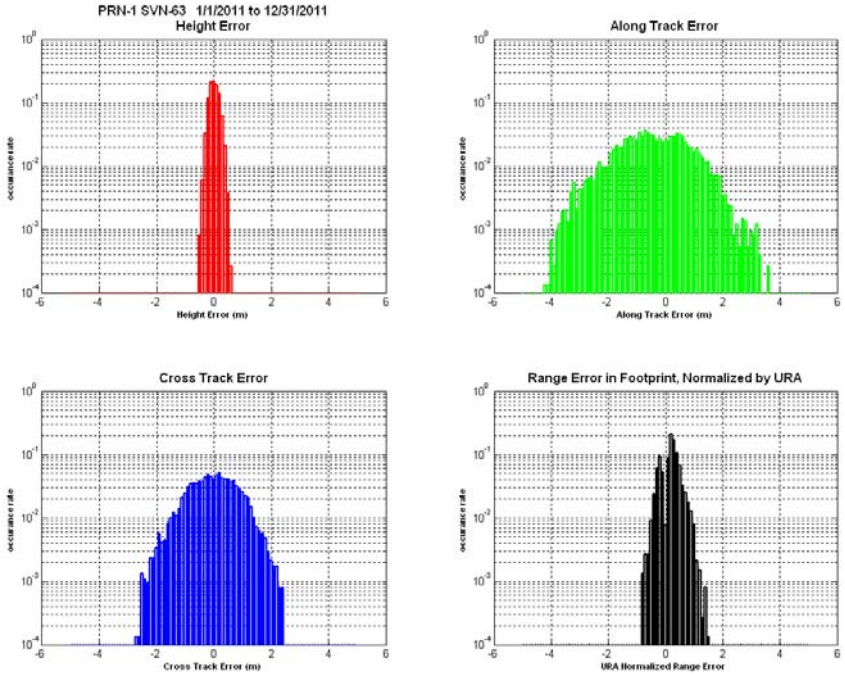


Figure 12-46 Histograms of H, A, C, and Range Error PRN-2

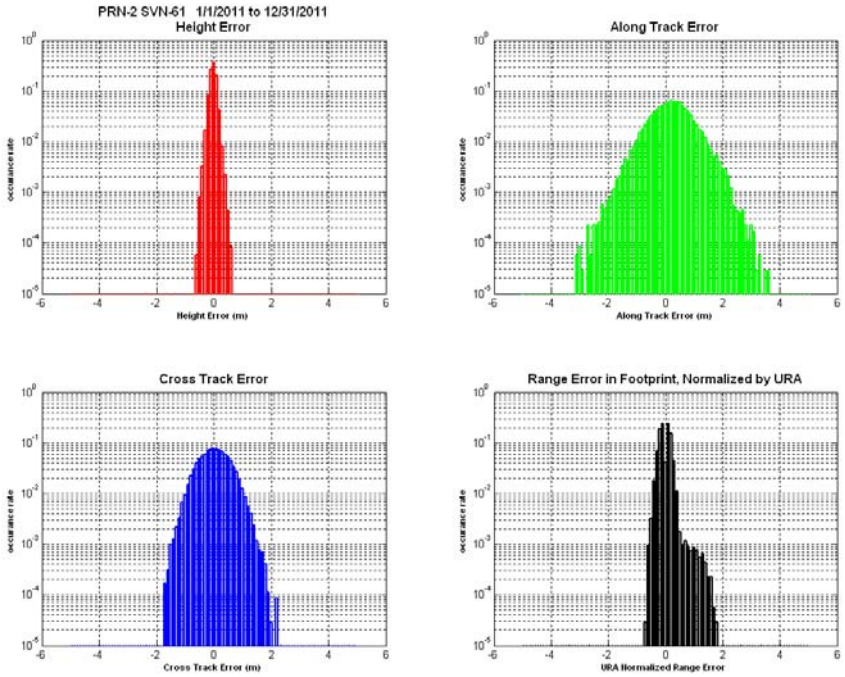


Figure 12-47 Histograms of H, A, C, and Range Error PRN-3

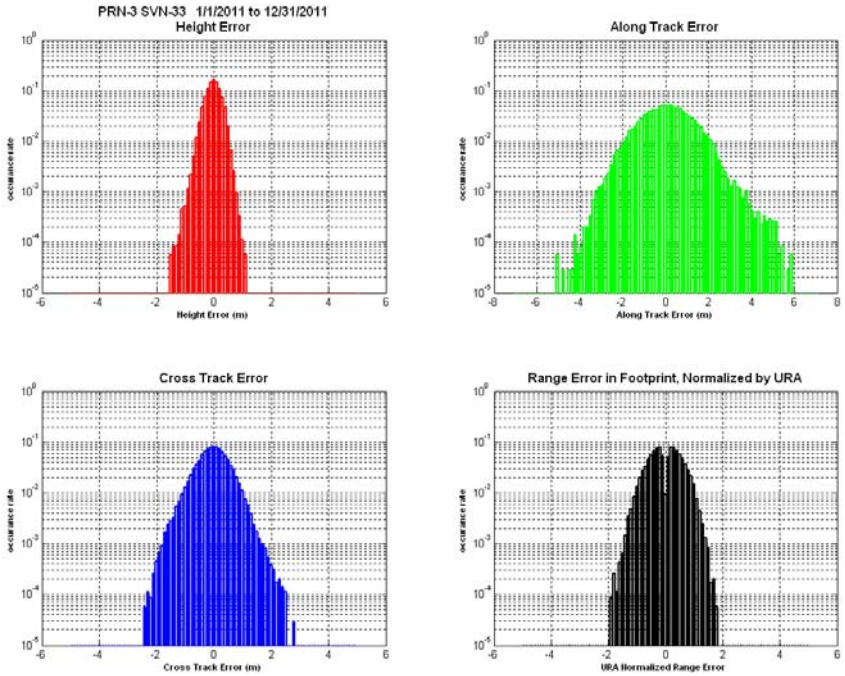


Figure 12-48 Histograms of H, A, C, and Range Error PRN-4

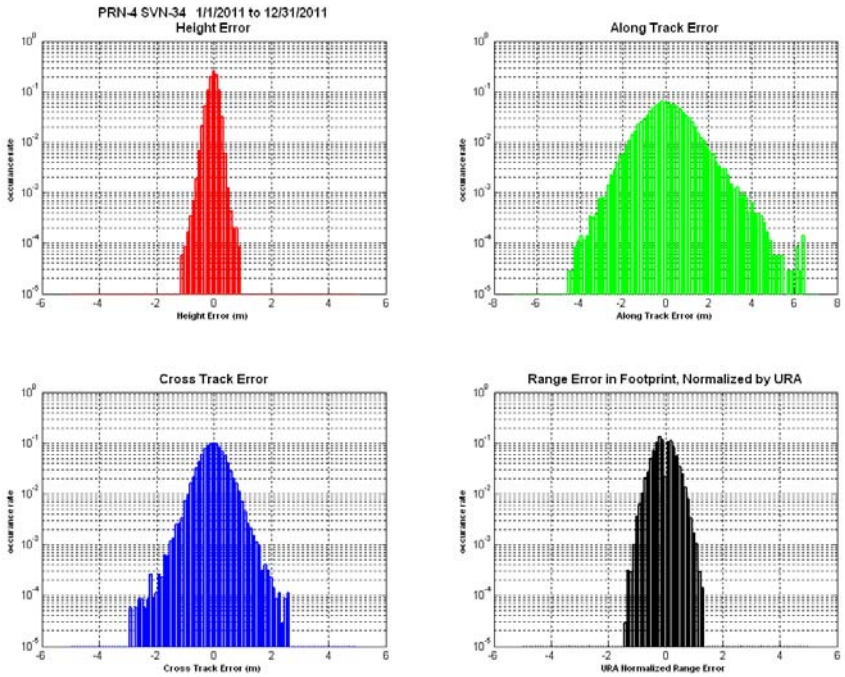


Figure 12-49 Histograms of H, A, C, and Range Error PRN-5

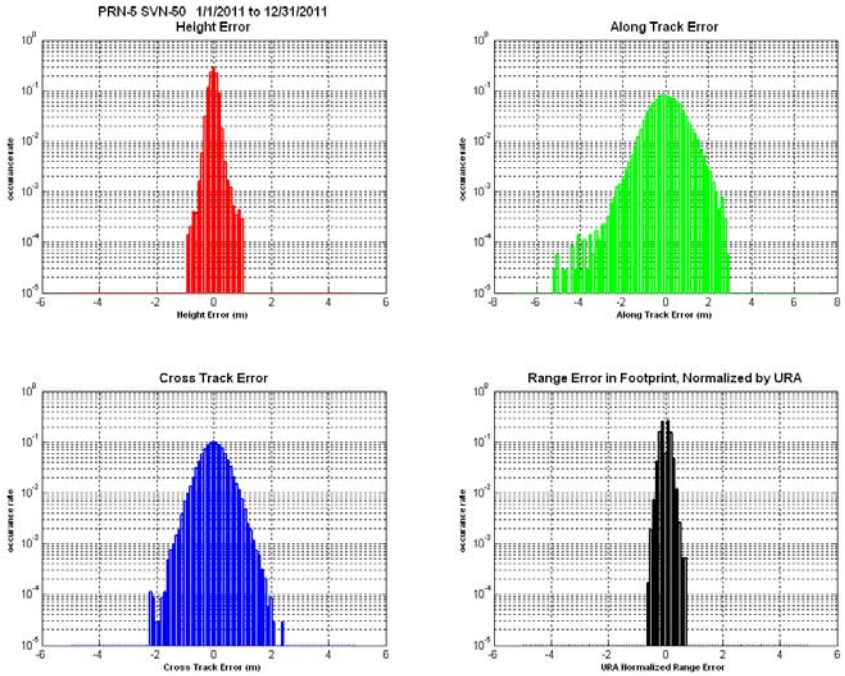


Figure 12-50 Histograms of H, A, C, and Range Error PRN-6

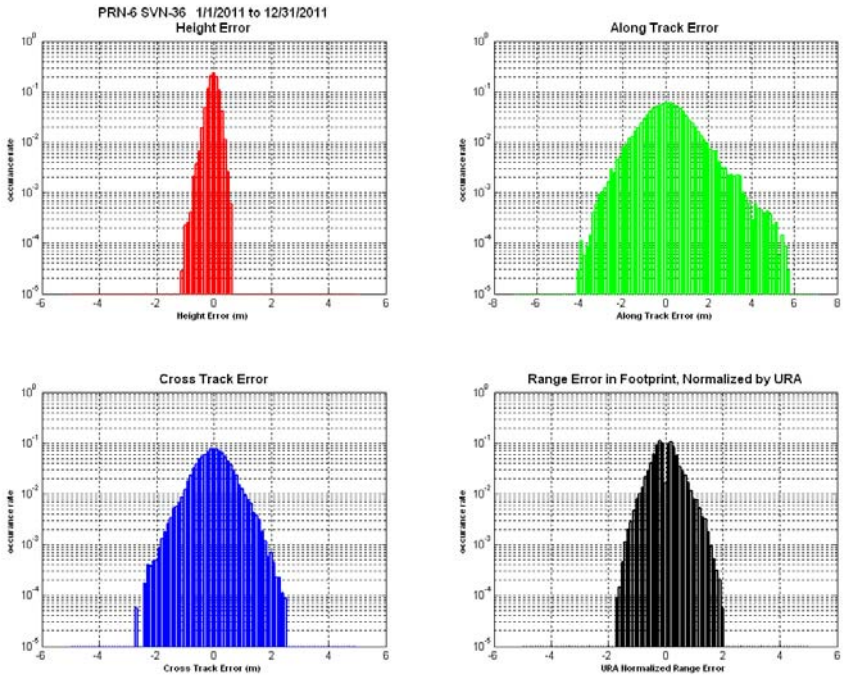


Figure 12-51 Histograms of H, A, C, and Range Error PRN-7

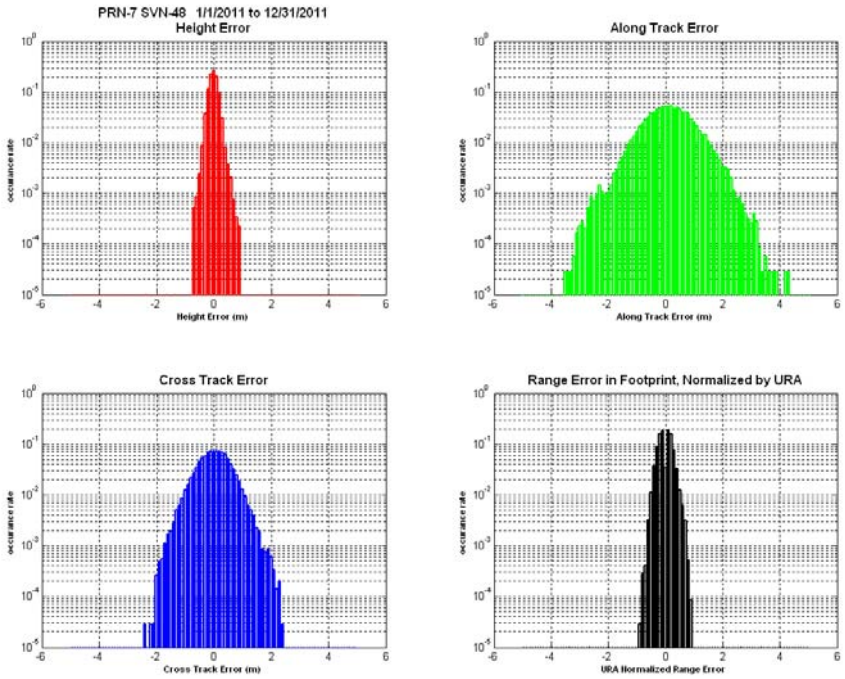


Figure 12-52 Histograms of H, A, C, and Range Error PRN-8

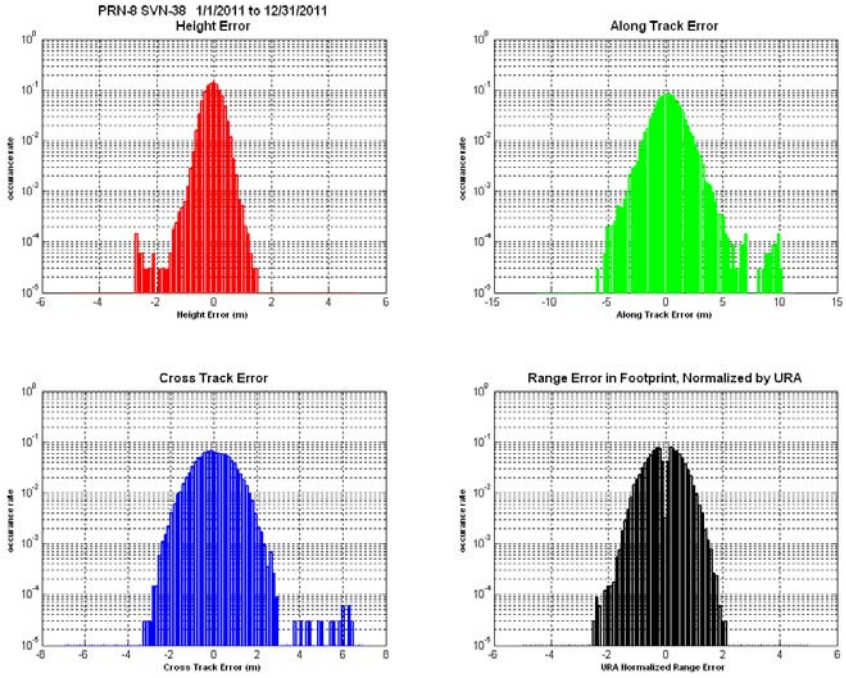


Figure 12-53 Histograms of H, A, C, and Range Error PRN-9

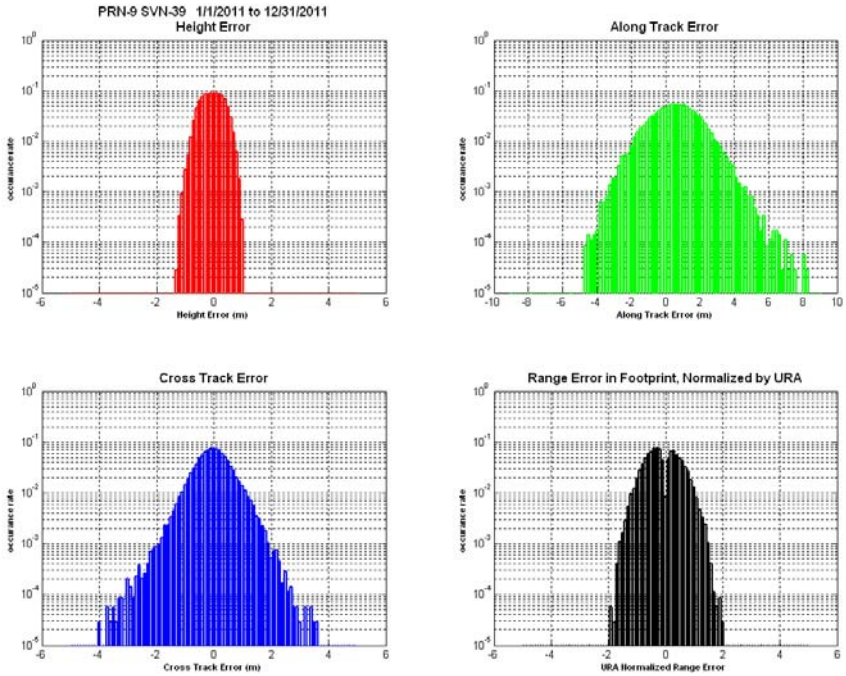


Figure 12-54 Histograms of H, A, C, and Range Error PRN-10

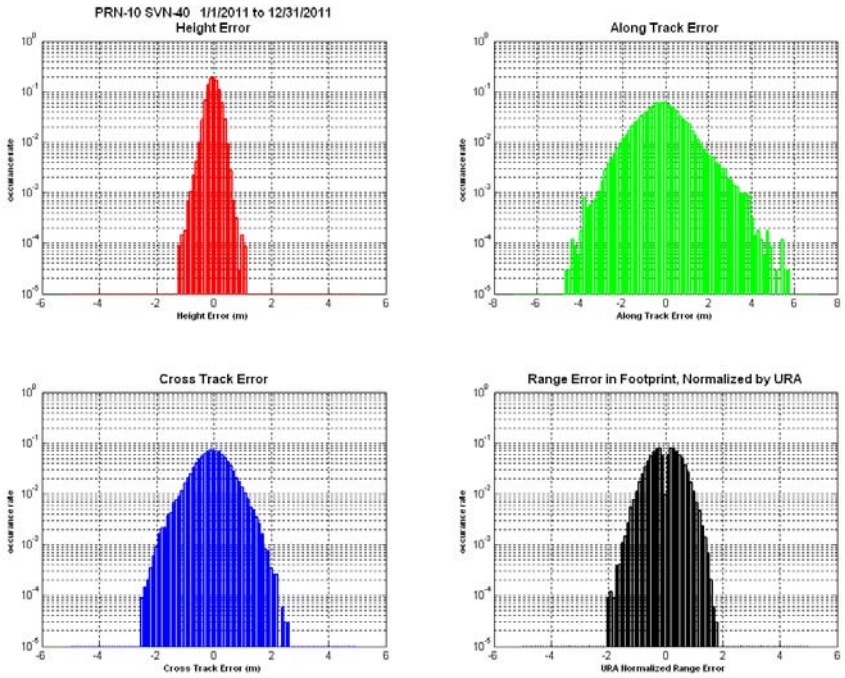


Figure 12-55 Histograms of H, A, C, and Range Error PRN-11

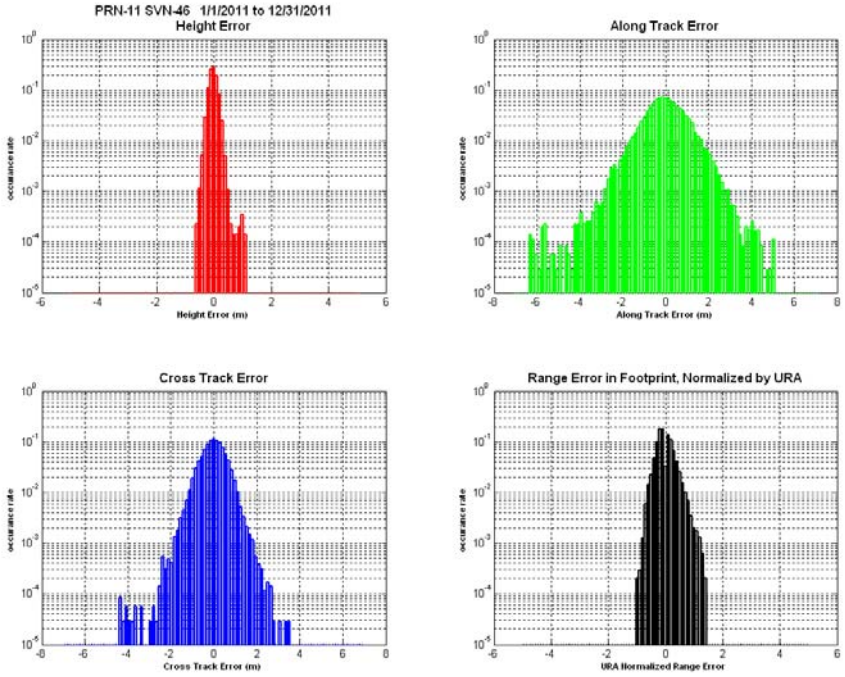


Figure 12-56 Histograms of H, A, C, and Range Error PRN-12

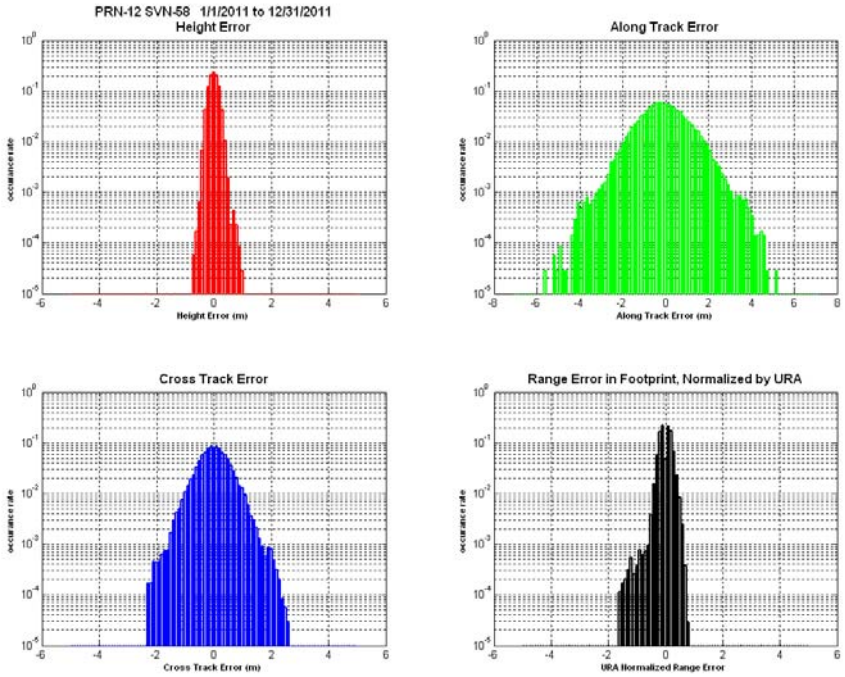


Figure 12-57 Histograms of H, A, C, and Range Error PRN-13

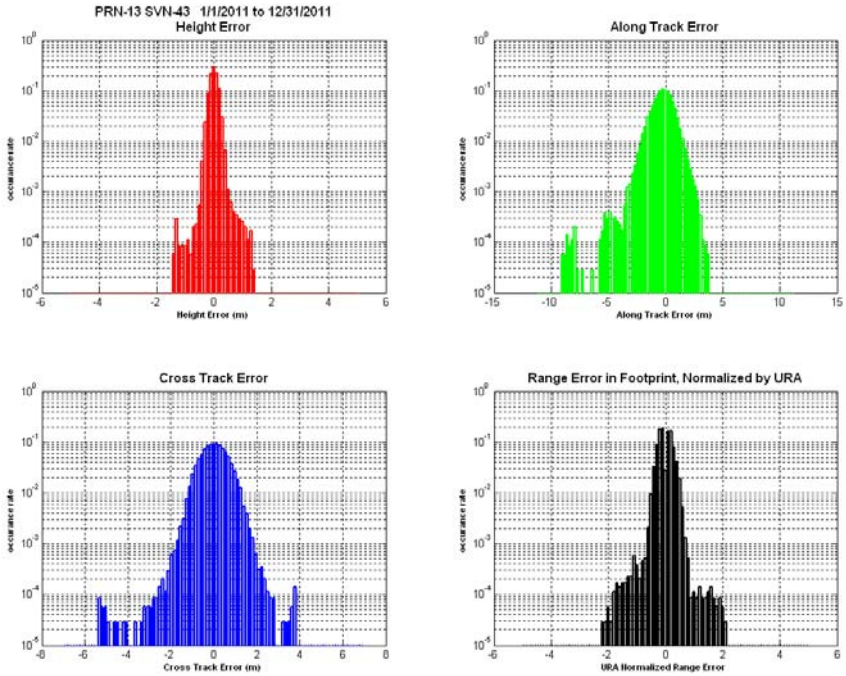


Figure 12-58 Histograms of H, A, C, and Range Error PRN-14

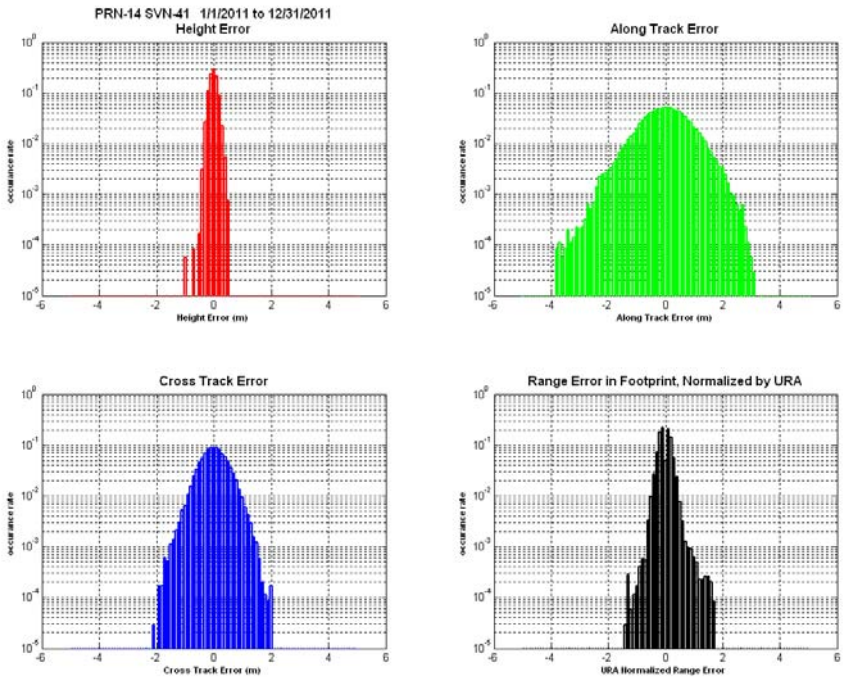


Figure 12-59 Histograms of H, A, C, and Range Error PRN-15

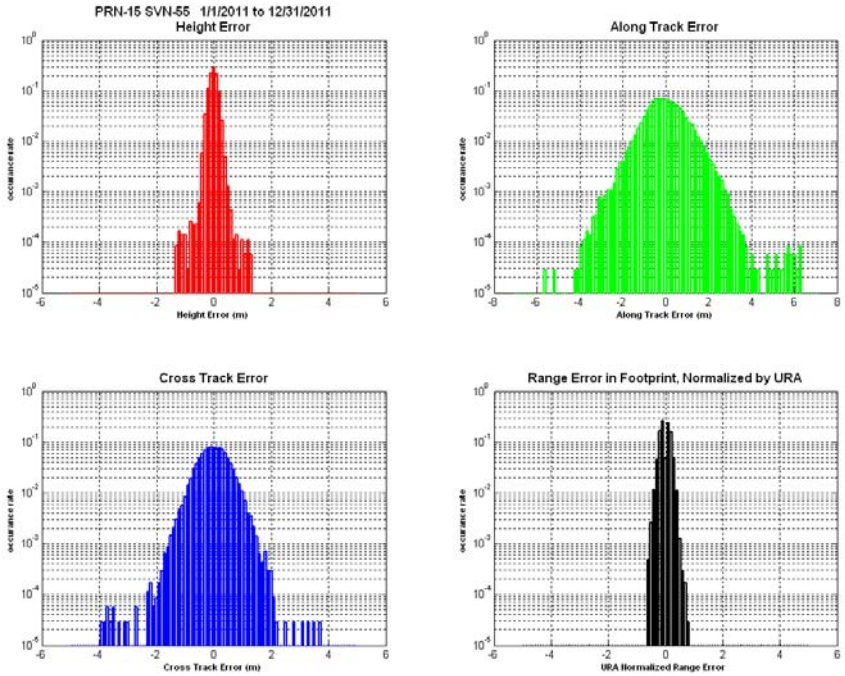


Figure 12-60 Histograms of H, A, C, and Range Error PRN-16

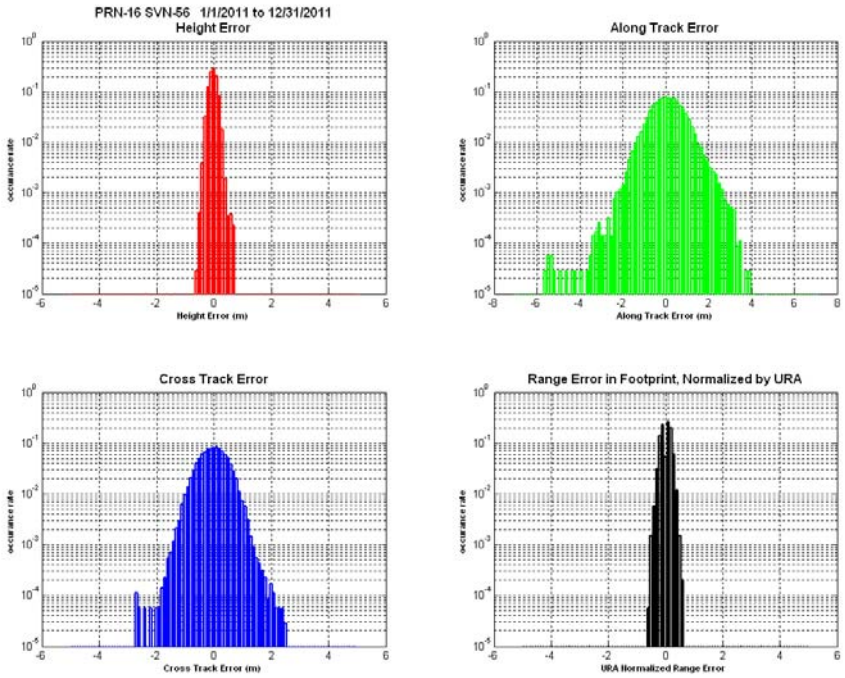


Figure 12-61 Histograms of H, A, C, and Range Error PRN-17

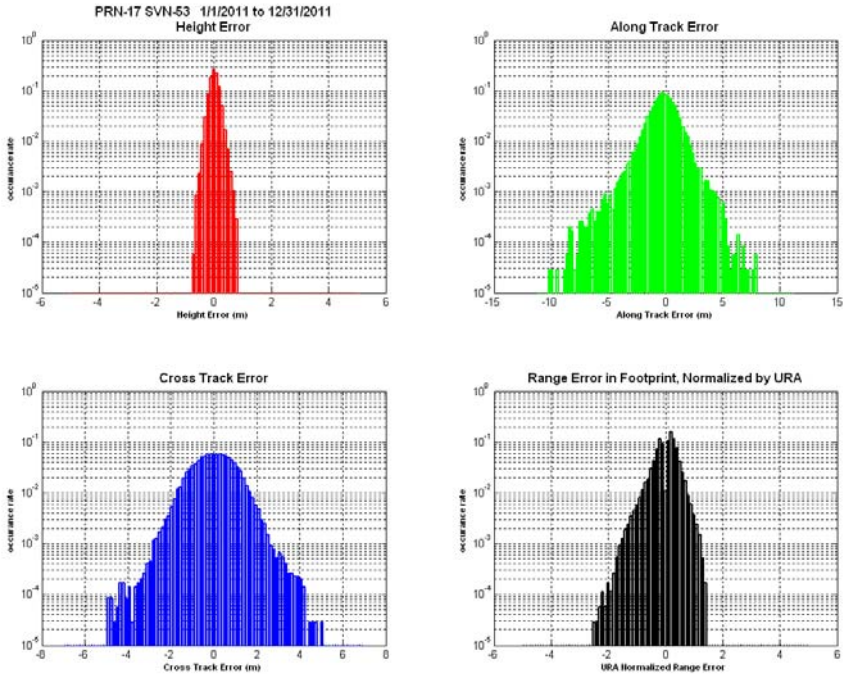


Figure 12-62 Histograms of H, A, C, and Range Error PRN-18

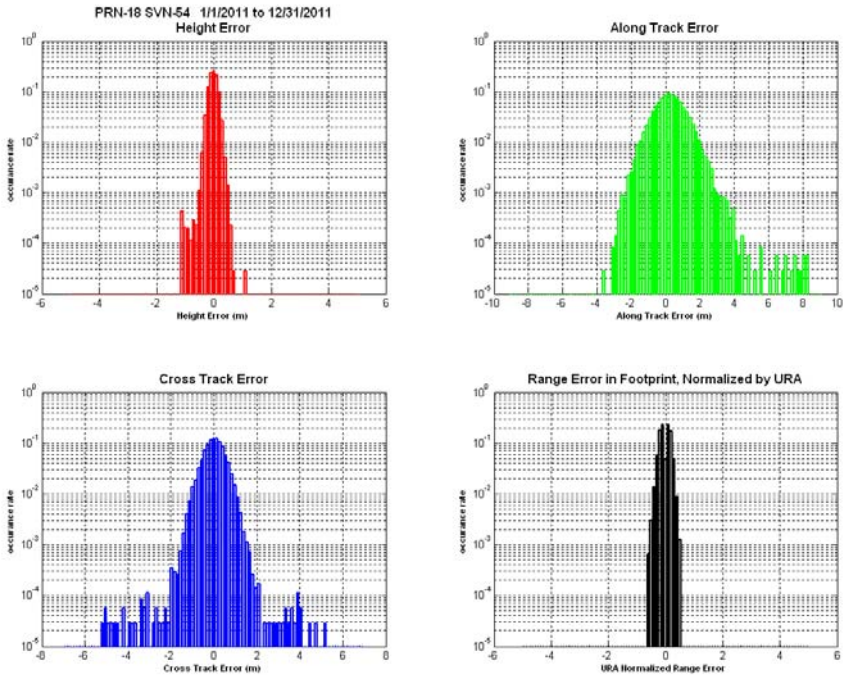


Figure 12-63 Histograms of H, A, C, and Range Error PRN-19

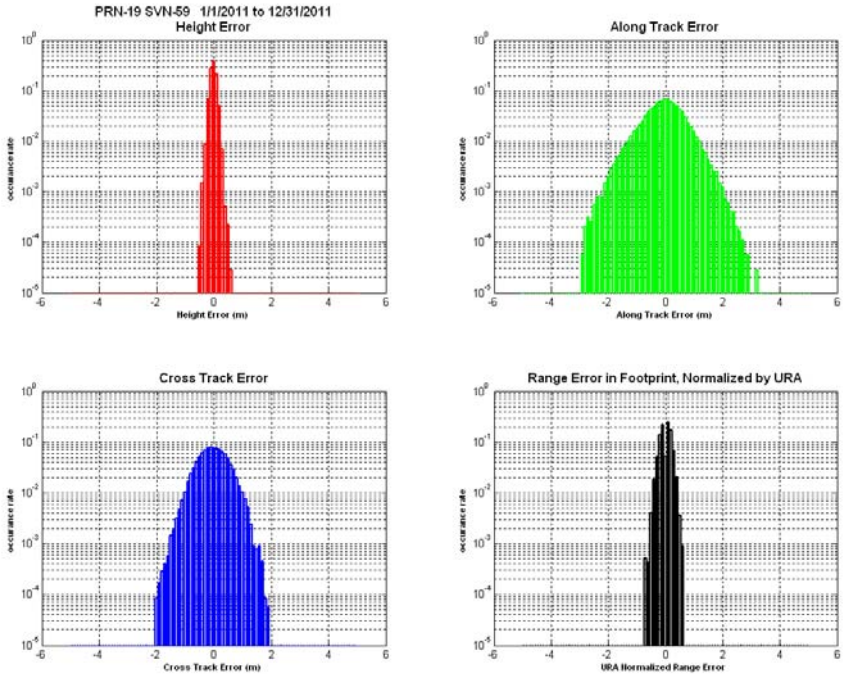


Figure 12-64 Histograms of H, A, C, and Range Error PRN-20

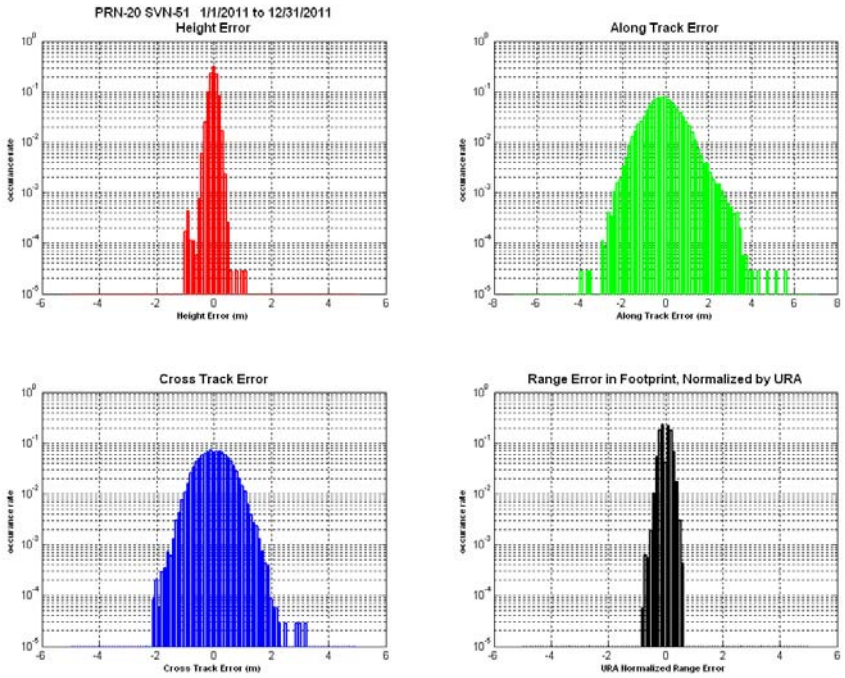


Figure 12-65 Histograms of H, A, C, and Range Error PRN-21

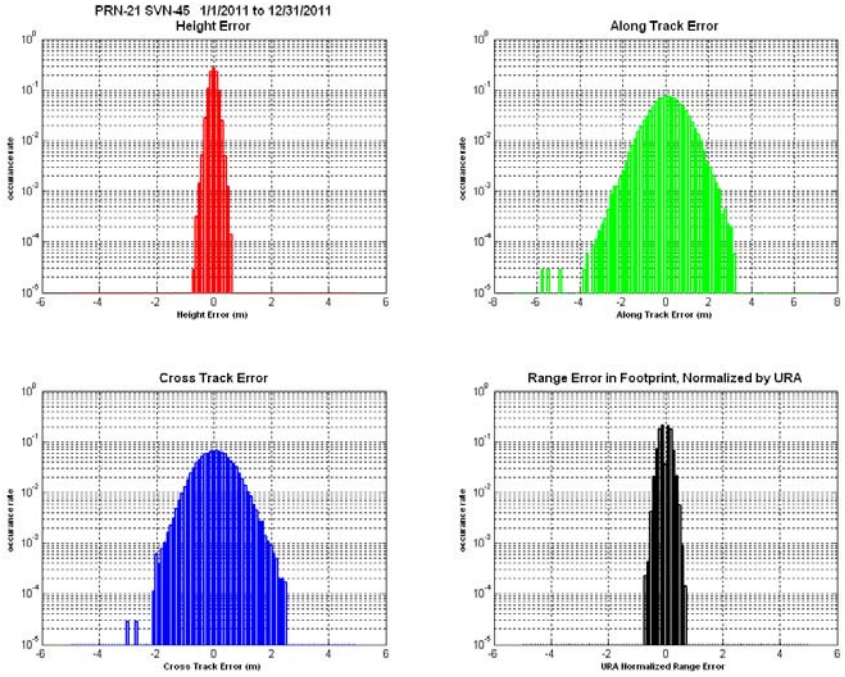


Figure 12-66 Histograms of H, A, C, and Range Error PRN-22

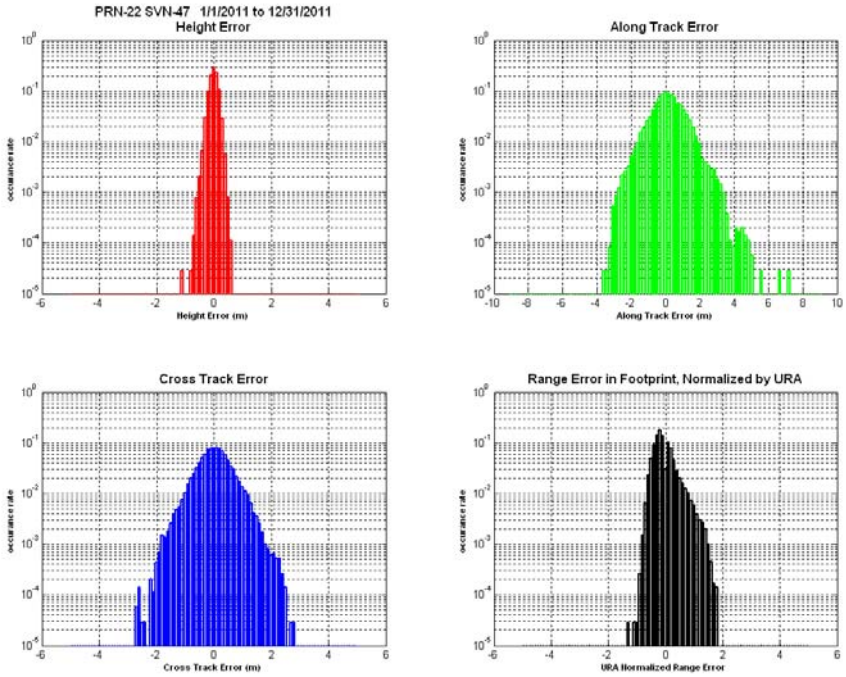


Figure 12-67 Histograms of H, A, C, and Range Error PRN-23

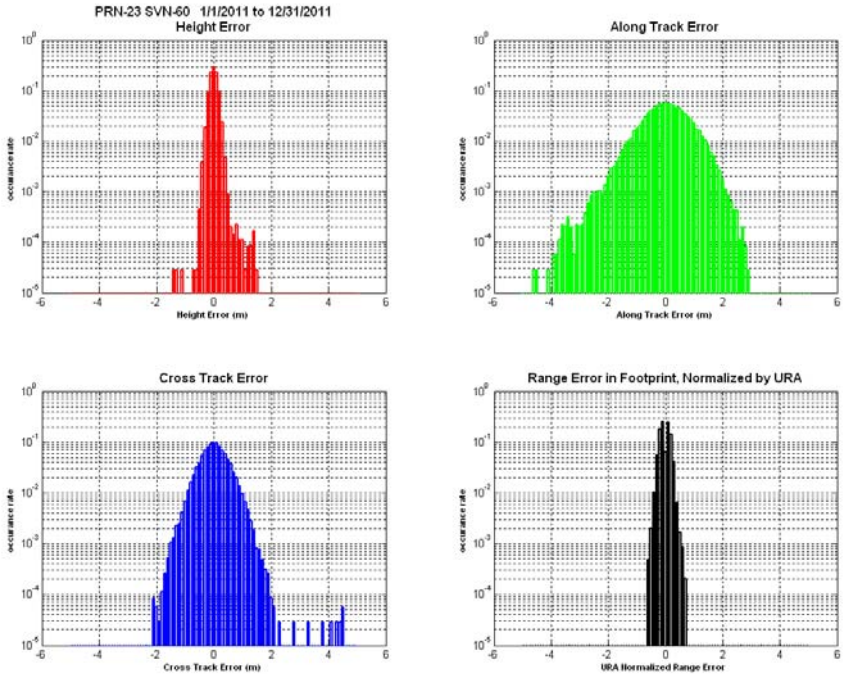


Figure 12-68 Histograms of H, A, C, and Range Error PRN-24

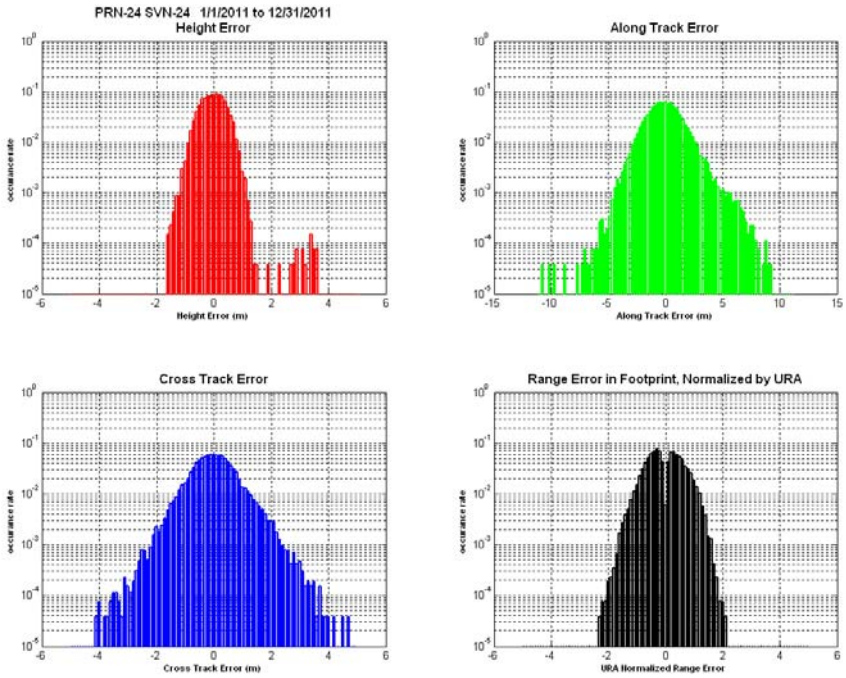


Figure 12-69 Histograms of H, A, C, and Range Error PRN-25

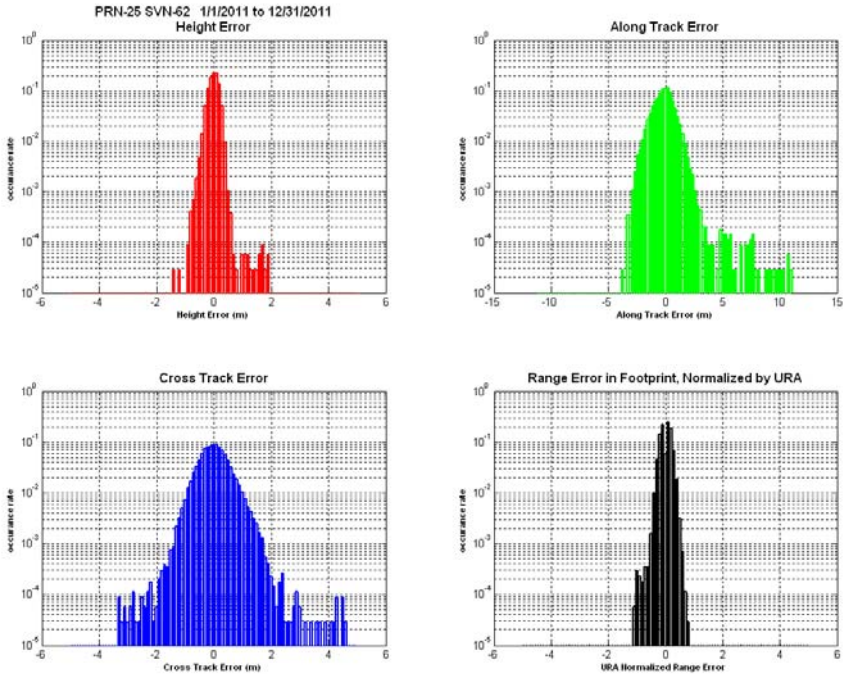


Figure 12-70 Histograms of H, A, C, and Range Error PRN-26

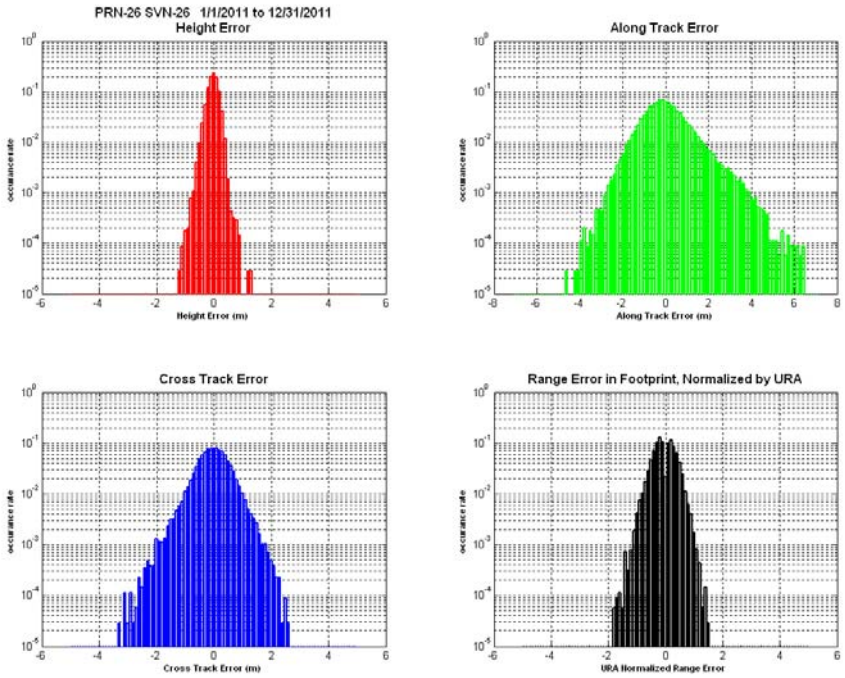


Figure 12-71 Histograms of H, A, C, and Range Error PRN-27

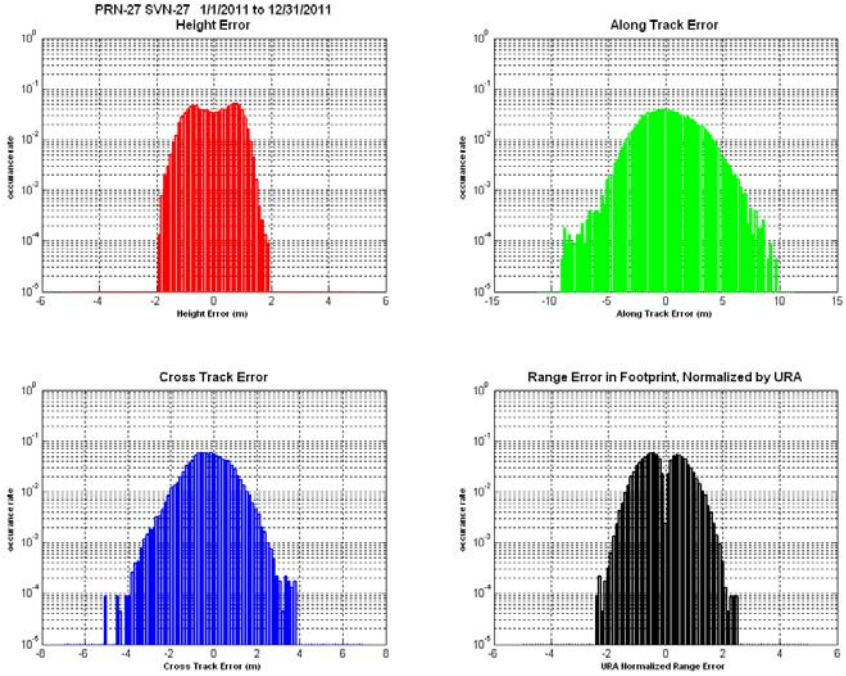


Figure 12-72 Histograms of H, A, C, and Range Error PRN-28

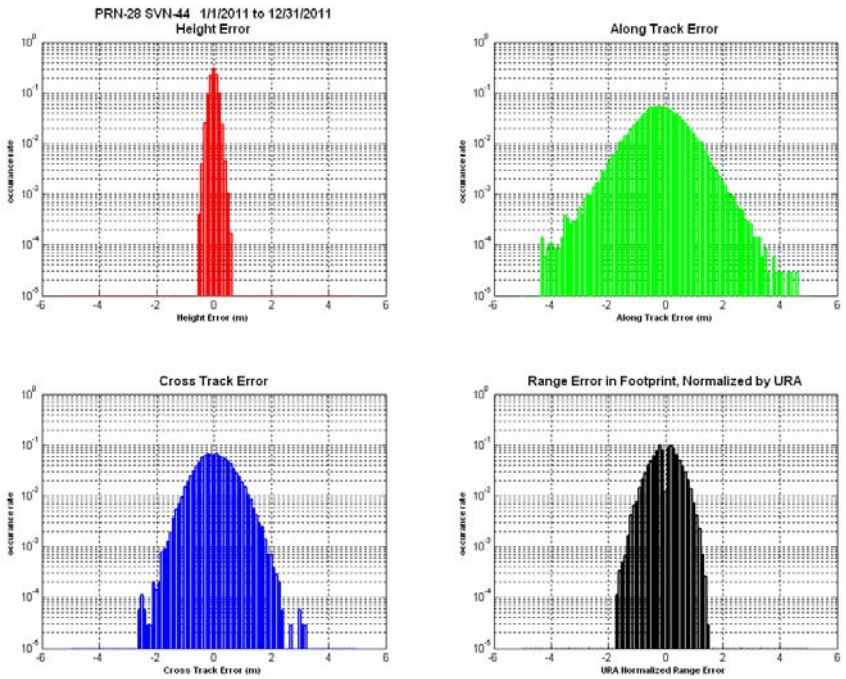


Figure 12-73 Histograms of H, A, C, and Range Error PRN-29

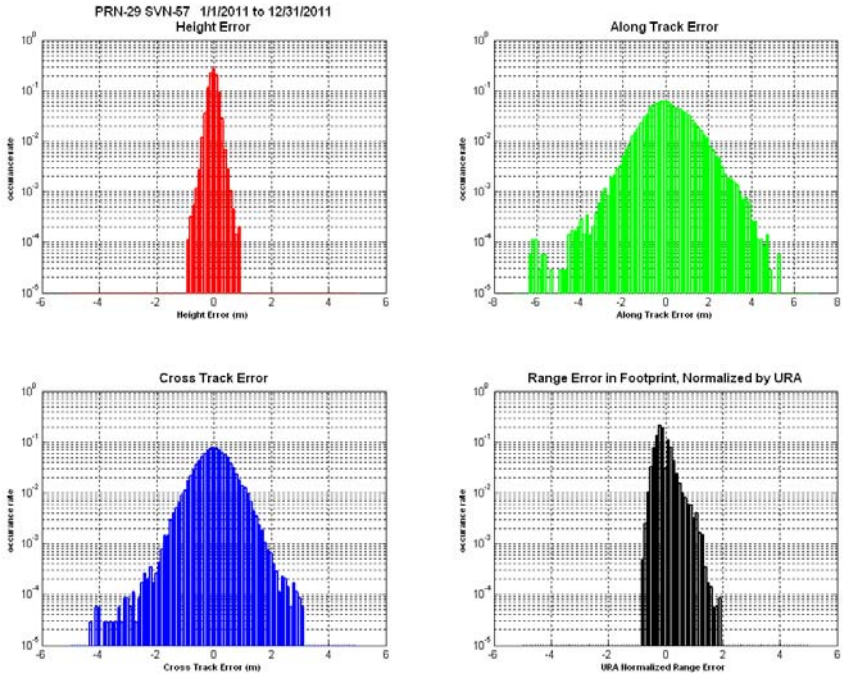


Figure 12-74 Histograms of H, A, C, and Range Error PRN-30

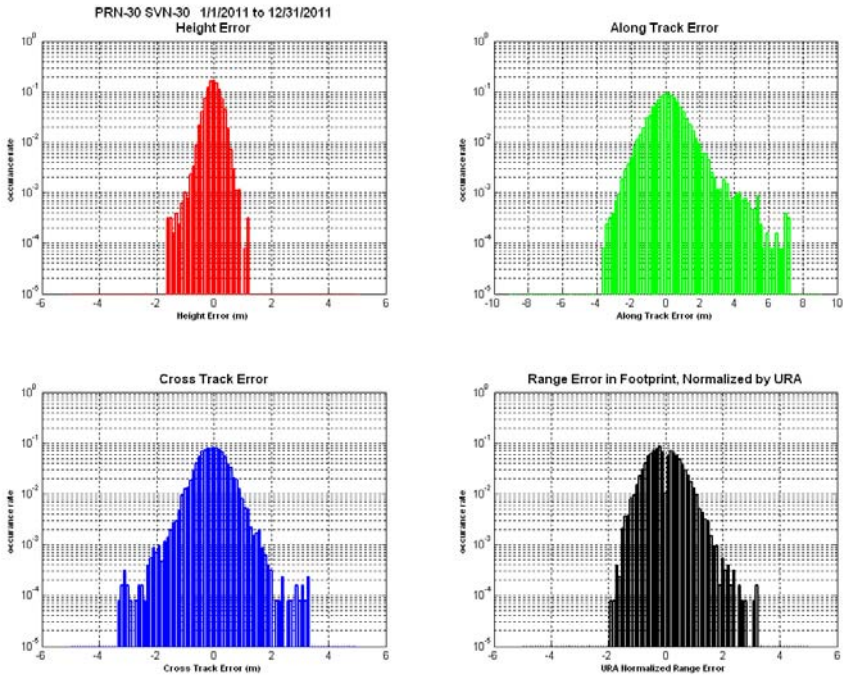


Figure 12-75 Histograms of H, A, C, and Range Error PRN-30

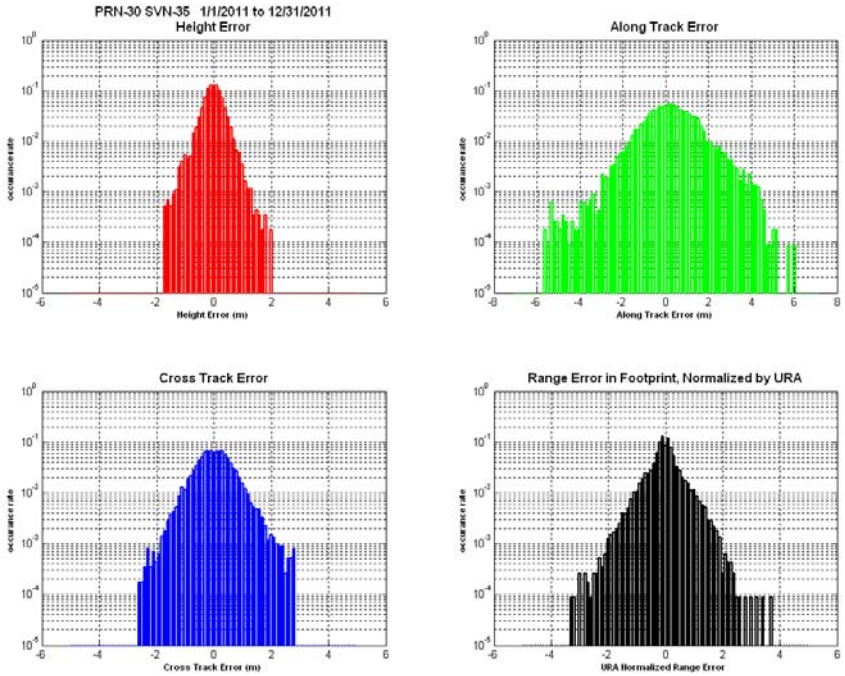


Figure 12-76 Histograms of H, A, C, and Range Error PRN-31

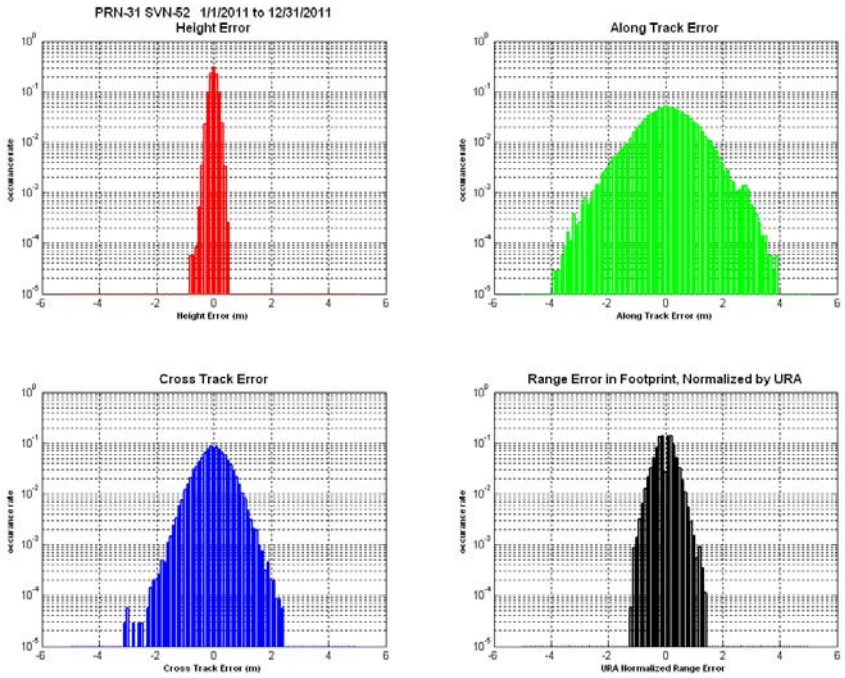


Figure 12-77 Histograms of H, A, C, and Range Error PRN-32

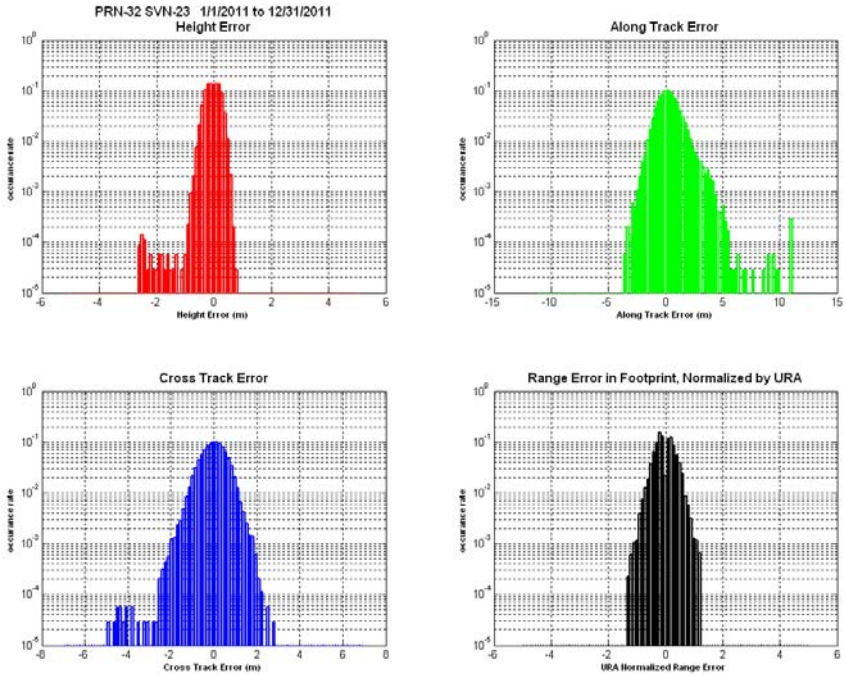


Figure 12-78 Timeline of URA Normalized Range Error PRN-1 SVN-63

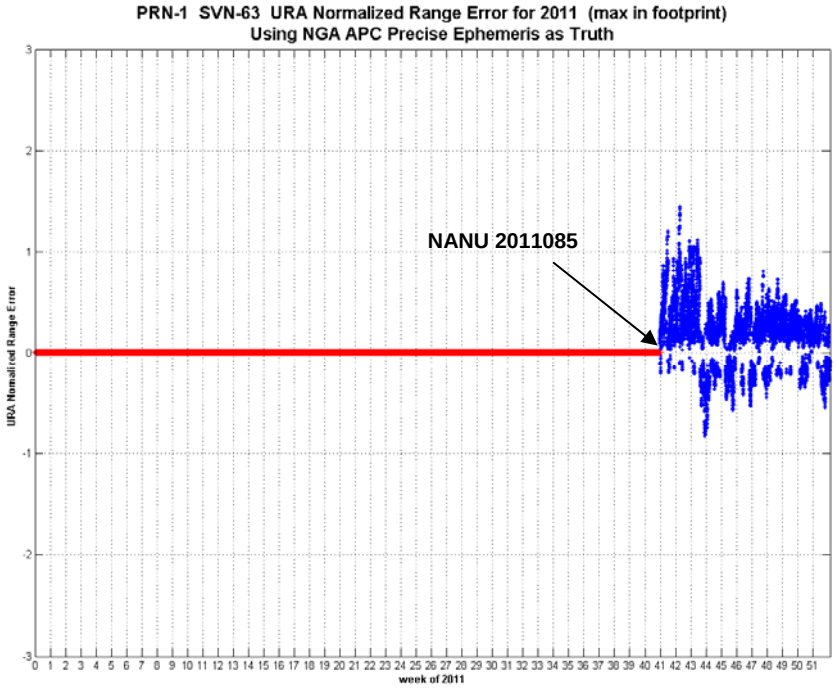


Figure 12-79 Timeline of URA Normalized Range Error PRN-2 SVN-61

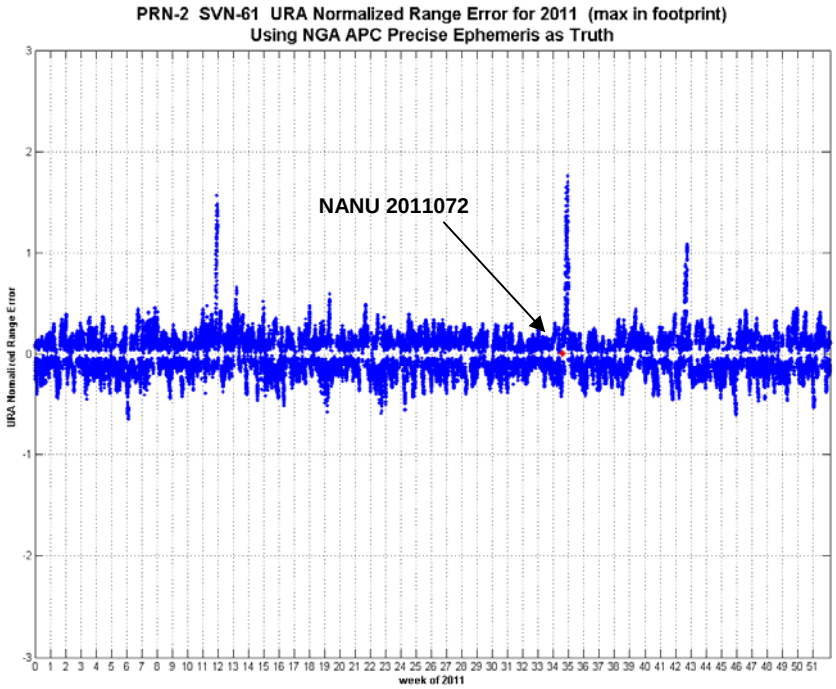


Figure 12-80 Timeline of URA Normalized Range Error PRN-3 SVN-33

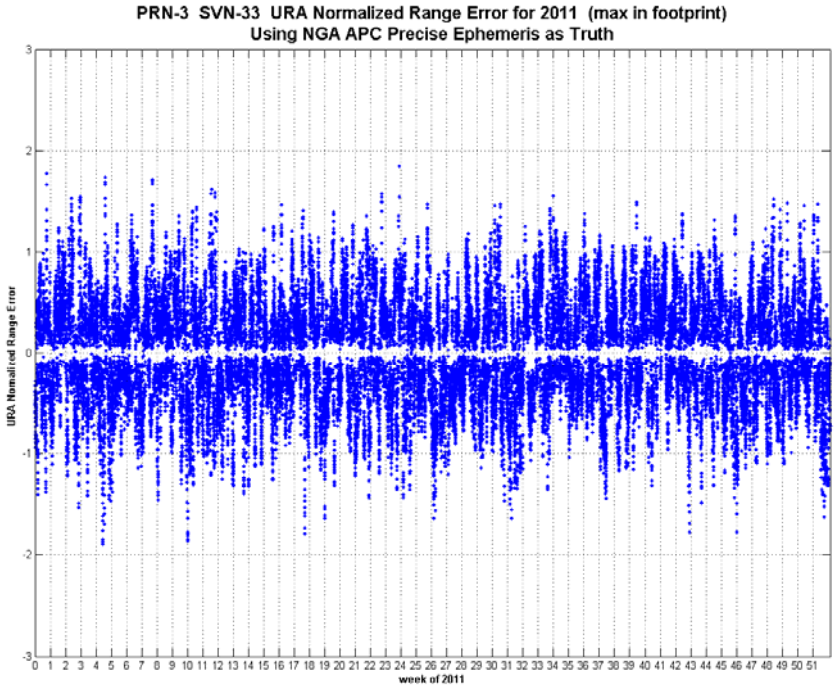


Figure 12-81 Timeline of URA Normalized Range Error PRN-4 SV-34

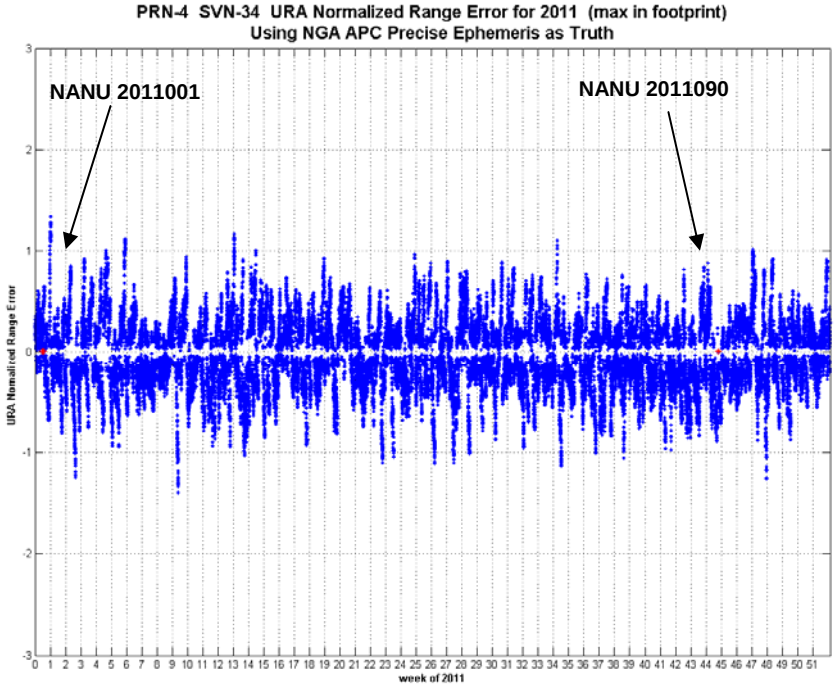


Figure 12-82 Timeline of URA Normalized Range Error PRN-5 SVN-50

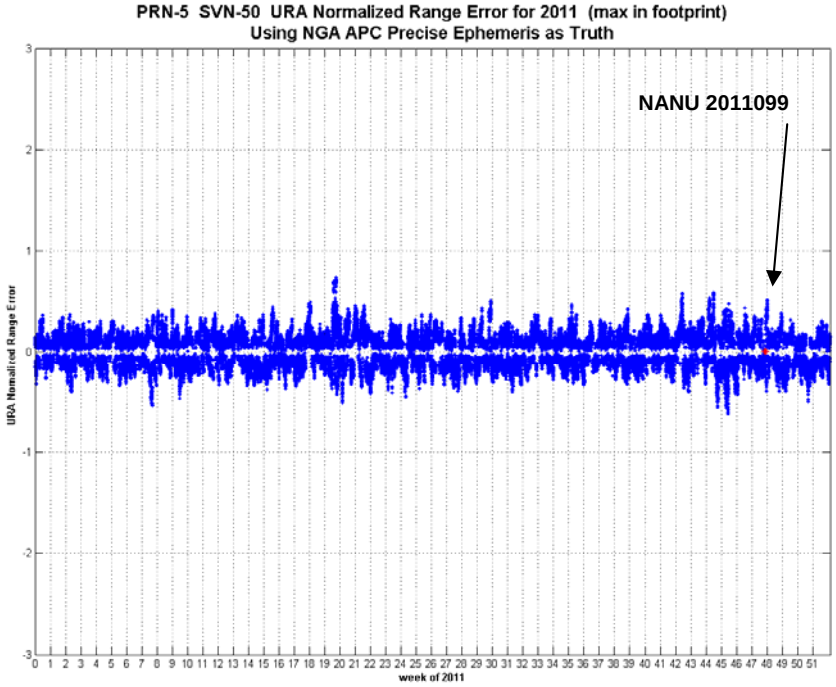


Figure 12-83 Timeline of URA Normalized Range Error PRN-6 SVN-36

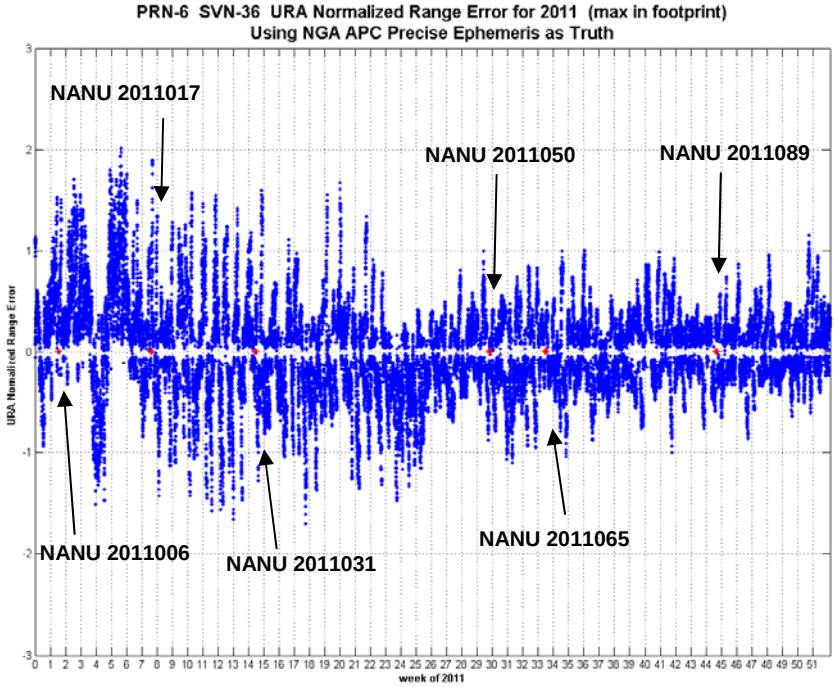


Figure 12-84 Timeline of URA Normalized Range Error PRN-7 SVN-48

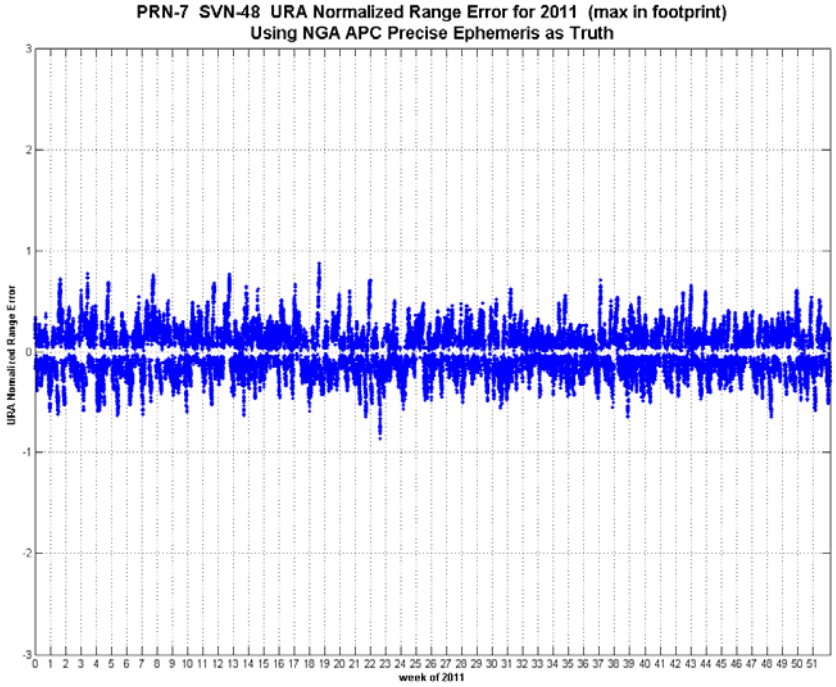


Figure 12-85 Timeline of URA Normalized Range Error PRN-8 SVN-38

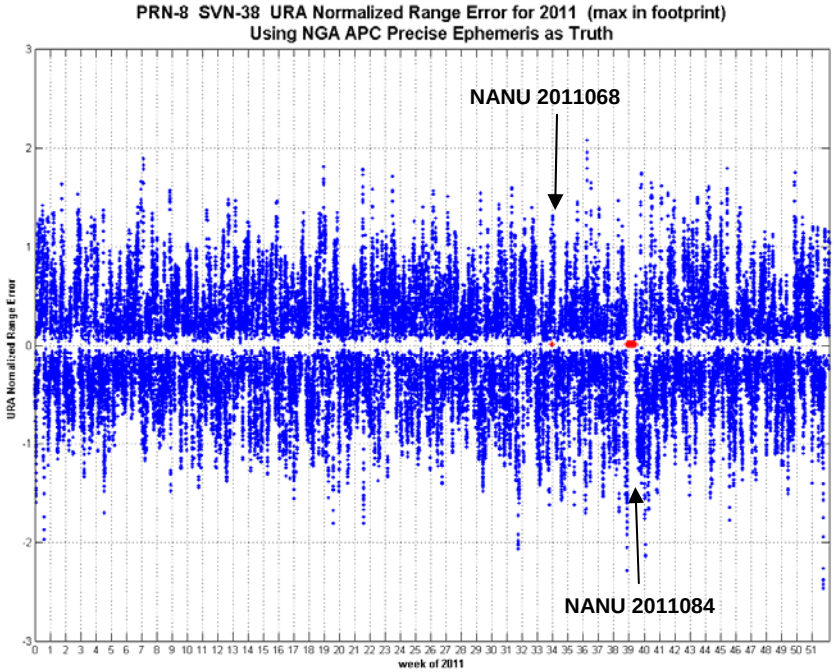


Figure 12-86 Timeline of URA Normalized Range Error PRN-9 SVN-39

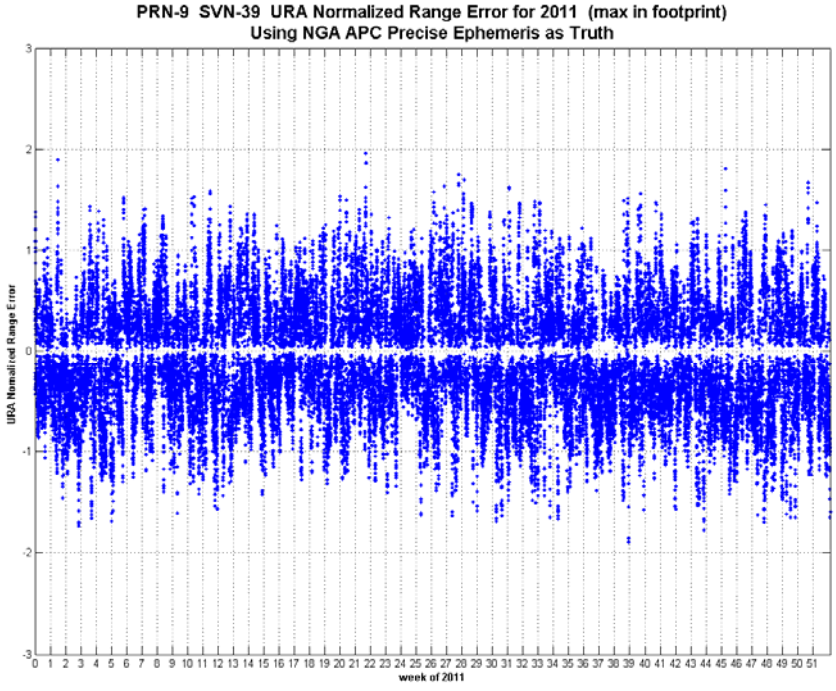


Figure 12-87 Timeline of URA Normalized Range Error PRN-10 SVN-40

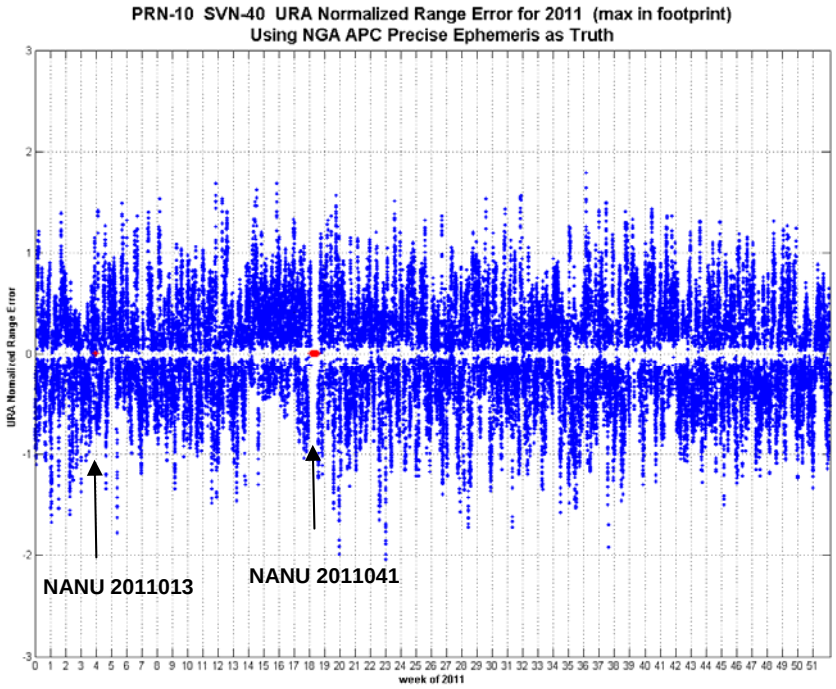


Figure 12-88 Timeline of URA Normalized Range Error PRN-11 SVN-46

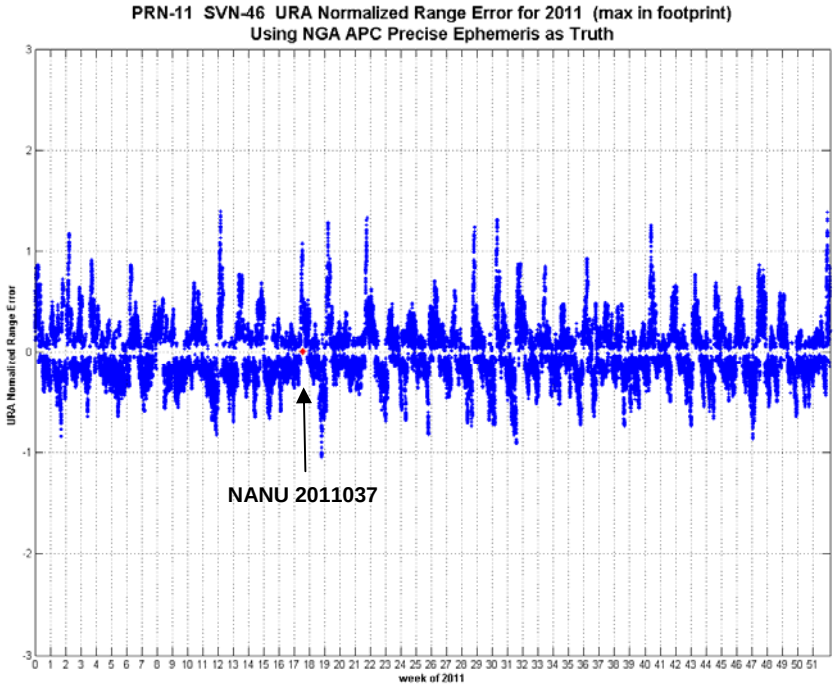


Figure 12-89 Timeline of URA Normalized Range Error PRN-12 SVN-58

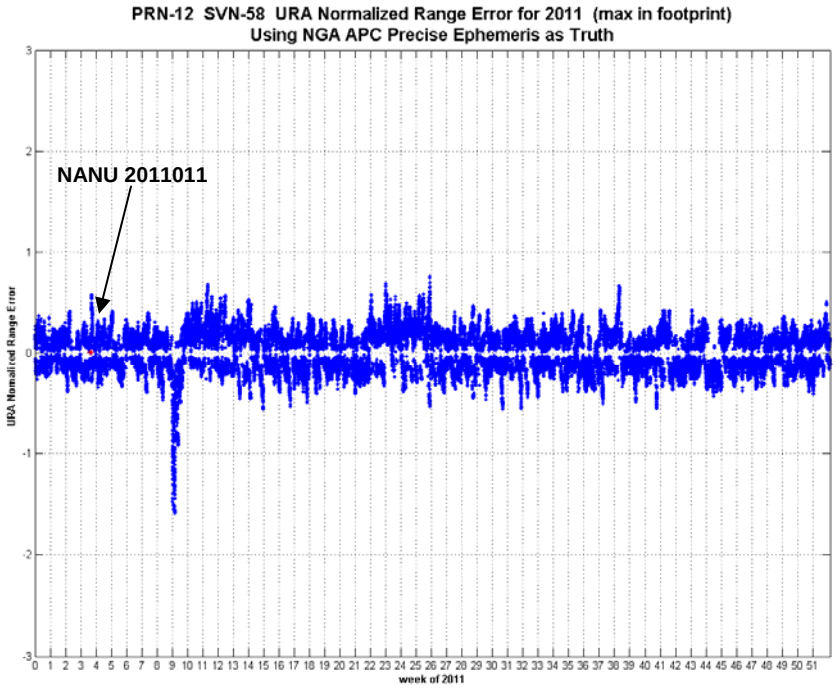


Figure 12-90 Timeline of URA Normalized Range Error PRN-13 SVN-43

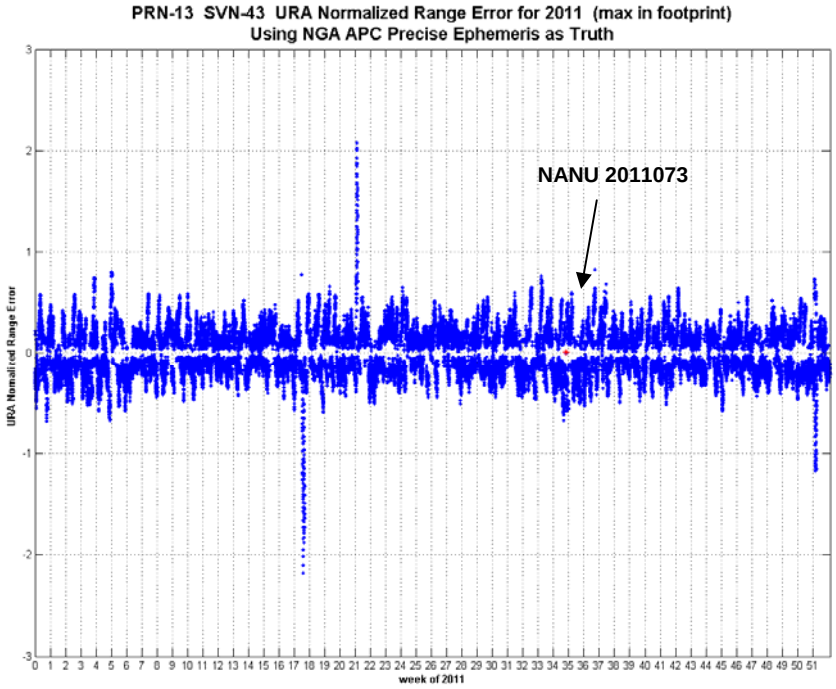


Figure 12-91 Timeline of URA Normalized Range Error PRN-14 SVN-41

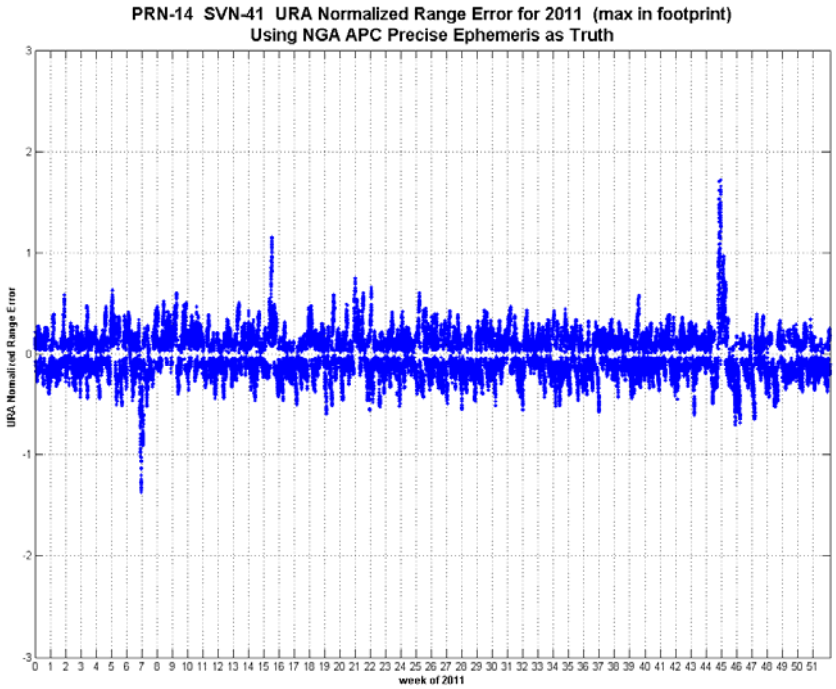


Figure 12-92 Timeline of URA Normalized Range Error PRN-15 SVN-55

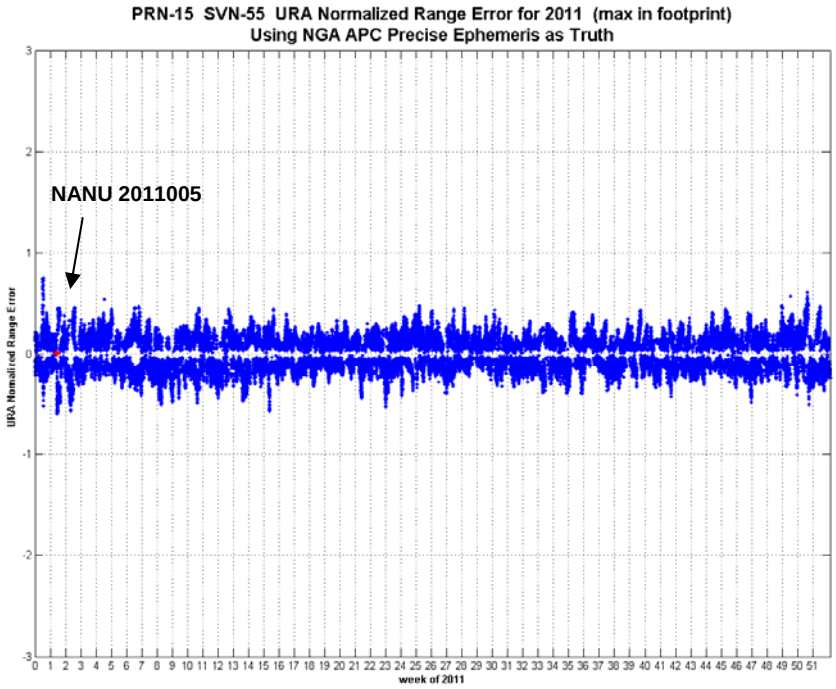


Figure 12-93 Timeline of URA Normalized Range Error PRN-16 SVN-56

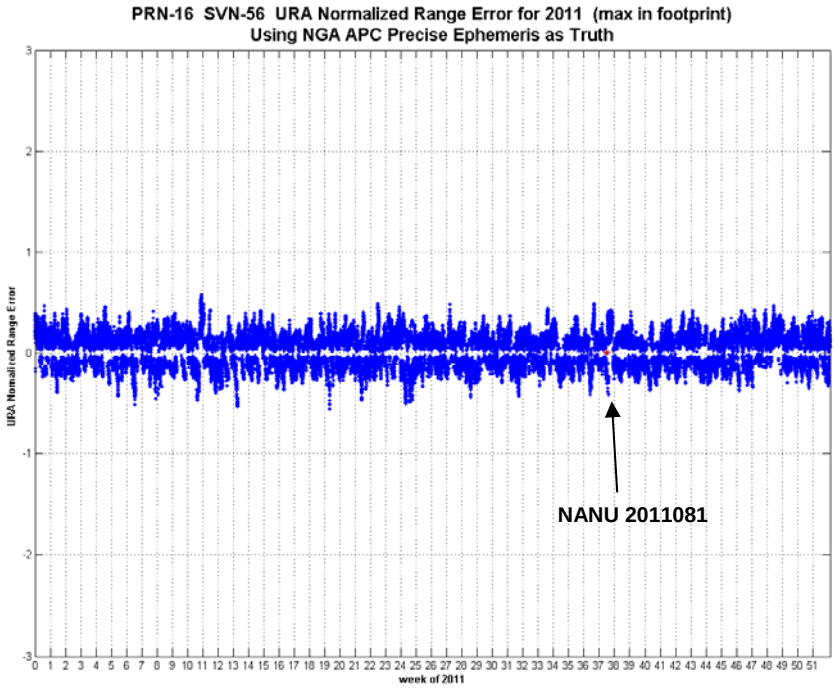


Figure 12-94 Timeline of URA Normalized Range Error PRN-17 SVN-53

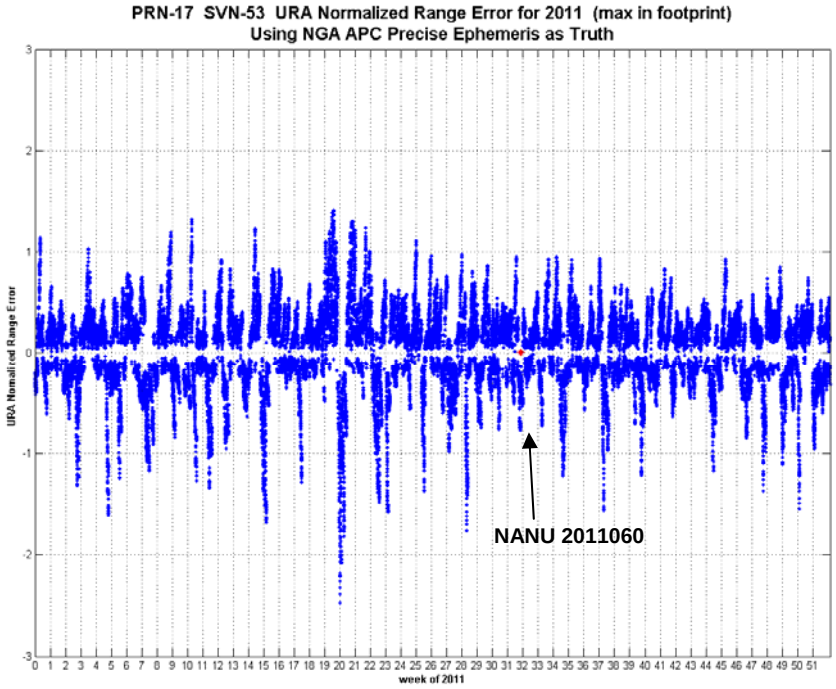


Figure 12-95 Timeline of URA Normalized Range Error PRN-18 SVN-54

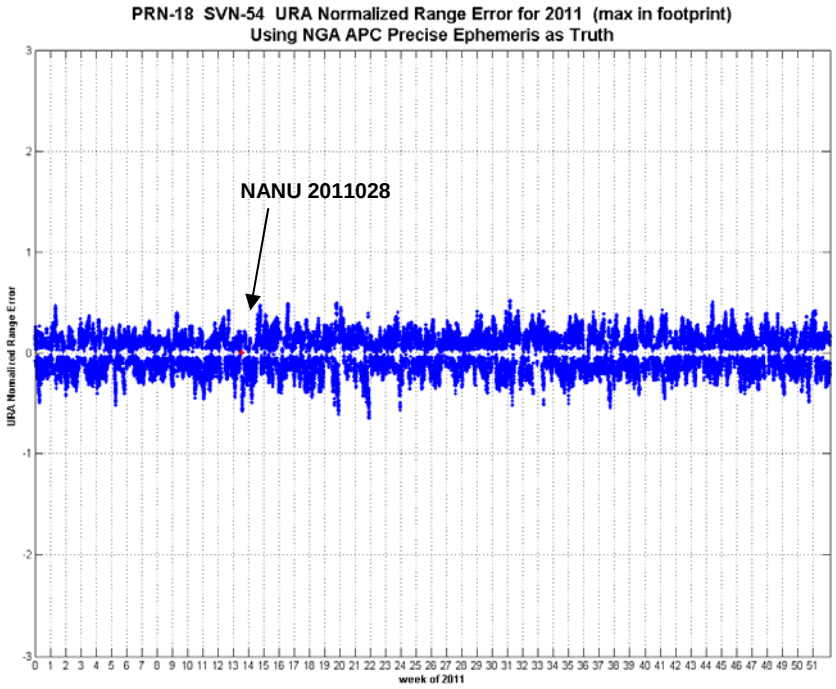


Figure 12-96 Timeline of URA Normalized Range Error PRN-19 SVN-59

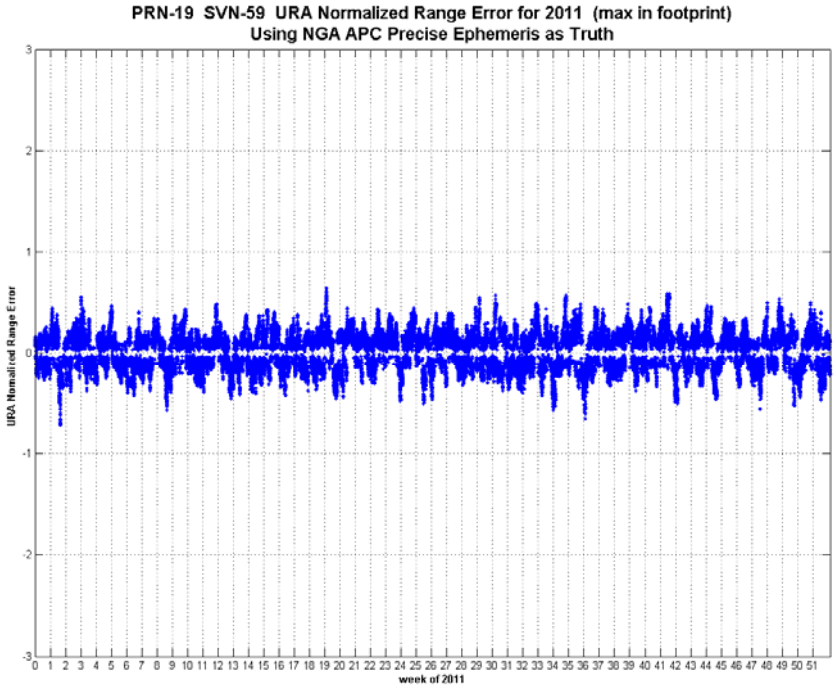


Figure 12-97 Timeline of URA Normalized Range Error PRN-20 SVN-51

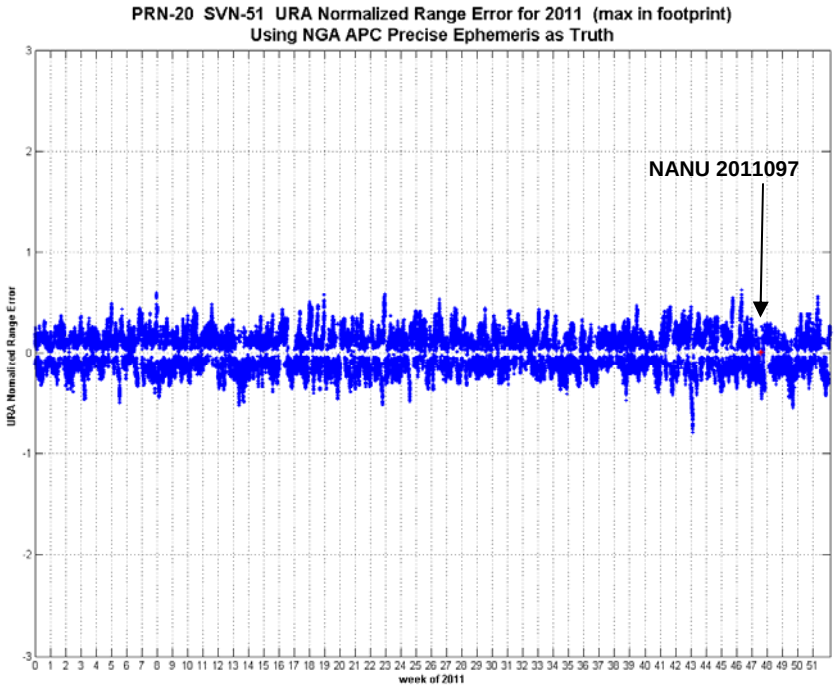


Figure 12-98 Timeline of URA Normalized Range Error PRN-21 SVN-45

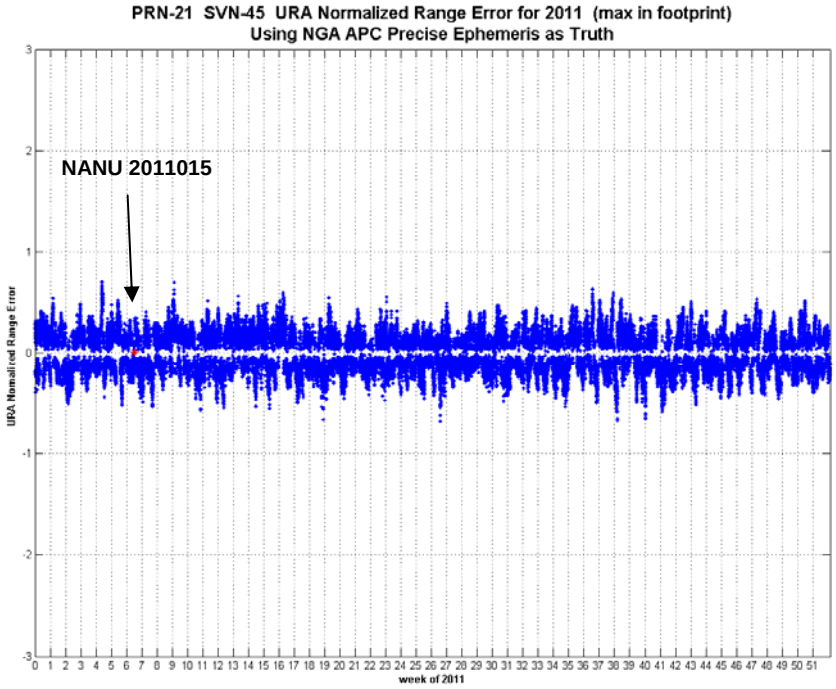


Figure 12-99 Timeline of URA Normalized Range Error PRN-22 SVN-47

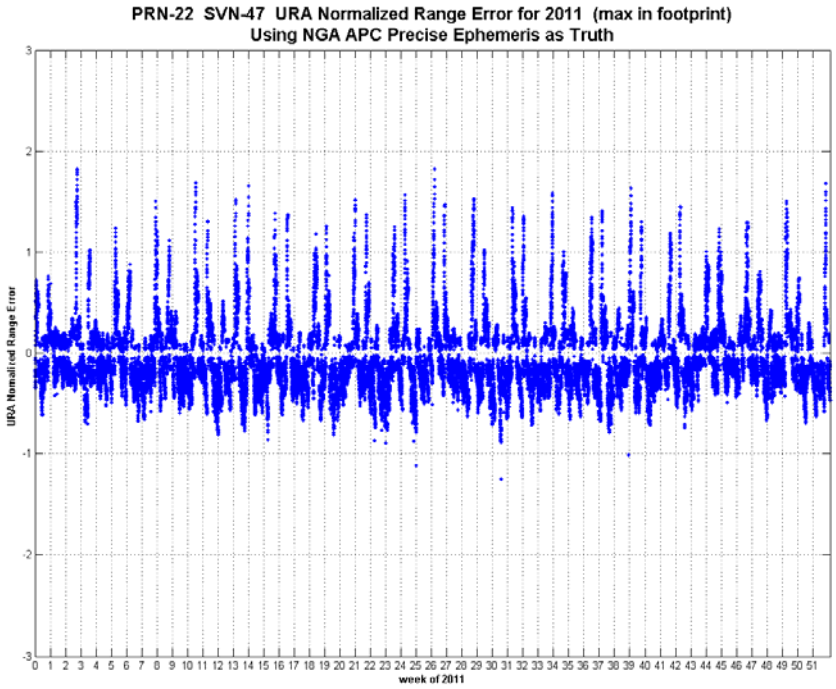


Figure 12-100 Timeline of URA Normalized Range Error PRN-23 SVN-60

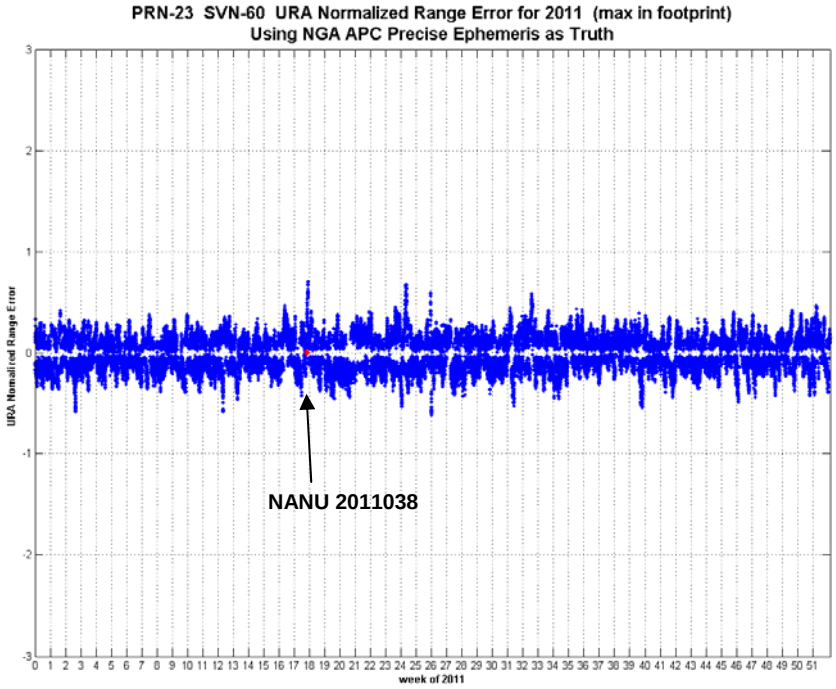


Figure 12-101 Timeline of URA Normalized Range Error PRN-24 SVN-24

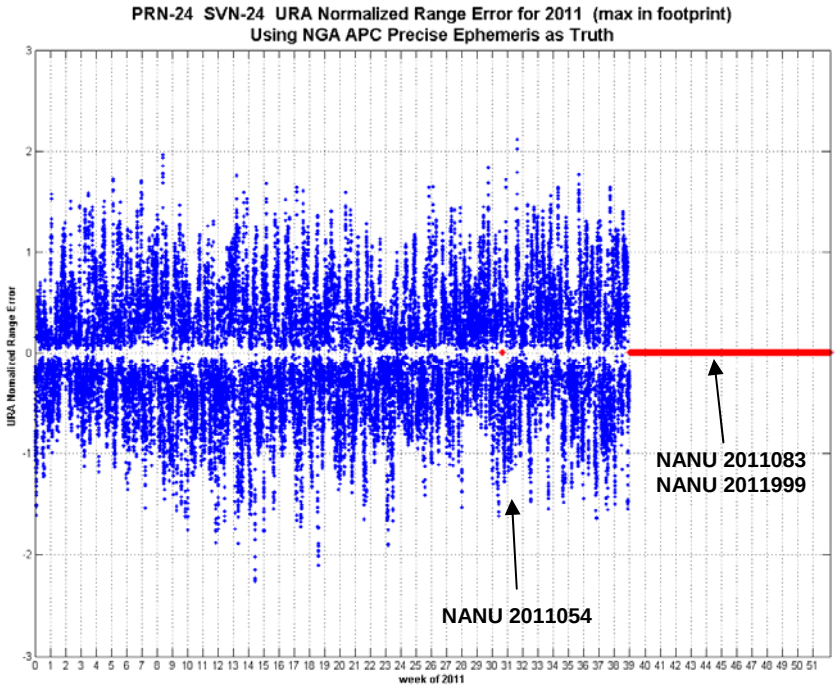


Figure 12-102 Timeline of URA Normalized Range Error PRN-25 SVN-62

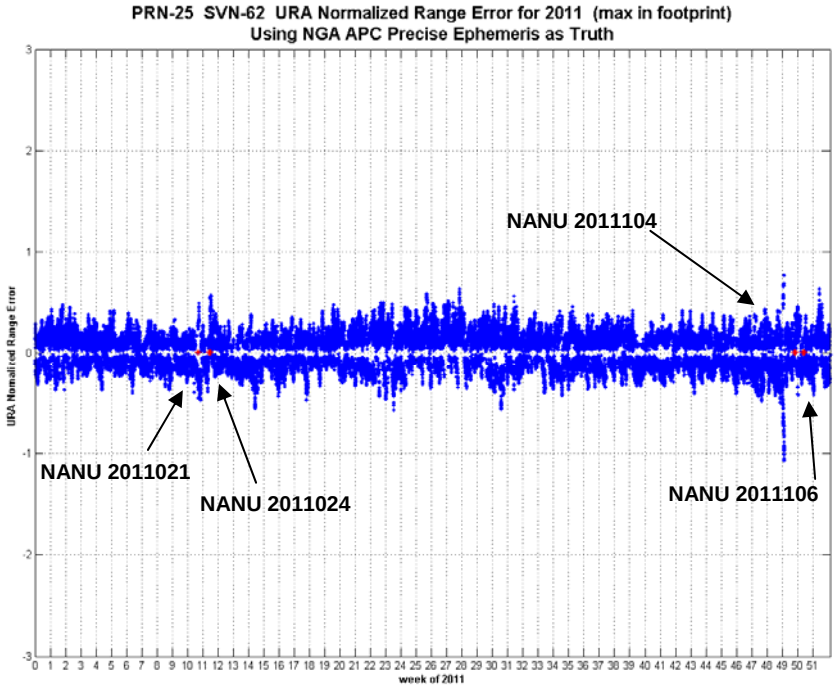


Figure 12-103 Timeline of URA Normalized Range Error PRN-26 SVN-26

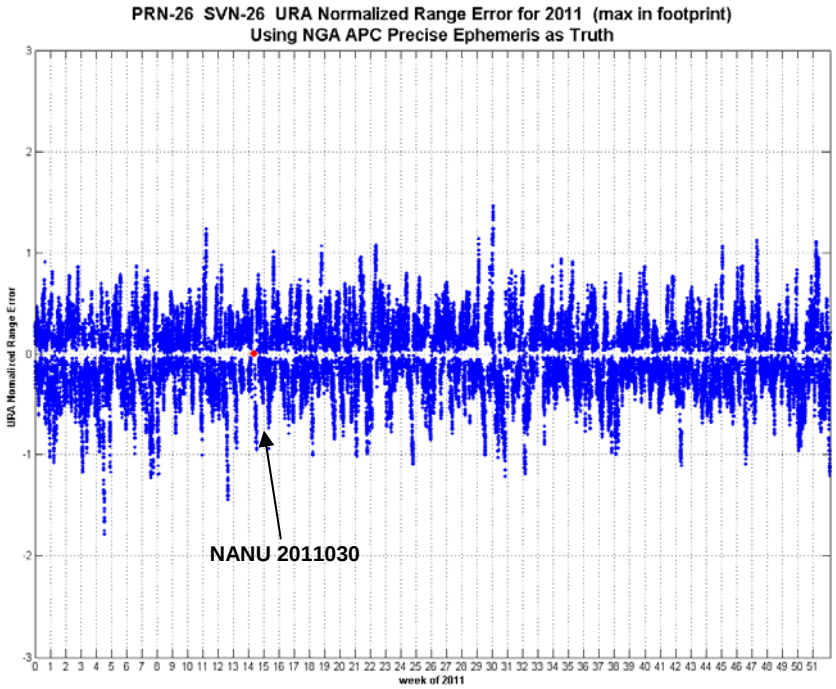


Figure 12-104 Timeline of URA Normalized Range Error PRN-27 SVN-27

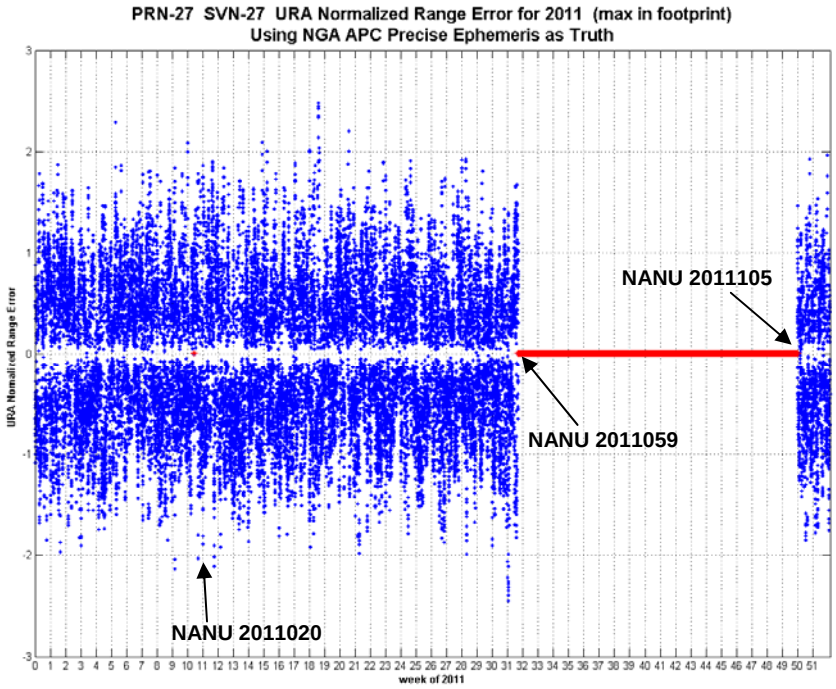


Figure 12-105 Timeline of URA Normalized Range Error PRN-28 SVN-44

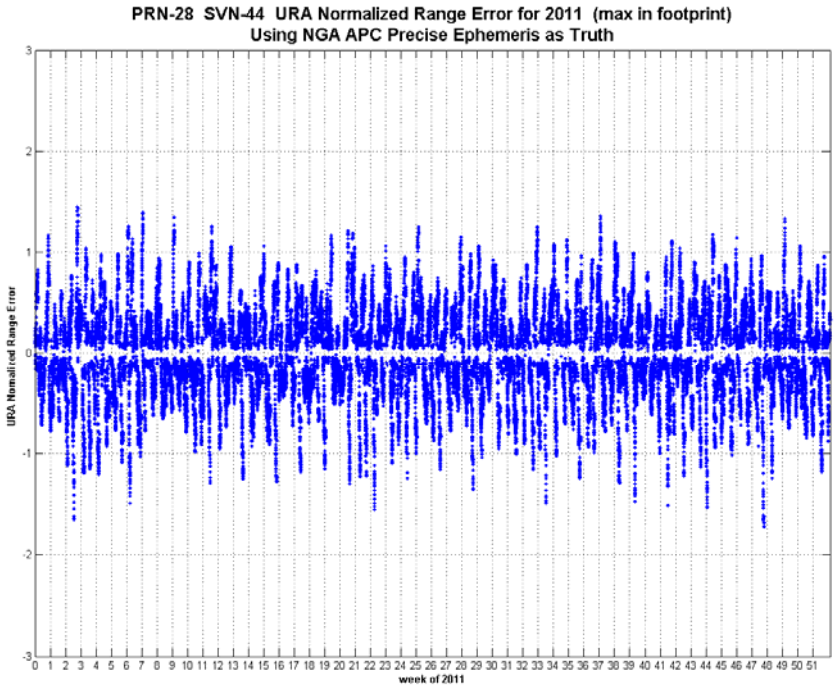


Figure 12-106 Timeline of URA Normalized Range Error PRN-29 SVN-57

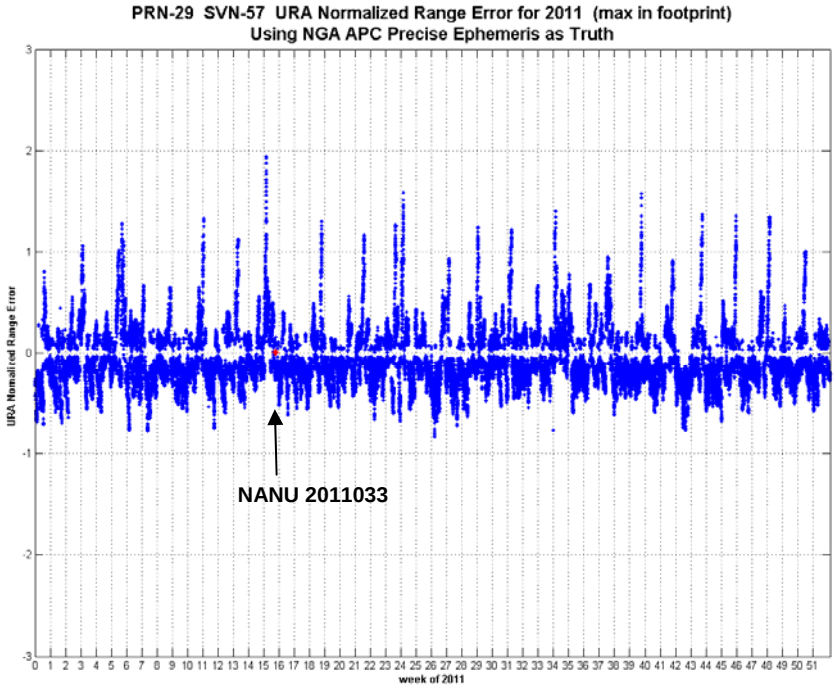


Figure 12-107 Timeline of URA Normalized Range Error PRN-30 SVN-30

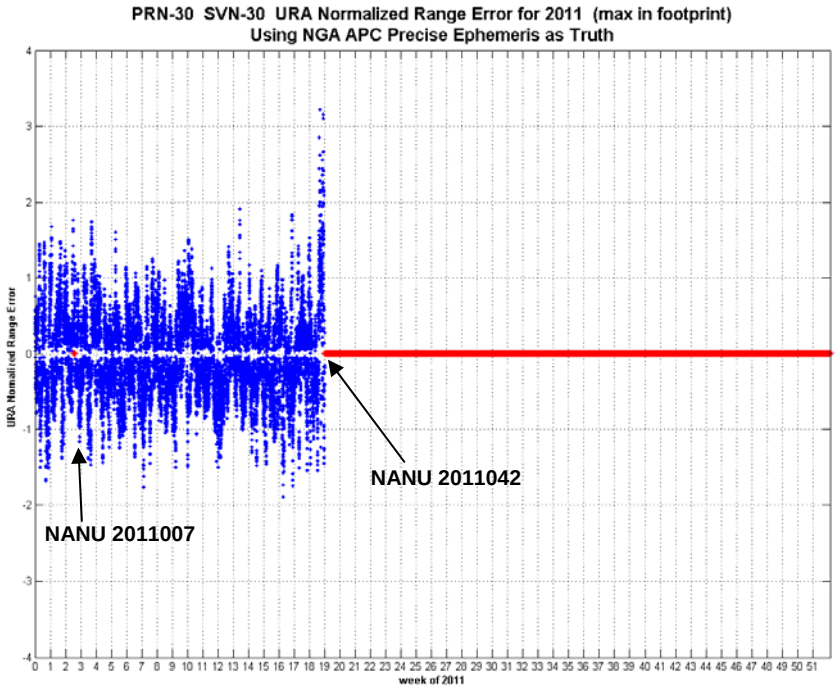


Figure 12-108 Timeline of URA Normalized Range Error PRN-30 SVN-35

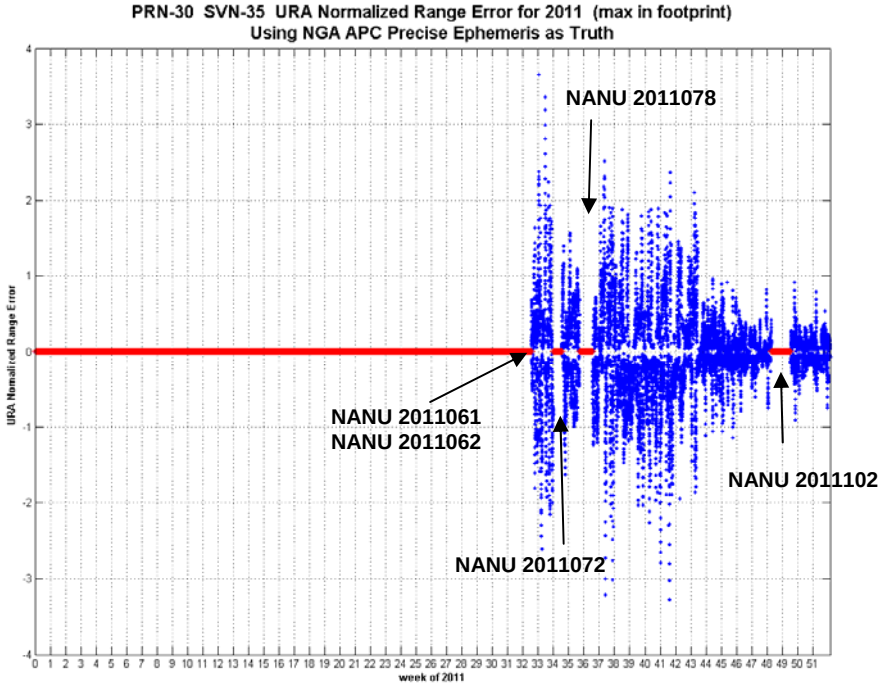


Figure 12-109 Timeline of URA Normalized Range Error PRN-31 SVN-52

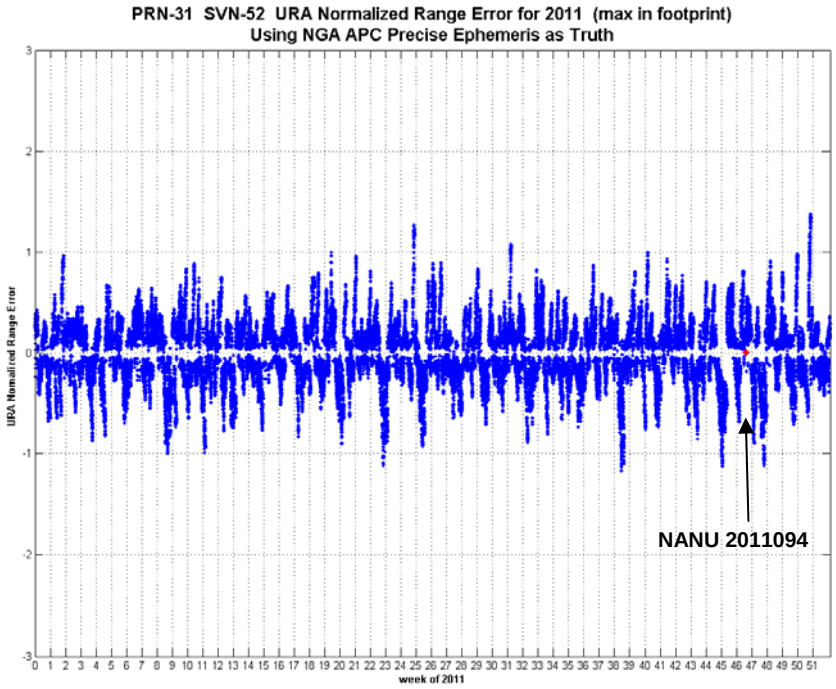
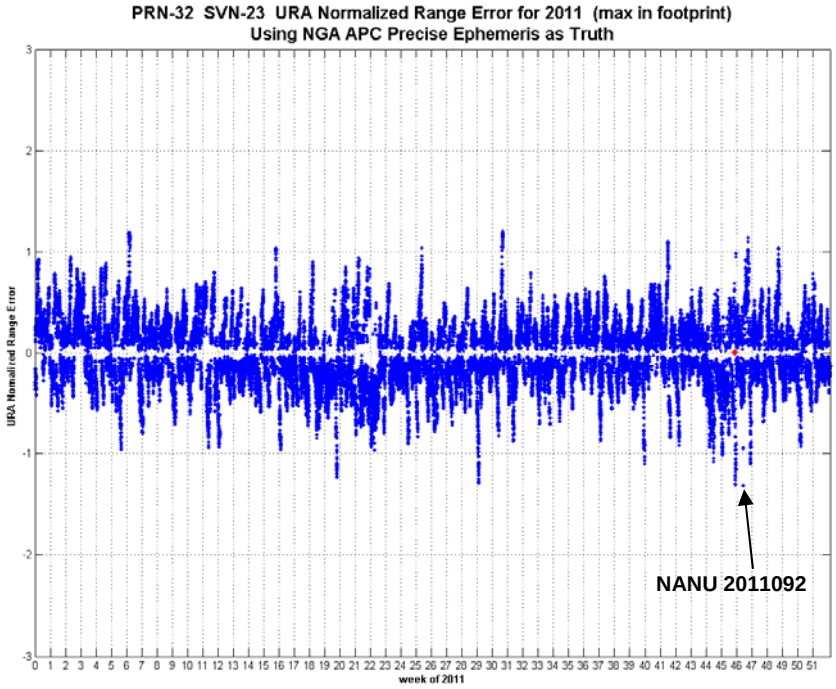


Figure 12-110 Timeline of URA Normalized Range Error PRN-32 SVN-23



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

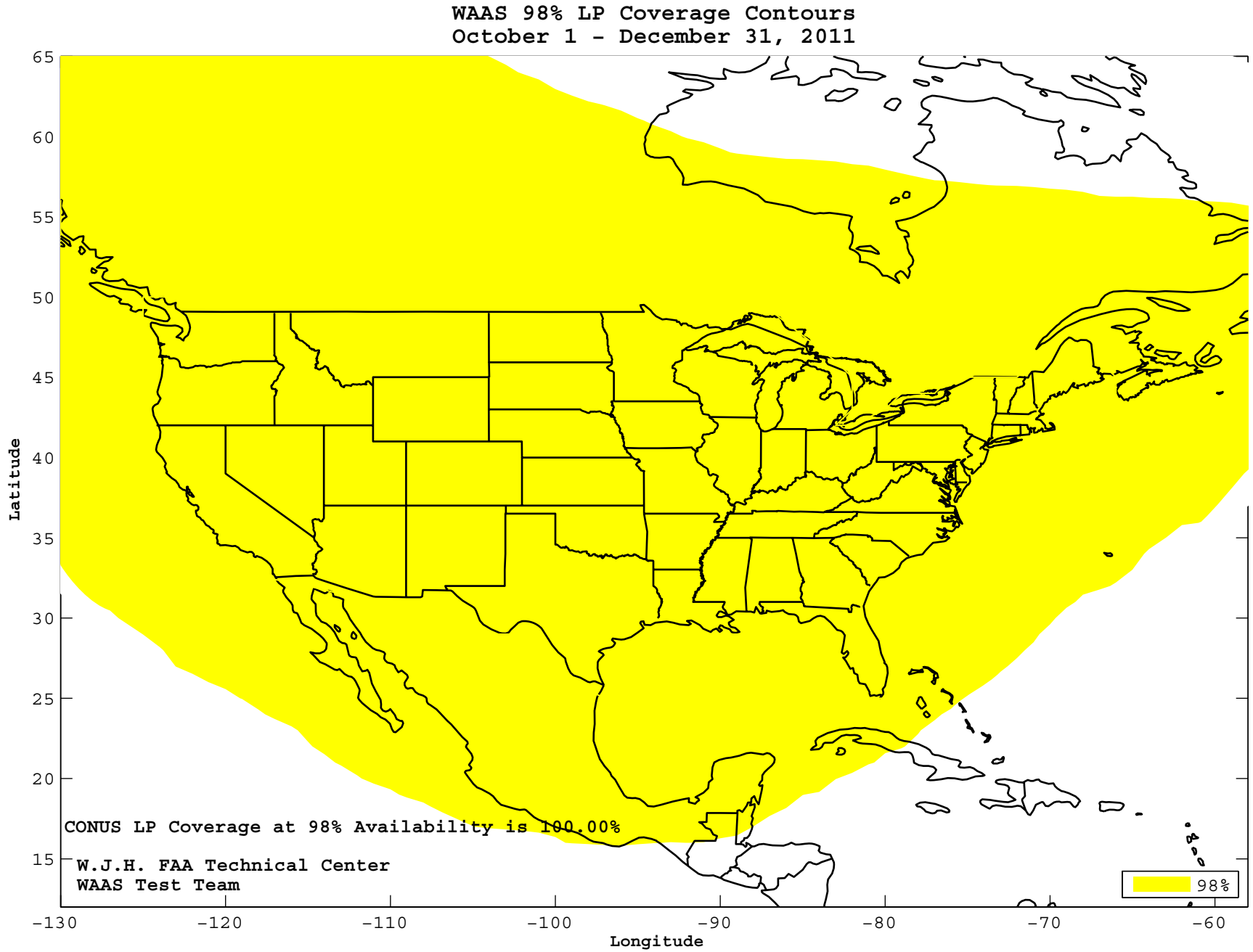


Figure B-2 98% Alaska LP Availability Contour for the Quarter

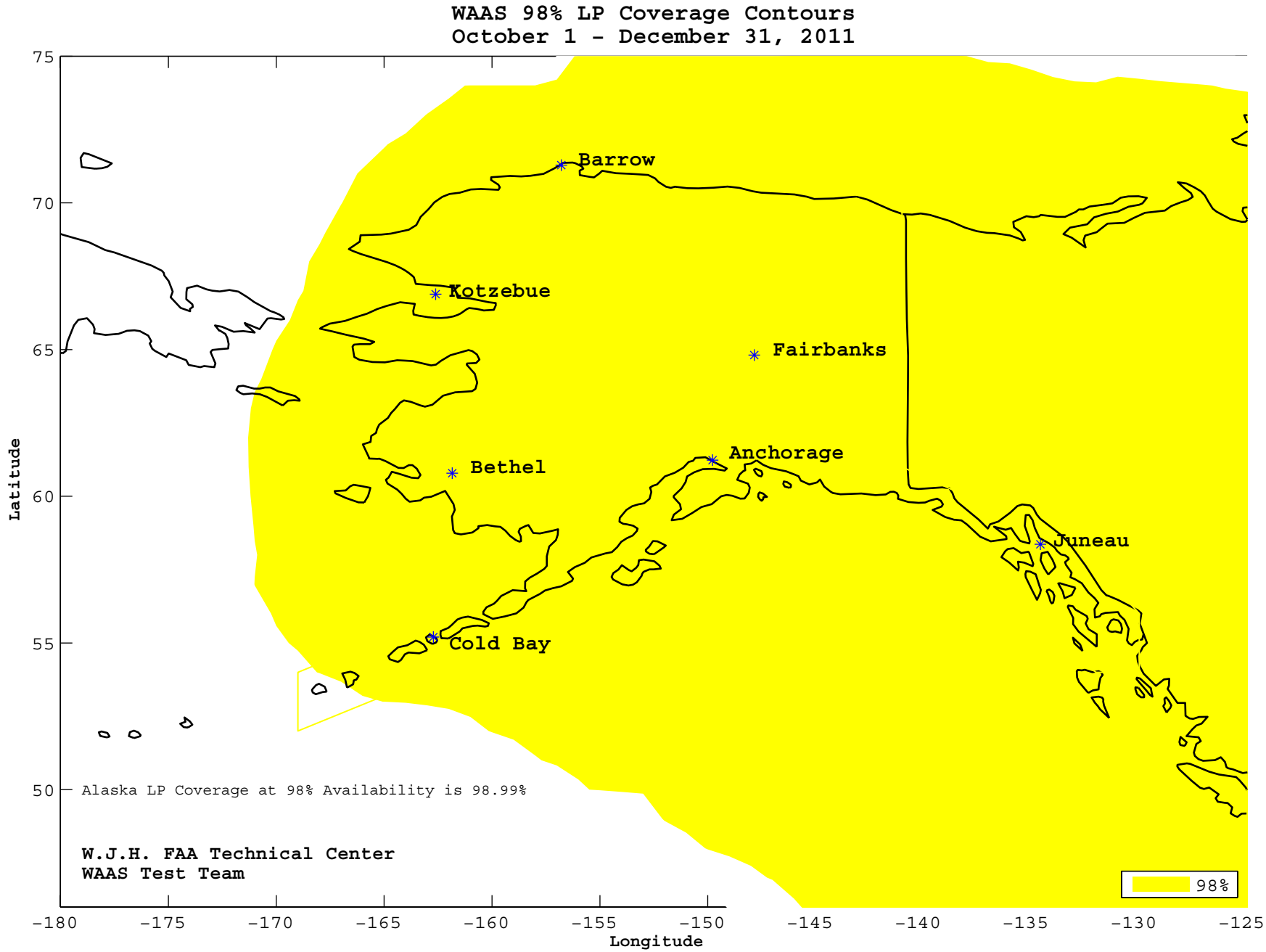


Figure B-3 98% CONUS LPV Availability Contour for the Quarter

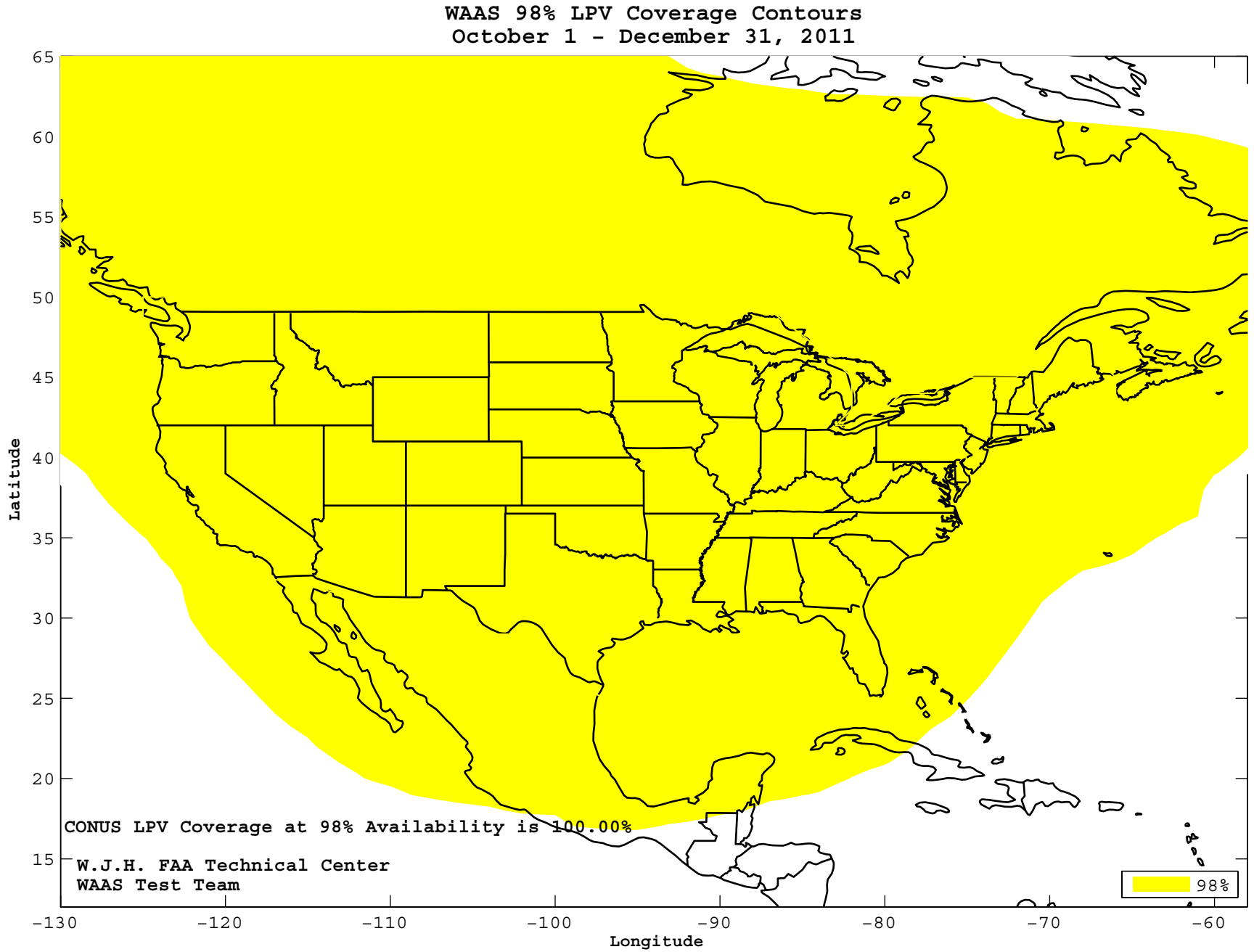


Figure B-4 98% Alaska LPV Availability Contour for the Quarter

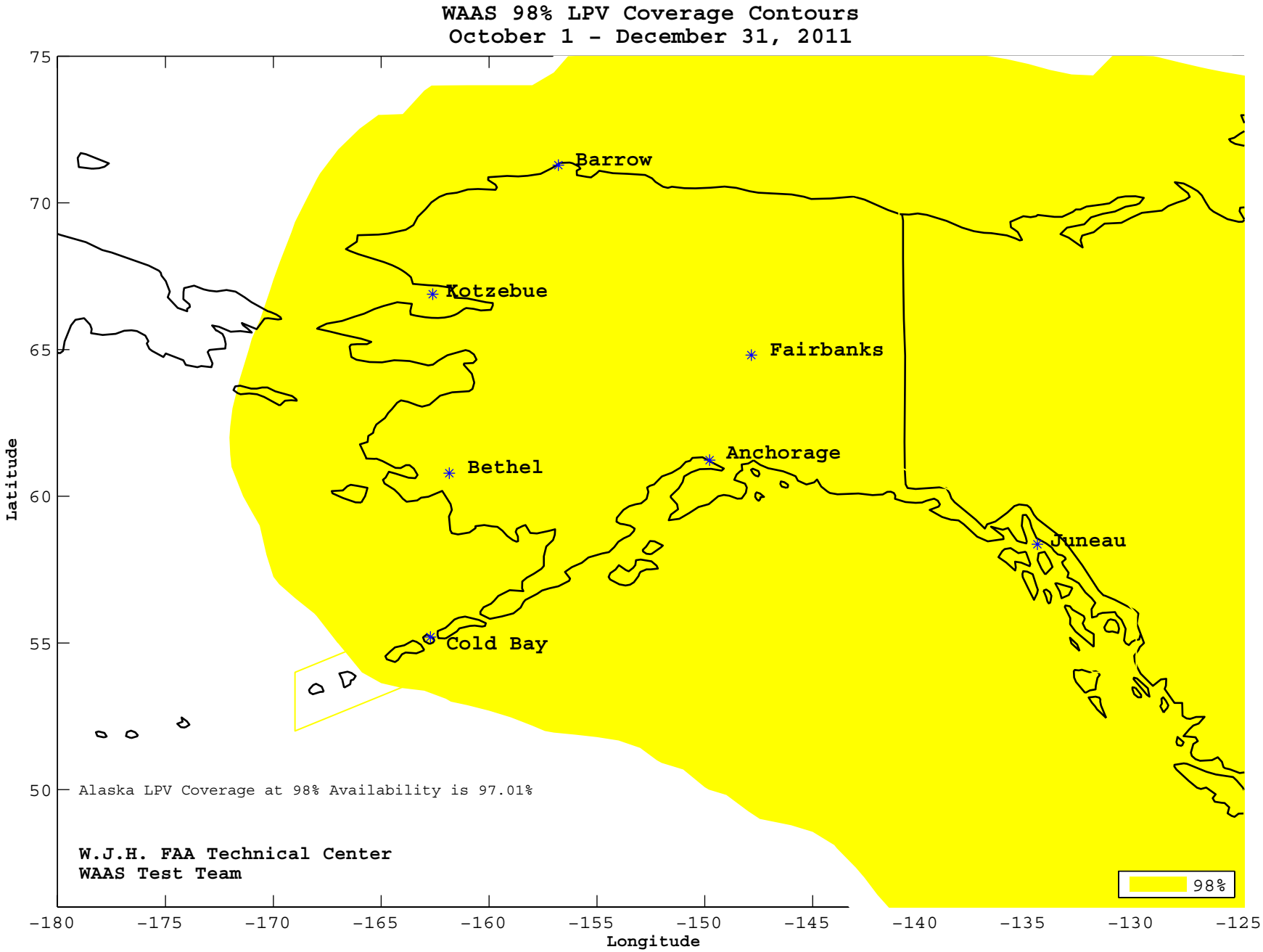


Figure B-5 99% CONUS LPV 200 Availability Contour for the Quarter

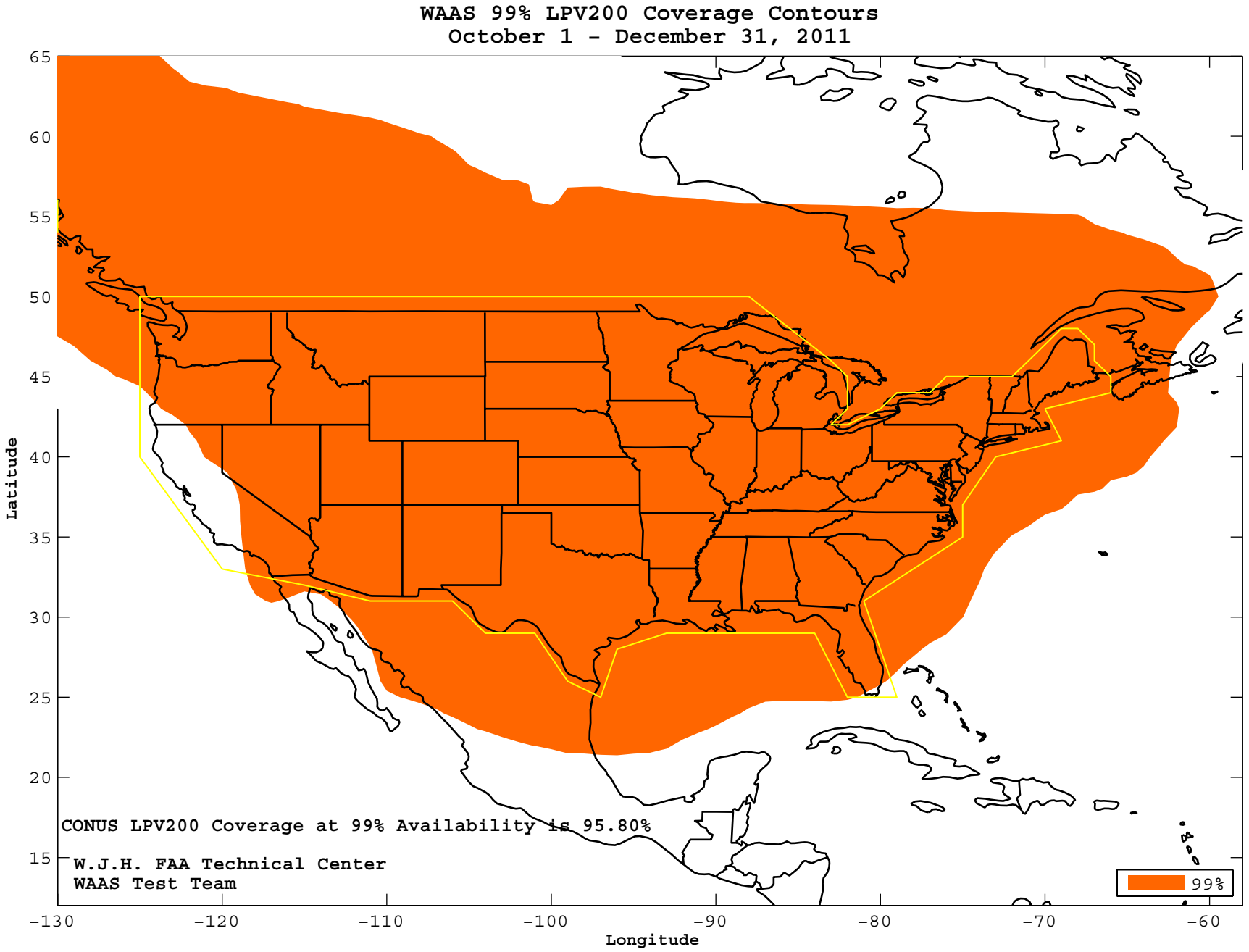


Figure B-6 99% Alaska LPV 200 Availability Contour for the Quarter