LAX/Community Noise Roundtable

Work Program A13 –
North Downwind Arrival Study Results

June 8, 2016

Presentation Outline

- Background
- Study Roles
- Study Design
- Study Elements
- Study Results
- Questions and Answers

Background

- 2012 – LAWA begins receiving complaints about low, loud, frequent aircraft noise events over Culver City
  - Culver City lies beneath the North Downwind Arrival course into LAX, which has been in use for decades
- 2014 – LAWA examines aircraft altitudes over Culver City and finds no obvious changes in aircraft altitudes or flight track locations
  - Culver City becomes a member of the LAX/Community Noise Roundtable and Culver City residents frequently attend Roundtable meetings to express concerns about low, loud, and frequent aircraft noise events

Background

- October 2015 – Residents north and south of the North Downwind Arrival course perceive aircraft are lower, louder, and more frequent

- November 2015 – LAWA examines flights over Pacific Palisades and finds no obvious changes in aircraft altitudes and flight track locations

- January 2016 – FAA SoCal TRACON Staff Present on the North Downwind Arrivals to the LAX Roundtable; finds no obvious changes in aircraft flight track locations

Background

- March 2016 – LAWA authorizes ESA and HMMH to begin the North Downwind Arrival Study

- May 2016 – The LAX/Community Noise Roundtable adopts Work Program Item A13 - North Downwind Arrival Study

- June 2016 - The LAX/Community Noise Roundtable holds a special meeting to review and discuss the North Downwind Arrival Study results

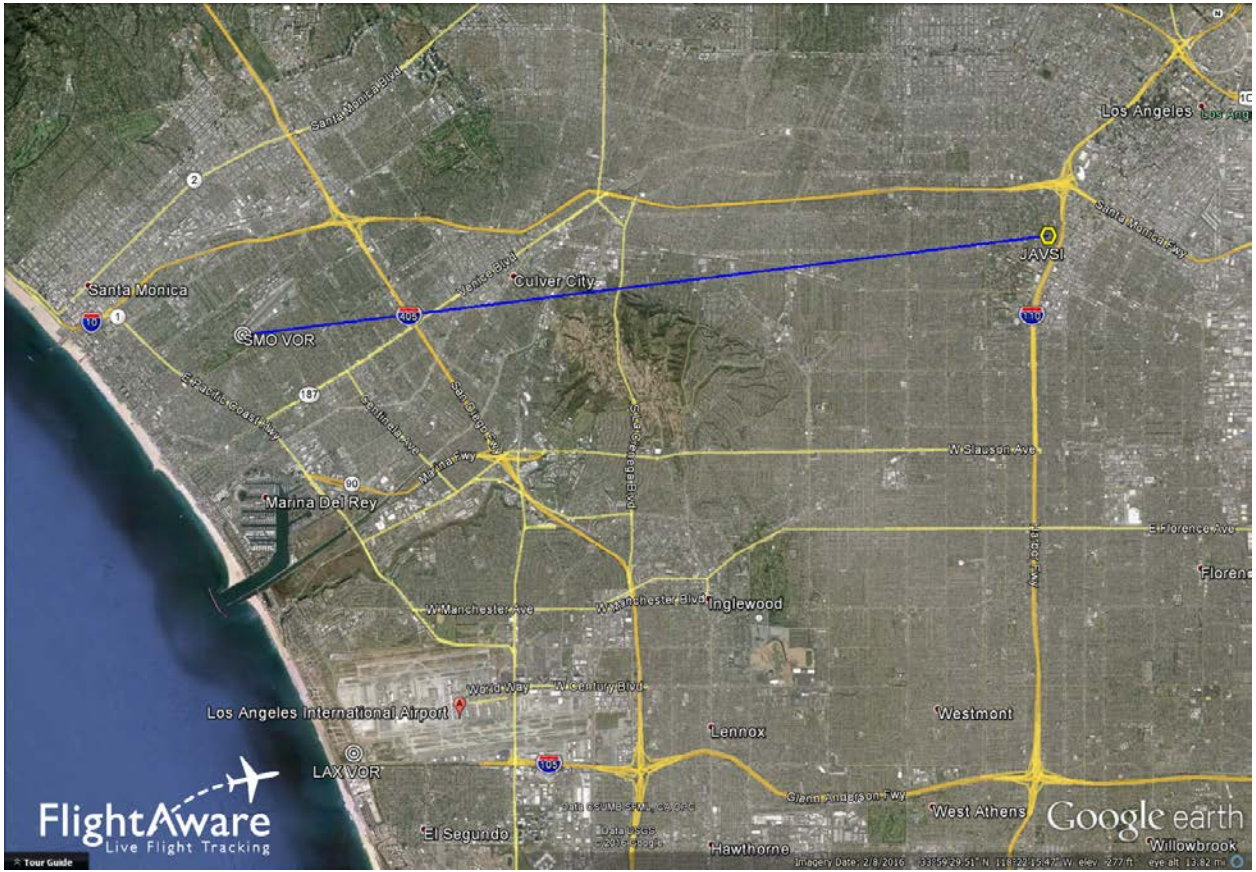
Background – Key Terms

- **North Downwind Arrival** – The standard arrival course for aircraft arriving from the north and west of LAX
- **Santa Monica VOR** – A navigational aid on the southwest edge of Santa Monica Airport (SMO)
- **Radial** – An electronic signal with a specific heading to or from a VOR
- **Fix/Waypoint** – A named coordinate in the airspace that aircraft fly to/over

Background – Key Terms

- **National Airspace System (NAS)** – The navigable airspace that is controlled by the Federal Aviation Administration
- **Area Navigation (RNAV)** – Permits navigation on any desired flight path
- **Vectors** – Directions provided by the air traffic controllers to pilots to navigate from point to point

Background – Key Terms



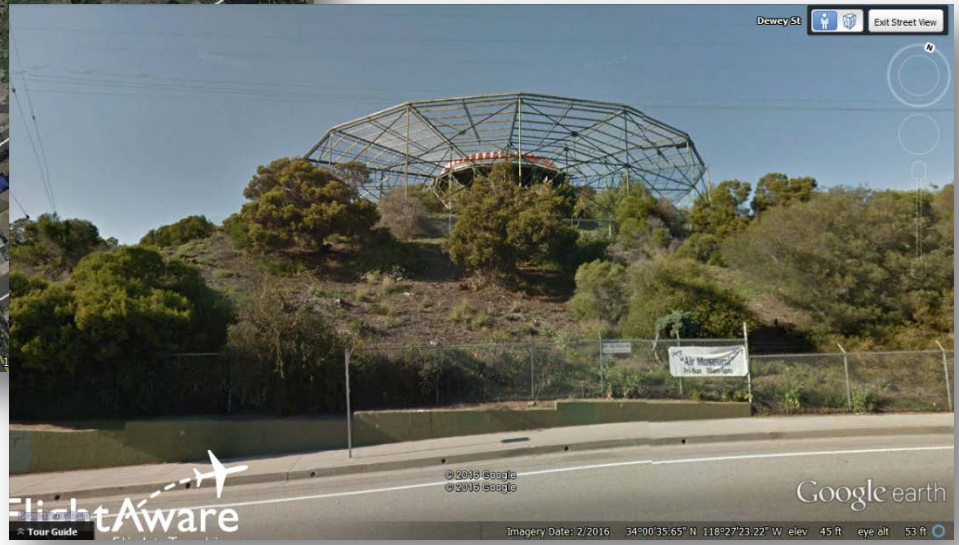
- SMO VOR
- 068^{o} Radial
- JAVSI Fix

Source: Google Earth, ESA 2016

Background – Key Terms

Source: Google Earth, ESA 2016

- SMO VOR



Source: Google Earth, ESA 2016

Background – Key Terms

- **Federal Aviation Administration (FAA)** – The federal agency responsible for the safe and efficient use of the NAS
- **Los Angeles World Airports (LAWA)** – Owner/operator of Los Angeles International Airport (LAX)
- **Airlines/aircraft operators** – Schedule aircraft arrivals and departures and make aircraft purchases to meet passenger demands
- **Passengers** – Create the travel demand that drives when and how frequently the airlines schedule flights; fund research and development for newer/quieter aircraft through ticket taxes

Study Roles

- **LAWA** – Initiate and fund the study effort and review the study results
- **ESA** – Develop the scope of work for the Study, review HMMH's work, and present the Study Results
- **HMMH** - Serve as an independent consultant analyzing large amounts of flight track and altitude data over several years
- **Roundtable** – Provide a forum for the Study results to be reviewed and discussed

Study Design

- Look at flight track and altitude data in new ways; focused on visual images and data trends
- Analyze the data in a fine-grain manner on a month-over-month, year-over-year basis to identify any changes
- See if the data reveal any new insights into the origin of the community's aircraft noise complaints

Study Elements

- Identify up to ten locations for data analysis
  - Generally associated with areas of increased noise complaints or navigational fixes
- Analyze data from 2010 through 2015 on a monthly basis
- Assess Changes in Slant Distance
- Prepare Altitude Distribution Graphs
- Analyze Time of Day Distribution
- Prepare Flight Track Density Plots

Study Elements

- Review Historic Arrival Procedures and Fixes
- Compare Average Sound Exposure Levels
- Analyze Changes in Aircraft Fleet Mix
- Prepare a Technical Memorandum
- Present the Study Results at a Special LAX/Community Noise Roundtable Meeting

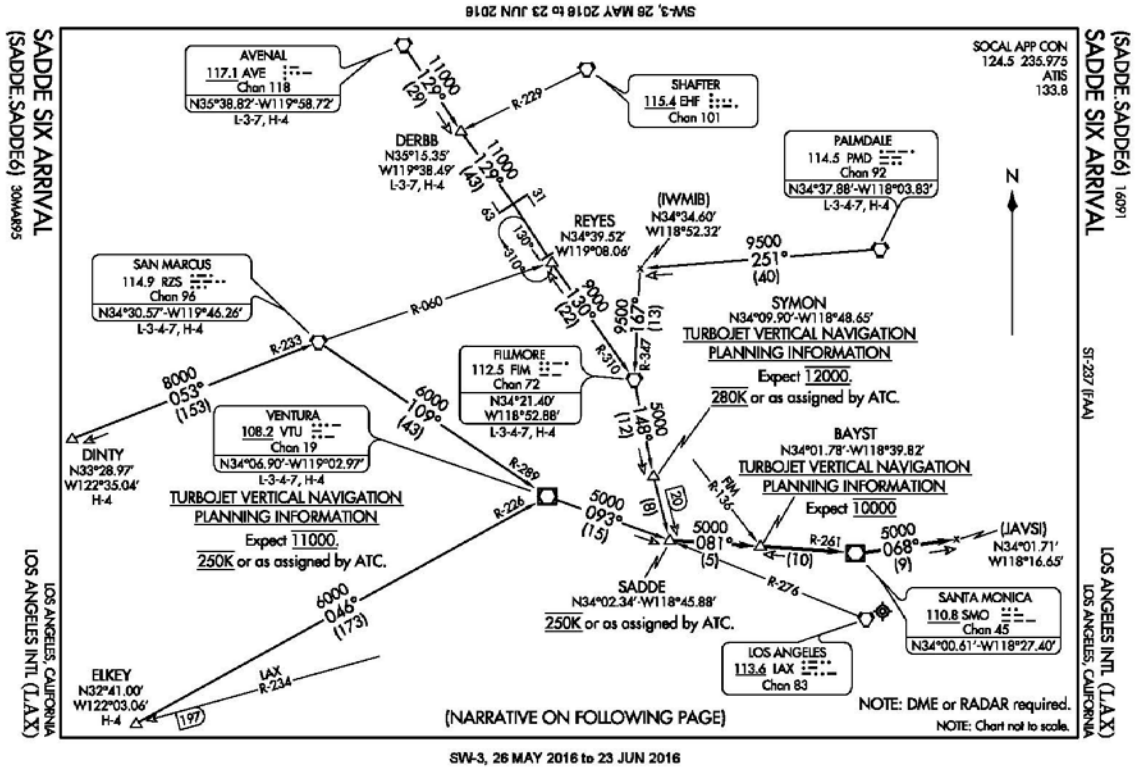
Study Elements

- LAWA staff also performed extensive additional analyses including:
  - Analyzing the timing and geographic distribution of aircraft noise complaints
  - Comparing the timing of notable events (e.g., major runway closures) to the increase in aircraft noise complaints in the vicinity of the North Downwind Arrival
- The net result of this effort was a comprehensive, detailed, and thorough examination of aircraft operations, flight tracks, altitudes, slant distances, fleet mix, aircraft noise levels, and noise complaints related to the North Downwind Arrival from 2010 through 2015

Study Results

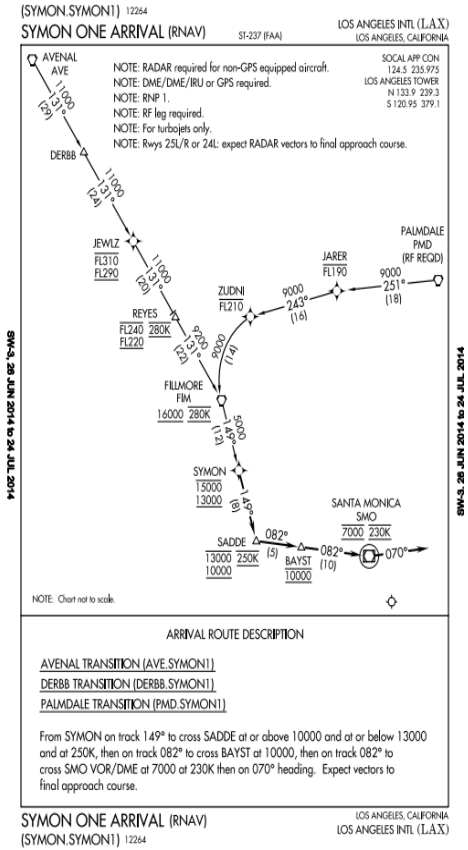
- Due to the quantity of data analyzed, we are providing examples from several representative locations during tonight's meeting
- The representative examples are indicative of the changes we saw in the other data sets for the other locations along the length of the North Downwind Arrival course

Study Results – Review Arrival Procedures



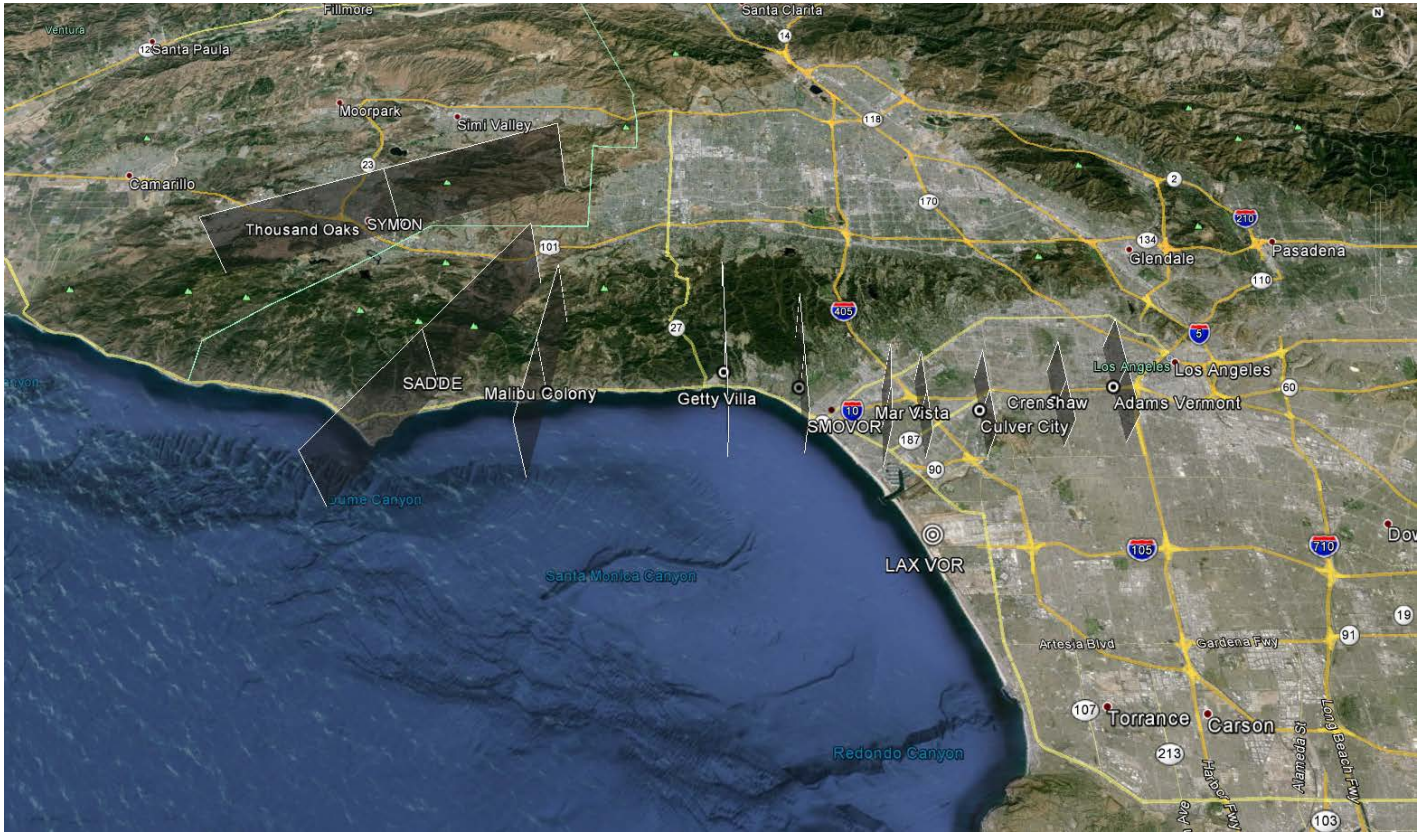
- There is only one published arrival procedure associated with the North Downwind; a Standard Terminal Arrival Route (STAR) called SADDE SIX
- SADDE SIX was published as early as 2004 and continues to be used through today

Study Results – Review Arrival Procedures



- On September 20, 2012, the FAA published two RNAV STAR arrival procedures; SYMON and KEACH. However, on September 19, 2012, the FAA published a Notice to Airmen (NOTAM) indicating the procedure was not available for use
- Both procedures were removed from publication by the FAA on August 19, 2015
- Since these procedures were not available for use, they do not appear to have contributed to the increase in the noise complaints associated with the North Downwind Arrival

Study Results – Data Analysis Locations



- Seven (7) Community-based locations
- Three (3) Navigational fixes

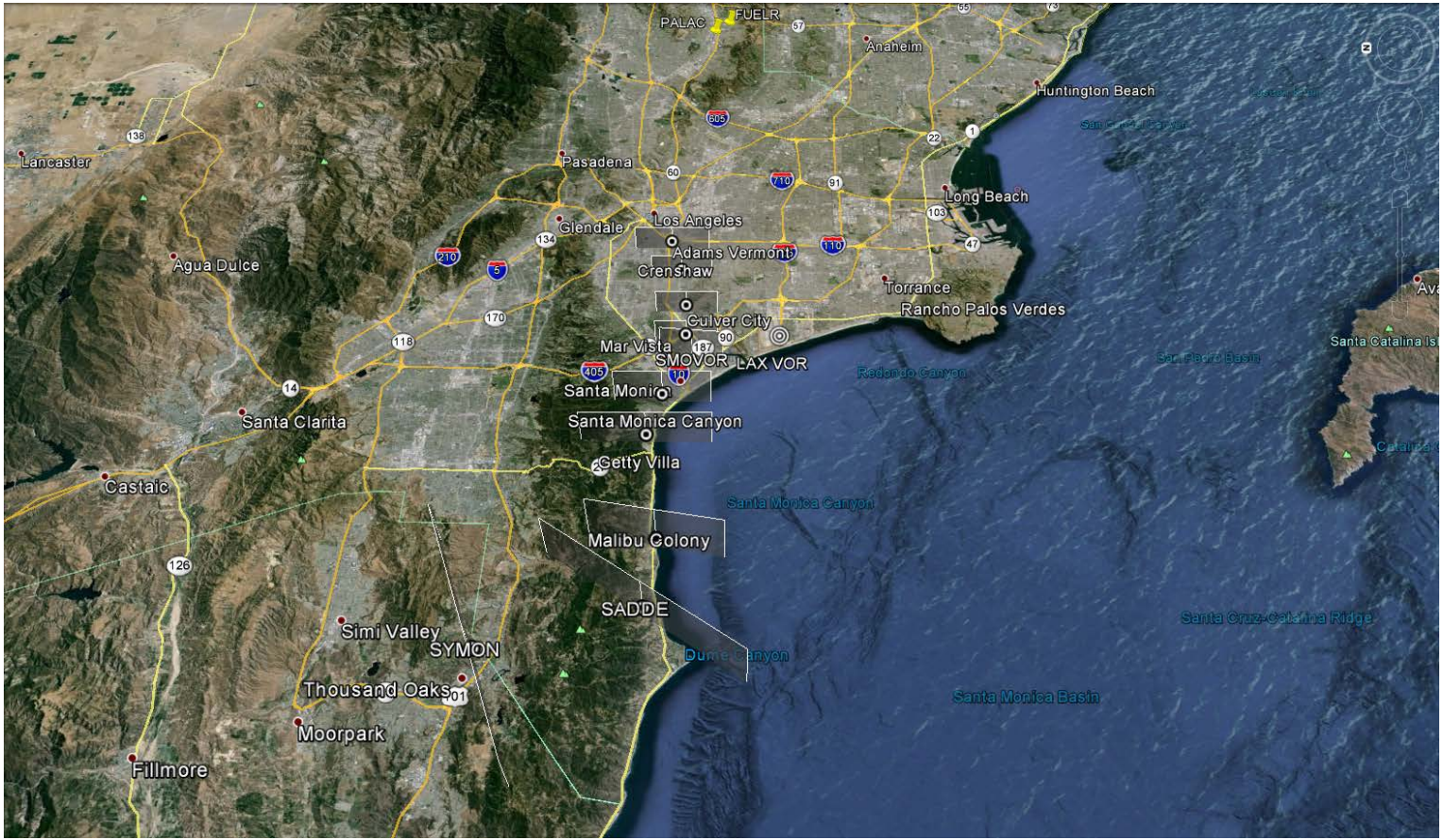
Source: Google Earth, HMMH 2016

Study Results – Gate Configuration and Locations

Analysis Points/Gates	Latitude	Longitude	Geographic Reference	Elevation (ft)	Heading (deg)	L/R - Width (ft)	Floor (ft)	Ceiling (ft)
SYMON	34.165	-118.811	Thousand Oaks Blvd & Via Merida	1,141	160	40,000	1,141	20,000
SADDE	34.039	-118.765	Latigo Canyon Rd & Willmott Ln	571	125	35,000	571	20,000
Malibu Colony	34.032	-118.689	Malibu Rd & Malibu Colony Rd	1	100	20,000	1	20,000
Getty Villa	34.045	-118.565	Pacific Coast Hwy & Getty Villa Dr	177	90	20,000	177	15,000
Santa Monica Canyon	34.034	-118.512	Attilla Rd & E. Channel Rd	90	90	15,000	90	15,000
SMOVOR	34.010	-118.457	Dewey St & 23rd St	117	95	10,000	117	15,000
Mar Vista	34.016	-118.430	Palms Blvd & McLaughlin Ave	102	90	10,000	102	10,000
Culver City	34.017	-118.388	Jefferson Blvd & Duquesne Ave	83	90	10,000	83	10,000
Crenshaw	34.023	-118.335	W. Exposition Blvd & Crenshaw Blvd	112	90	10,000	90	10,000
Adams-Vermont	34.033	-118.292	W. Adams Blvd & S. Vermont Ave	194	90	12,500	194	10,000

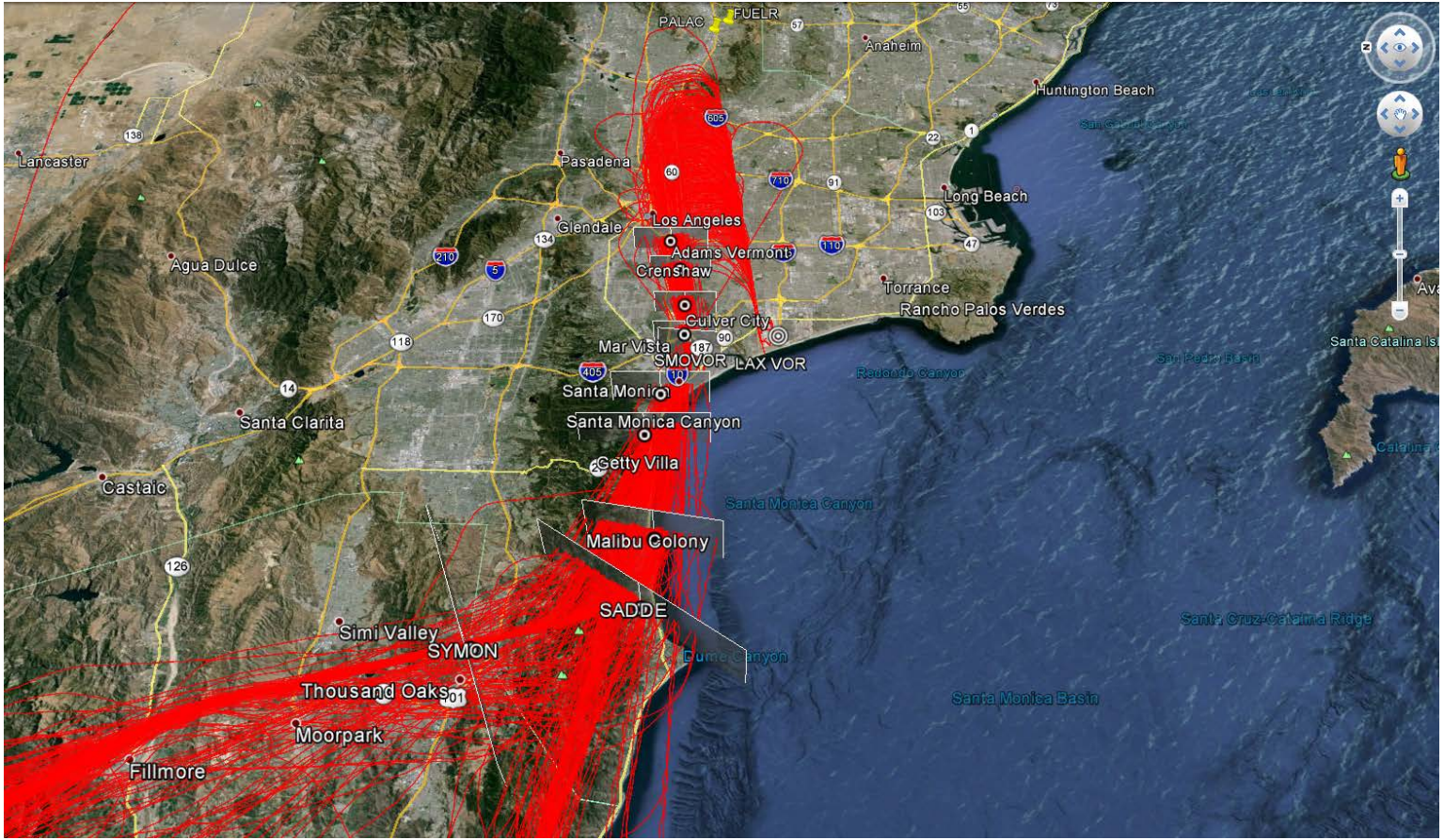
Source: LAWA, HMMH 2016

Study Results – Data Analysis Locations



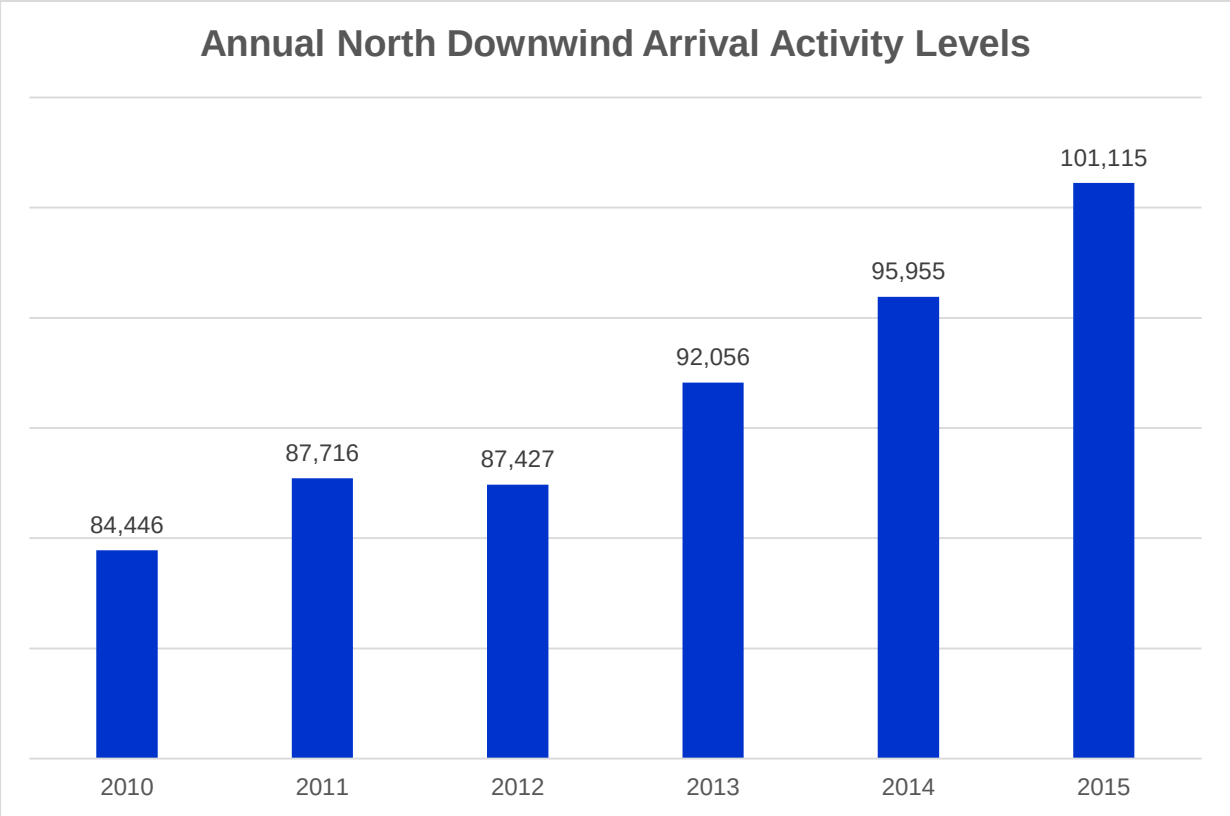
Source: Google Earth, HMMH 2016

Study Results – Data Analysis Locations



Source: Google Earth, HMMH 2016

Study Results – Activity Levels



Source: HMMH 2016

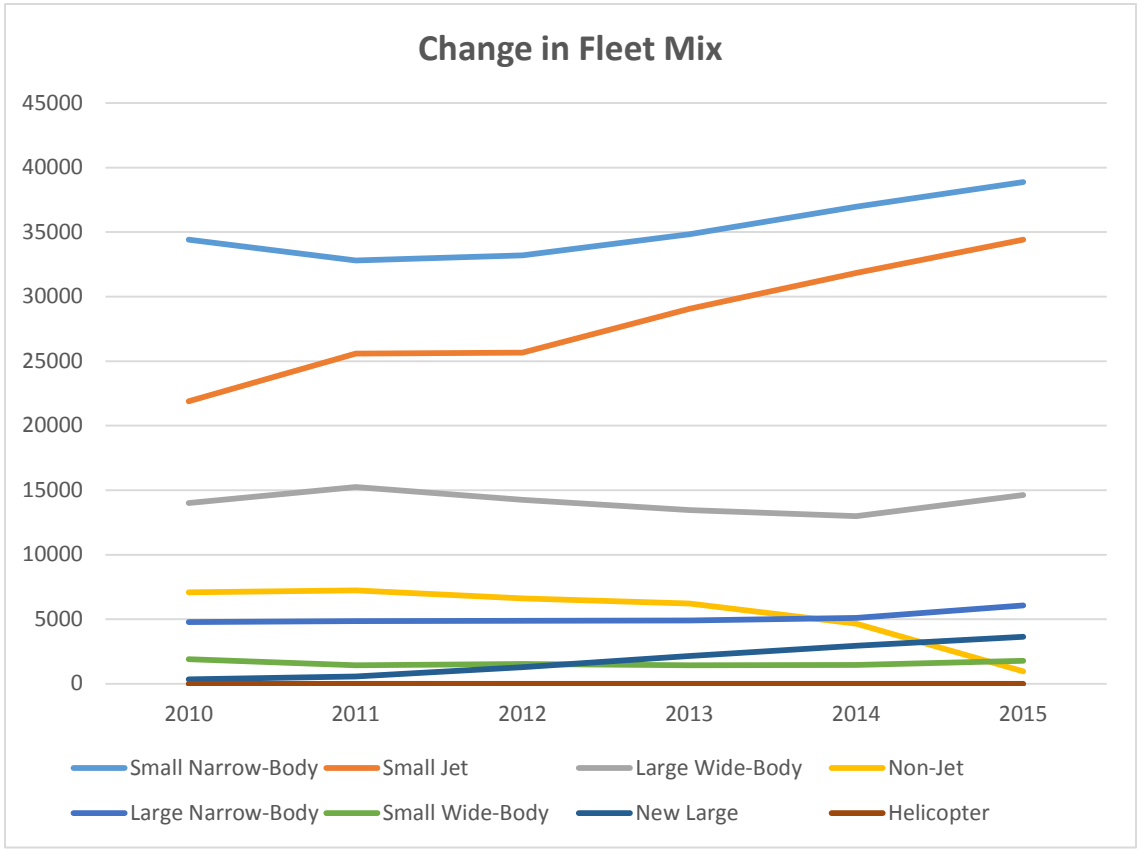
- Aircraft operations increased 22% on the North Downwind Arrival over the six-year analysis period
- This increase is consistent with the growth in overall traffic at LAX

Study Results – Fleet Mix Group Categories

Group	Sample Aircraft Type
Large Narrow-Body	B727, B757, B787
Large Wide-Body	A330, A340, B747, B777, MD11
New Large Aircraft	A380, B748
Small Jet	B717, CRJ, E145, Business Jets
Small Narrow-Body	A320, B737, MD80, MD88, MD90
Small Wide-Body	A300, A310, B767
Non-Jet	Wide Range of Piston-Driven Aircraft

Source: HMMH 2016

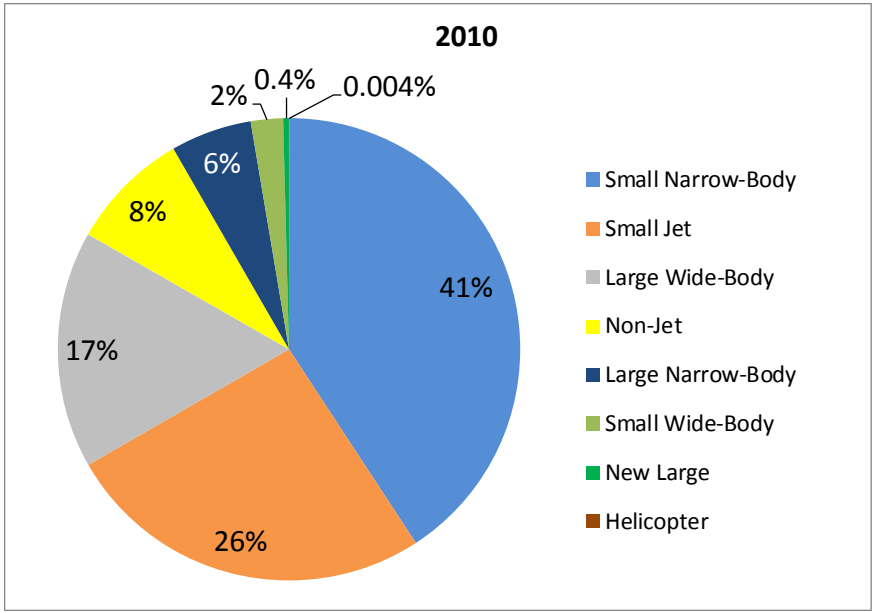
Study Results – Change in Fleet Mix by Category

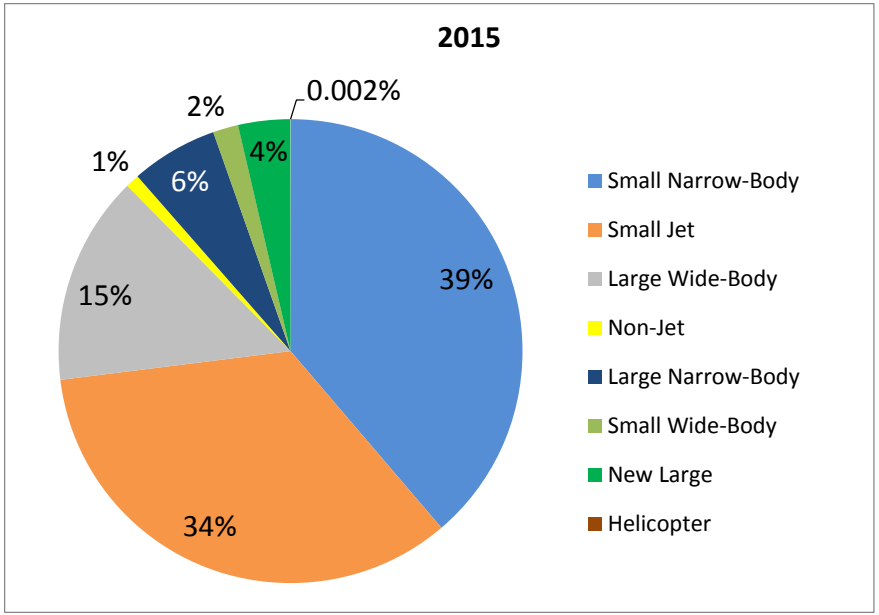


- The Small Narrow-Body, Small Jet, Large Narrow-Body, and New Large Aircraft categories have grown steadily since 2012
- The Non-Jet aircraft steadily declined over the six-year study period

Source: HMMH 2016

Study Results – Change in Fleet Mix by Category



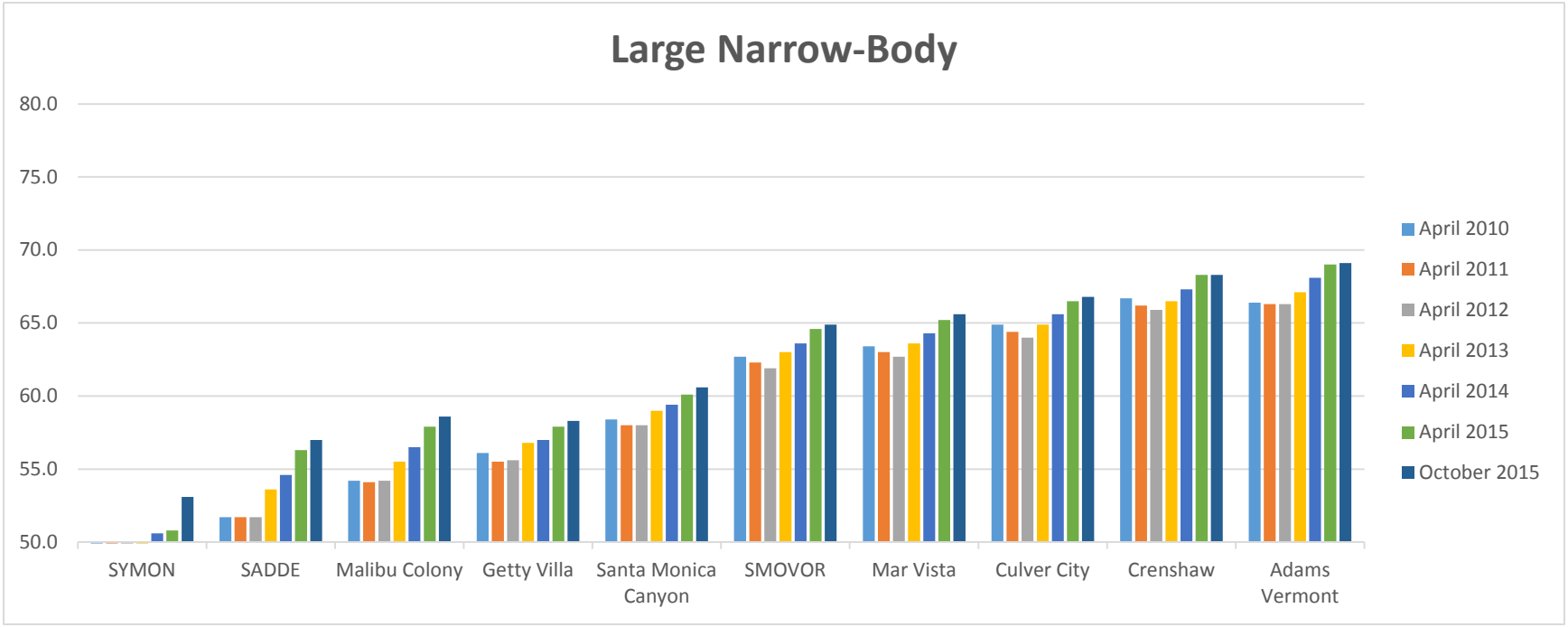


Source: HMMH 2016

Study Results – Sound Exposure Level Calculations

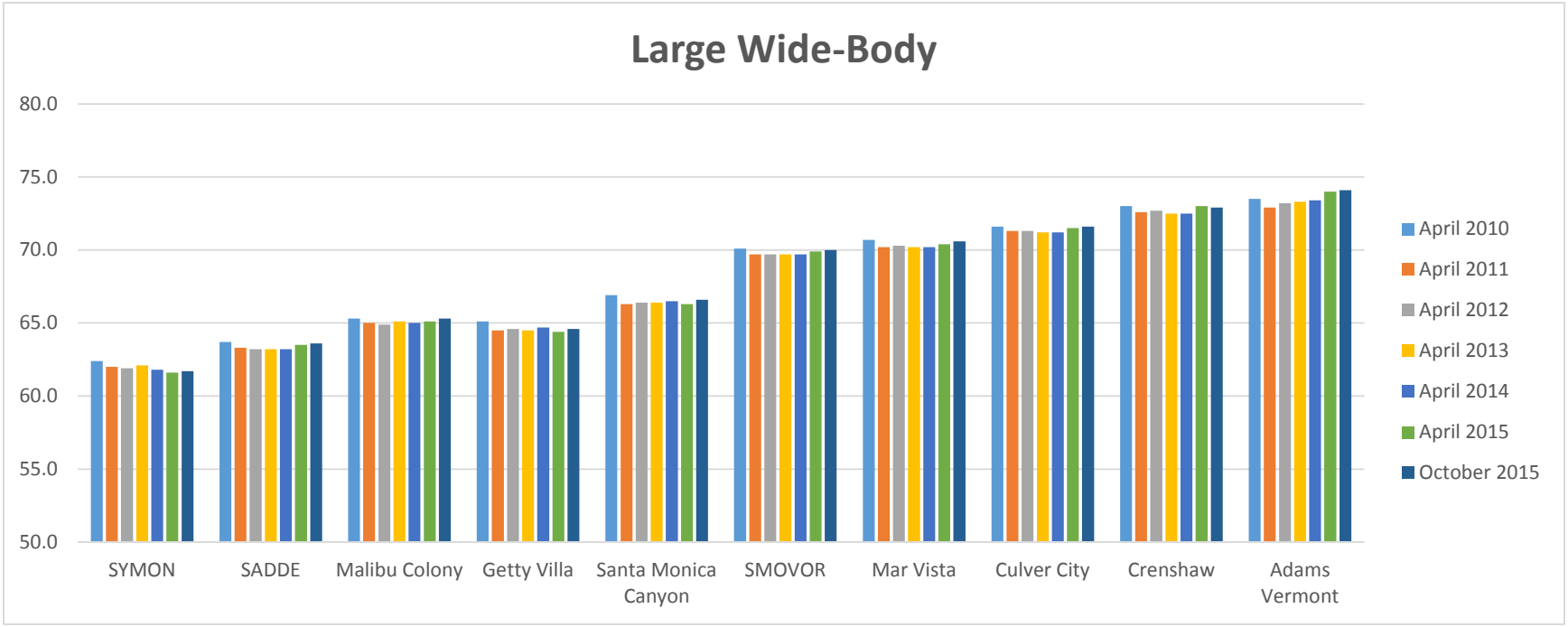
- Sound exposure levels (SEL) for each gate location were modeled using the Standard Grid calculation feature of the FAA's Integrated Noise Model (INM) Version 7.0d
- HMMH used a proprietary software system called RealContours™ that turned each radar flight track into a modeled track for use in the INM to calculate the daily SELs for each aircraft group/category for each gate
- The daily SELs were then averaged to compute an average monthly SEL value for each aircraft group or category at each key location
- Monthly SELs were calculated for the month of April from 2010 through 2015 as well as October 2014 and October 2015

Study Results – Sound Exposure Level Calculations



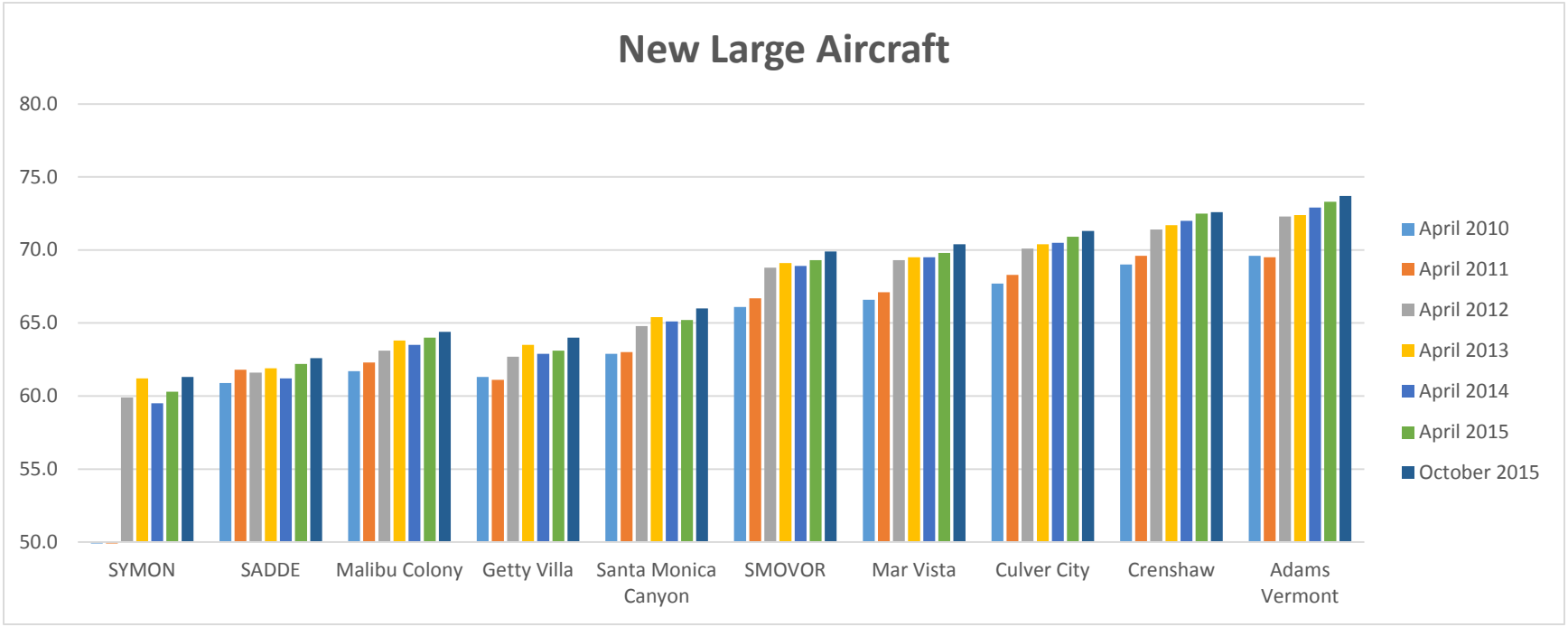
- The Large Narrow-Body group is showing a slight upward trend in average SEL values

Study Results – Sound Exposure Level Calculations



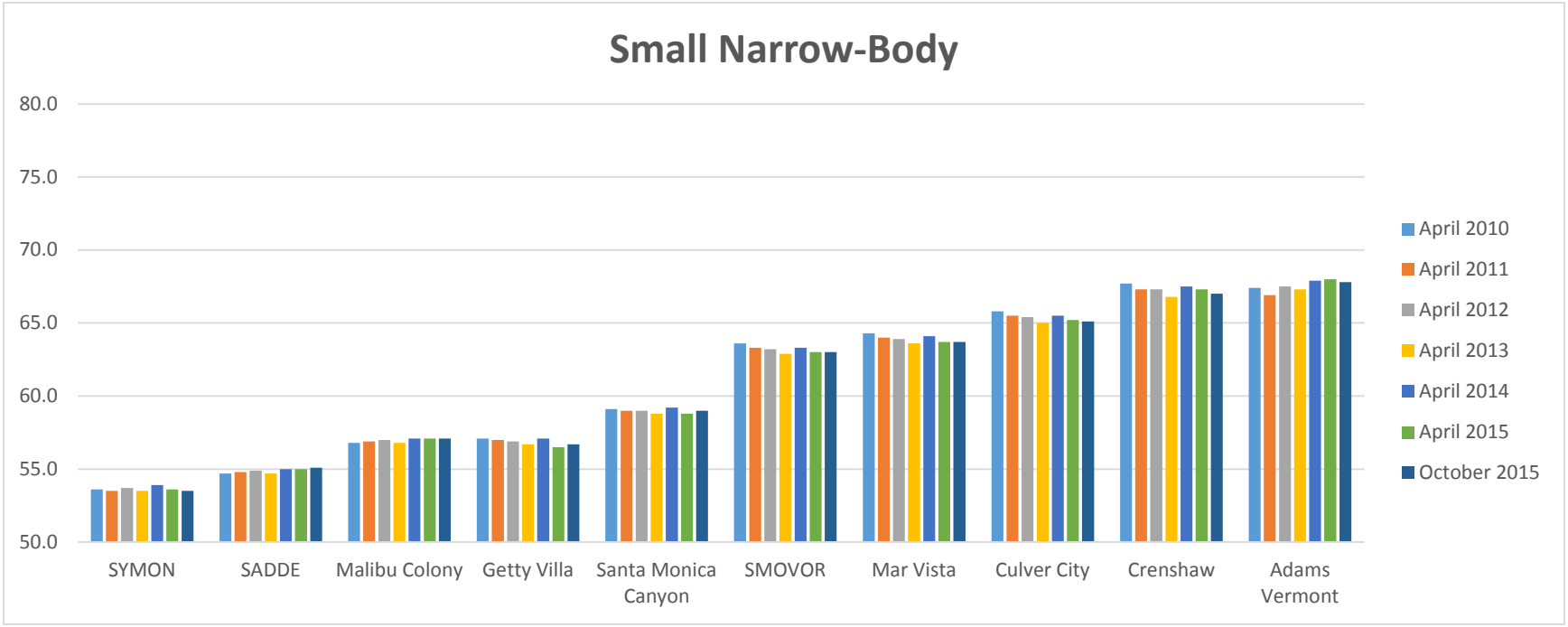
- The Large Wide-Body group is showing virtually no change in average SEL values during the six-year study period

Study Results – Sound Exposure Level Calculations



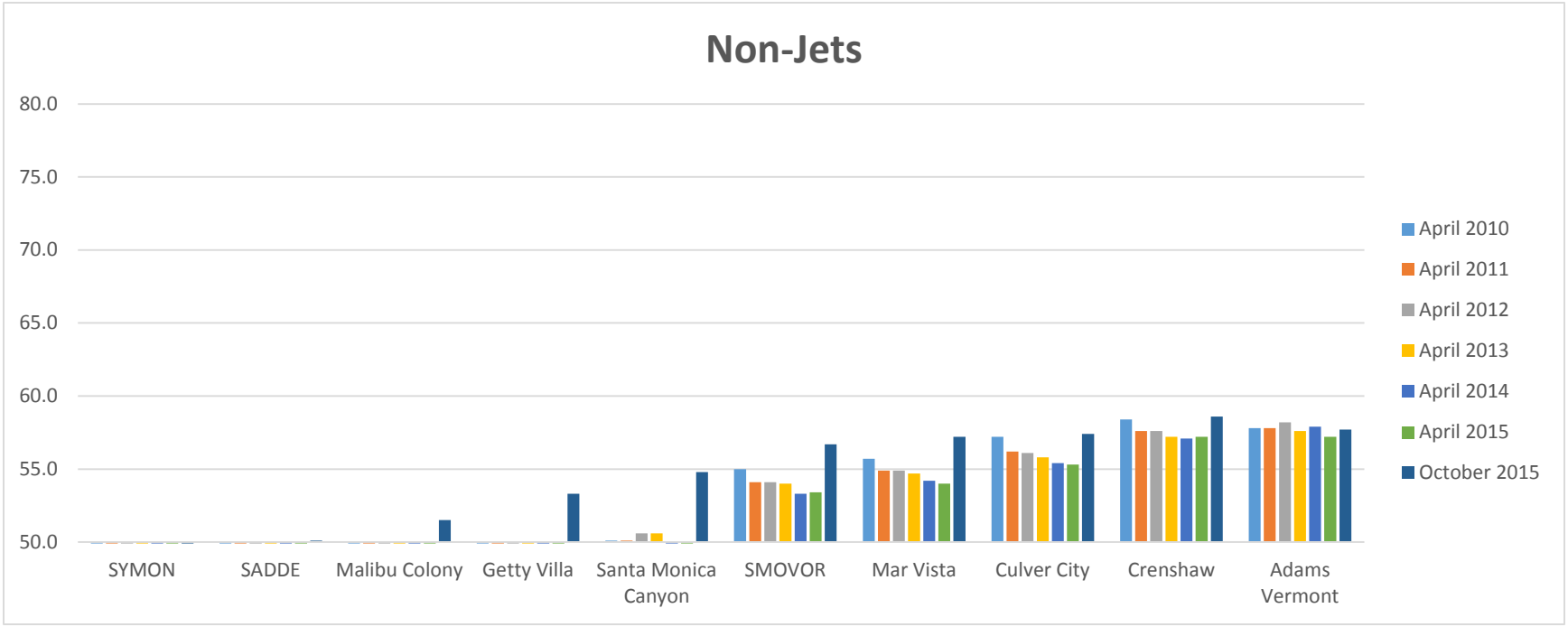
- Since 2012, the New Large Aircraft group is showing a slight increase in average SEL values

Study Results – Sound Exposure Level Calculations



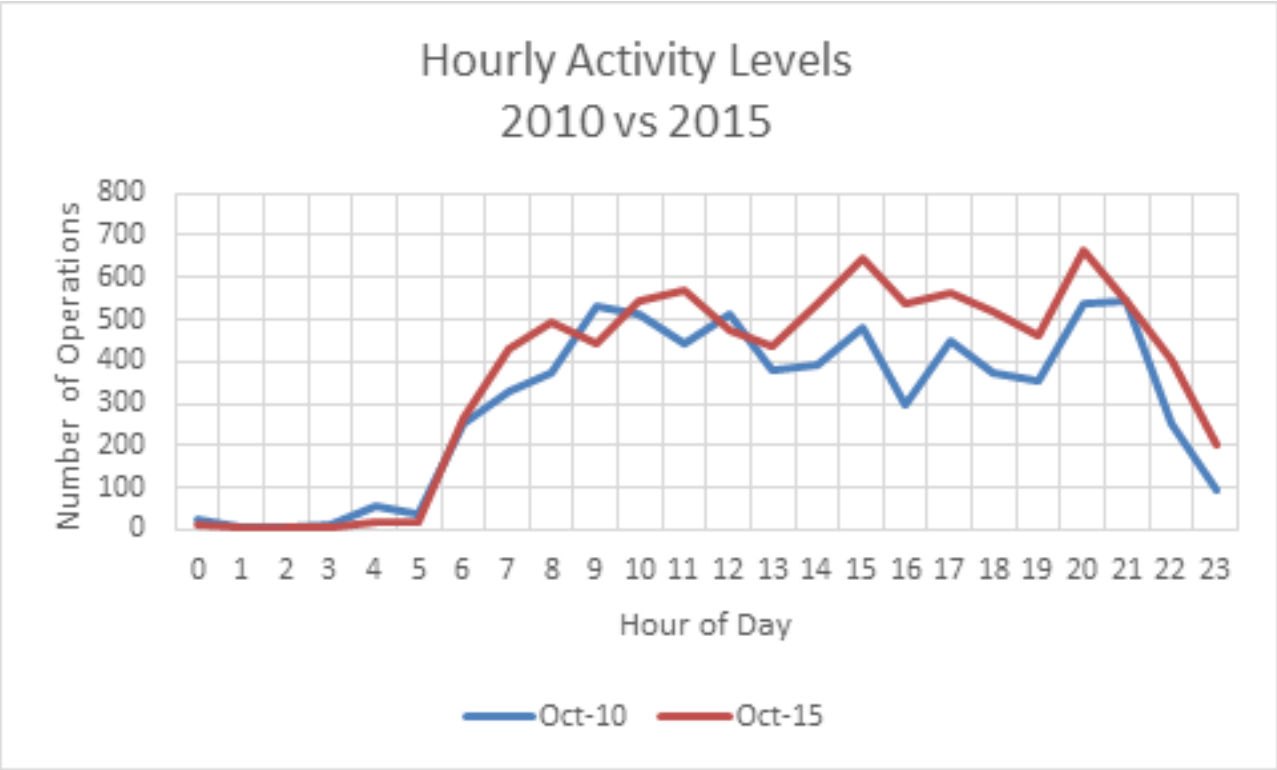
- The Small Narrow-Body group is showing virtually no change in average SEL values over the six-year study period

Study Results – Sound Exposure Level Calculations



- With the exception of October 2015, the Non-Jet group is generally showing a slight decrease in average SEL values over the six-year study period

Study Results – Time of Day Distribution

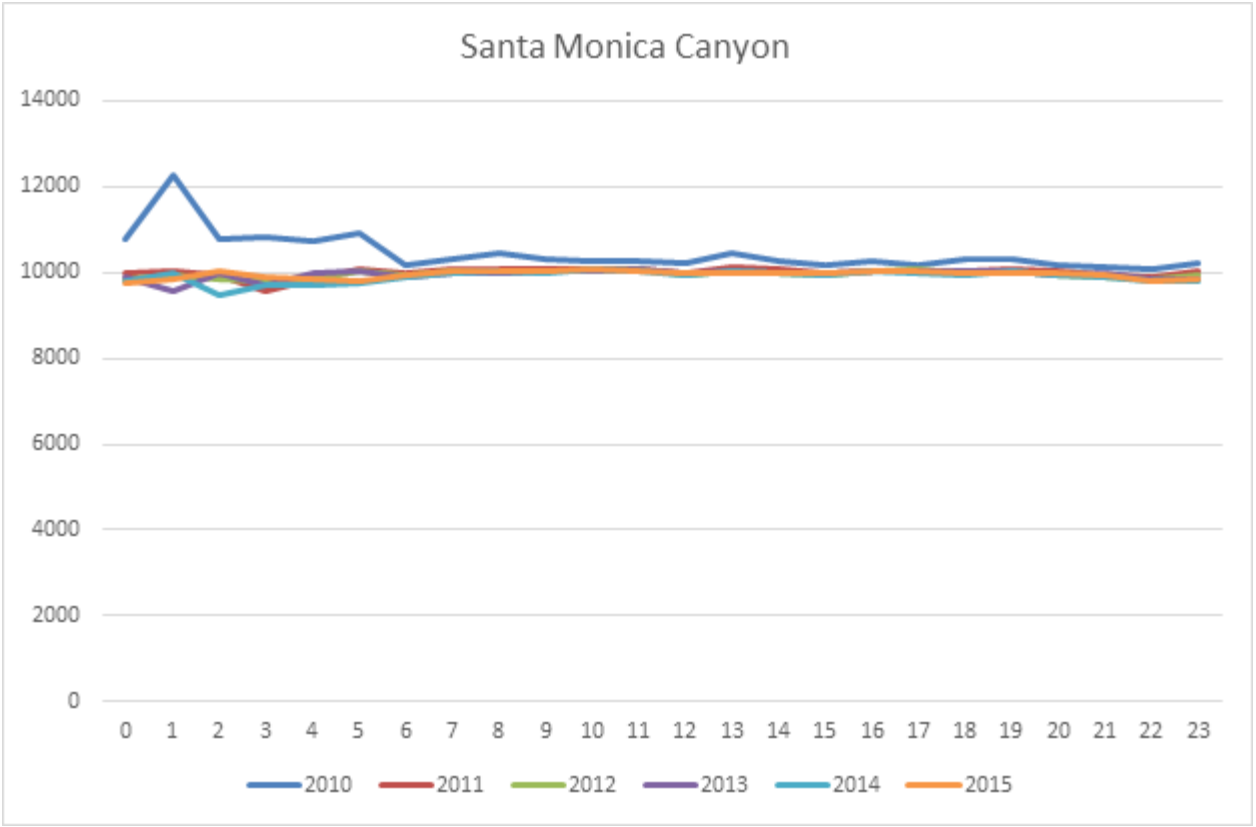


Source: HMMH 2016

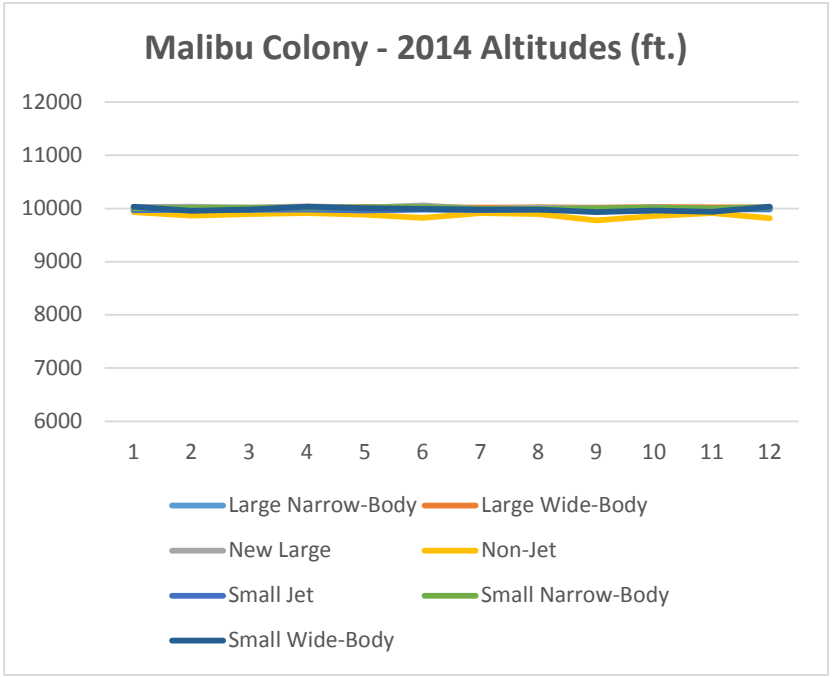
Study Results – Altitudes and Slant Distances by Aircraft Categories

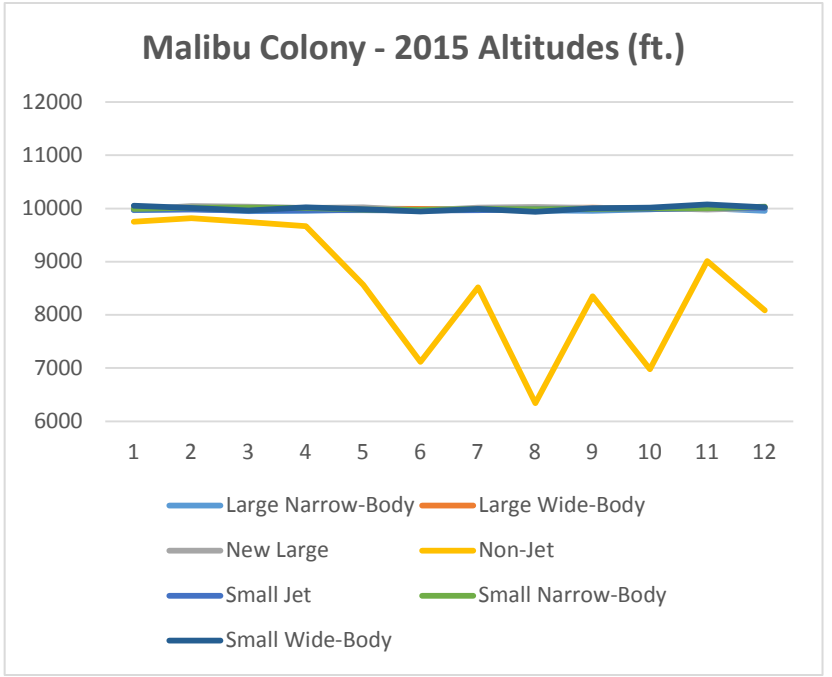
- Altitude and slant distances graphs were prepared for each aircraft category for each gate for the six-year study period
- The graphs for each gate were compared on a month-to-month basis to identify any changes that may have occurred over the six-year period
- With the exception of the non-jet aircraft category, the month over month results were relatively consistent
- The following slides offer a sample slant distance graph for Santa Monica Canyon and for sample altitudes for 2014 and 2015 for four representative gate locations

Study Results – Slant Distances by Year



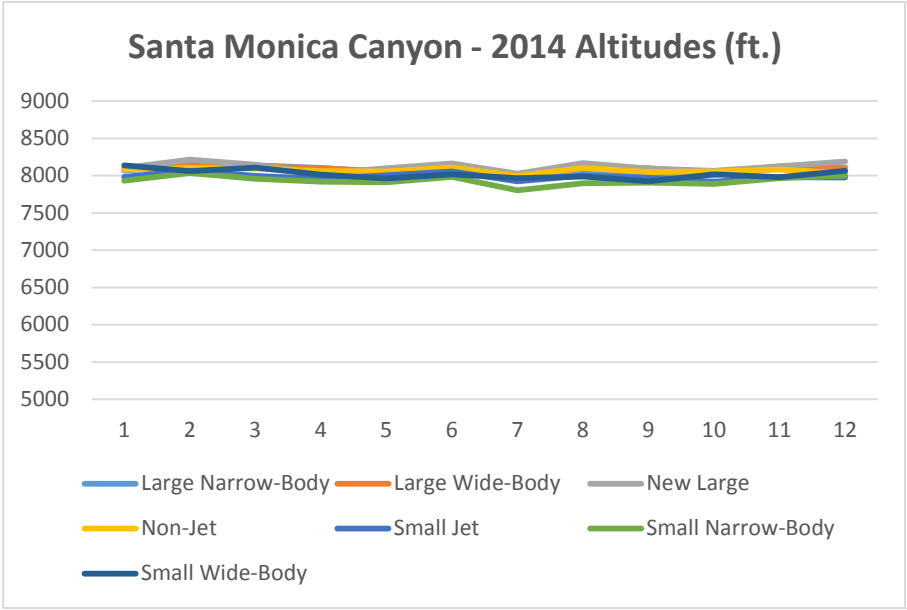
Study Results – Average Altitudes by Aircraft Category

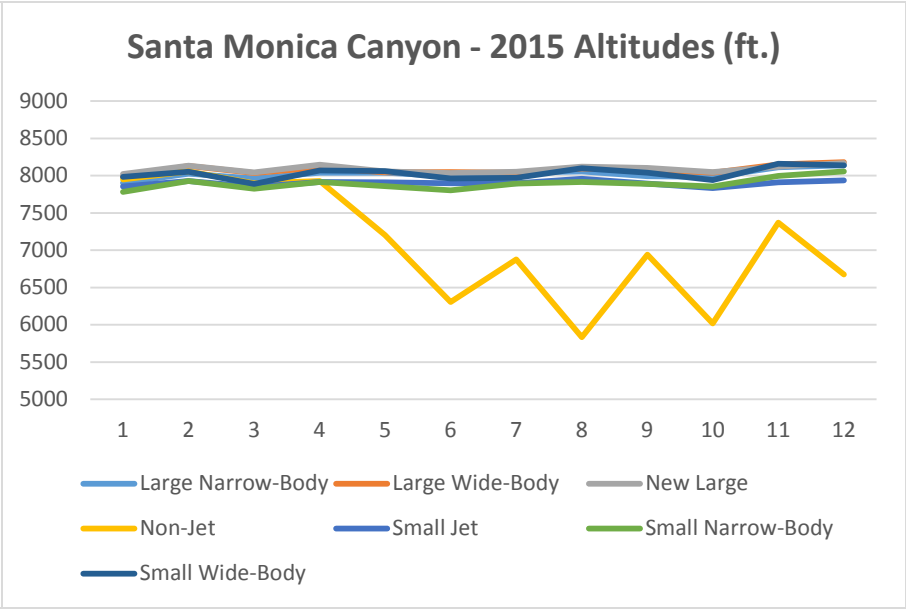




- With the exception of non-jet aircraft, the altitudes are consistent across aircraft categories from 2014 to 2015

Study Results – Average Altitudes by Aircraft Category





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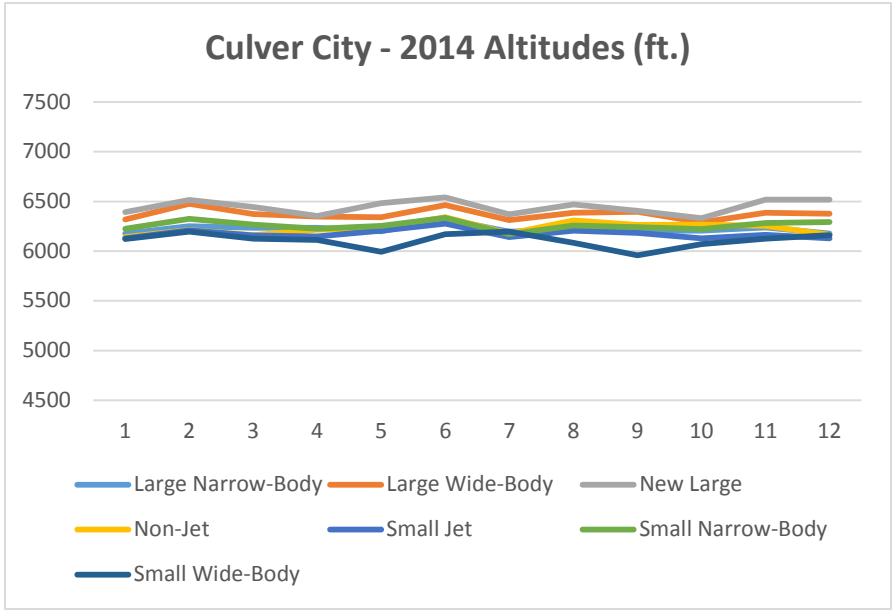
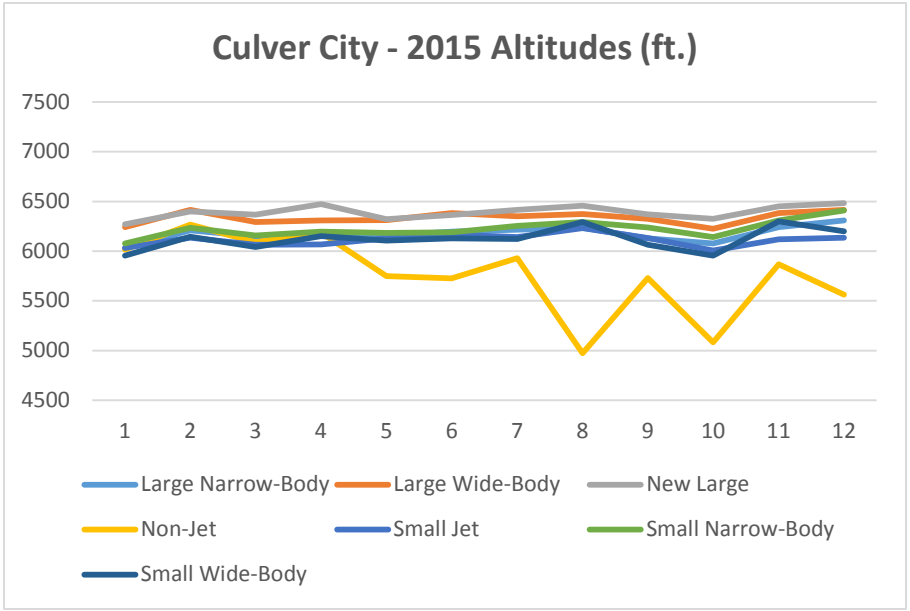
Study Results – Average Altitudes by Aircraft Category





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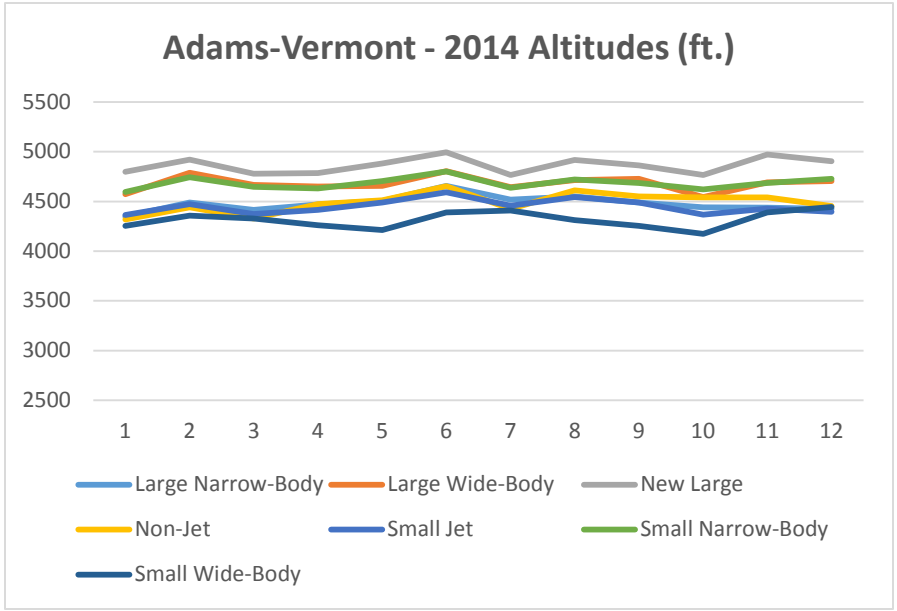

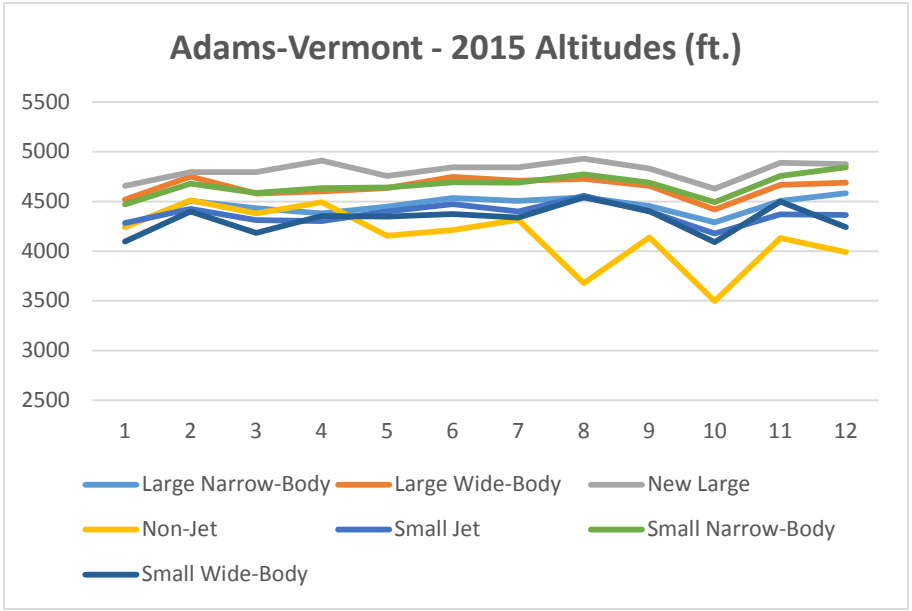

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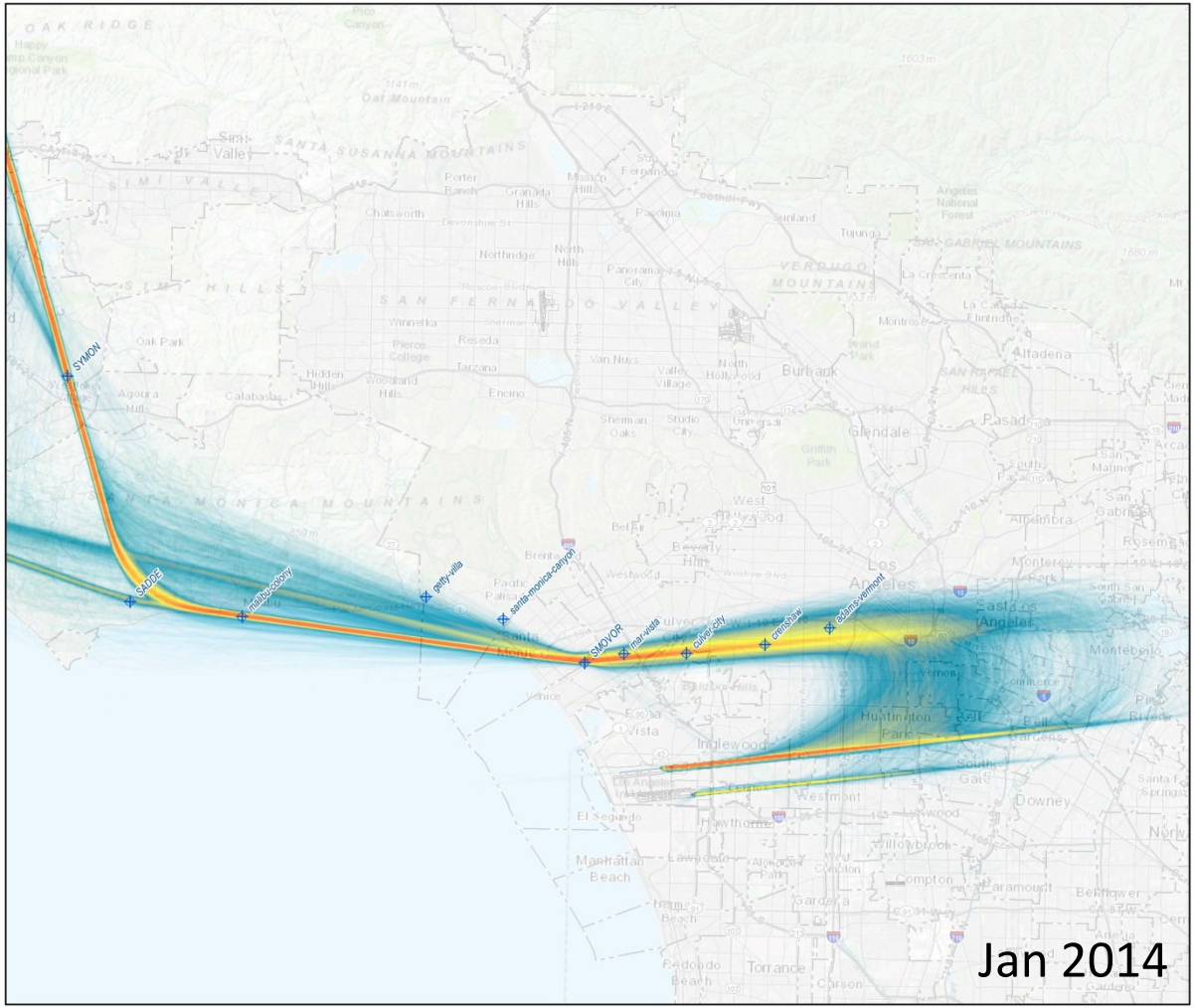
Study Results – Flight Track Density Maps

- Flight track density maps were developed for each month over the six-year analysis period
- As a result, 72 Flight track density maps were prepared, which were individually examined for noticeable changes throughout the six-year period
- The data are generally consistent until the summer of 2014, remain changed for approximately 12 months, and then return to the patterns of the previous four years
- The following images illustrate these recent changes



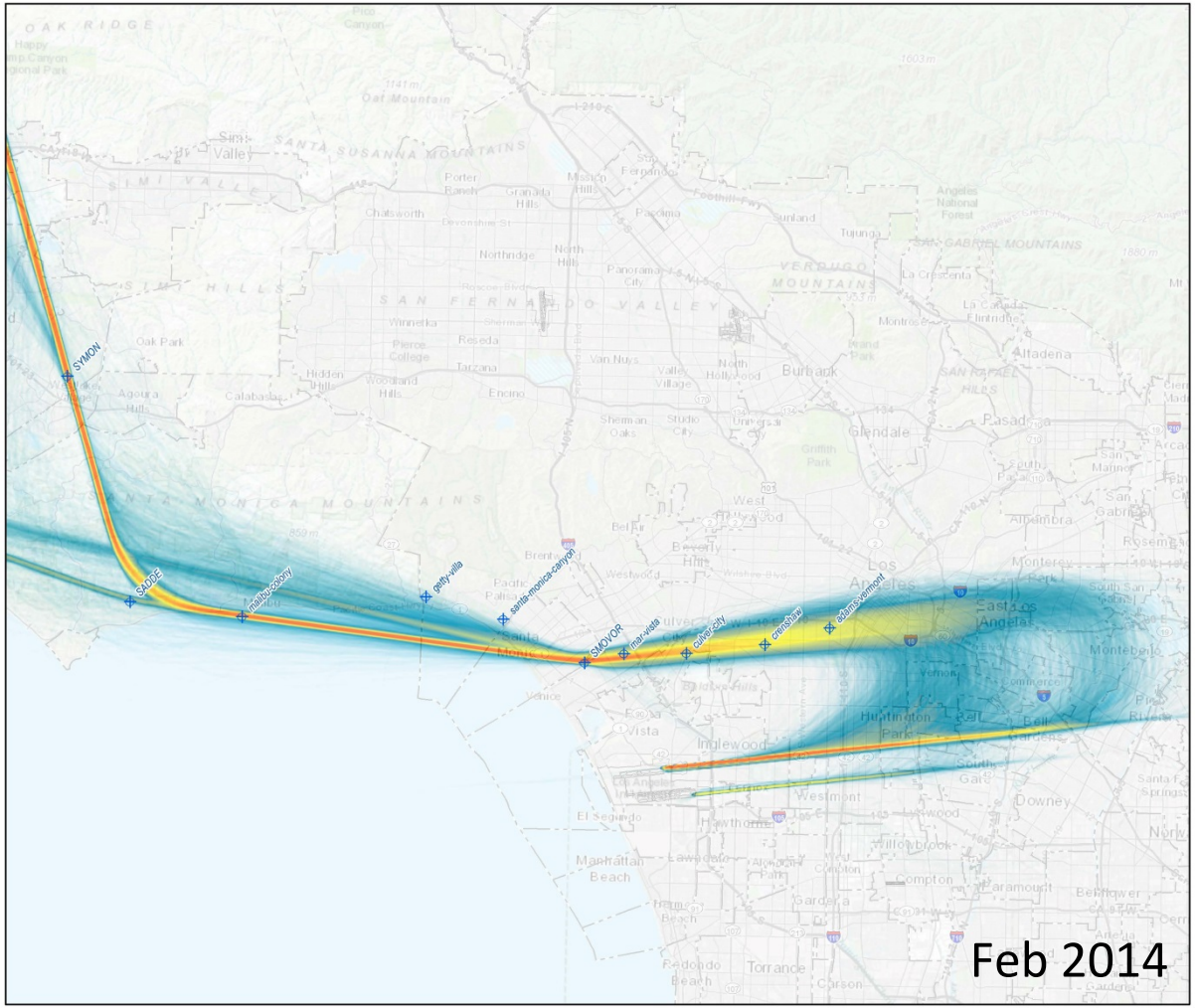
LAX Northerly Arrivals for January 2014

Radar Track Density (7,979 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



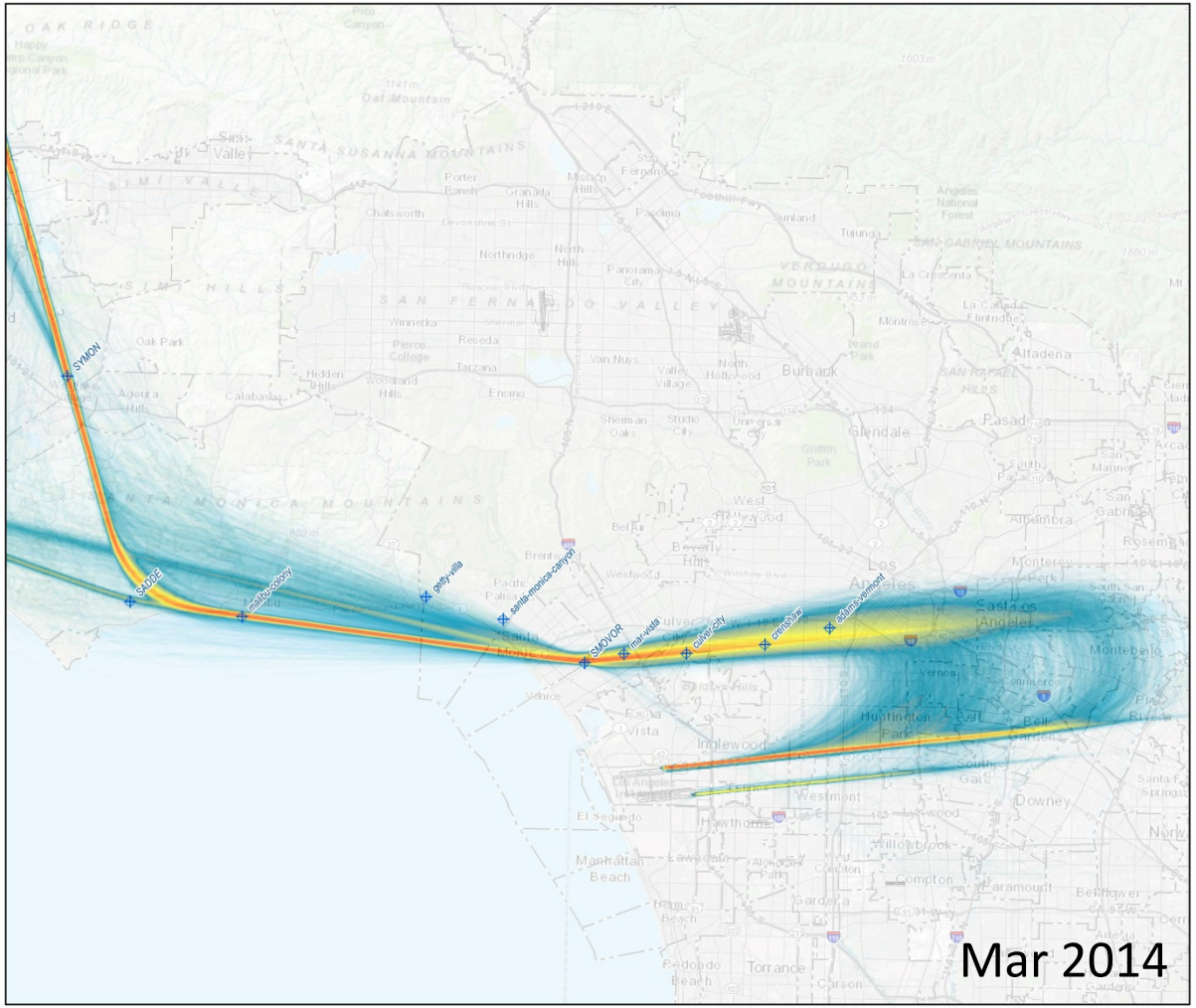
LAX Northerly Arrivals for February 2014

Radar Track Density (7,152 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



LAX Northerly Arrivals for March 2014

Radar Track Density (7,593 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

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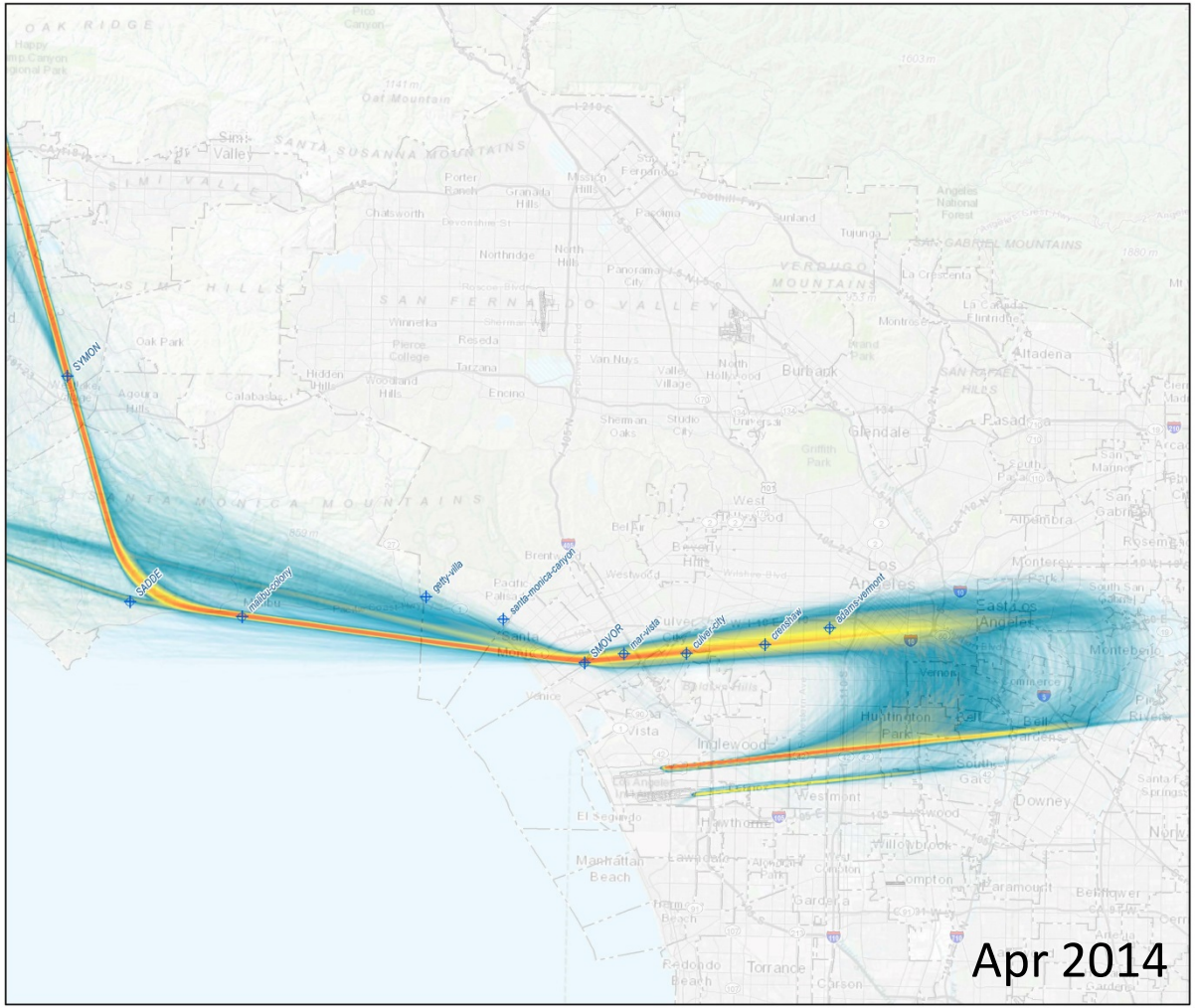


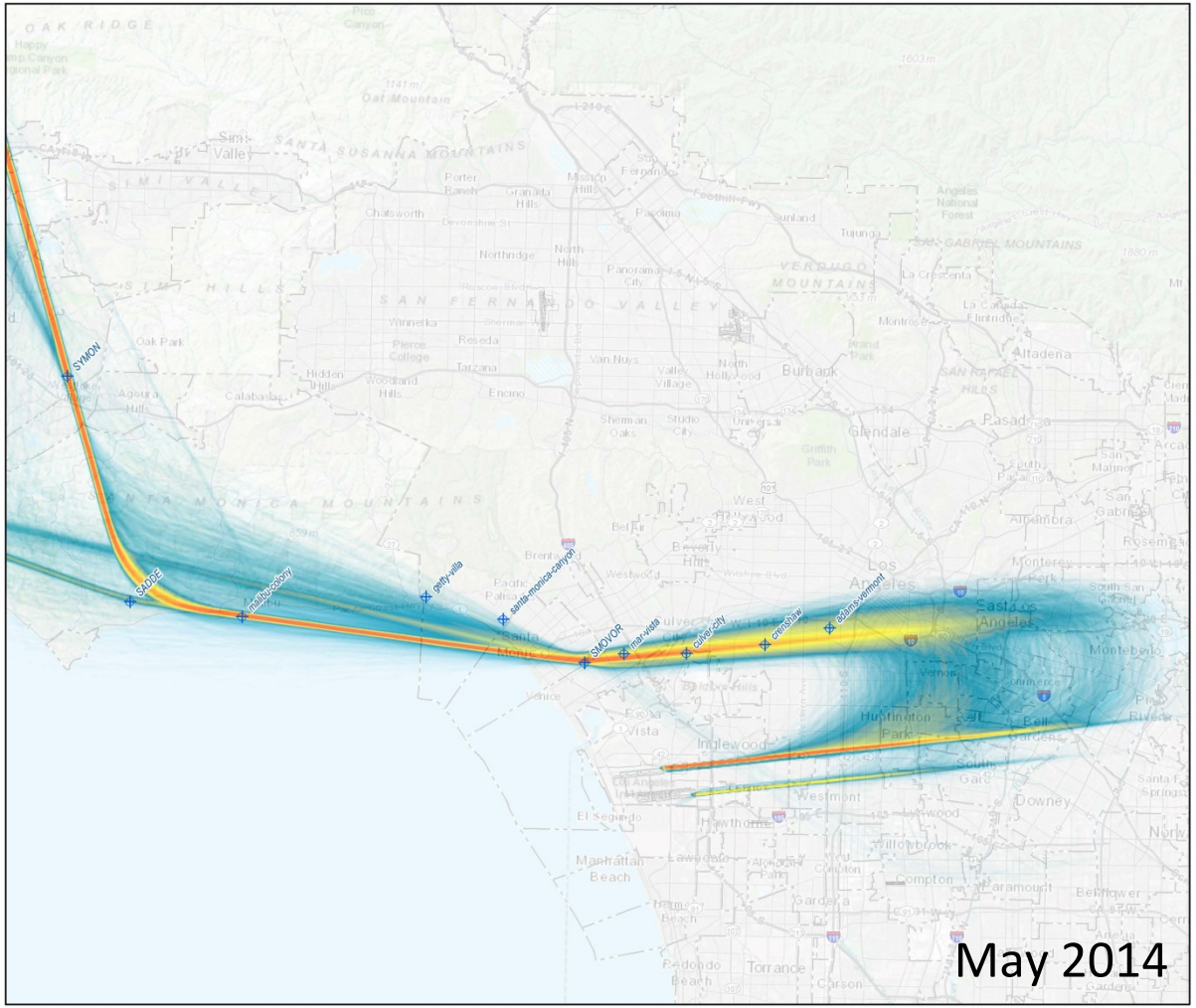
LAX Northerly Arrivals for April 2014

Radar Track Density (8,095 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



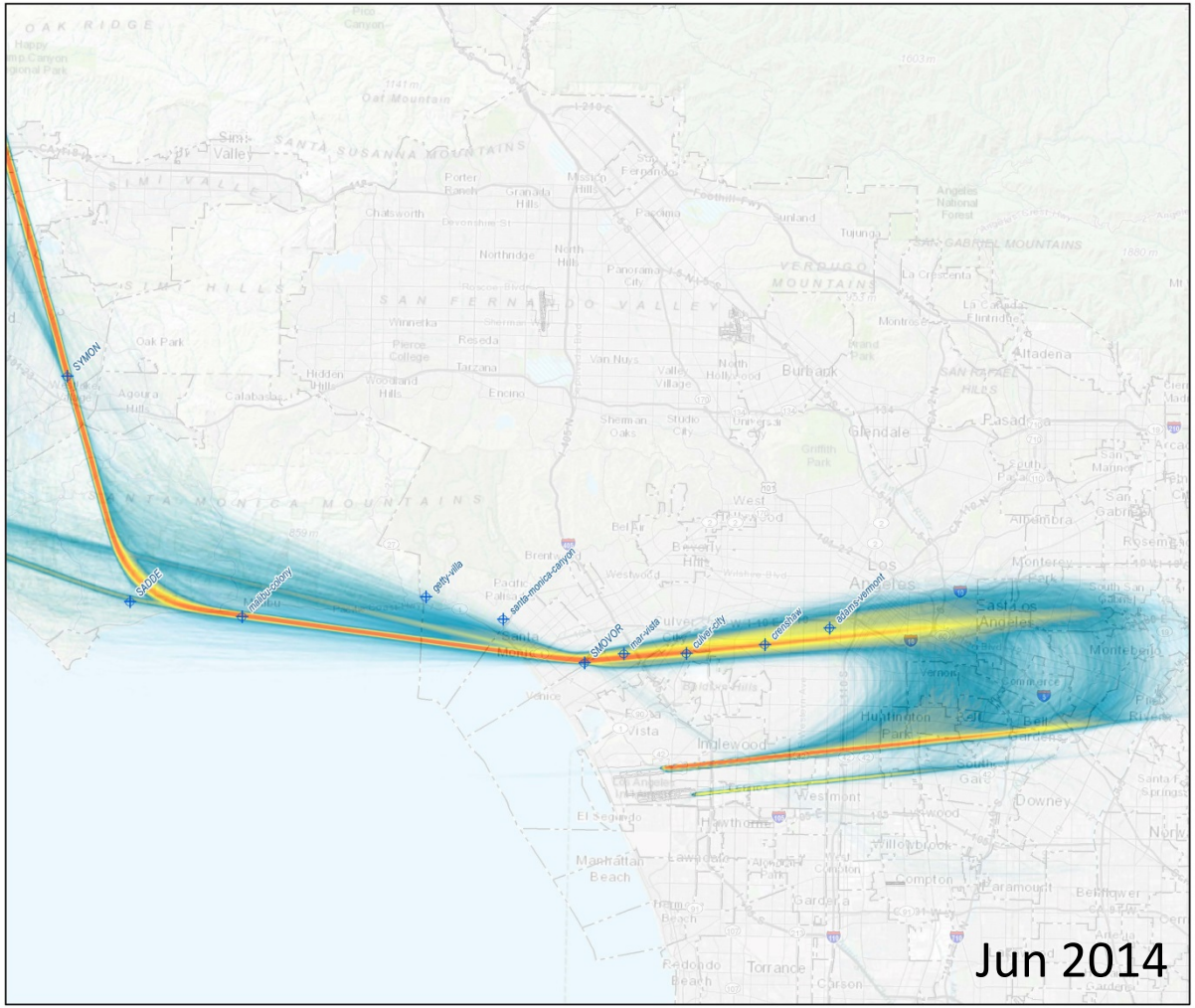
LAX Northerly Arrivals for May 2014

Radar Track Density (8,244 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



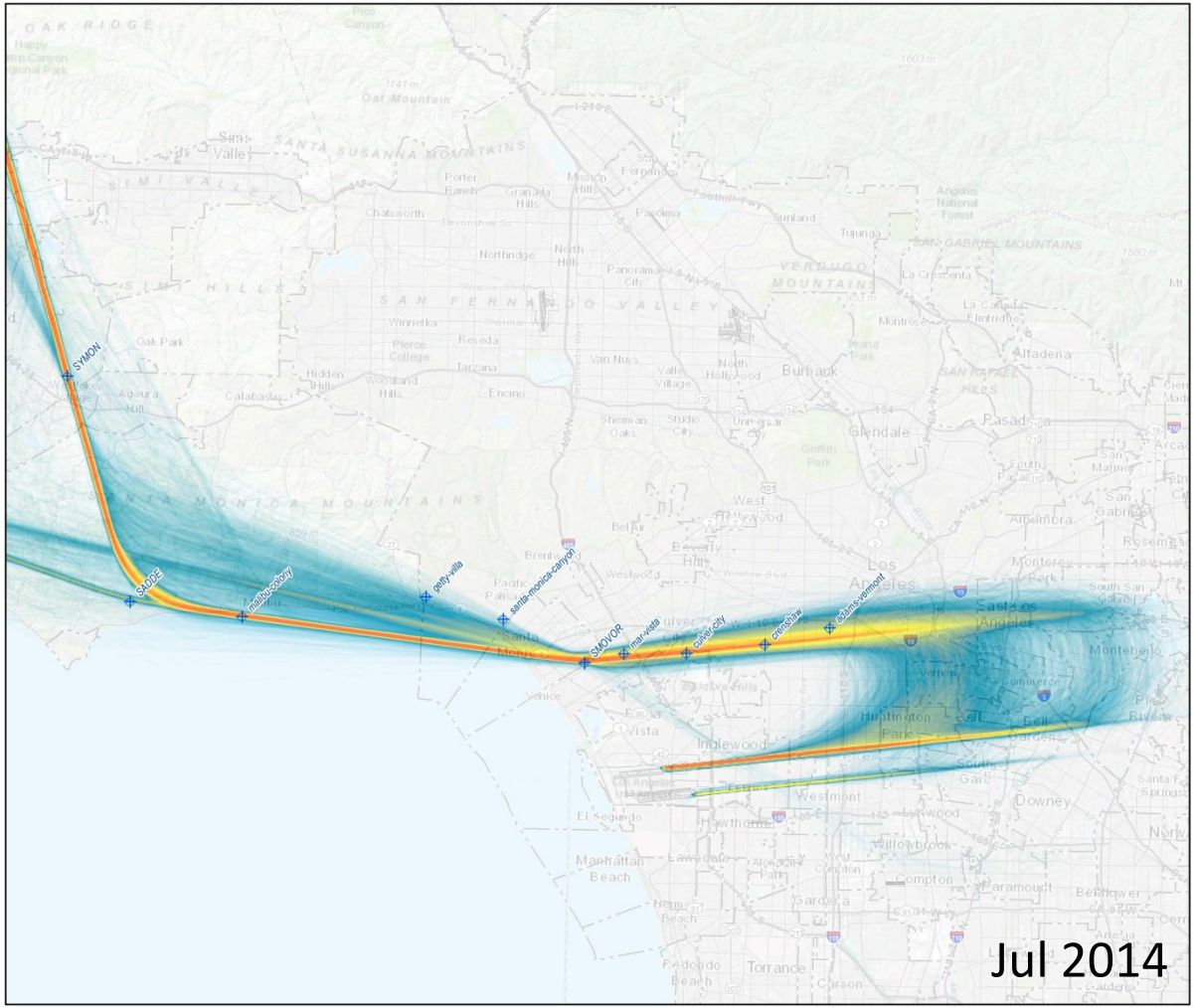
LAX Northerly Arrivals for June 2014

Radar Track Density (8,402 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



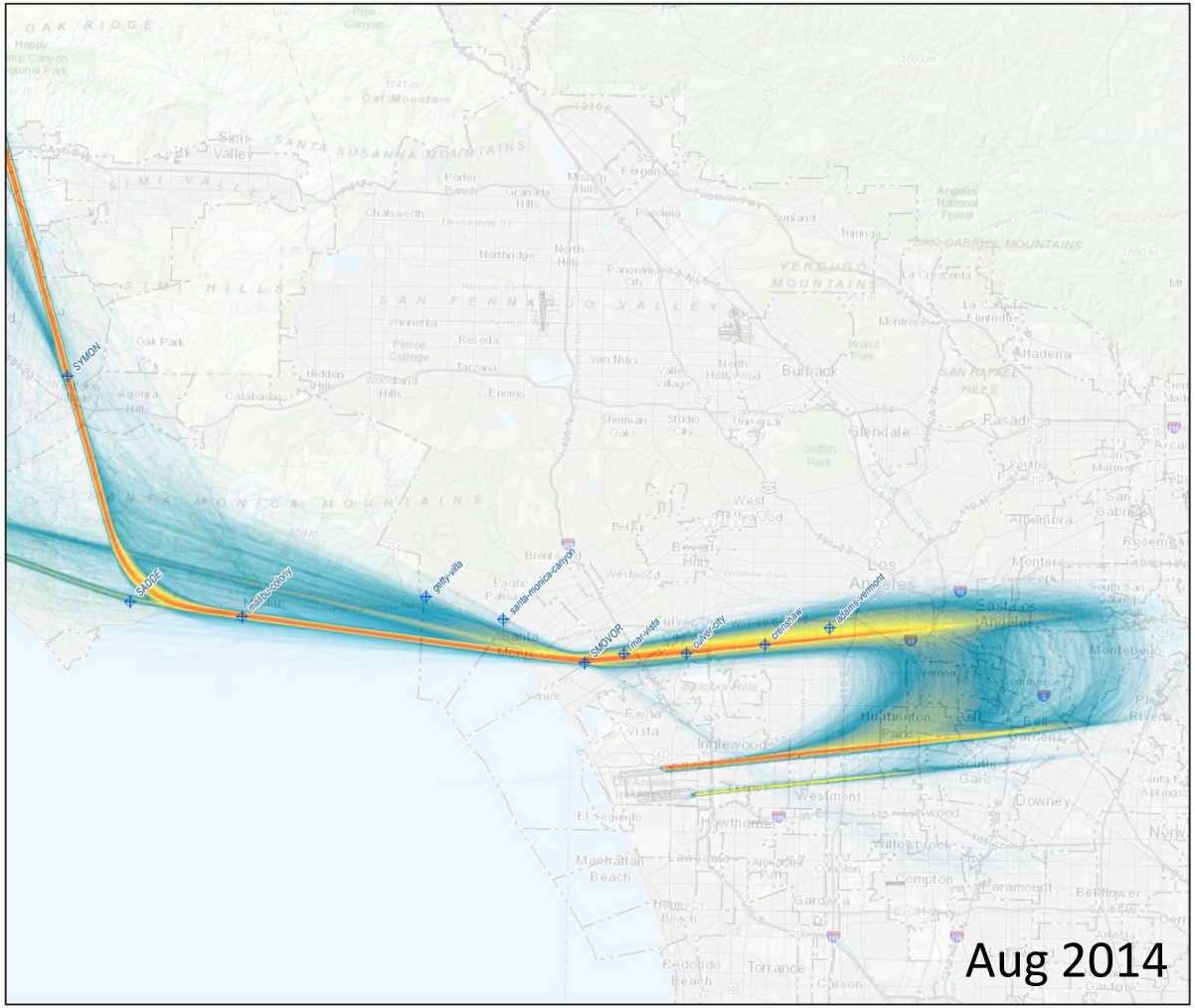
LAX Northerly Arrivals for July 2014

Radar Track Density (8,572 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



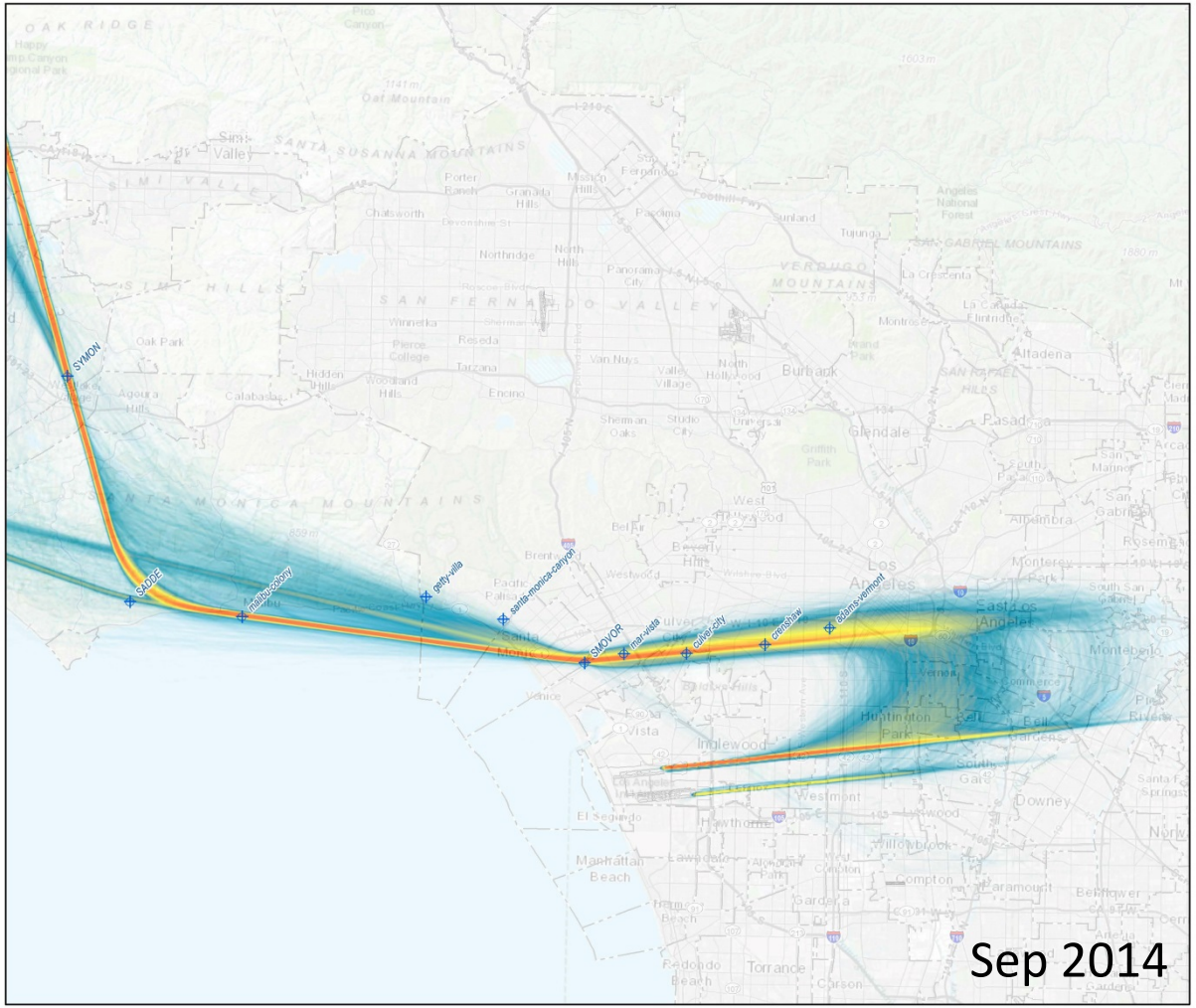
LAX Northerly Arrivals for August 2014

Radar Track Density (8,801 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



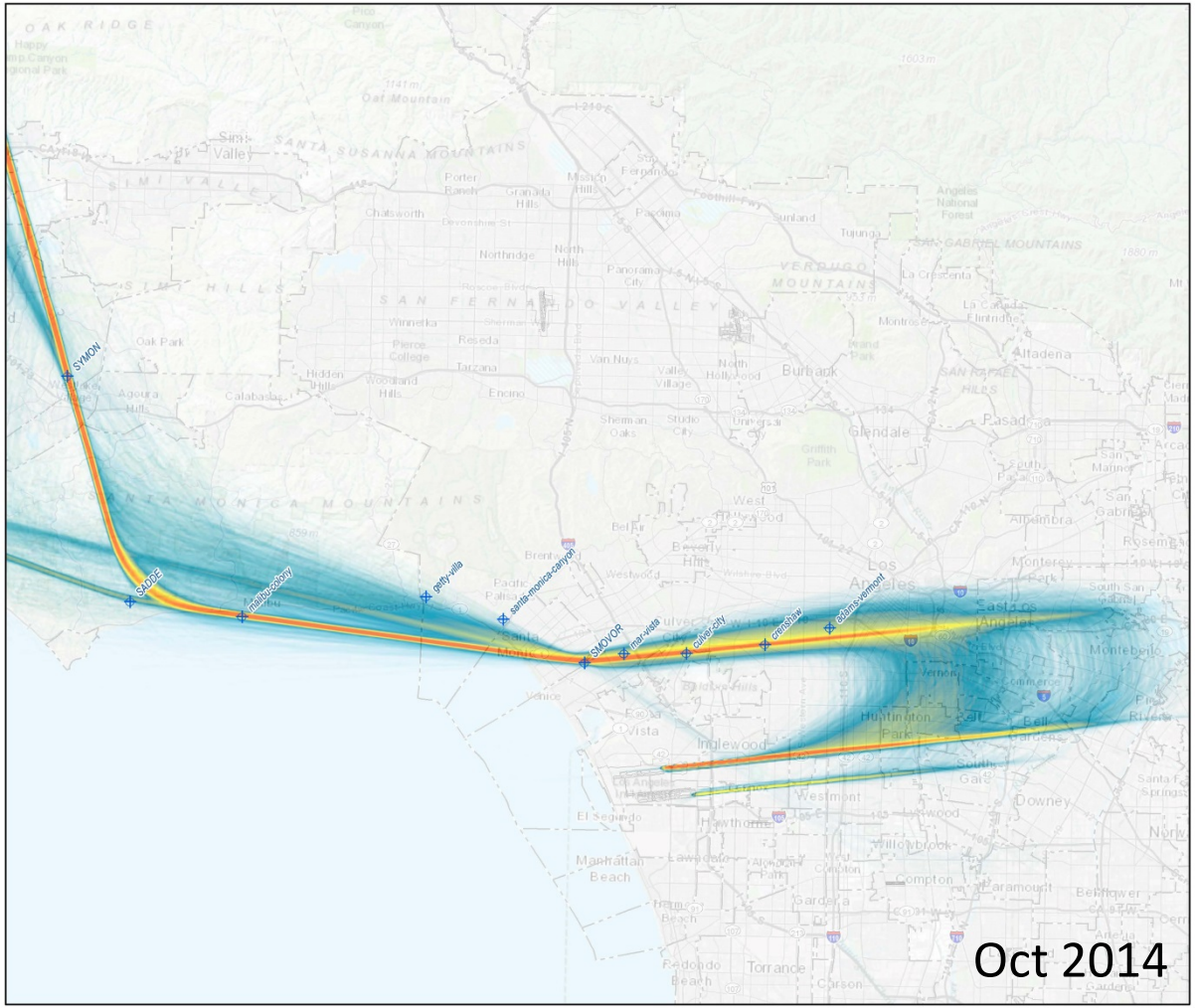
LAX Northerly Arrivals for September 2014

Radar Track Density (8,221 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



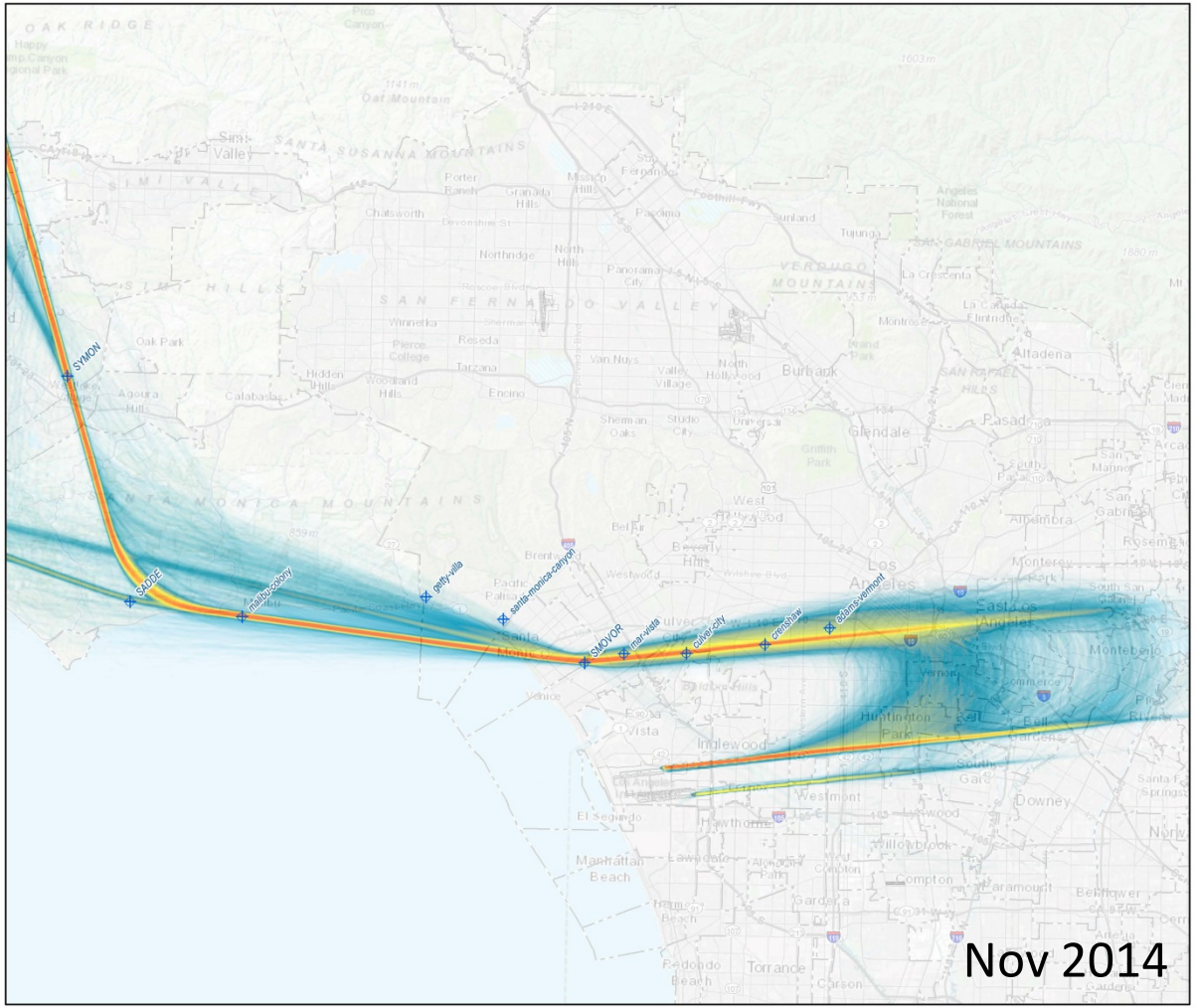
LAX Northerly Arrivals for October 2014

Radar Track Density (8,355 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



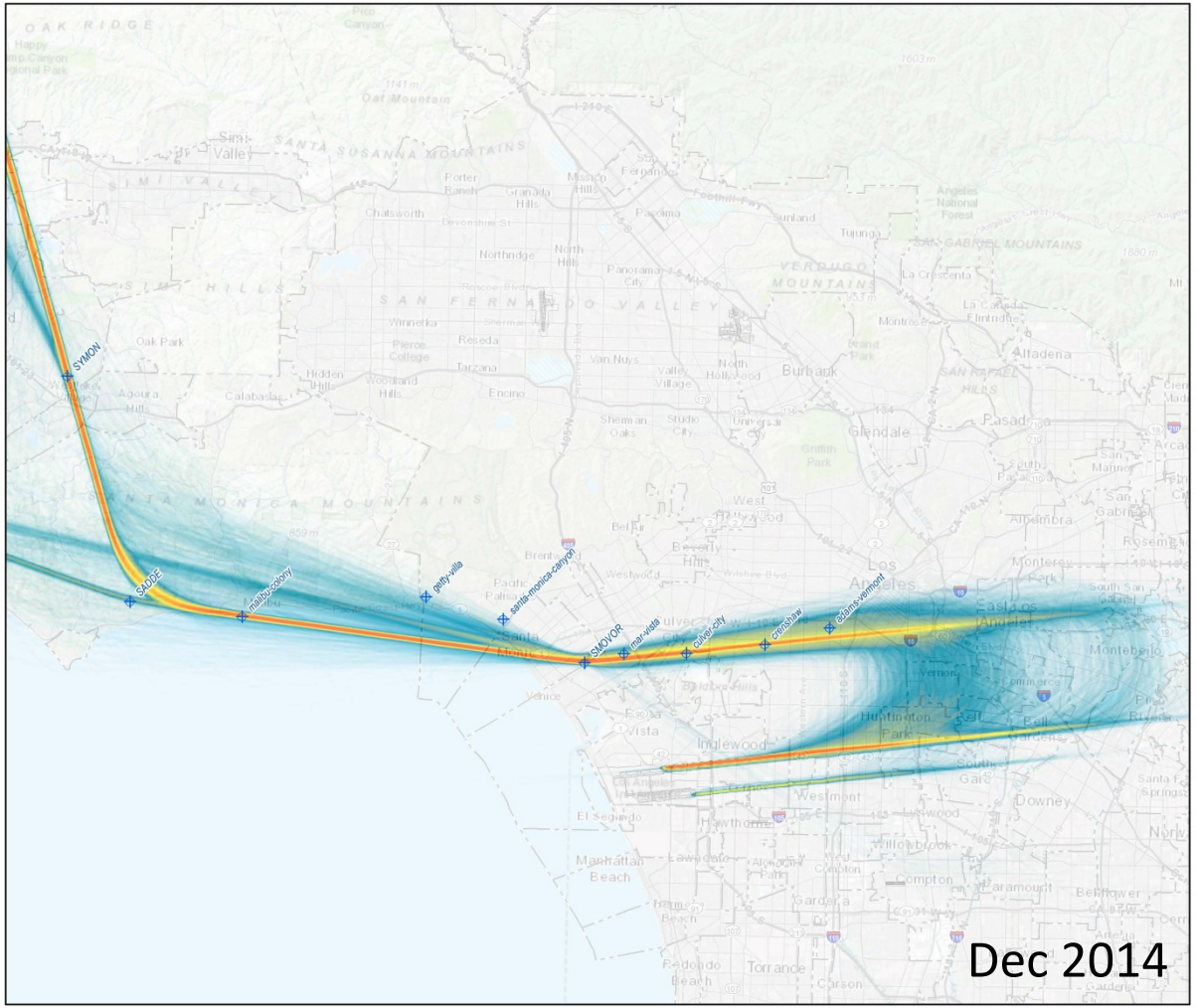
LAX Northerly Arrivals for November 2014

Radar Track Density (7,840 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



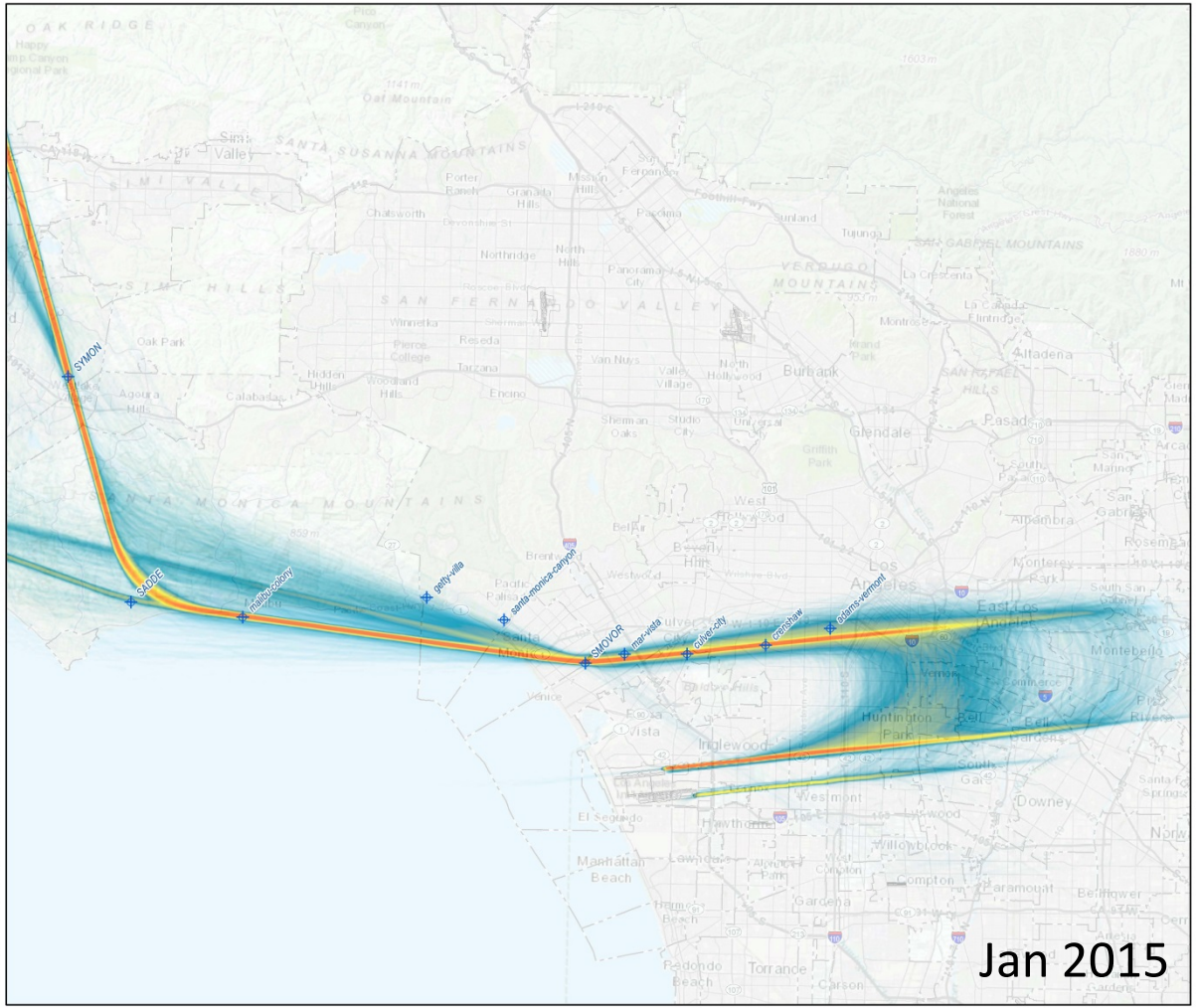
LAX Northerly Arrivals for December 2014

Radar Track Density (6,701 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



LAX Northerly Arrivals for January 2015

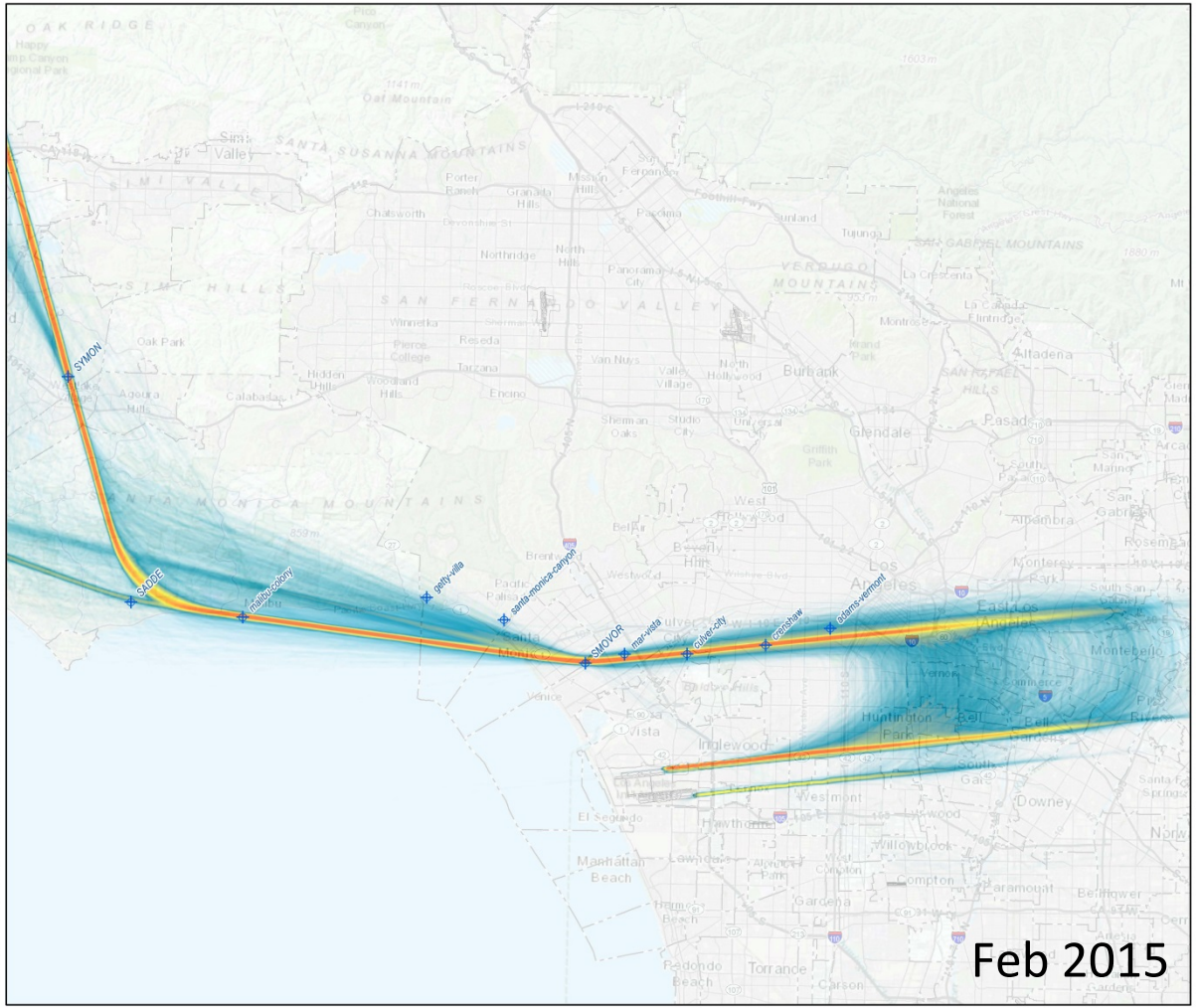
Radar Track Density (7,993 Radar Tracks)

Low Medium High

Jurisdictional Boundary

0 2 4 6 Nautical Mi

Document Path: G:\Projects\305XX\305430_LAWA\GIS\305430_LAWA_Track_Density_Jan_2015.mxd



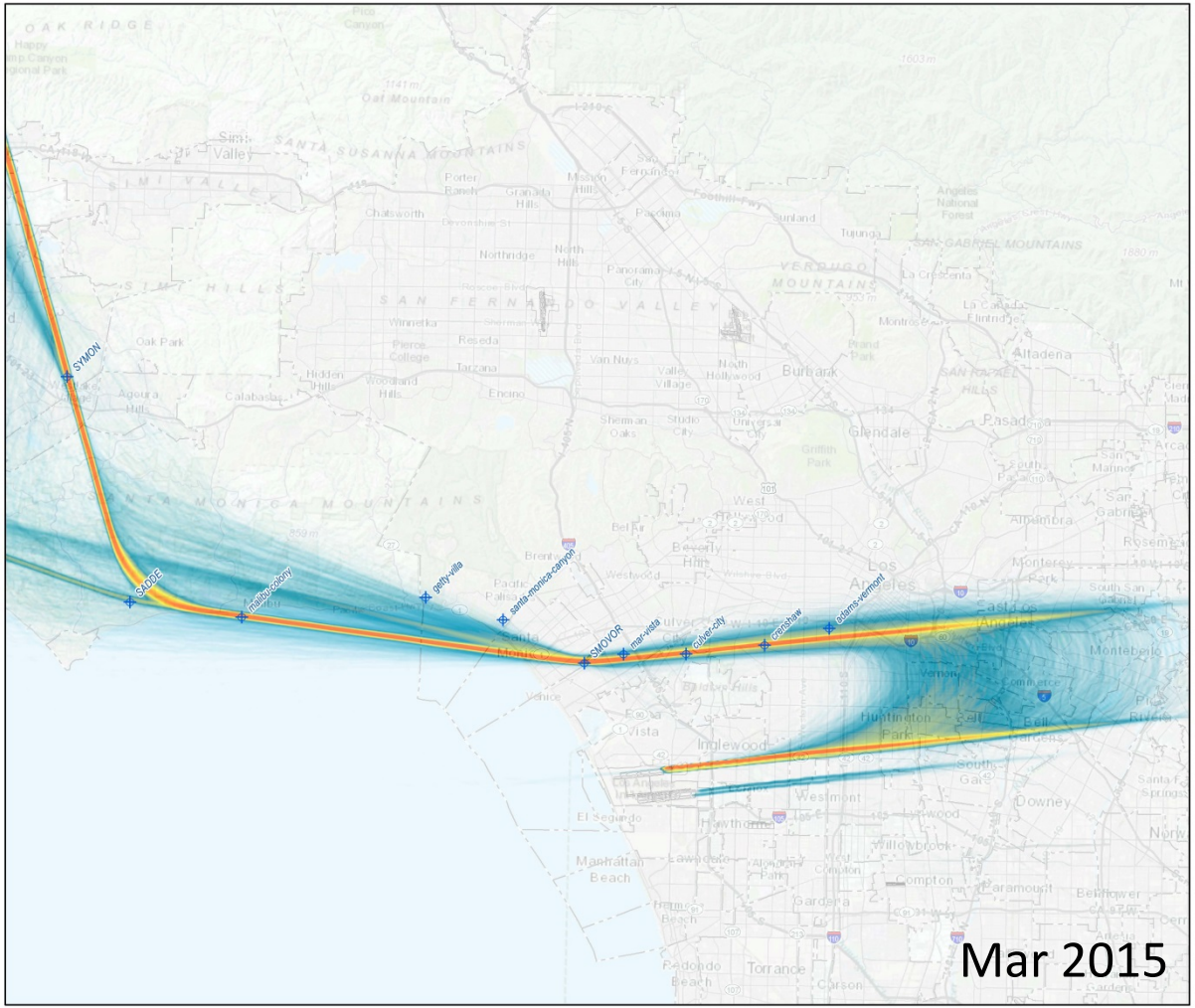
LAX Northerly Arrivals for February 2015

Radar Track Density (7,305 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



LAX Northerly Arrivals for March 2015

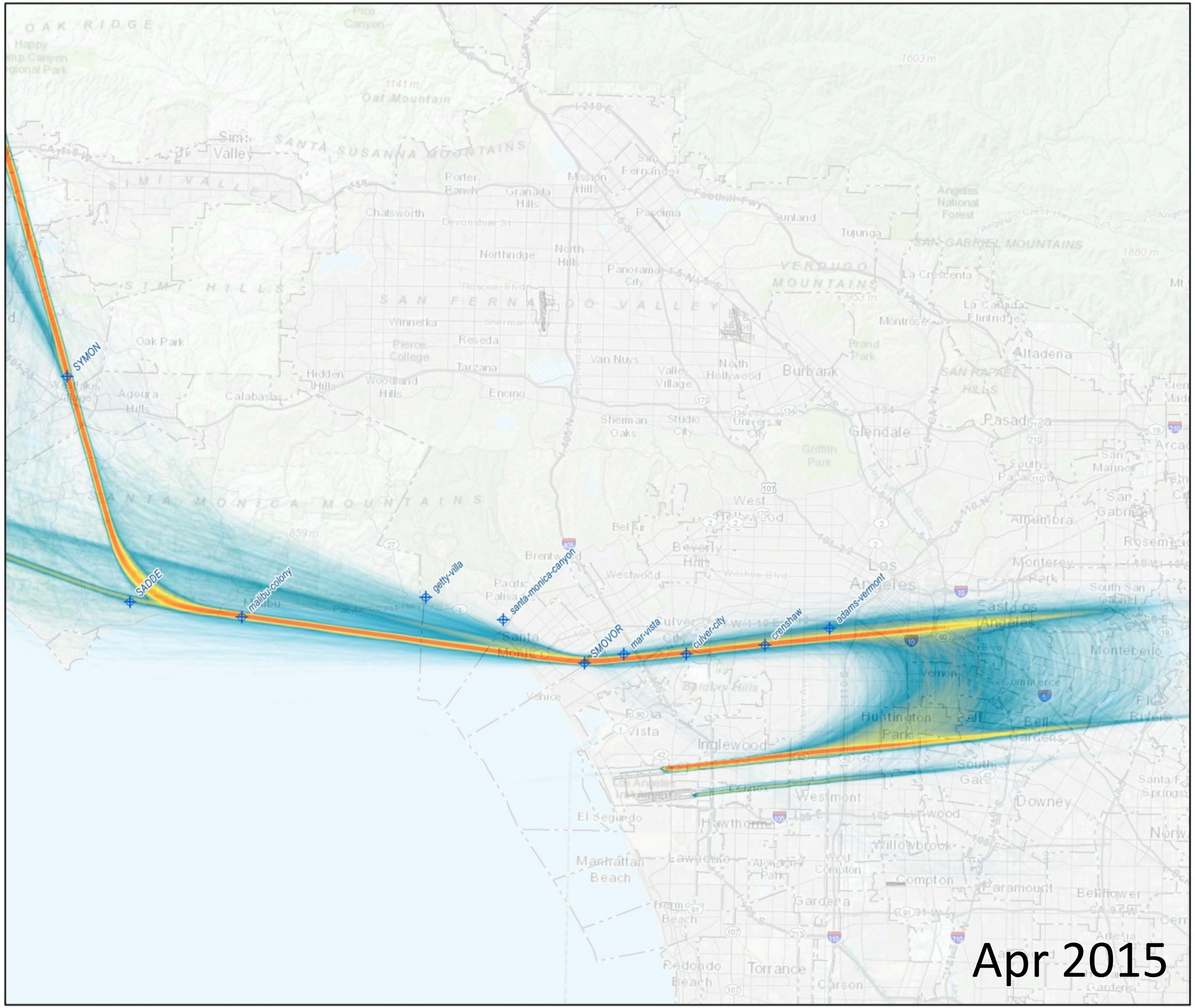
Radar Track Density (8,283 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi

LAX Northerly Arrivals for April 2015



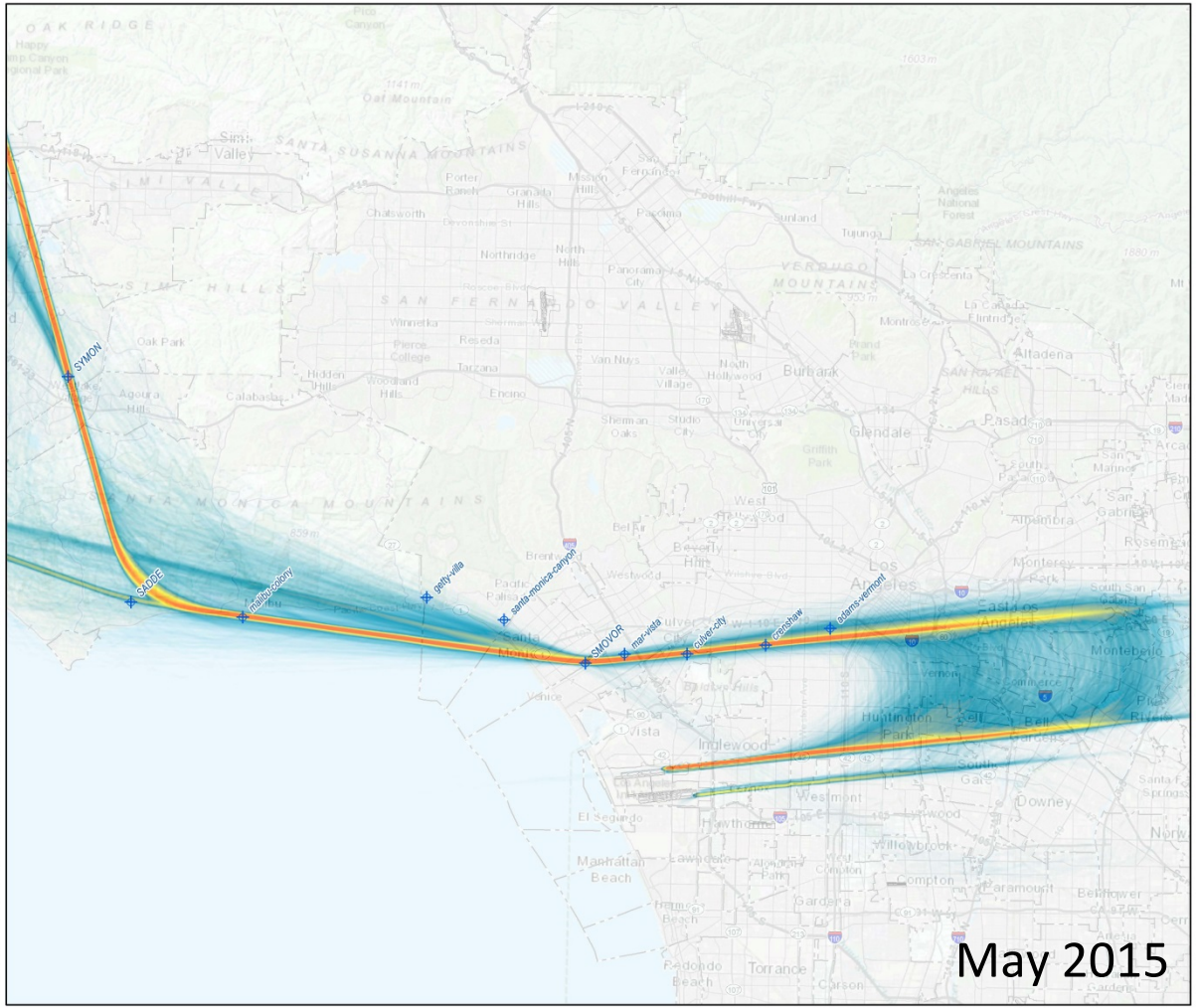
Radar Track Density (8,213 Radar Tracks)

Low Medium High

Jurisdictional Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

0 2 4 6 Nautical Mi



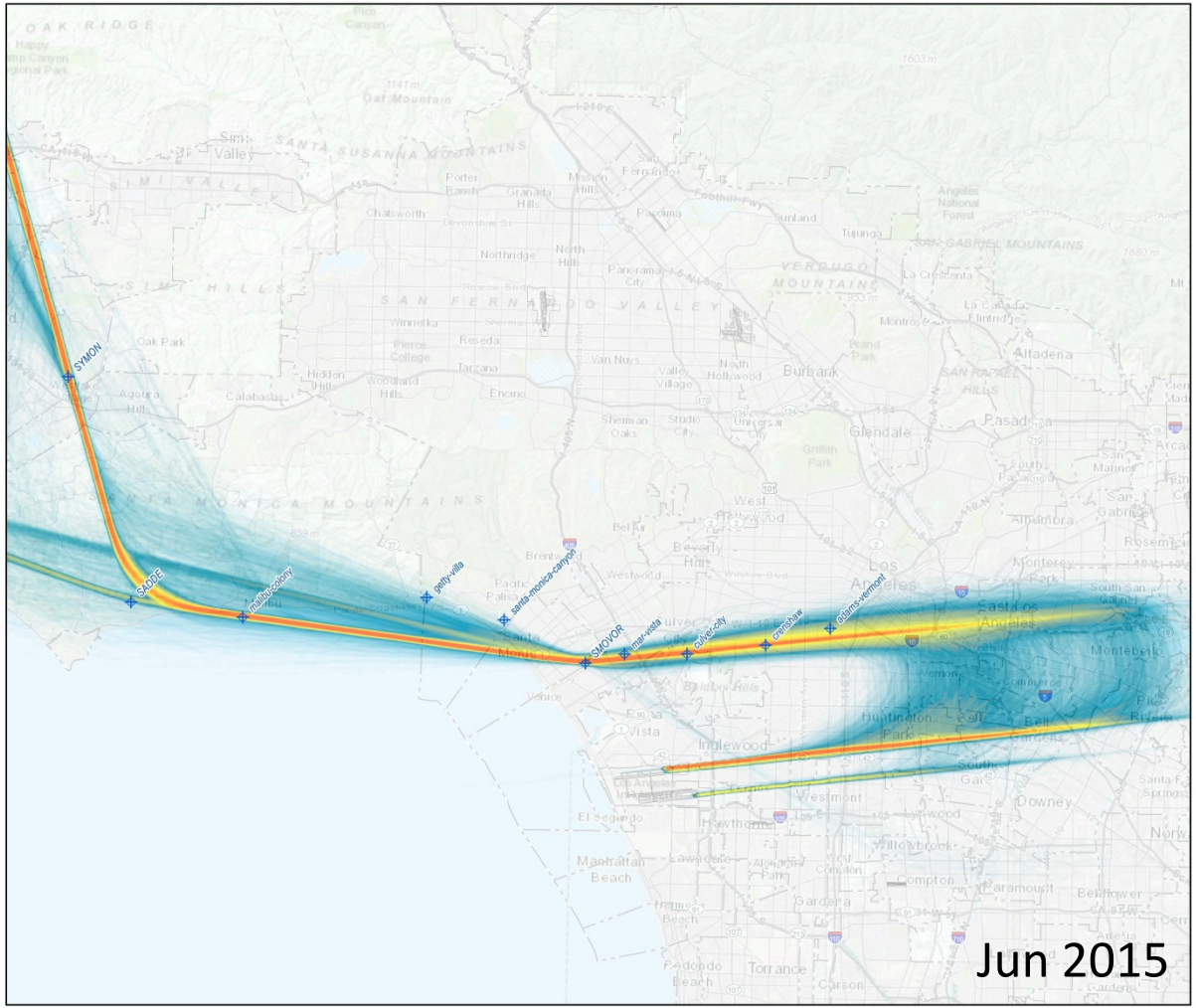
LAX Northerly Arrivals for May 2015

Radar Track Density (8,418 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



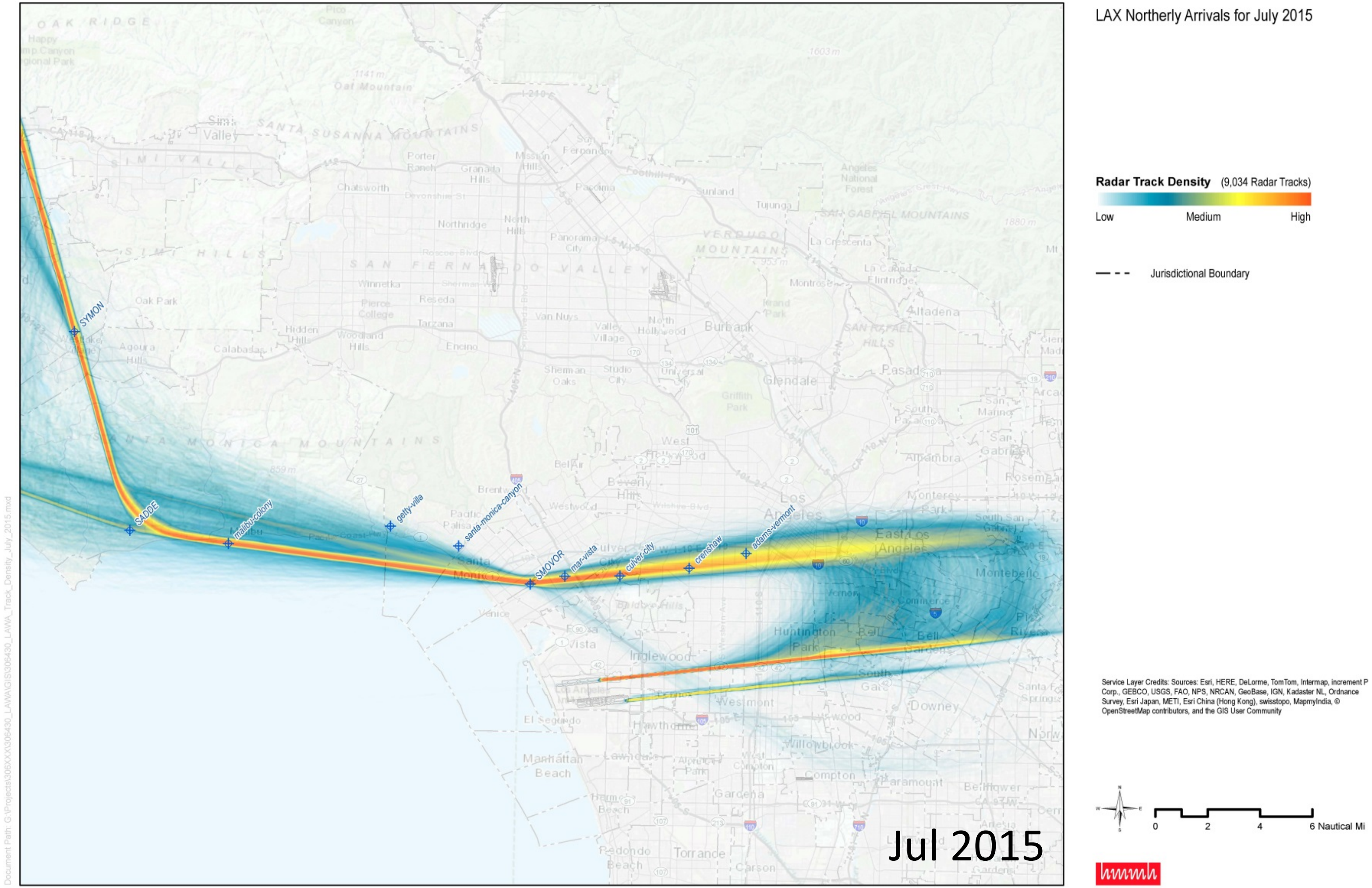
LAX Northerly Arrivals for June 2015

Radar Track Density (8,676 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi


LAX Northerly Arrivals for July 2015
Radar Track Density (9,034 Radar Tracks)
Low
Medium
High
Jurisdictional Boundary
SYMON
SADDE
malibu-colony
getty-villa
santa-monica-canyon
SMOVOR
mar-vista
culver-city
crenshaw
adams-vermont
Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
0
2
4
6 Nautical Mi
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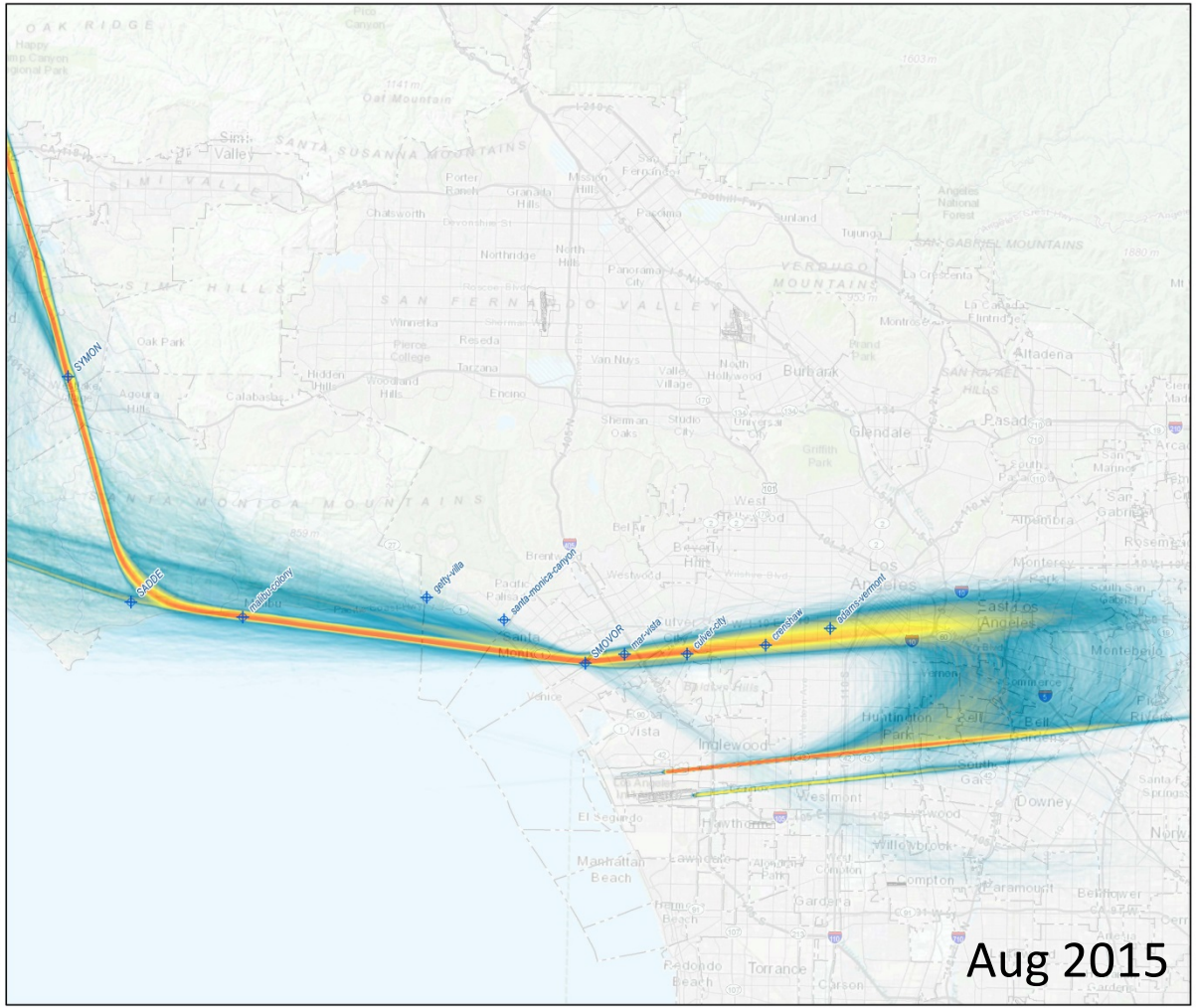
Jul 2015



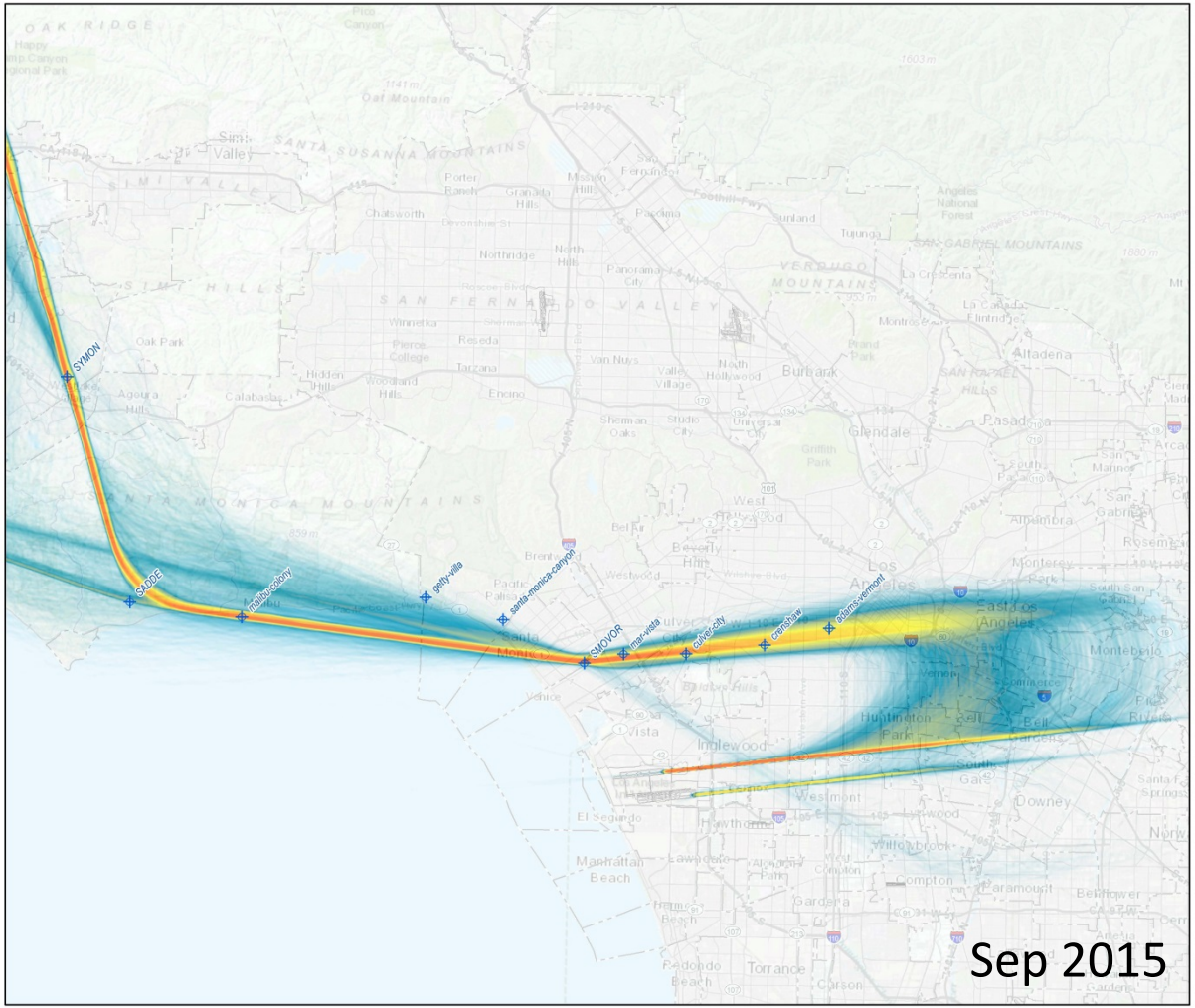
LAX Northerly Arrivals for August 2015

Radar Track Density (8,903 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



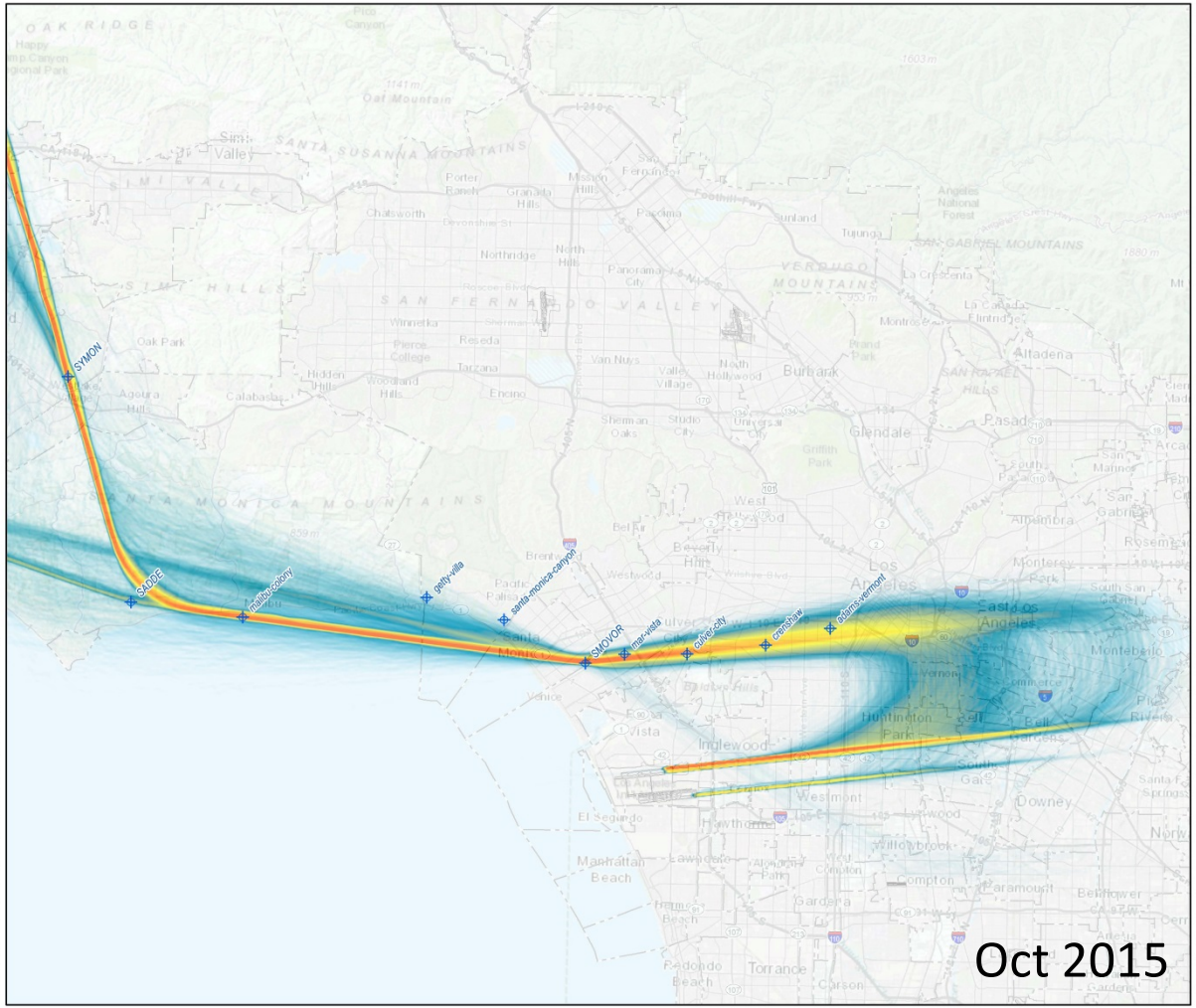
LAX Northerly Arrivals for September 2015

Radar Track Density (8,334 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi



LAX Northerly Arrivals for October 2015

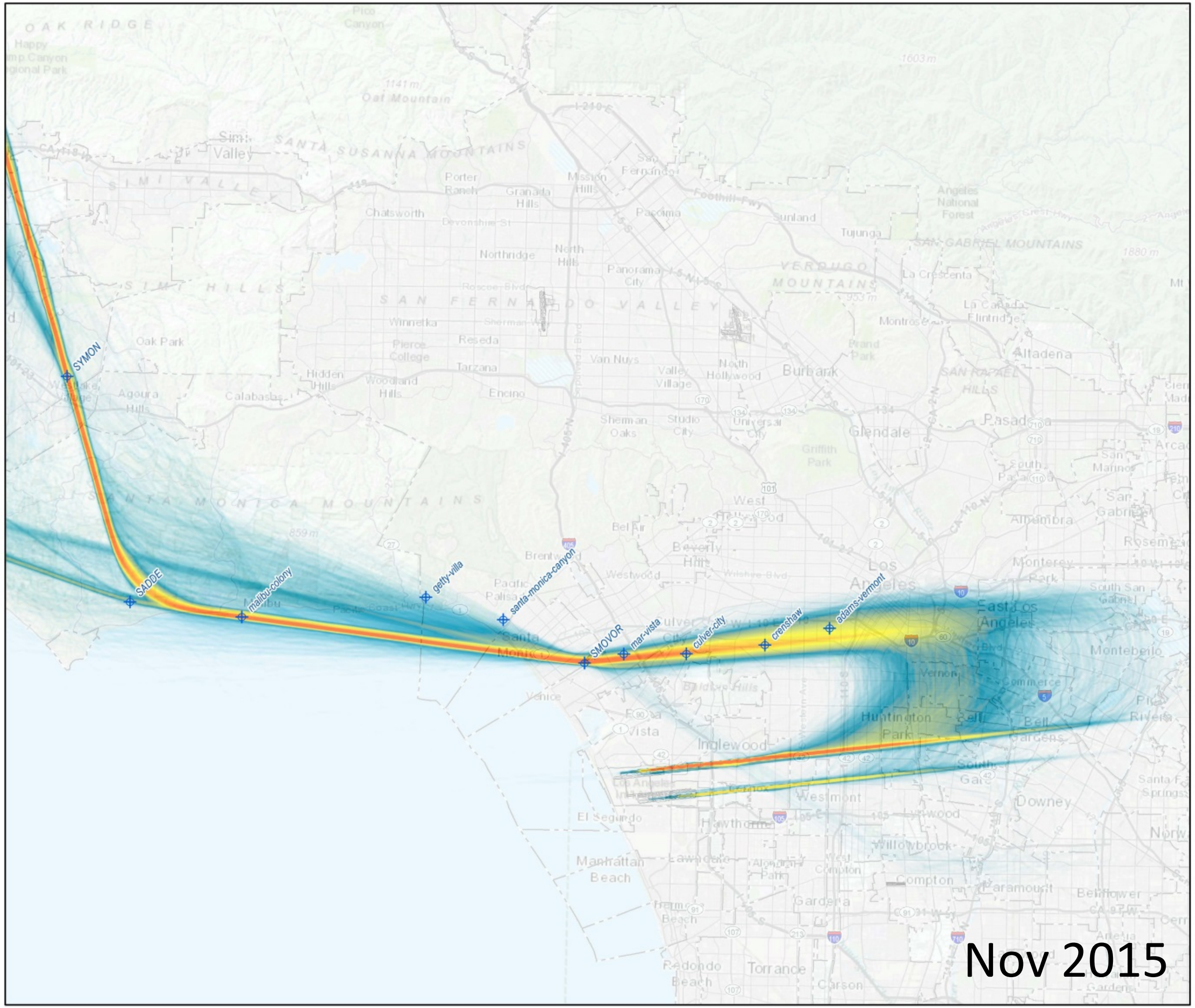
Radar Track Density (8,774 Radar Tracks)

Low — Medium — High

Jurisdictional Boundary

0 2 4 6 Nautical Mi

LAX Northerly Arrivals for November 2015



Radar Track Density (8,401 Radar Tracks)

Low Medium High

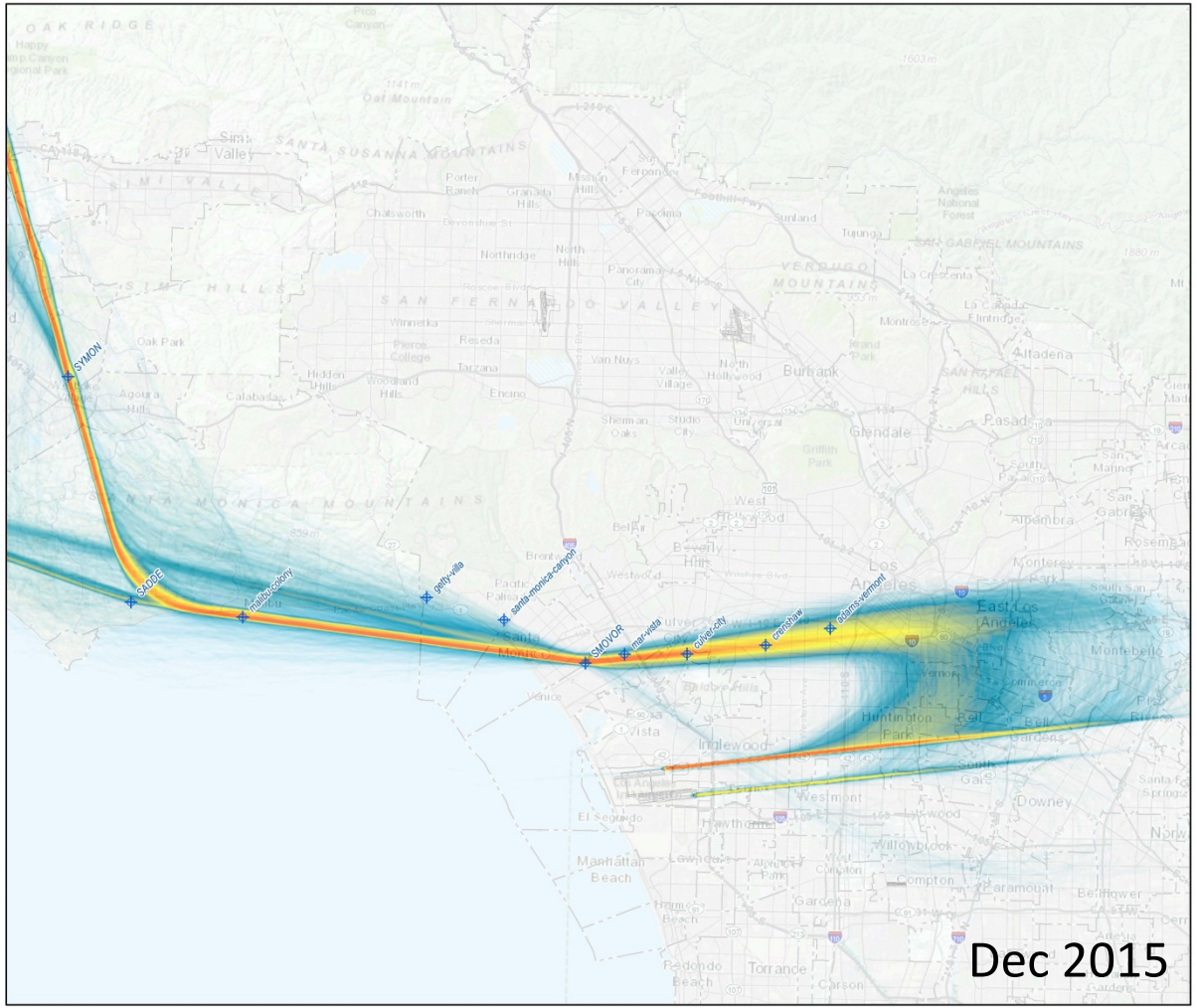
Jurisdictional Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

0 2 4 6 Nautical Mi

hmmh

Document Path: G:\Projects\306XXX\306430_LAWA\GIS\306430_LAWA_Track_Density_November_2015.mxd



LAX Northerly Arrivals for December 2015

Radar Track Density (8,781 Radar Tracks)

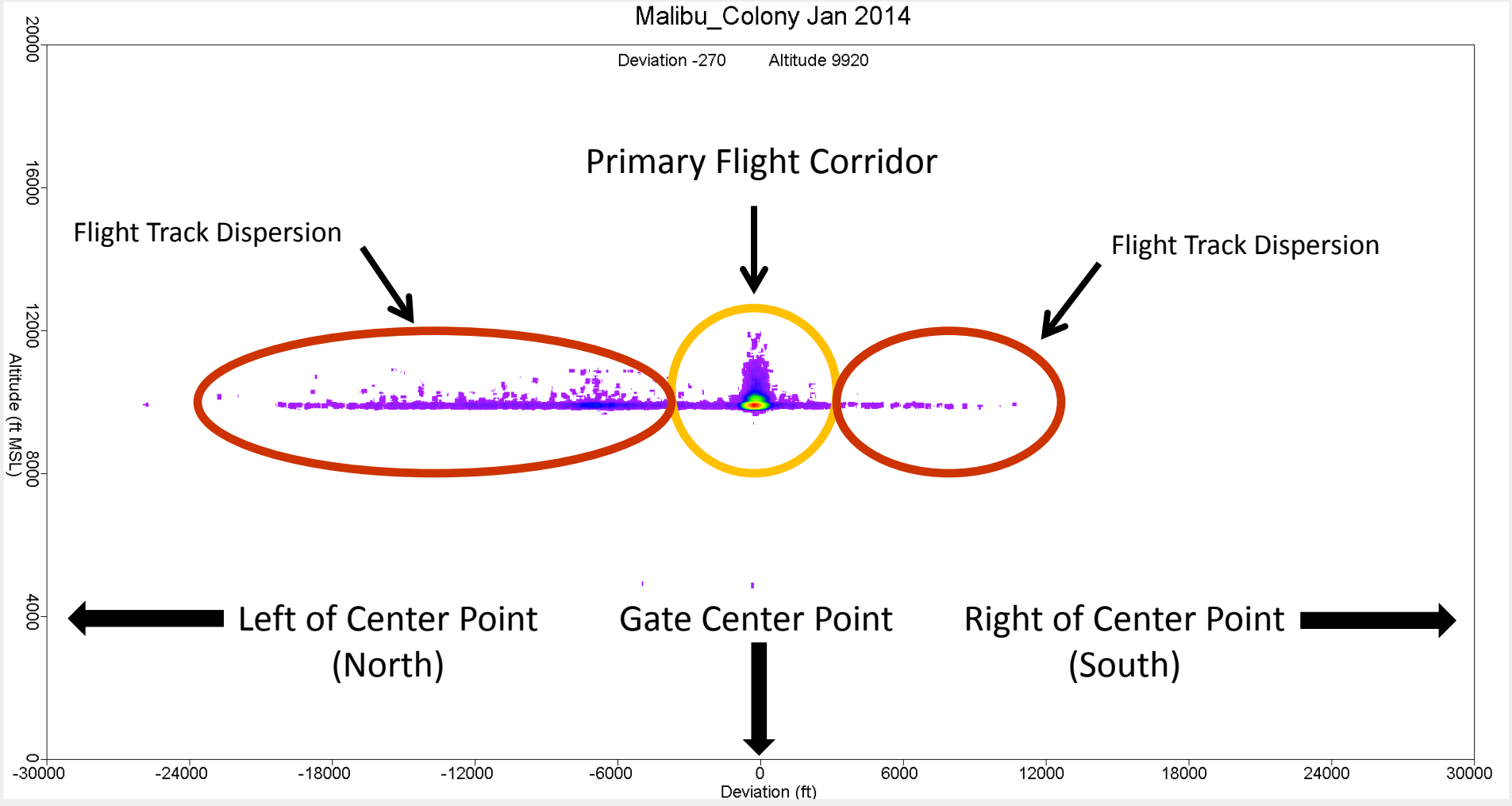
Low — Medium — High

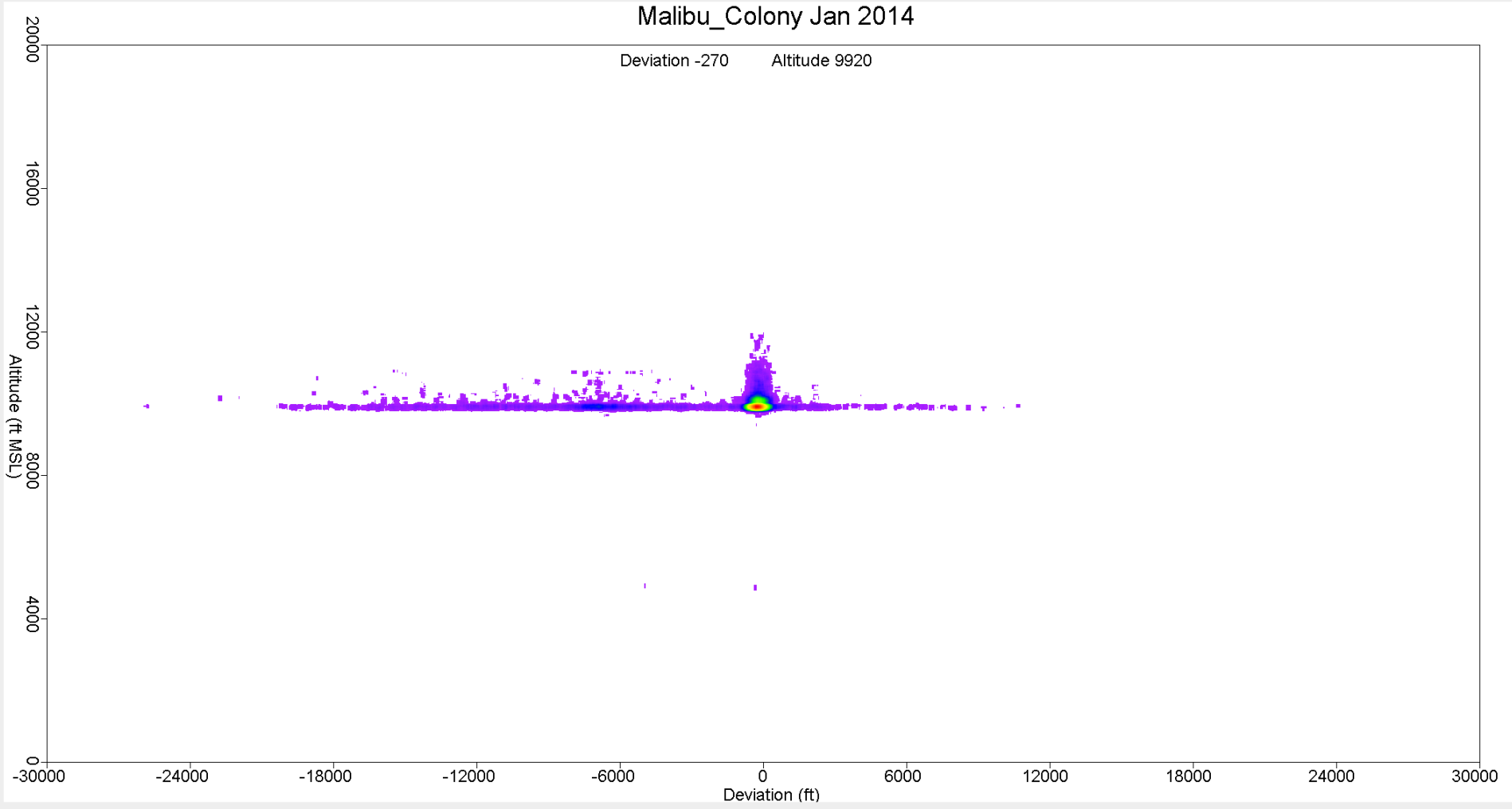
Jurisdictional Boundary

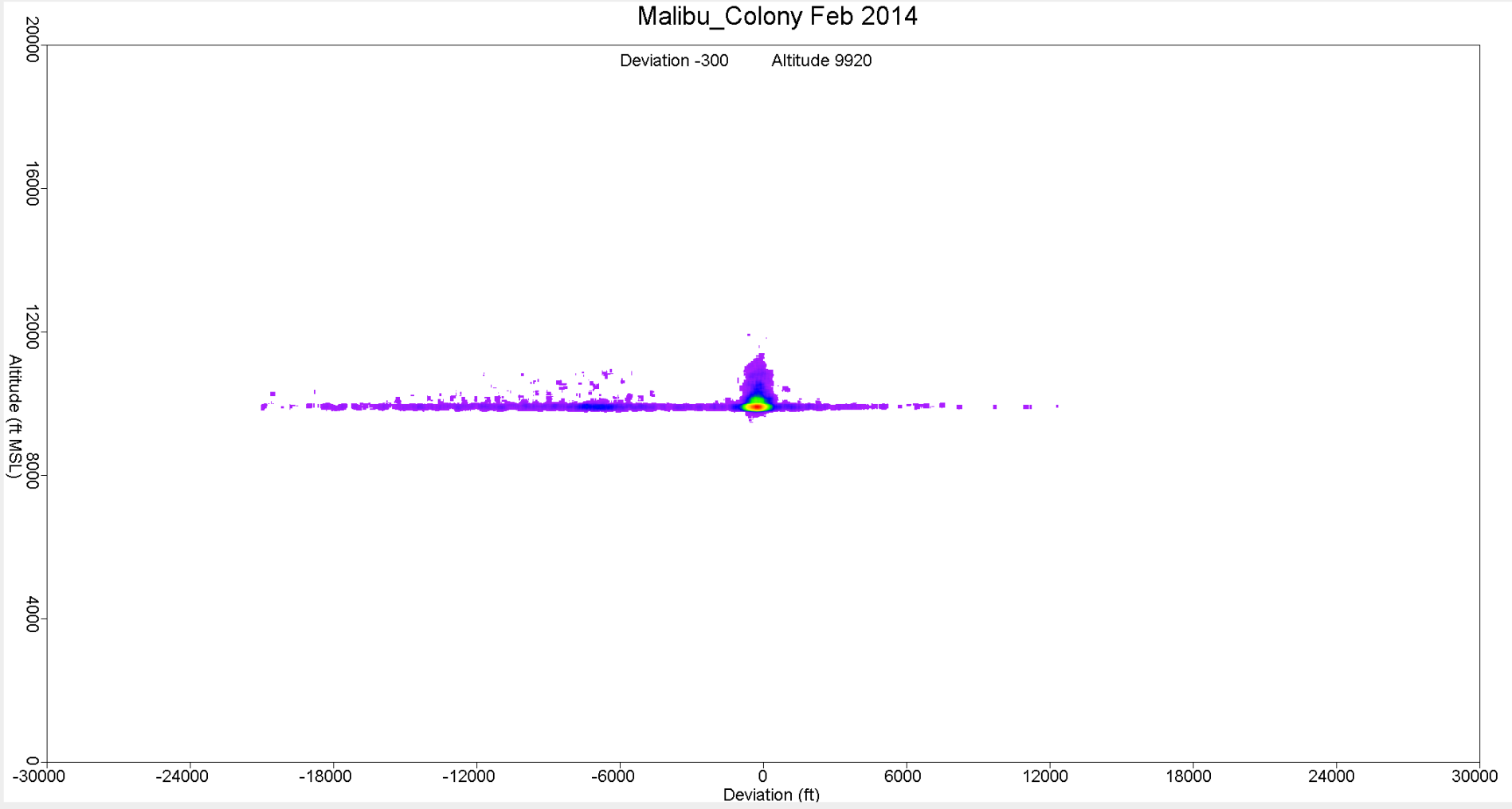
0 2 4 6 Nautical Mi

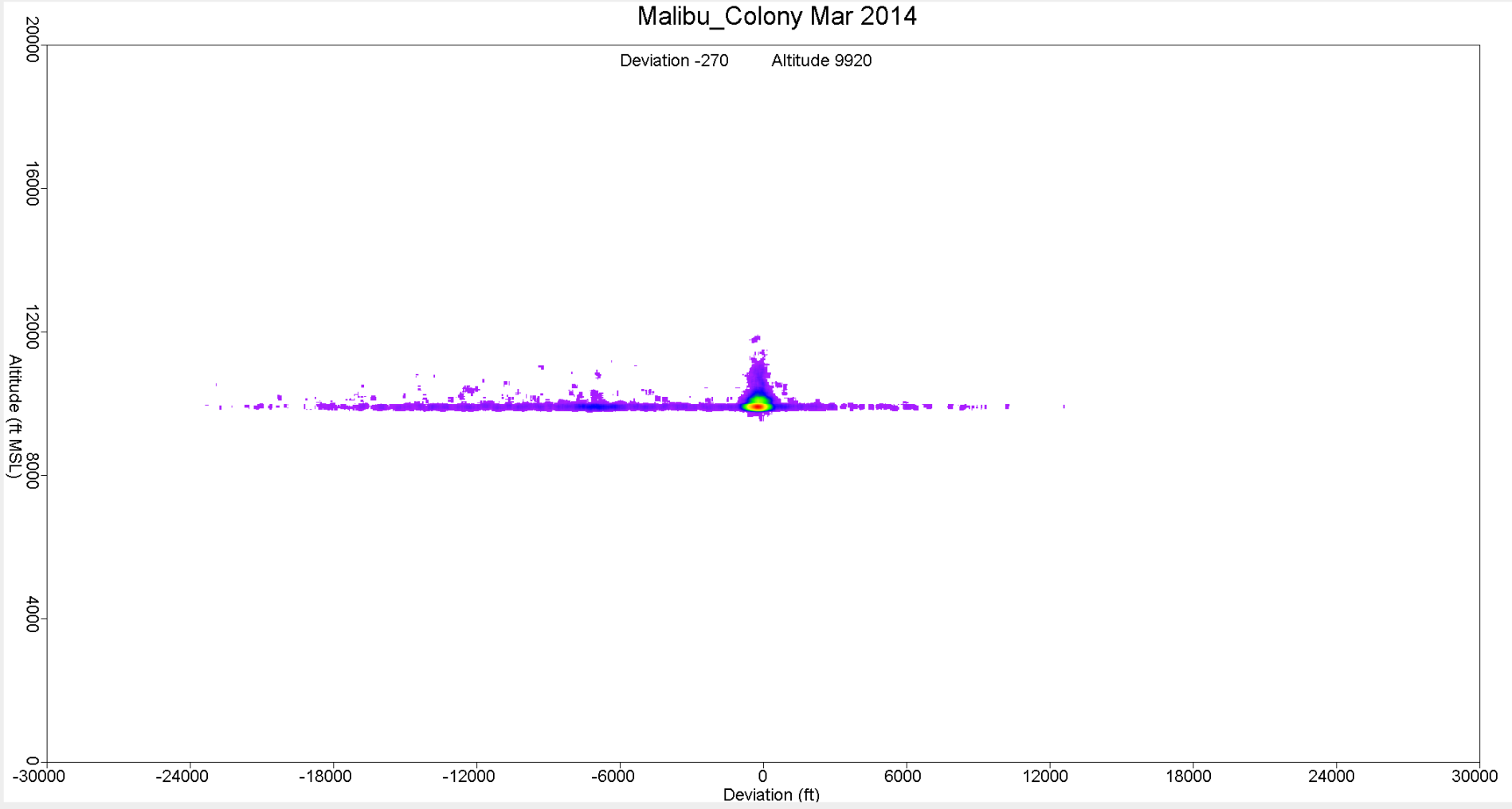
Study Results – Altitude Distribution Graphs

- Altitude distribution graphs were developed for all ten gates, each month over the six-year analysis period
- As a result, 720 altitude distribution graphs were prepared (i.e., 72 for each gate), which were examined for noticeable changes throughout the six-year period
- As with the flight track density graphs, the data are generally consistent until the summer of 2014, remain changed for approximately 12 months, and then return to the patterns of the previous four years
- The following images illustrate these recent changes


Malibu_Colony Jan 2014
Deviation -270
Altitude 9920
Primary Flight Corridor
Flight Track Dispersion
Flight Track Dispersion
Left of Center Point
(North)
Gate Center Point
Right of Center Point
(South)
Altitude (ft MSL)
20000
16000
12000
8000
4000
0
-30000
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Jan 2014
Deviation -270
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
-30000
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Feb 2014
Deviation -300
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
-30000
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Mar 2014
Deviation -270
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
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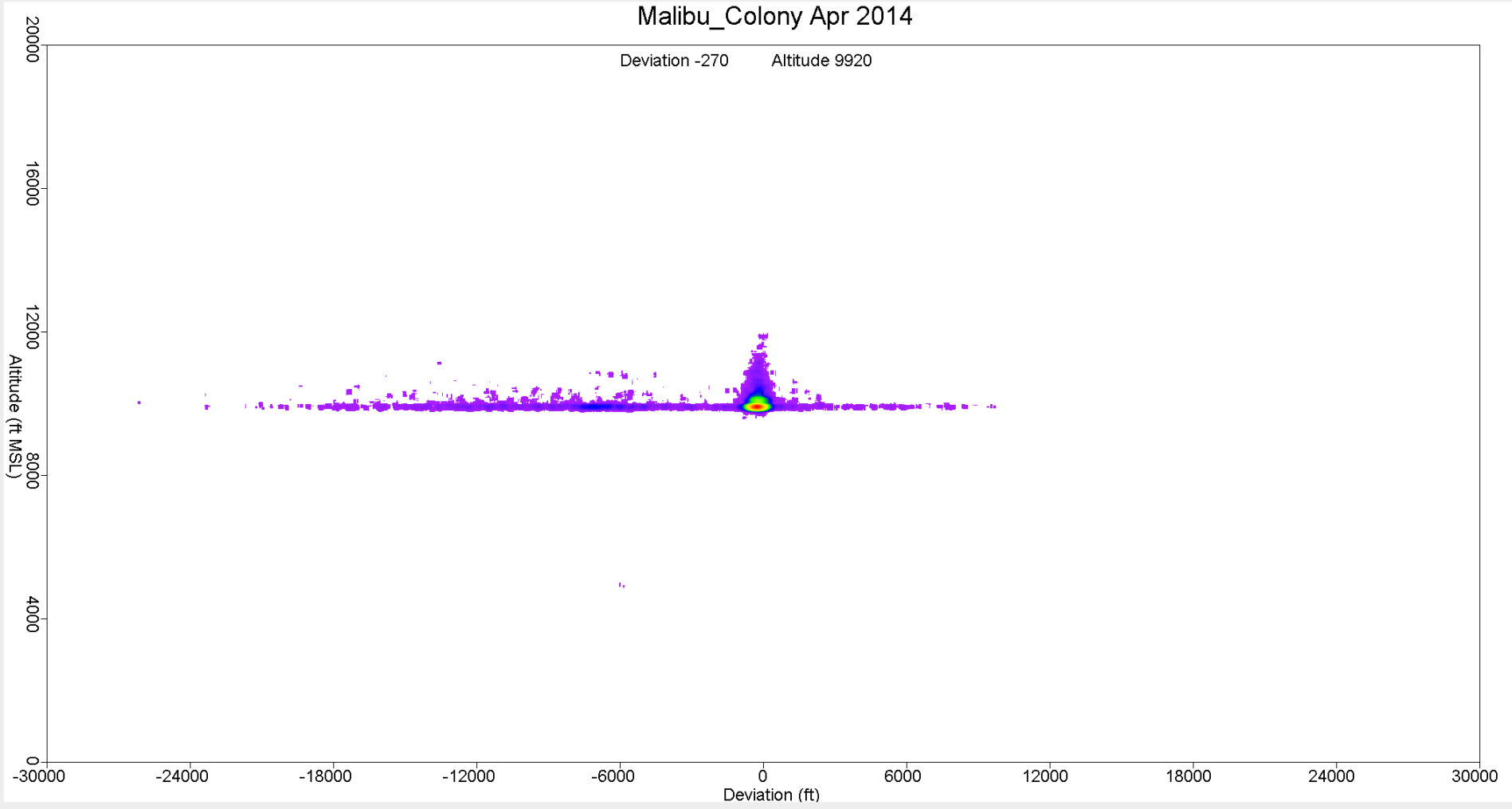
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Apr 2014
Deviation -270
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
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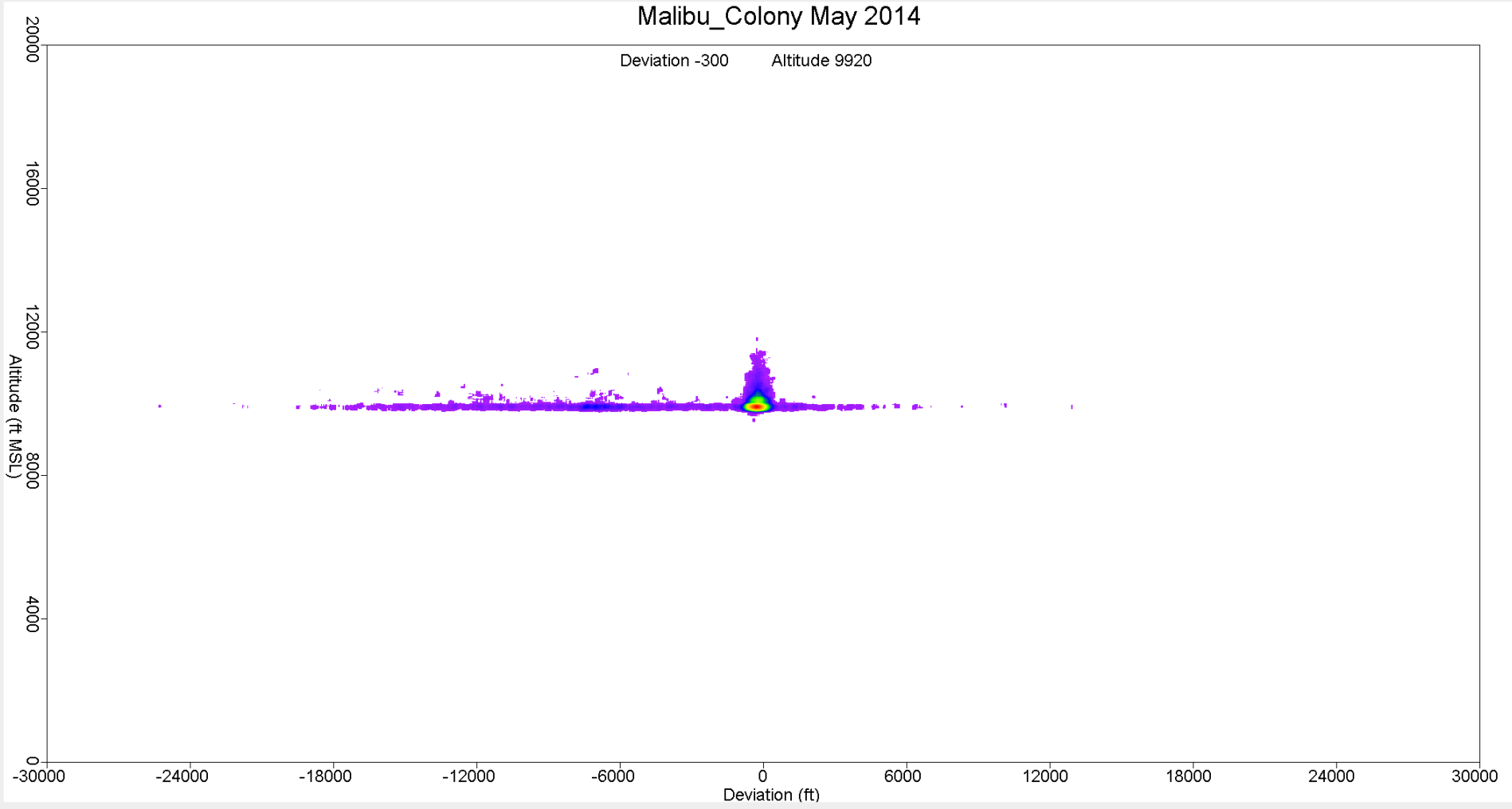
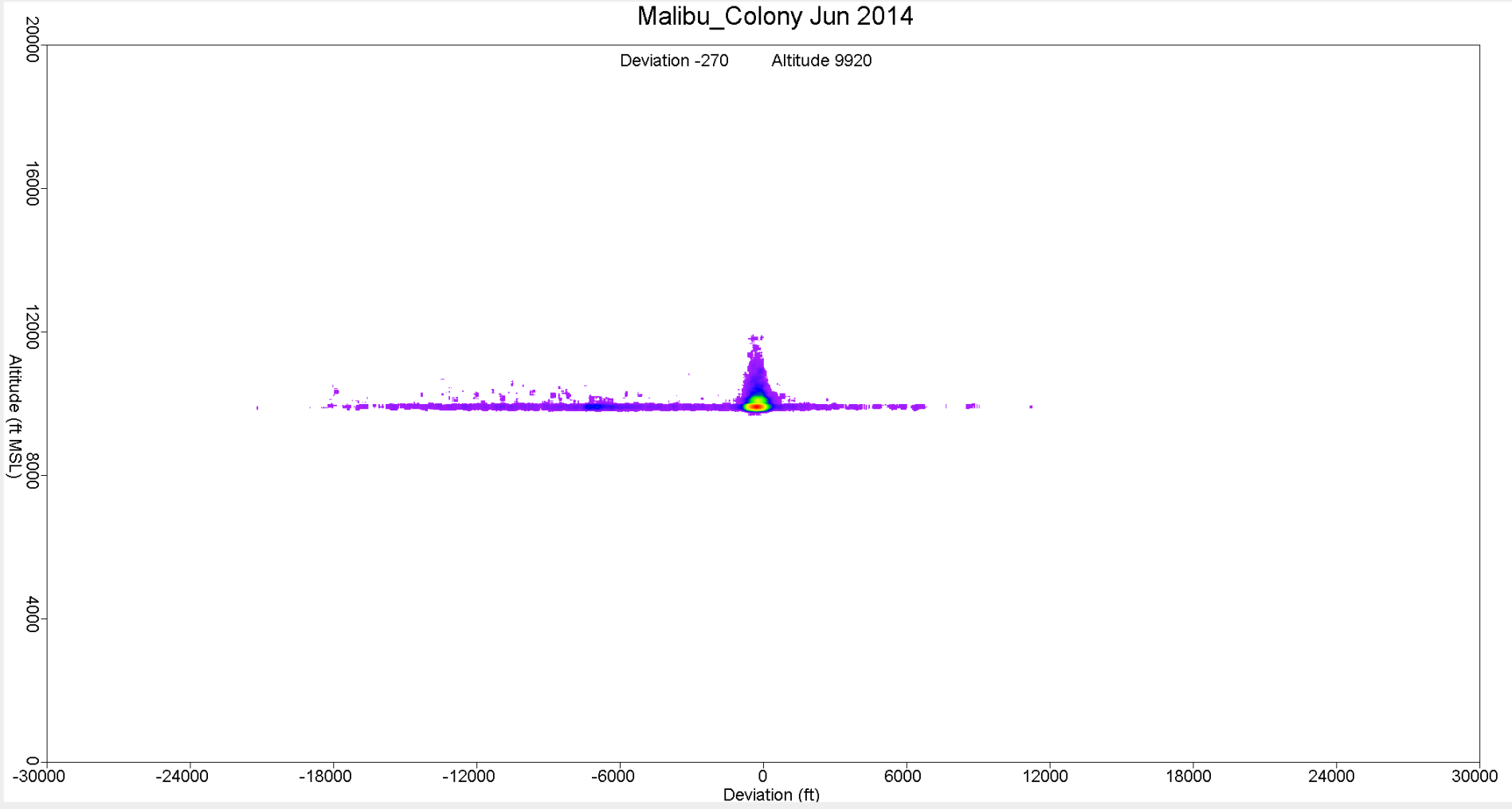
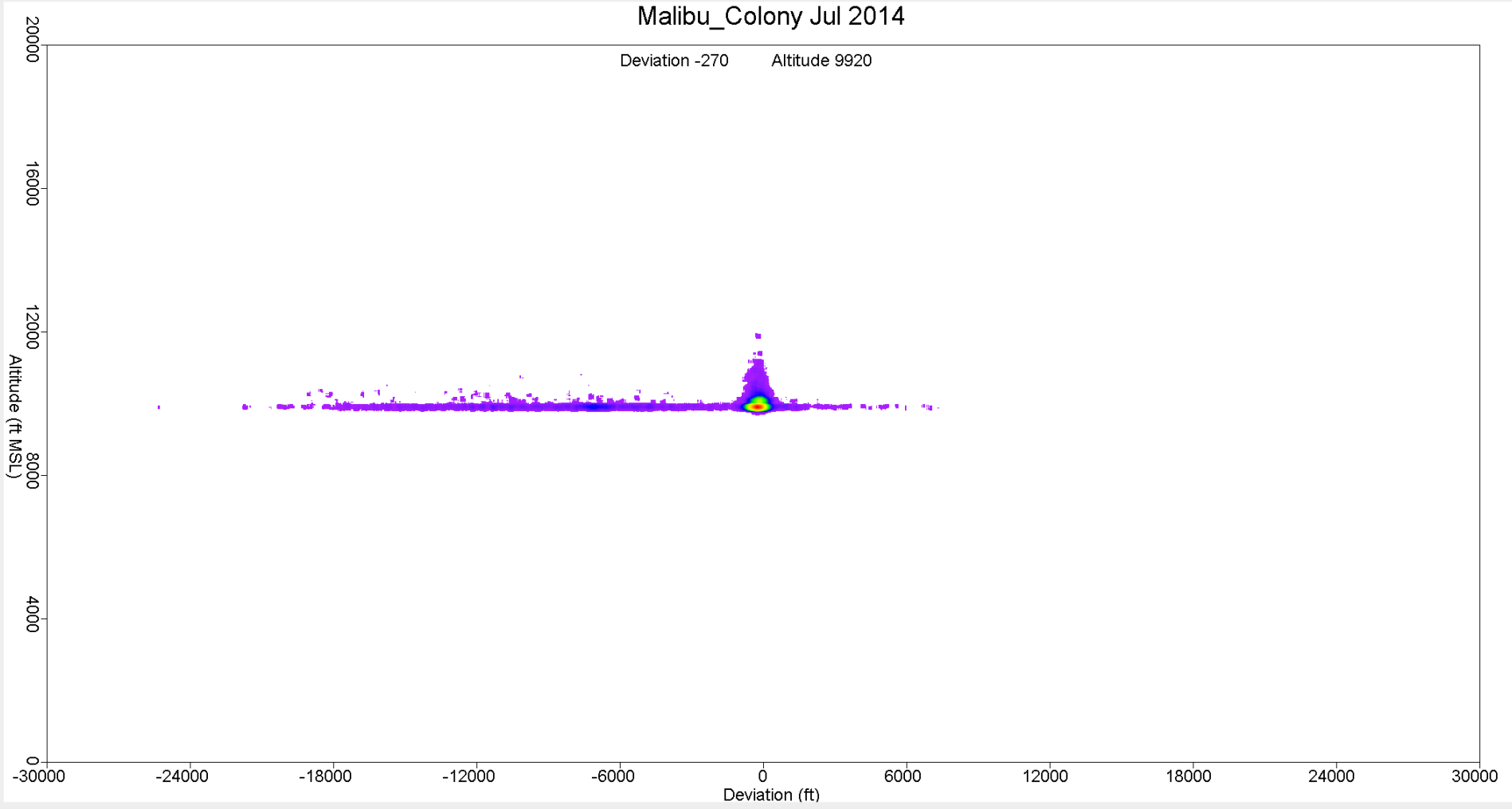
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony May 2014
Deviation -300
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
-30000
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Jun 2014
Deviation -270
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
-30000
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Jul 2014
Deviation -270
Altitude 9920
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16000
12000
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4000
0
Altitude (ft MSL)
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6000
12000
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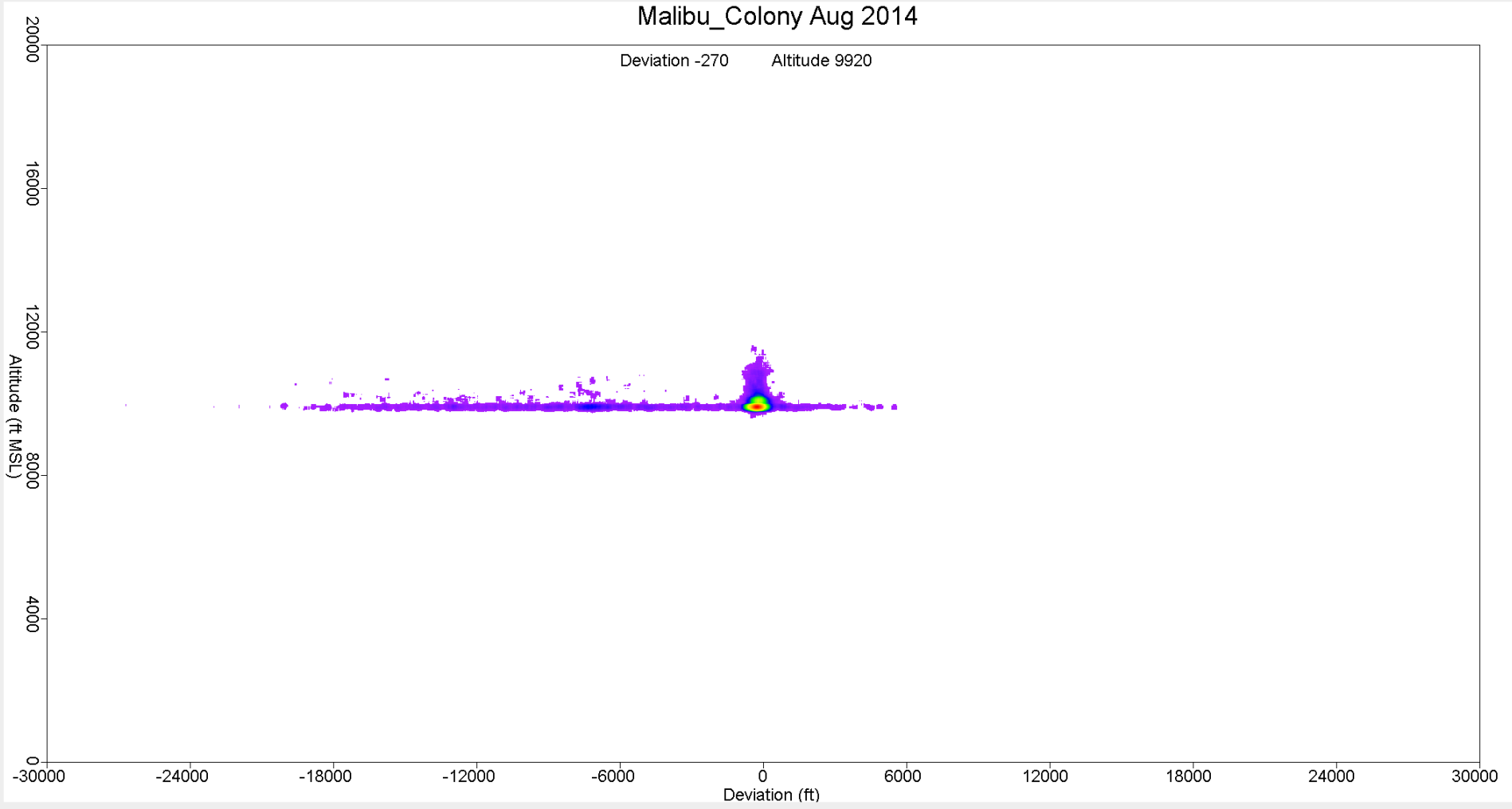
Deviation (ft)


Malibu_Colony Aug 2014
Deviation -270
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
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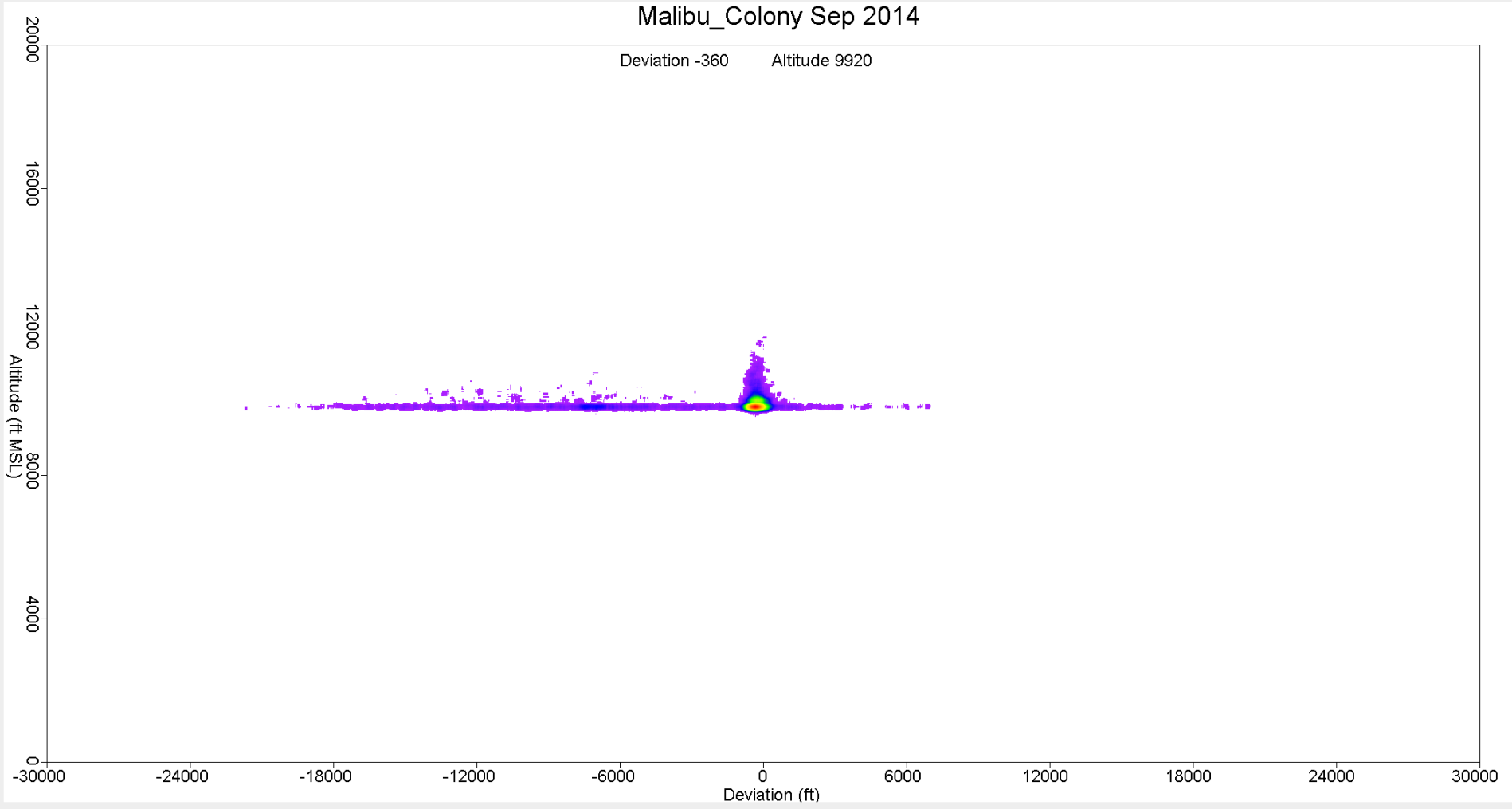
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Sep 2014
Deviation -360
Altitude 9920
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16000
12000
8000
4000
0
Altitude (ft MSL)
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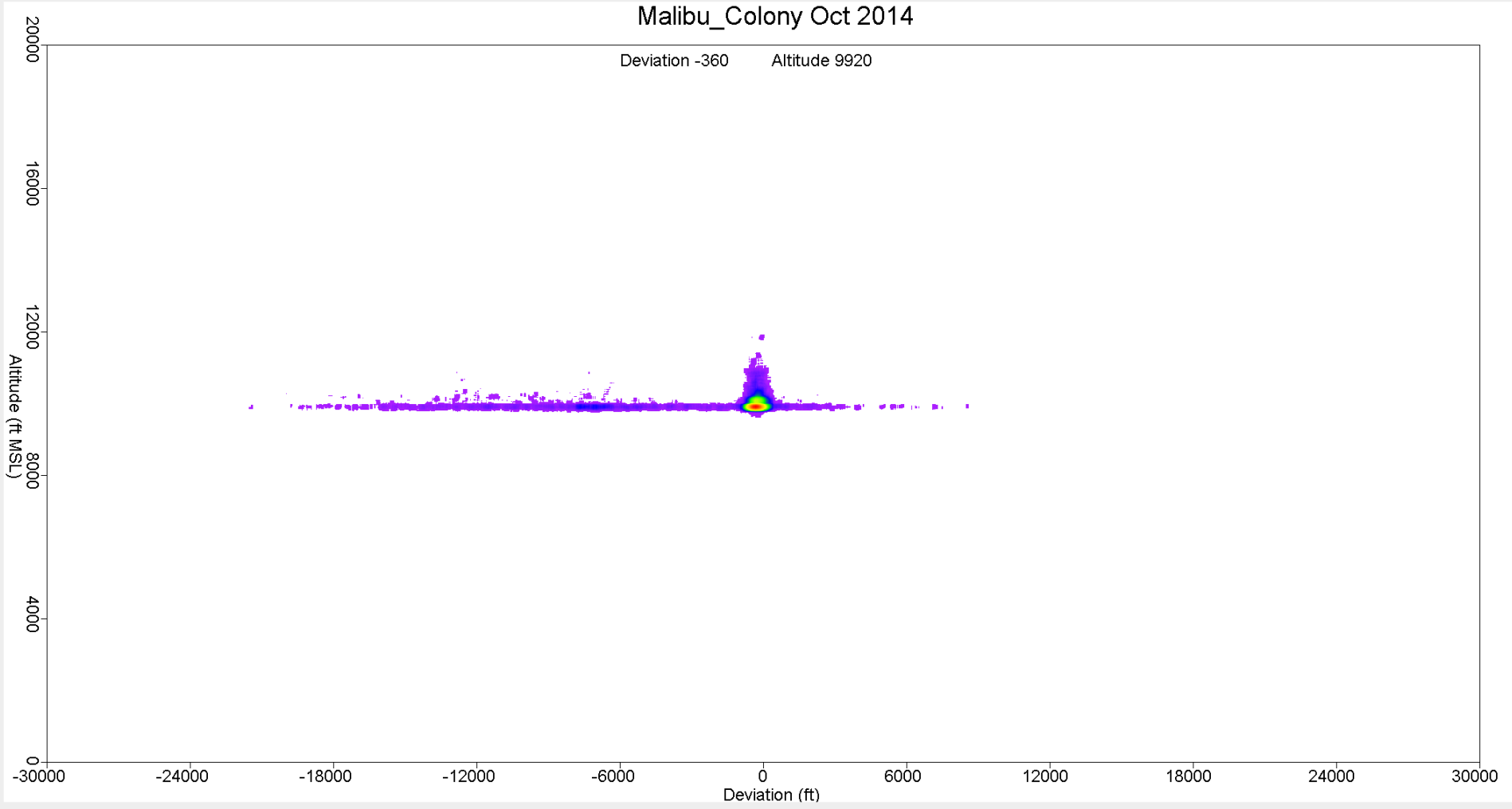
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Oct 2014
Deviation -360
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20000
16000
12000
8000
4000
0
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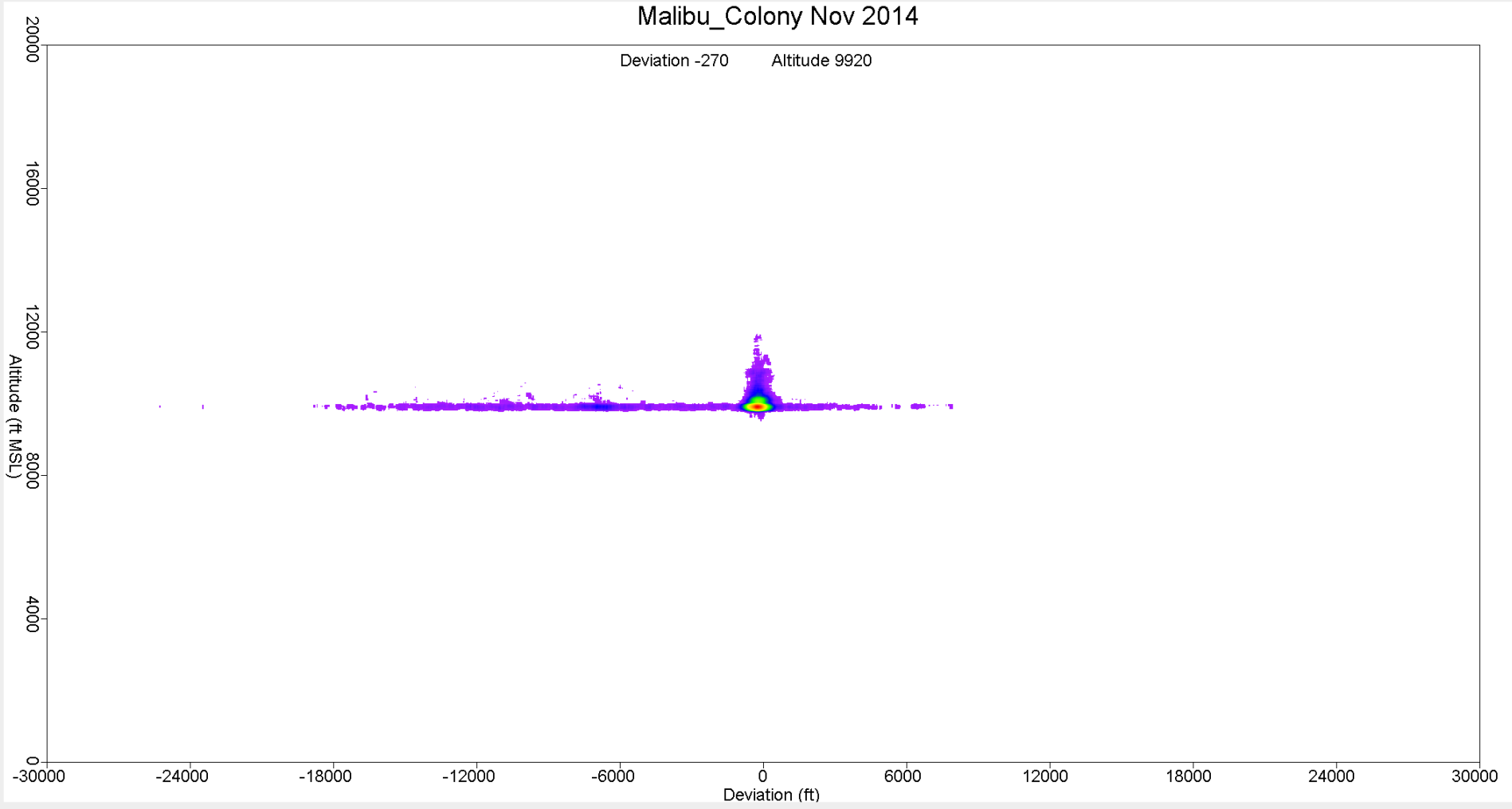
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Nov 2014
Deviation -270
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16000
12000
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4000
0
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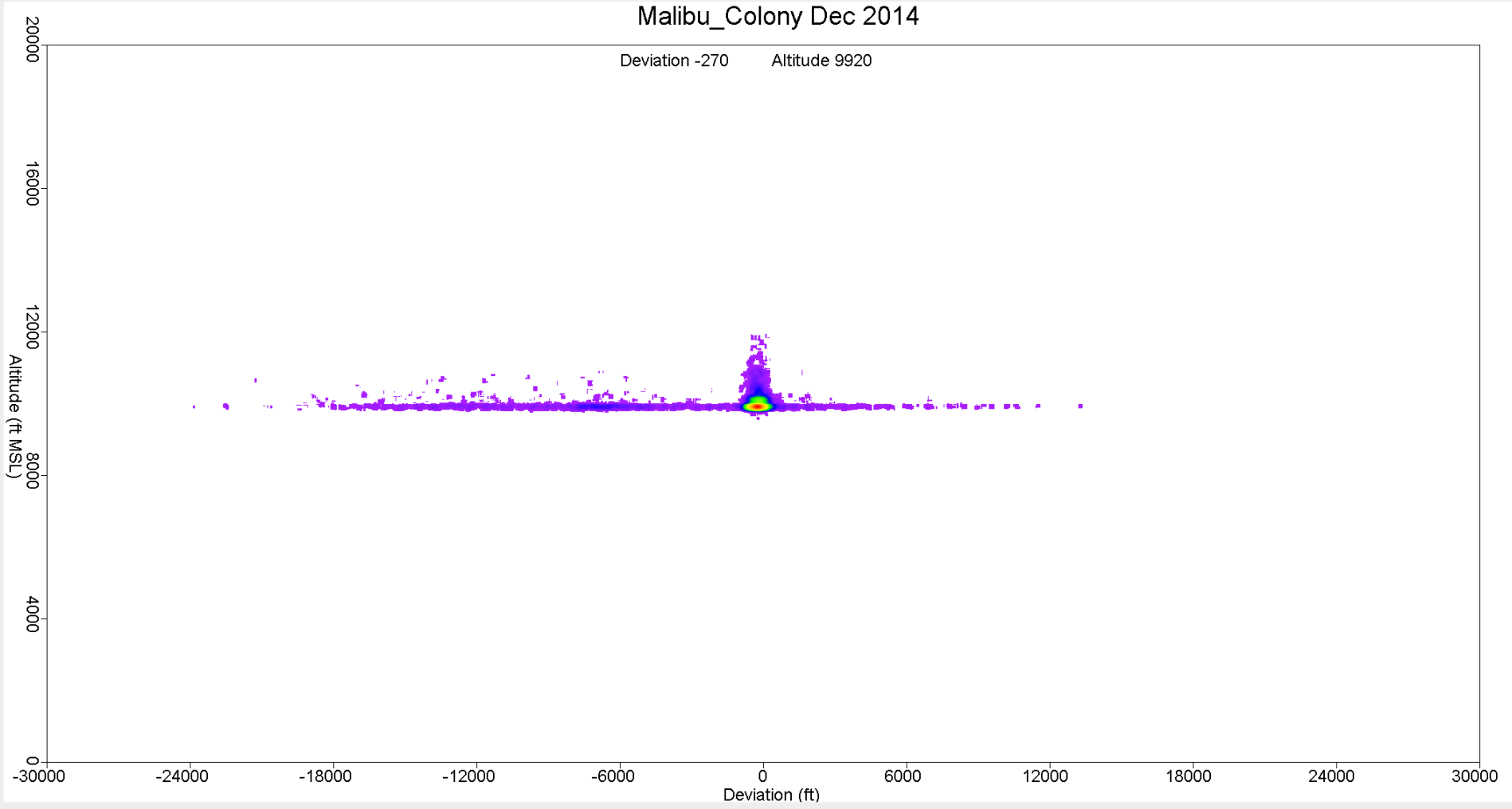
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Dec 2014
Deviation -270
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12000
8000
4000
0
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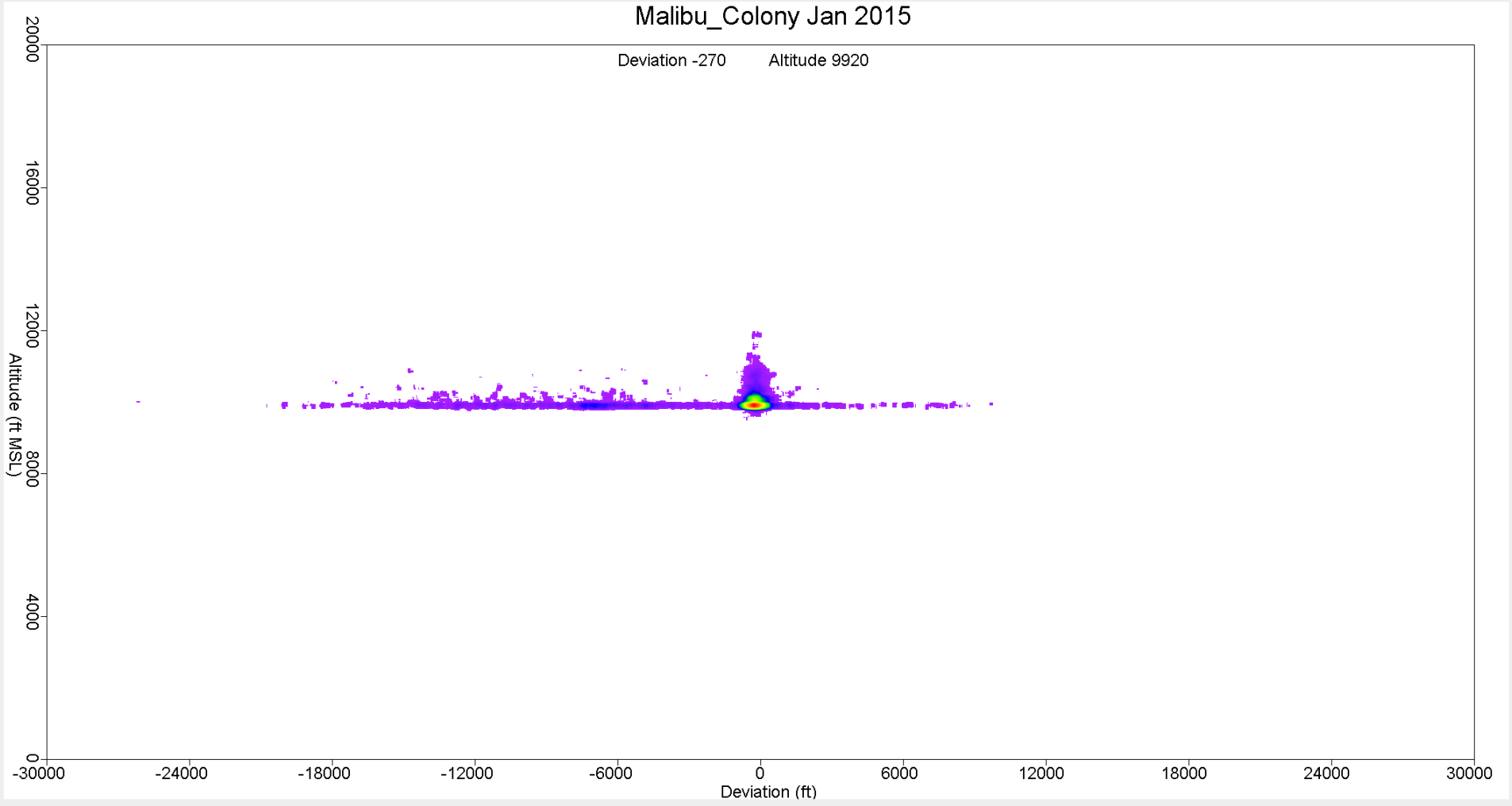
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Jan 2015
Deviation -270
Altitude 9920
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12000
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4000
0
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-18000
-12000
-6000
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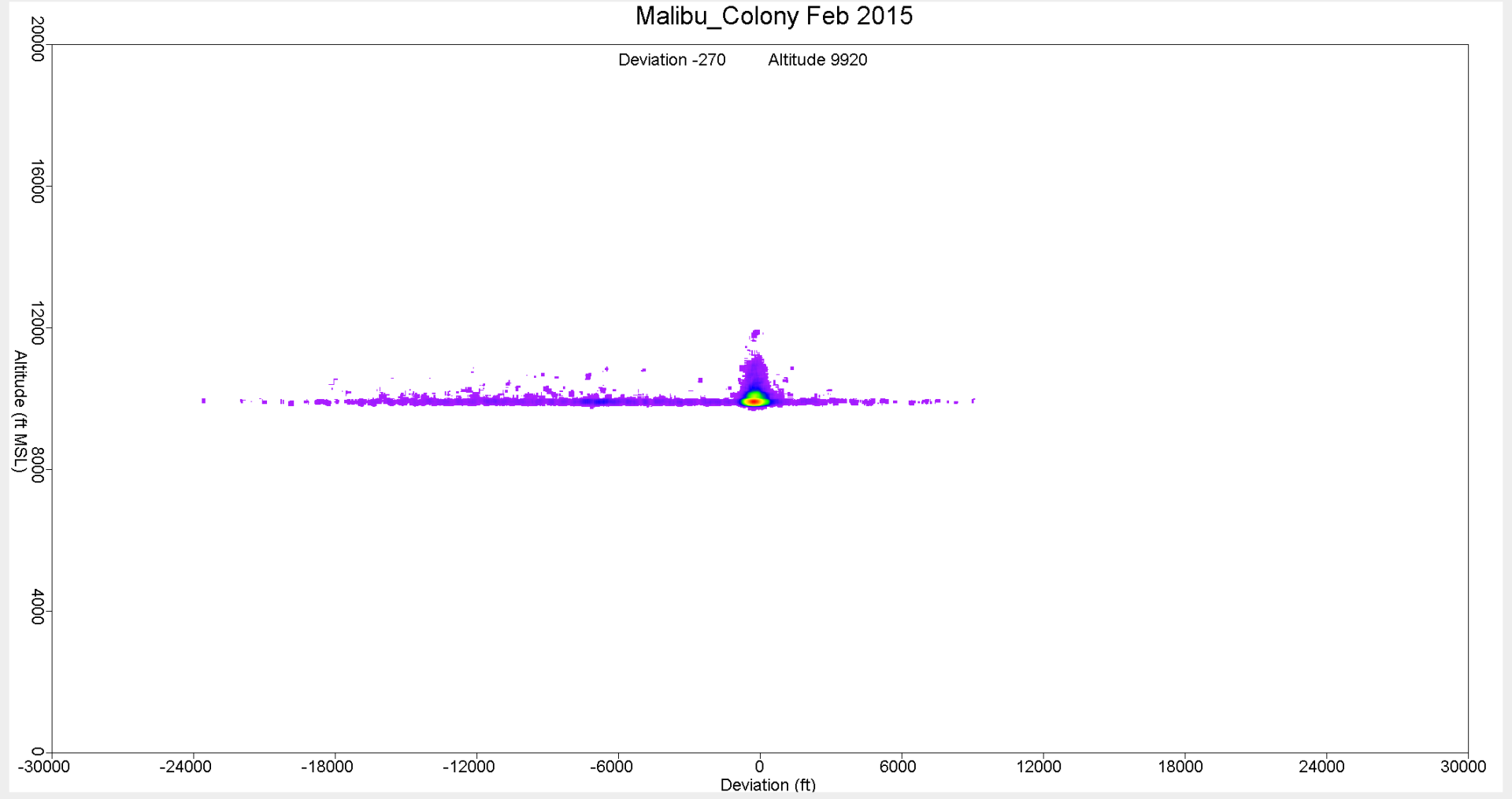
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Feb 2015
Deviation -270
Altitude 9920
20000
16000
12000
8000
4000
0
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-12000
-6000
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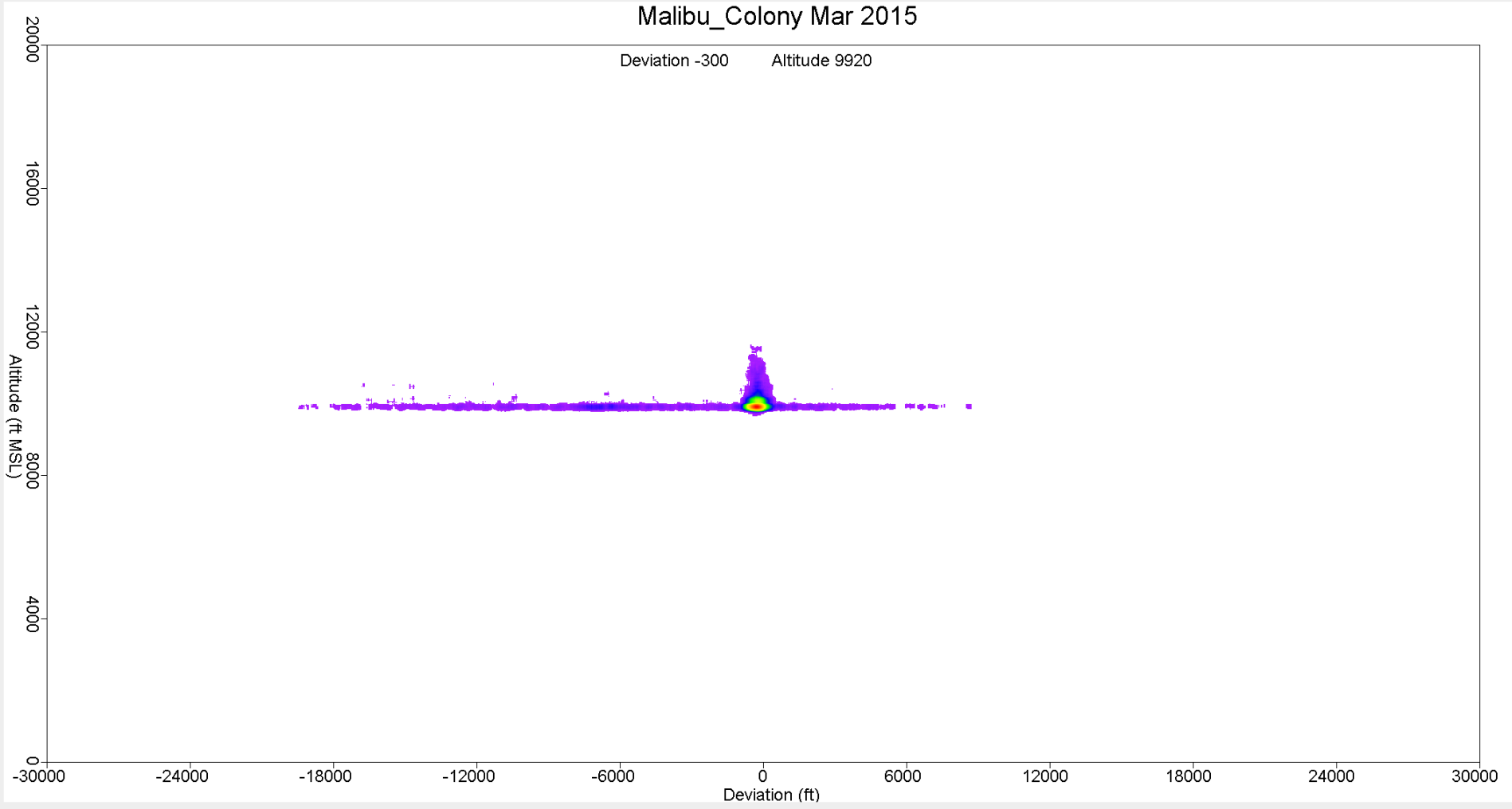
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Mar 2015
Deviation -300
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
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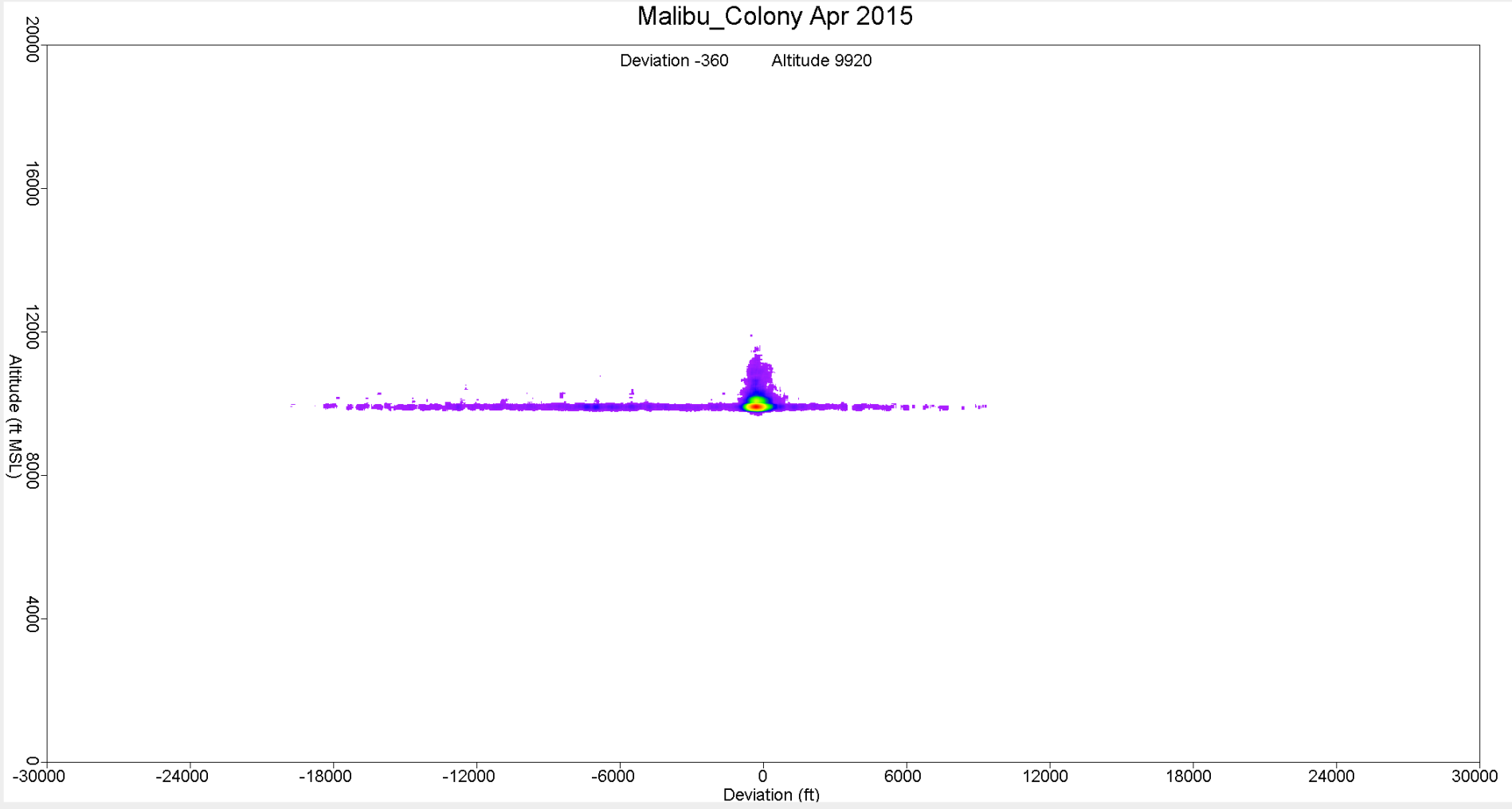
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Apr 2015
Deviation -360
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
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-12000
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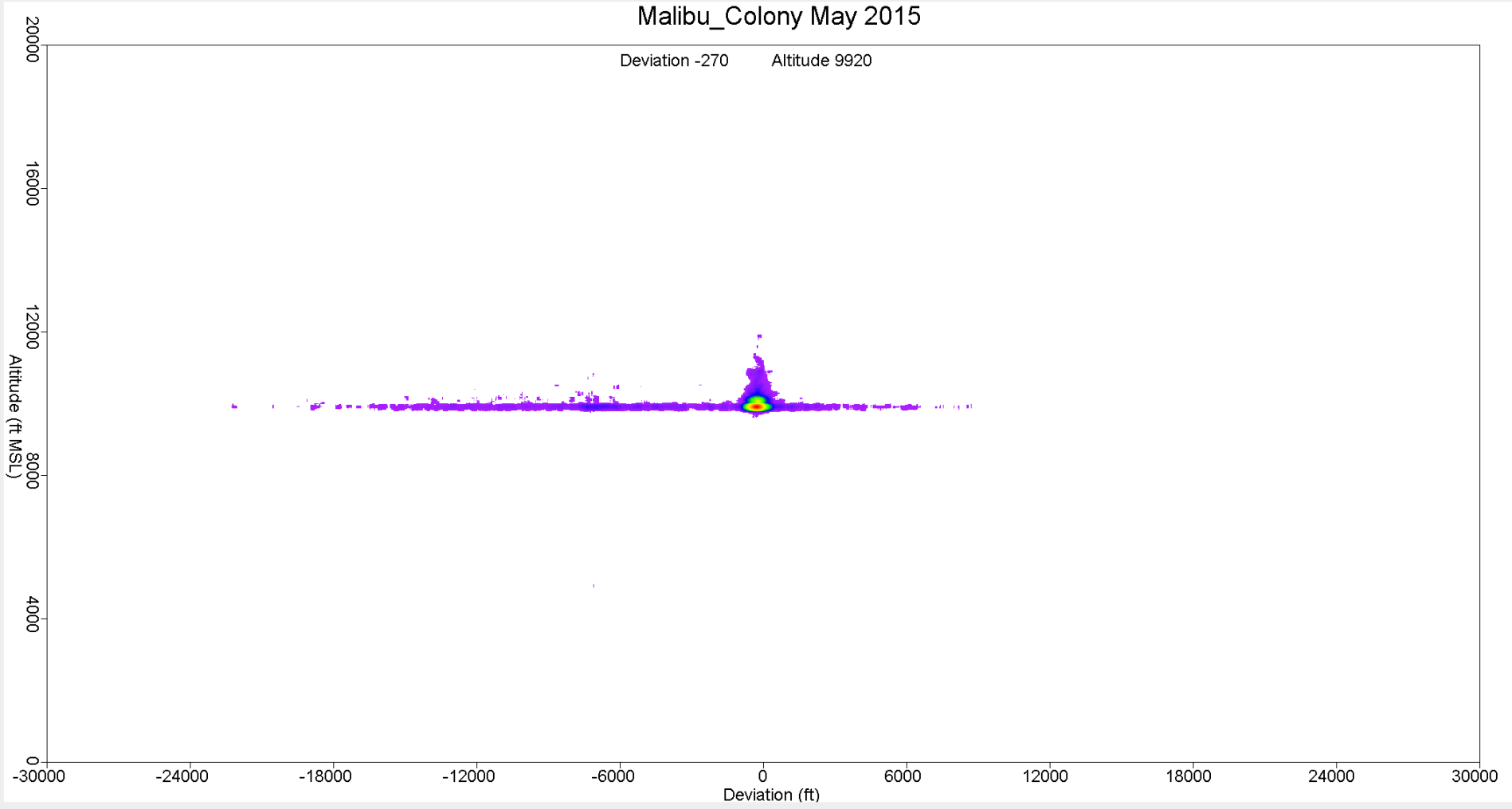
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony May 2015
Deviation -270
Altitude 9920
20000
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12000
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4000
0
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-12000
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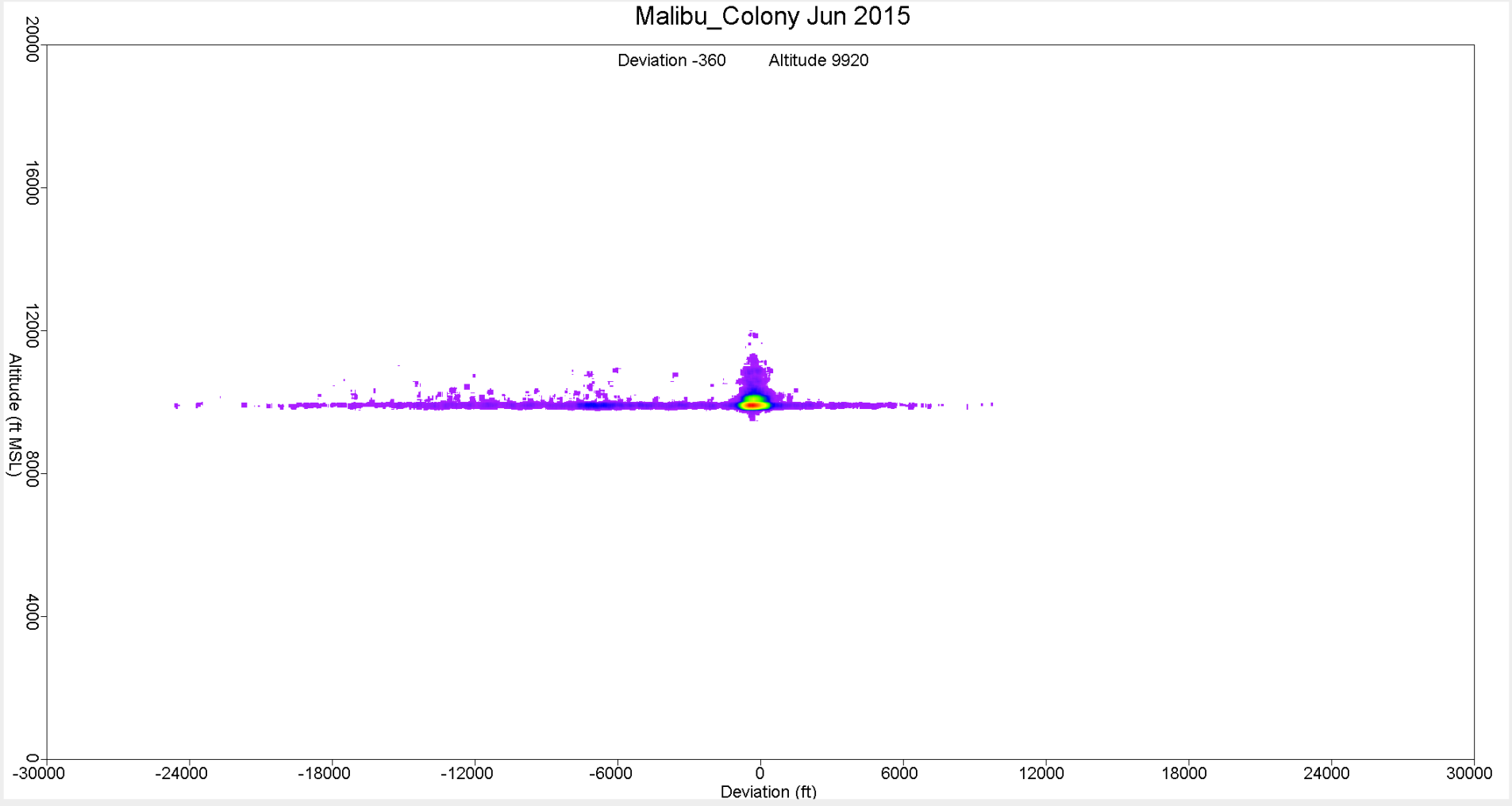
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Jun 2015
Deviation -360
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
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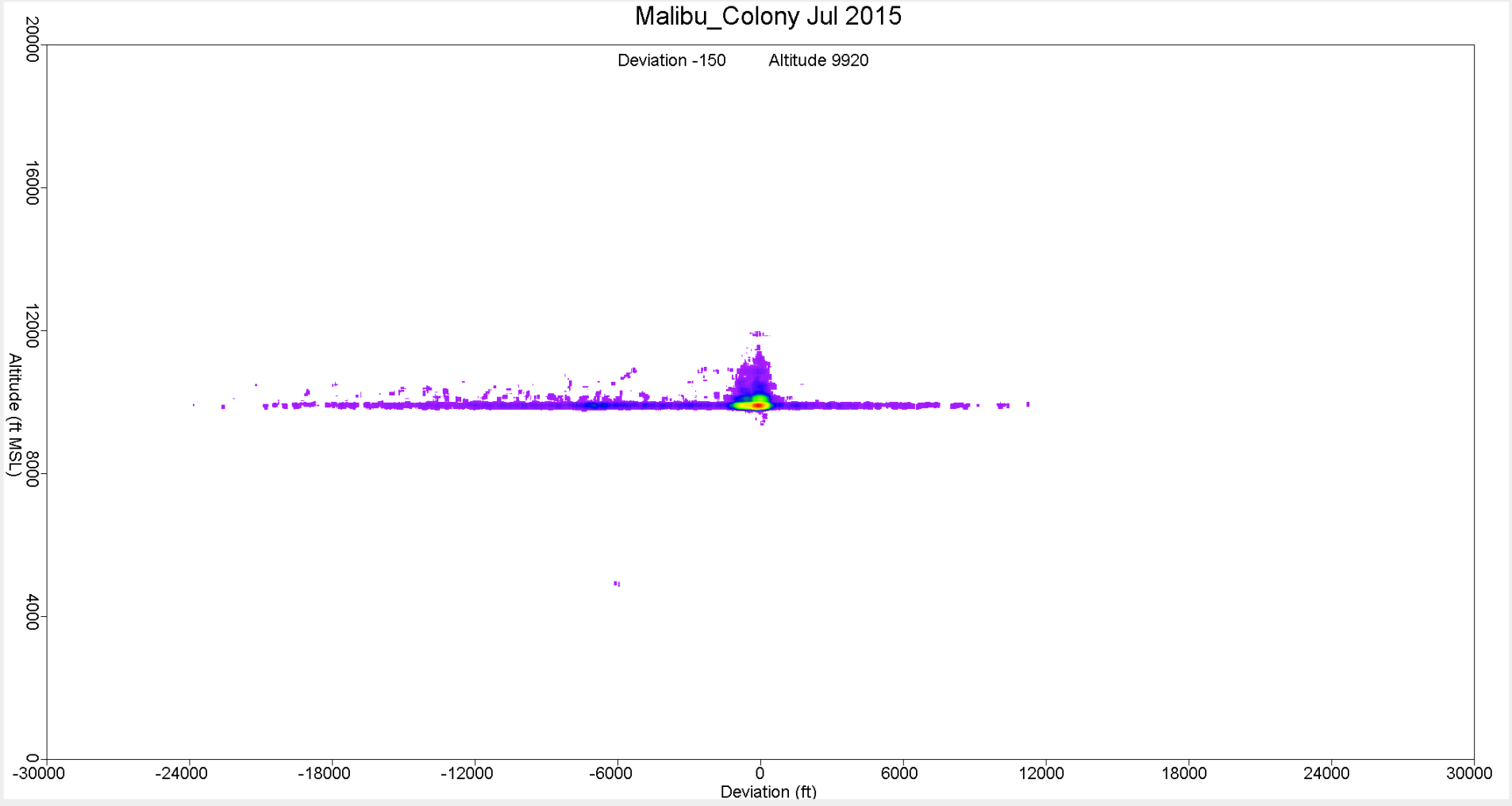
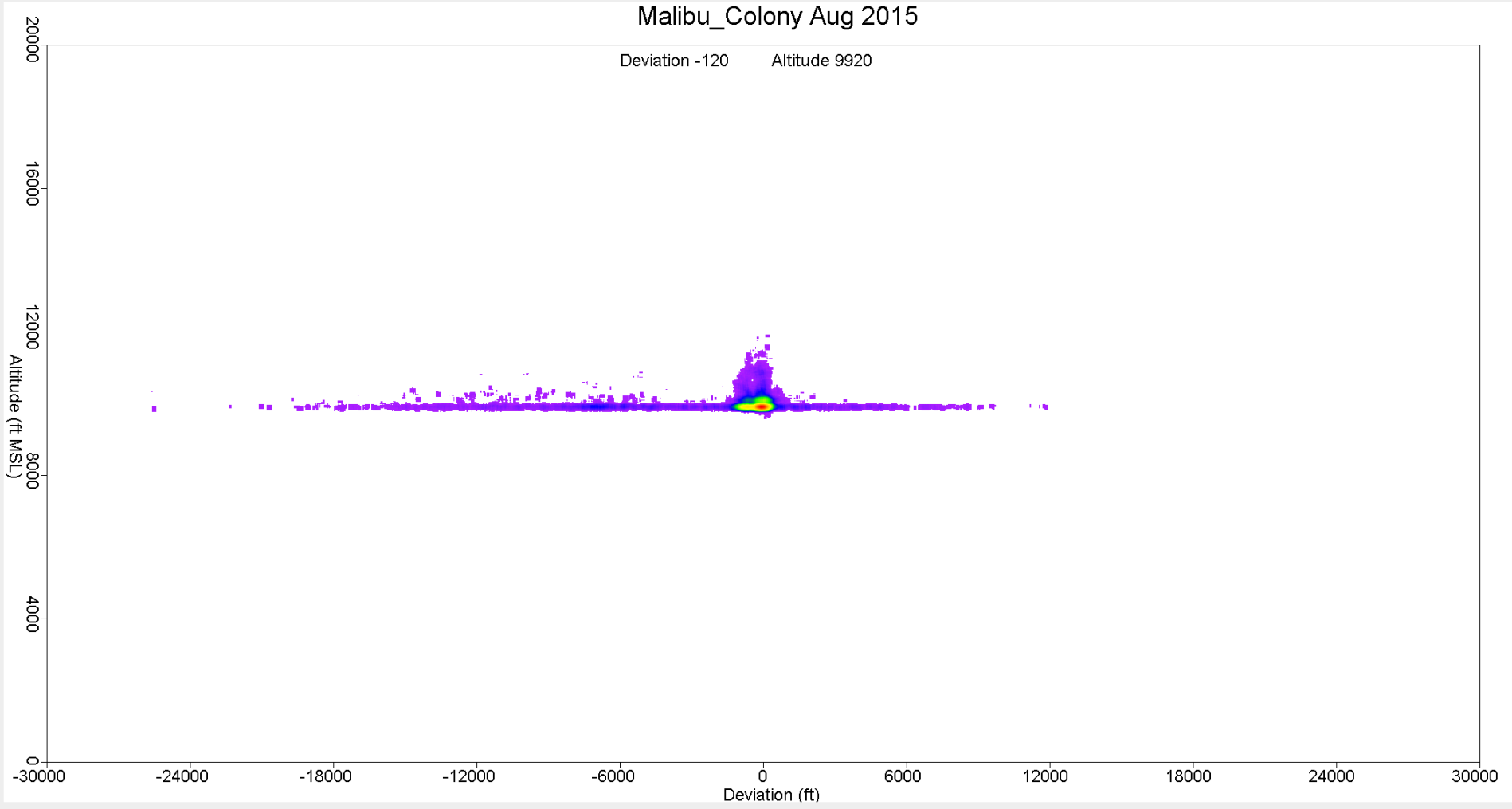
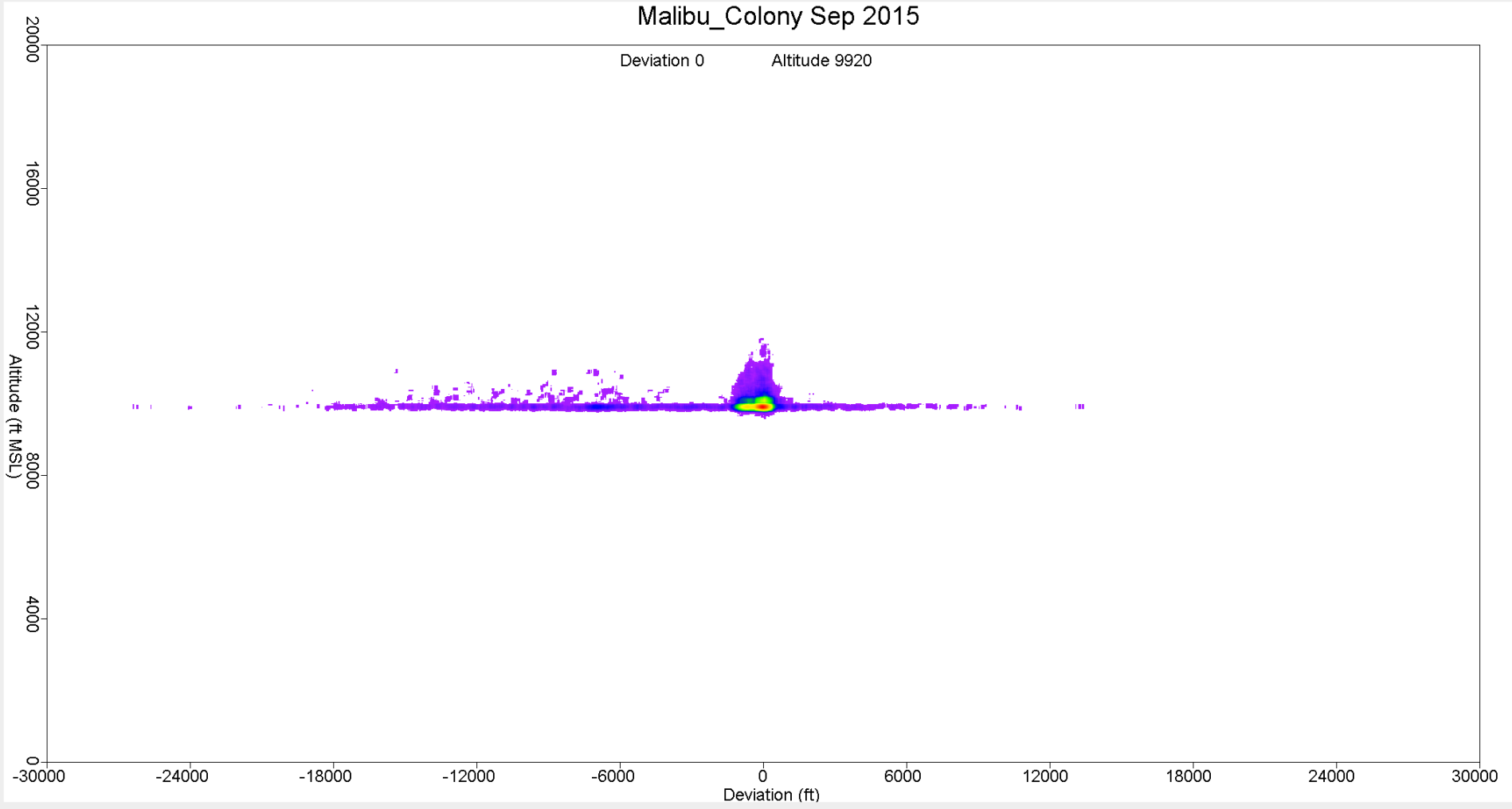
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Jul 2015
Deviation -150
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
-30000
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Aug 2015
Deviation -120
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
-30000
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Sep 2015
Deviation 0
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
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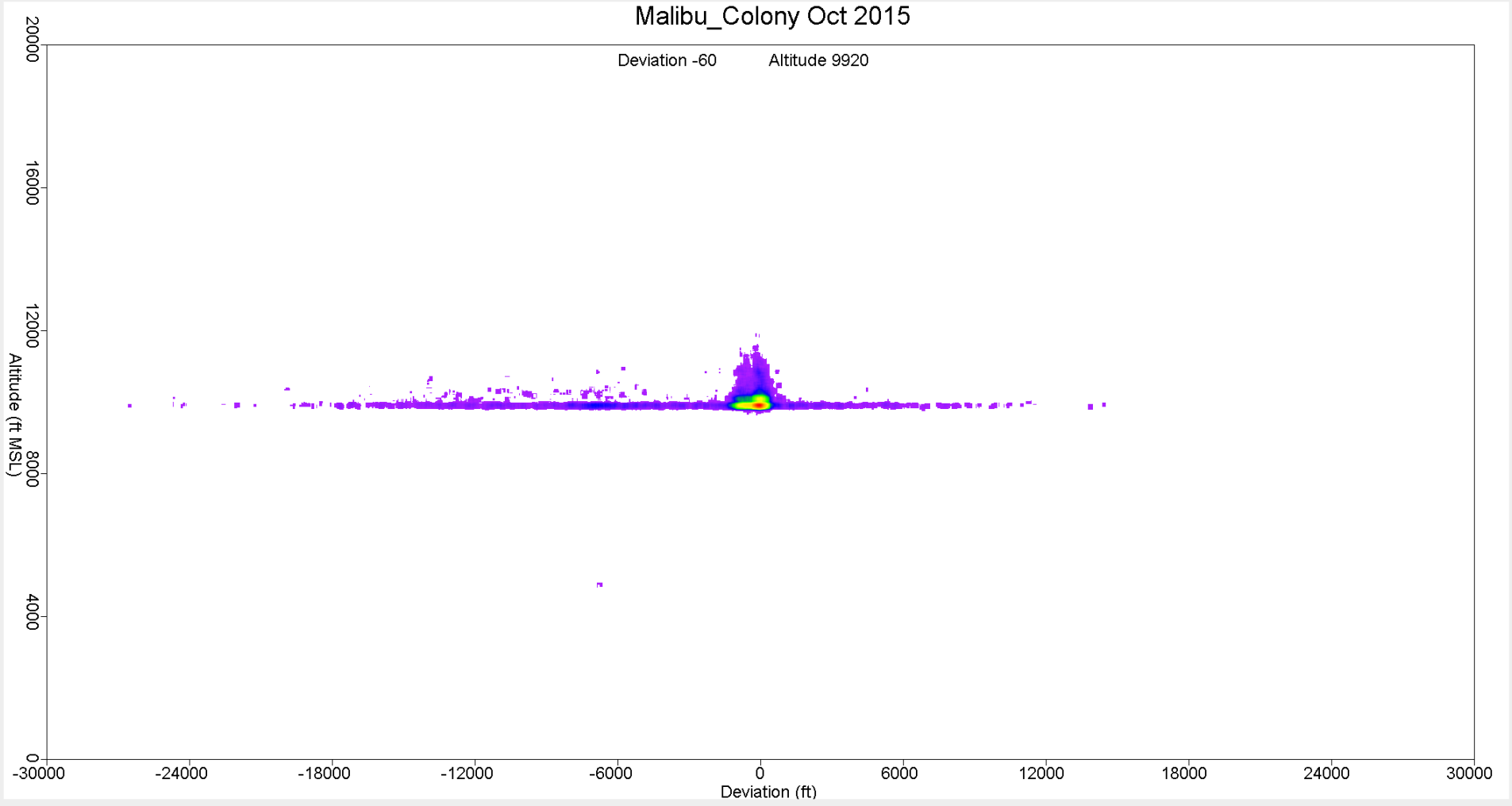
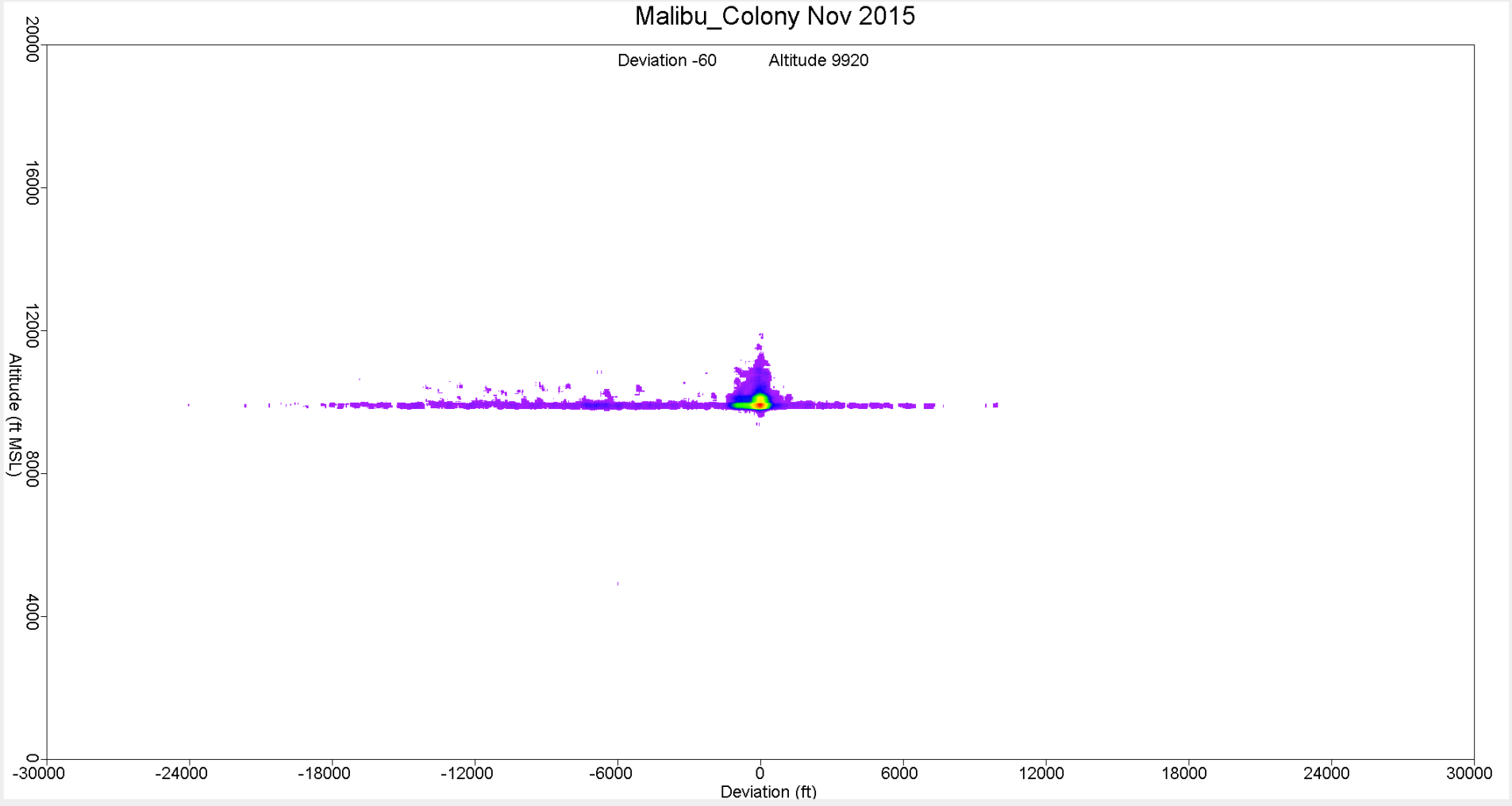
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Oct 2015
Deviation -60
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
-30000
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Nov 2015
Deviation -60
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
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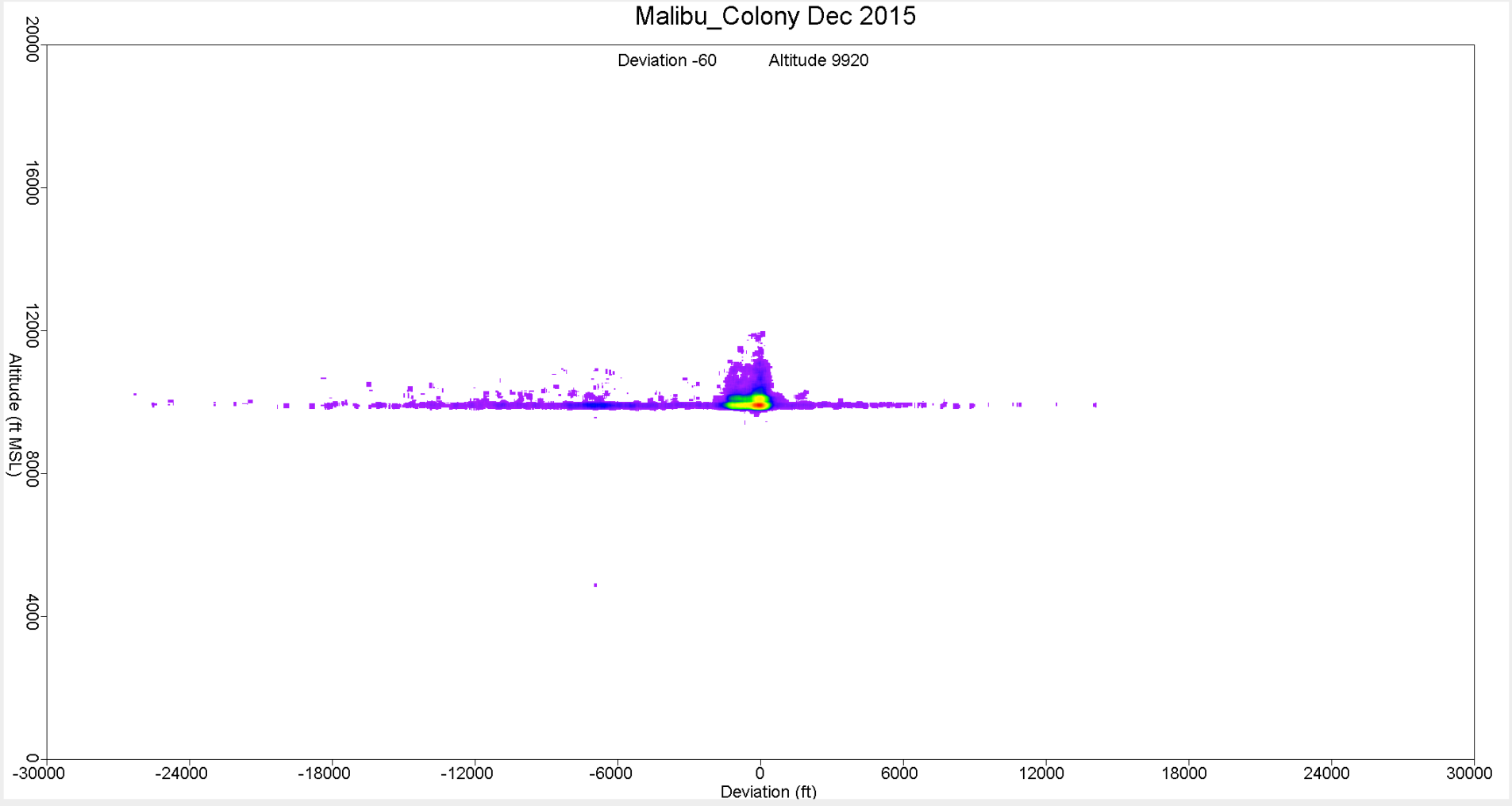
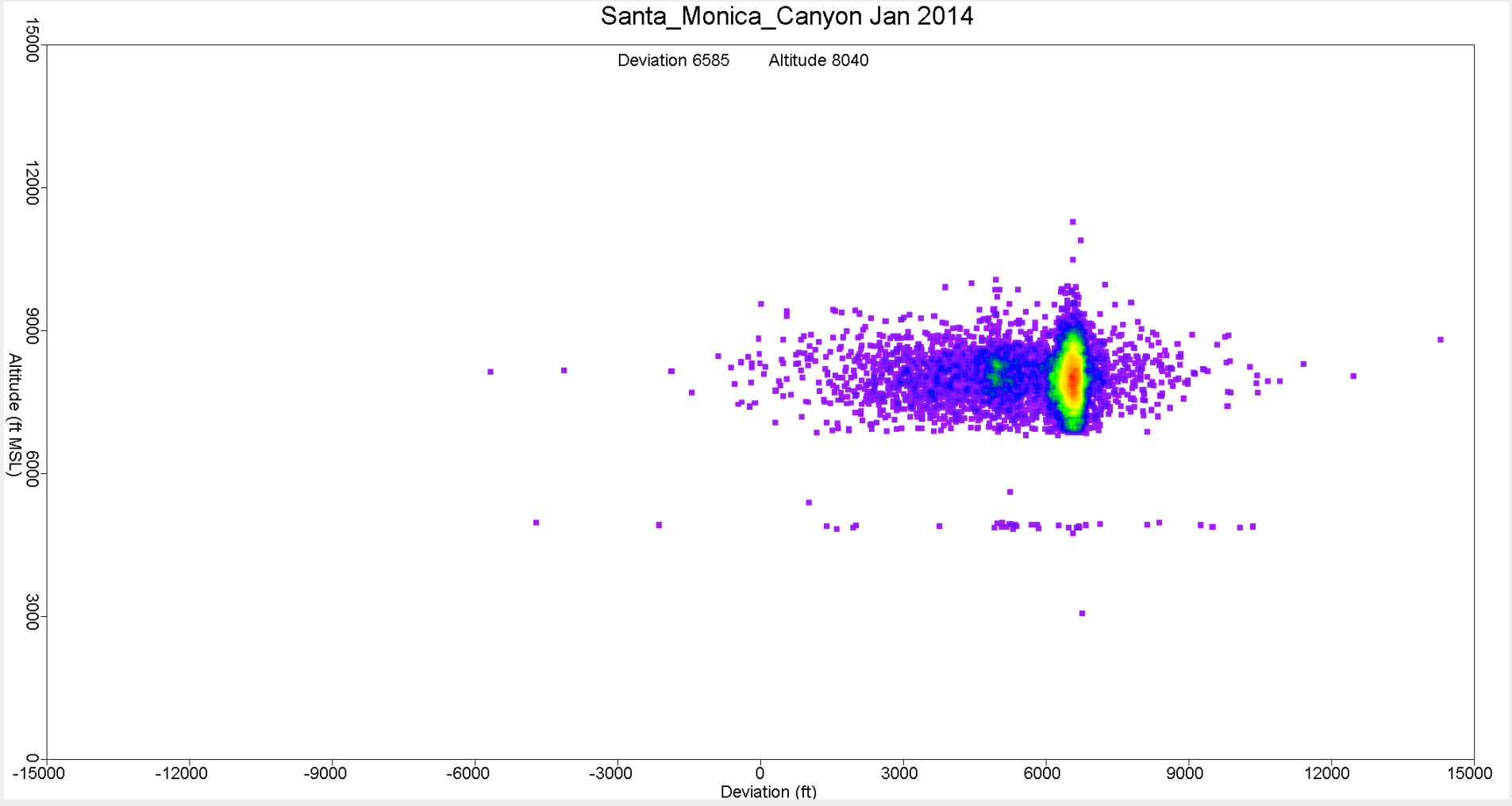
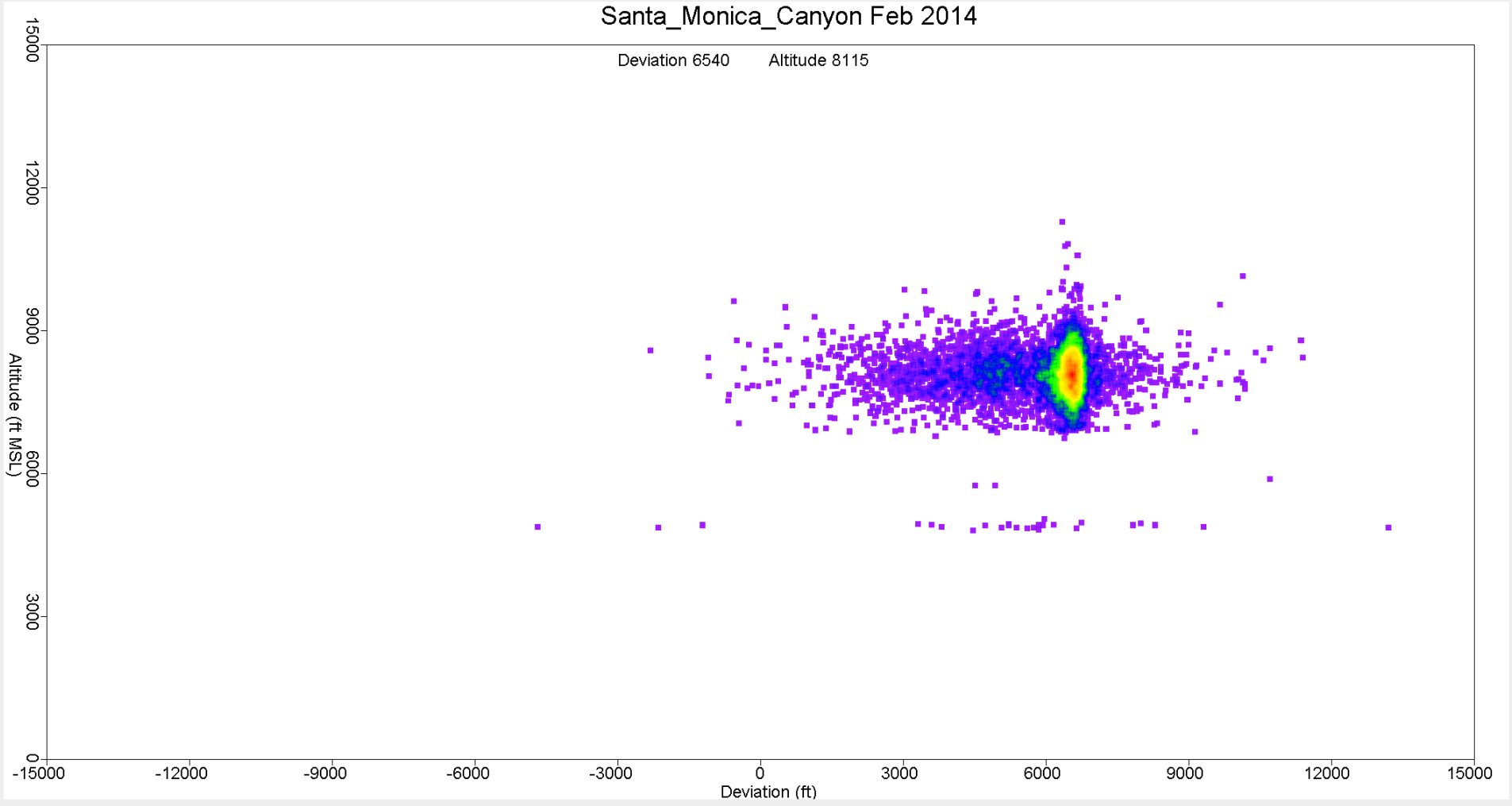
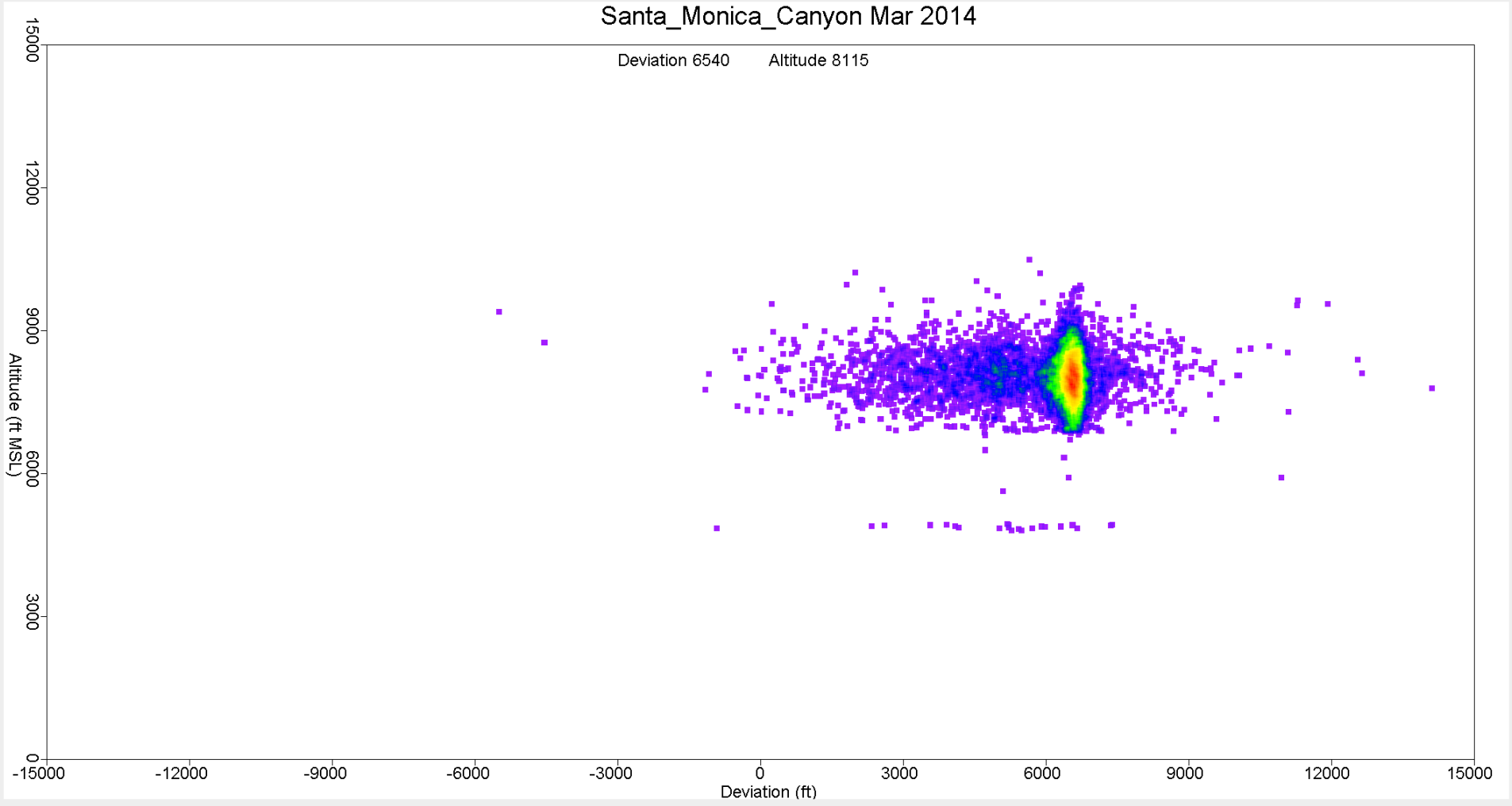
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Malibu_Colony Dec 2015
Deviation -60
Altitude 9920
20000
16000
12000
8000
4000
0
Altitude (ft MSL)
-30000
-24000
-18000
-12000
-6000
0
6000
12000
18000
24000
30000
Deviation (ft)


Santa_Monica_Canyon Jan 2014
Deviation 6585
Altitude 8040
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Feb 2014
Deviation 6540
Altitude 8115
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Mar 2014
Deviation 6540
Altitude 8115
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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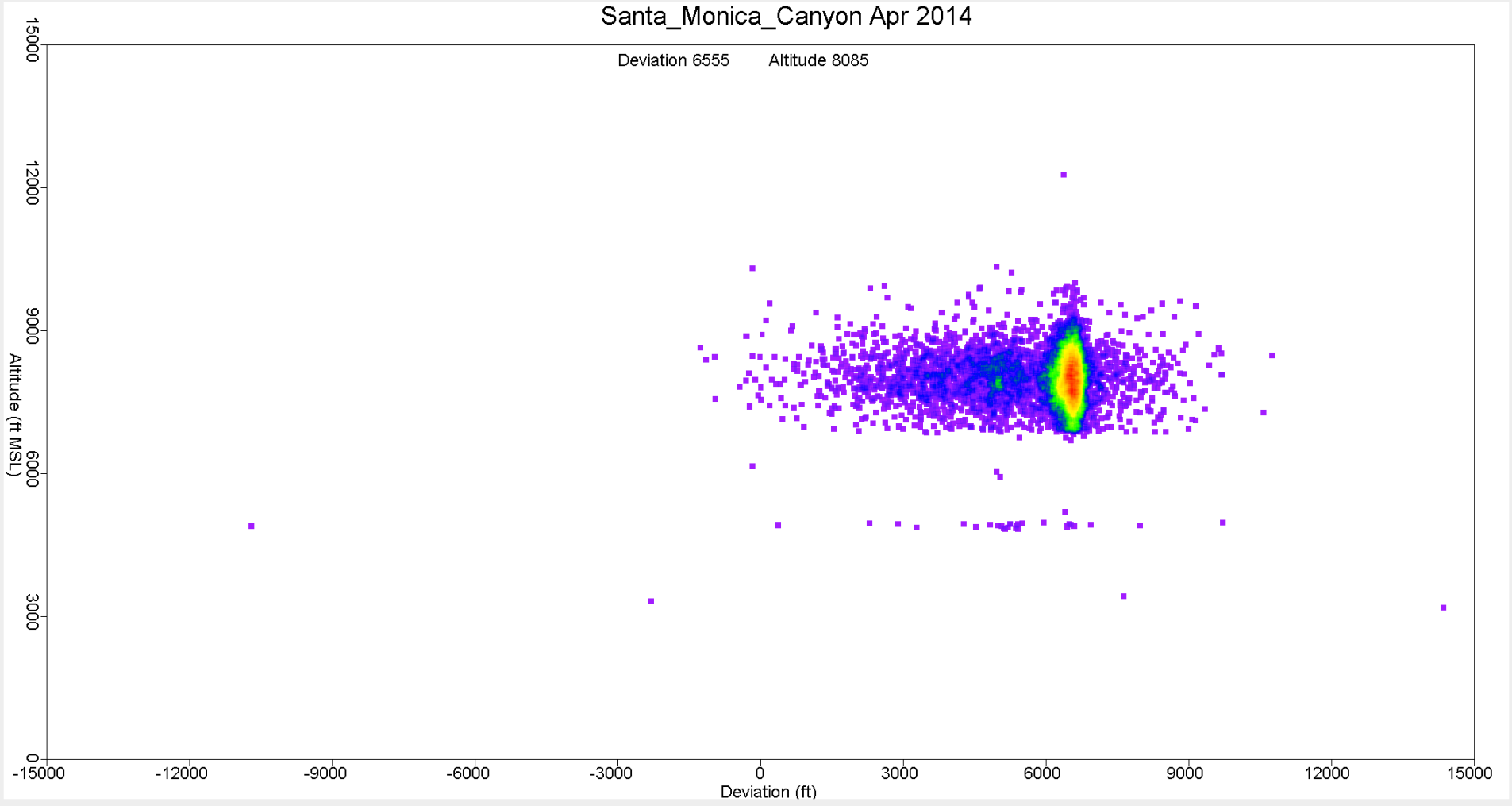
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Apr 2014
Deviation 6555
Altitude 8085
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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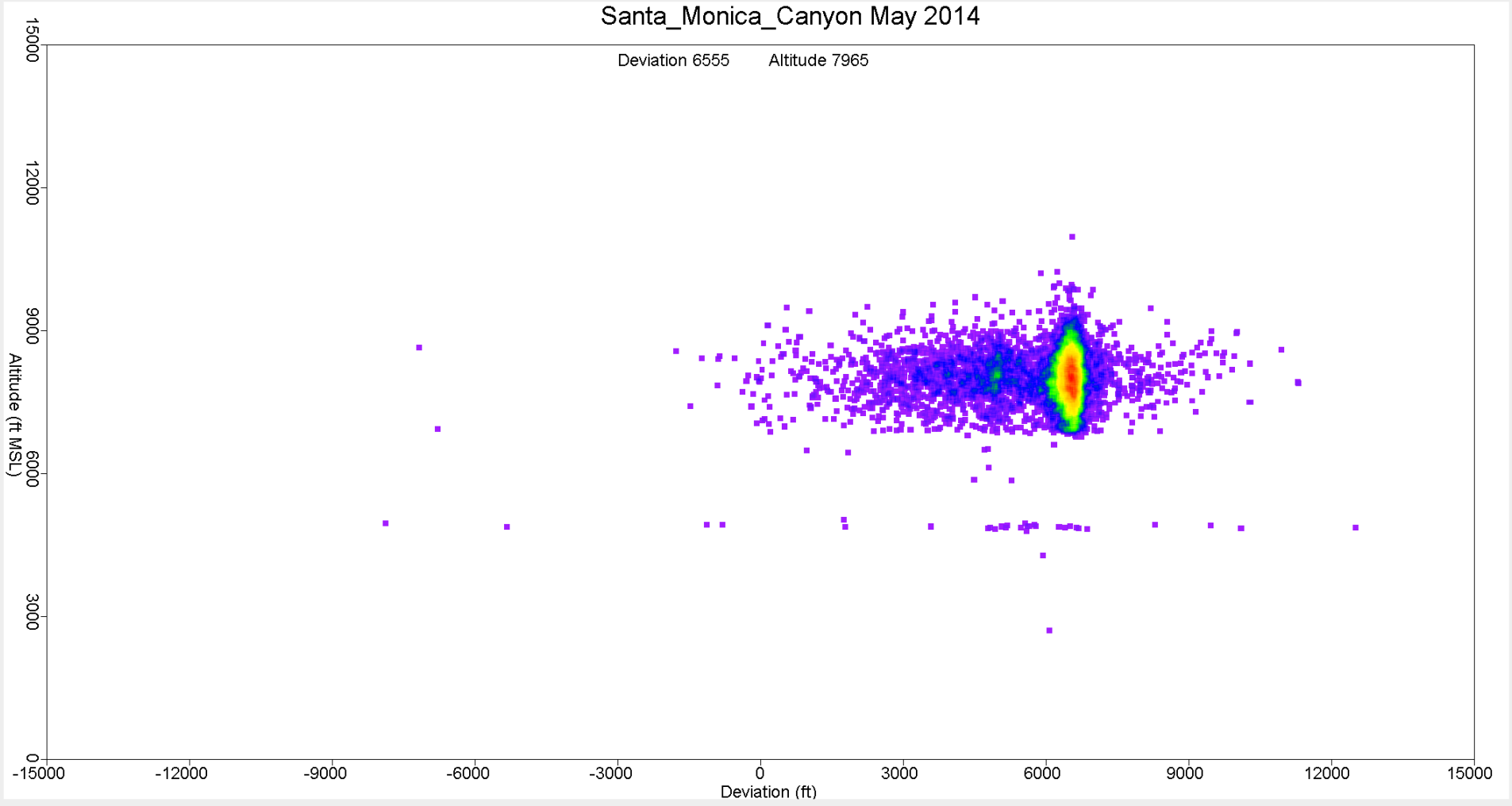
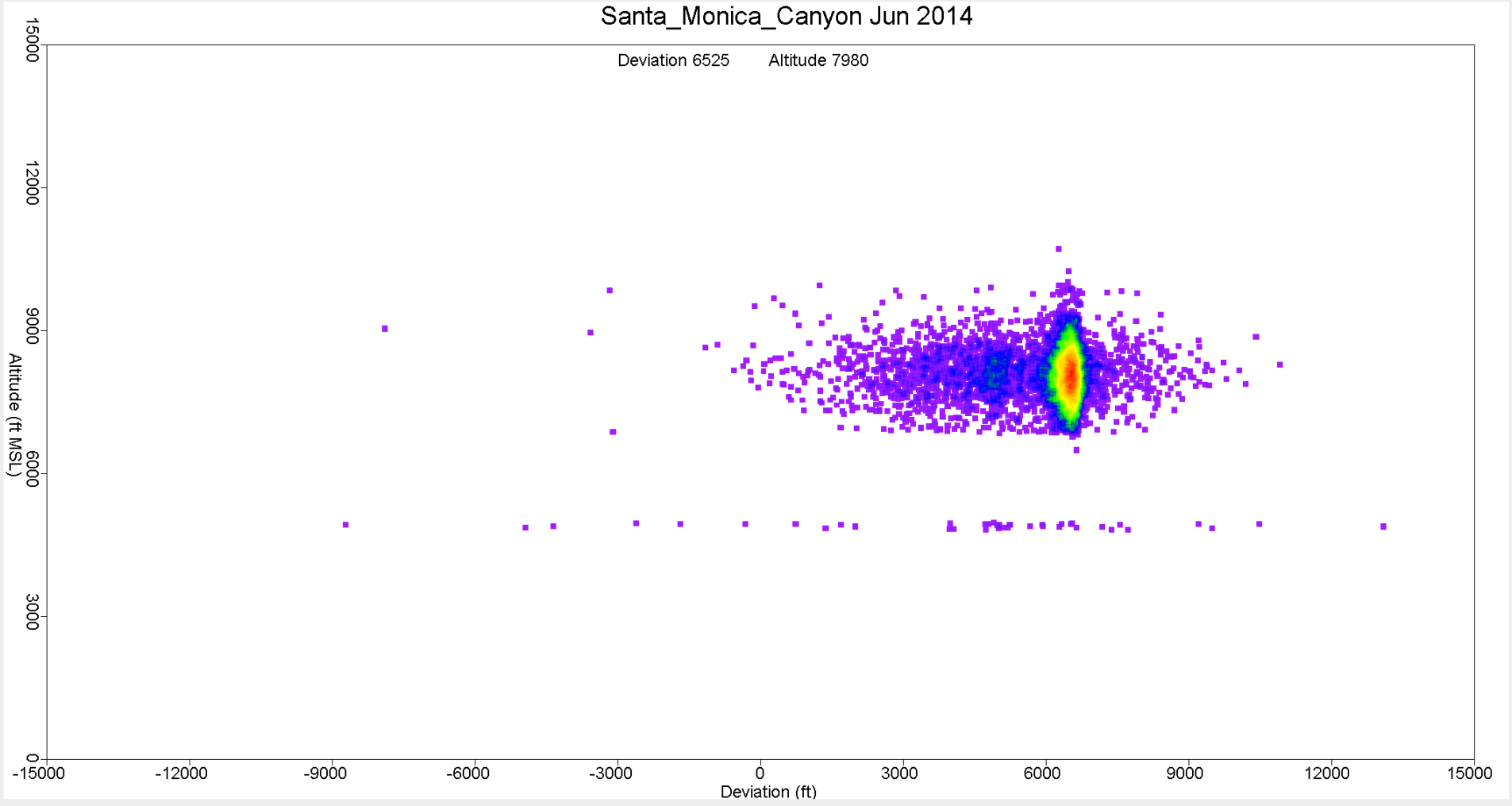
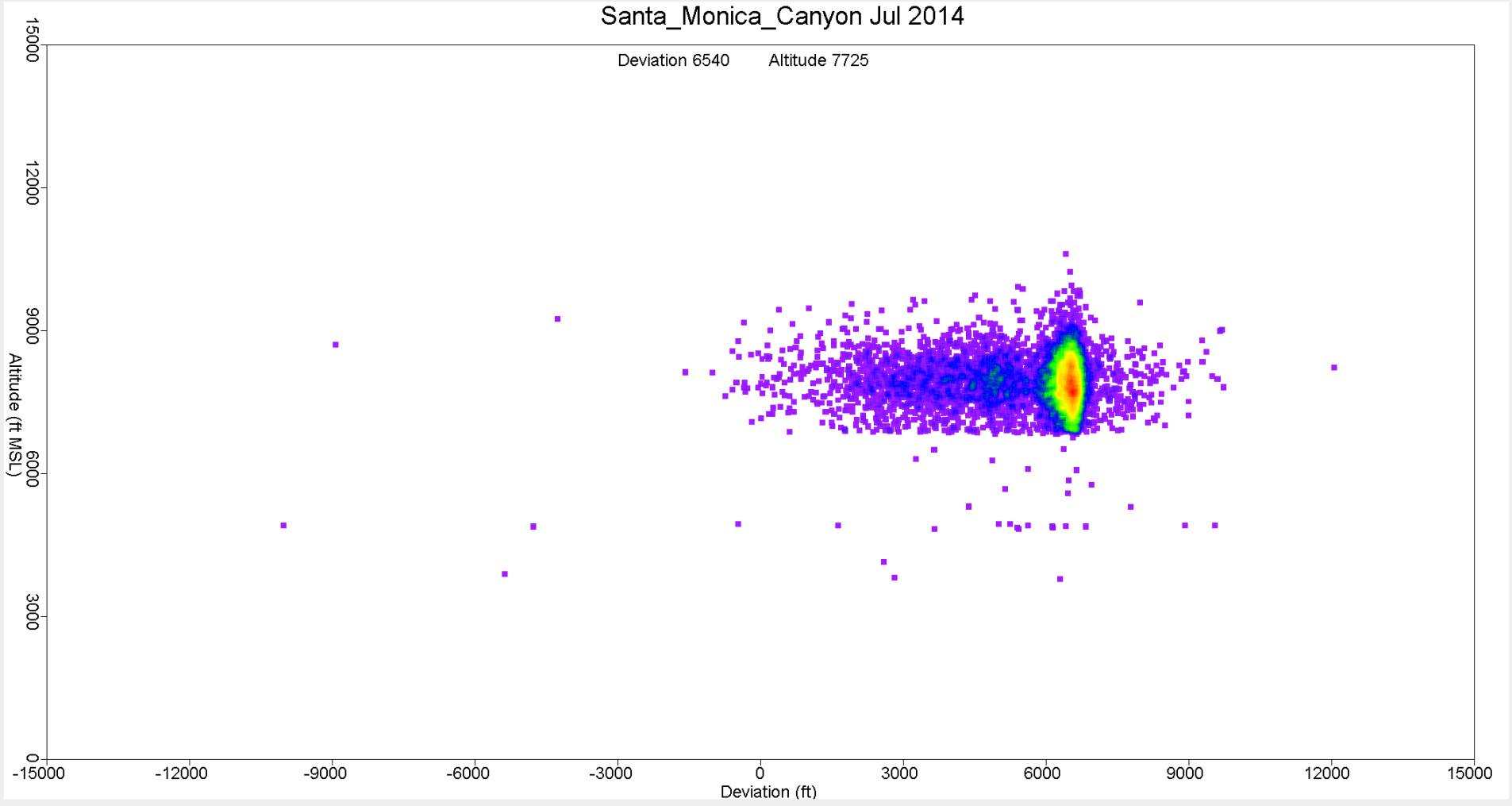
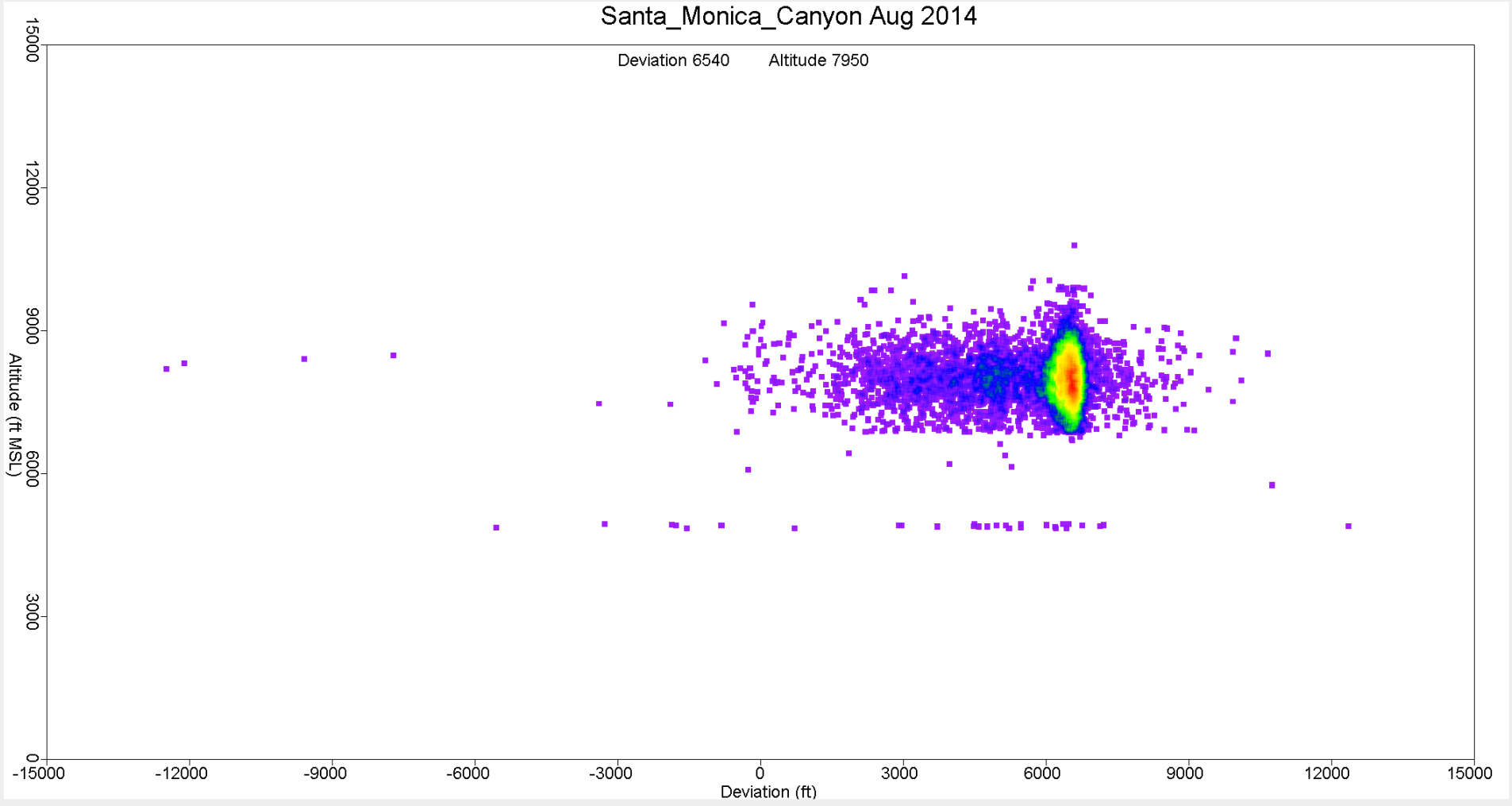
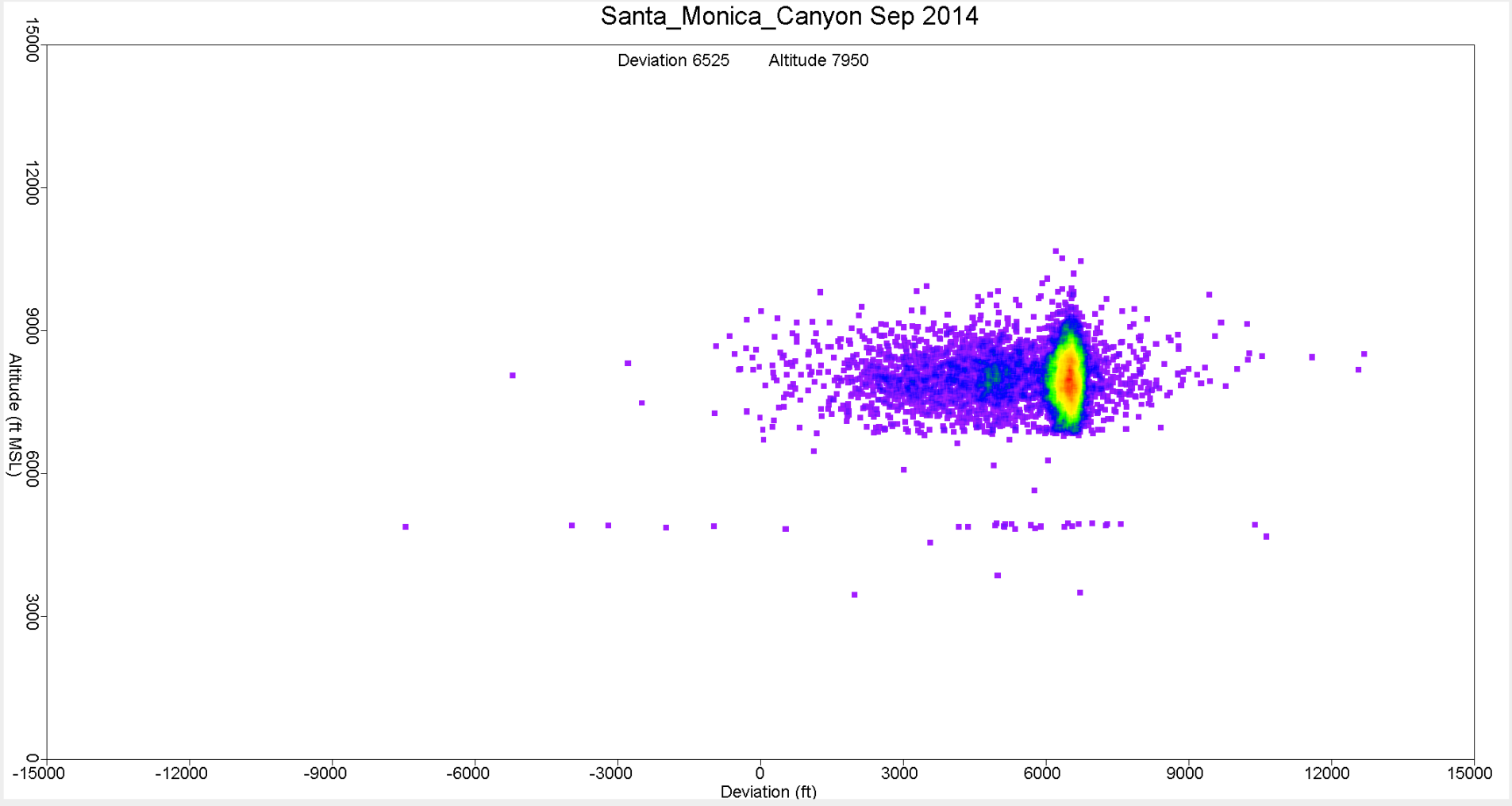
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)

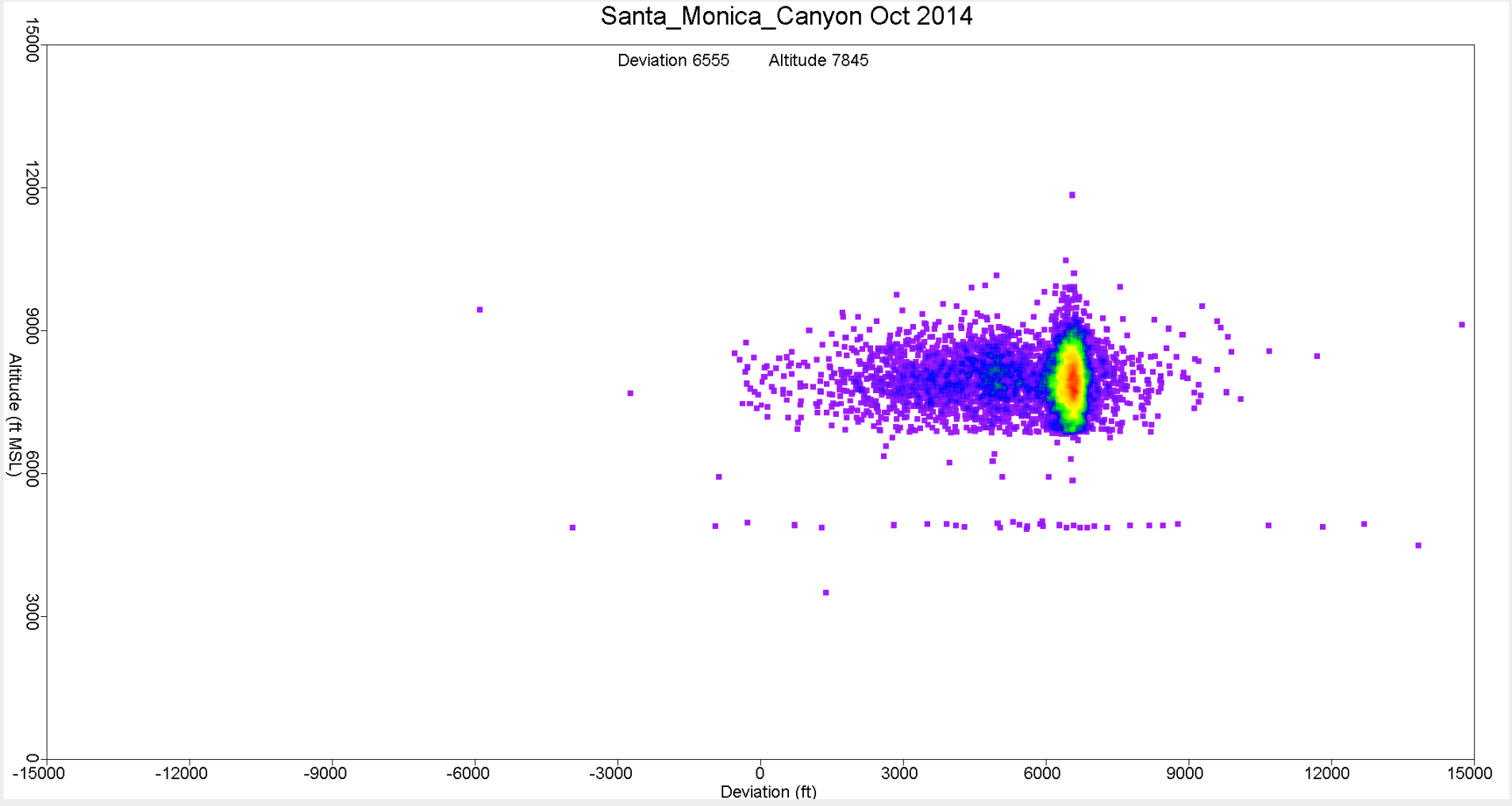

Santa_Monica_Canyon May 2014
Deviation 6555
Altitude 7965
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)

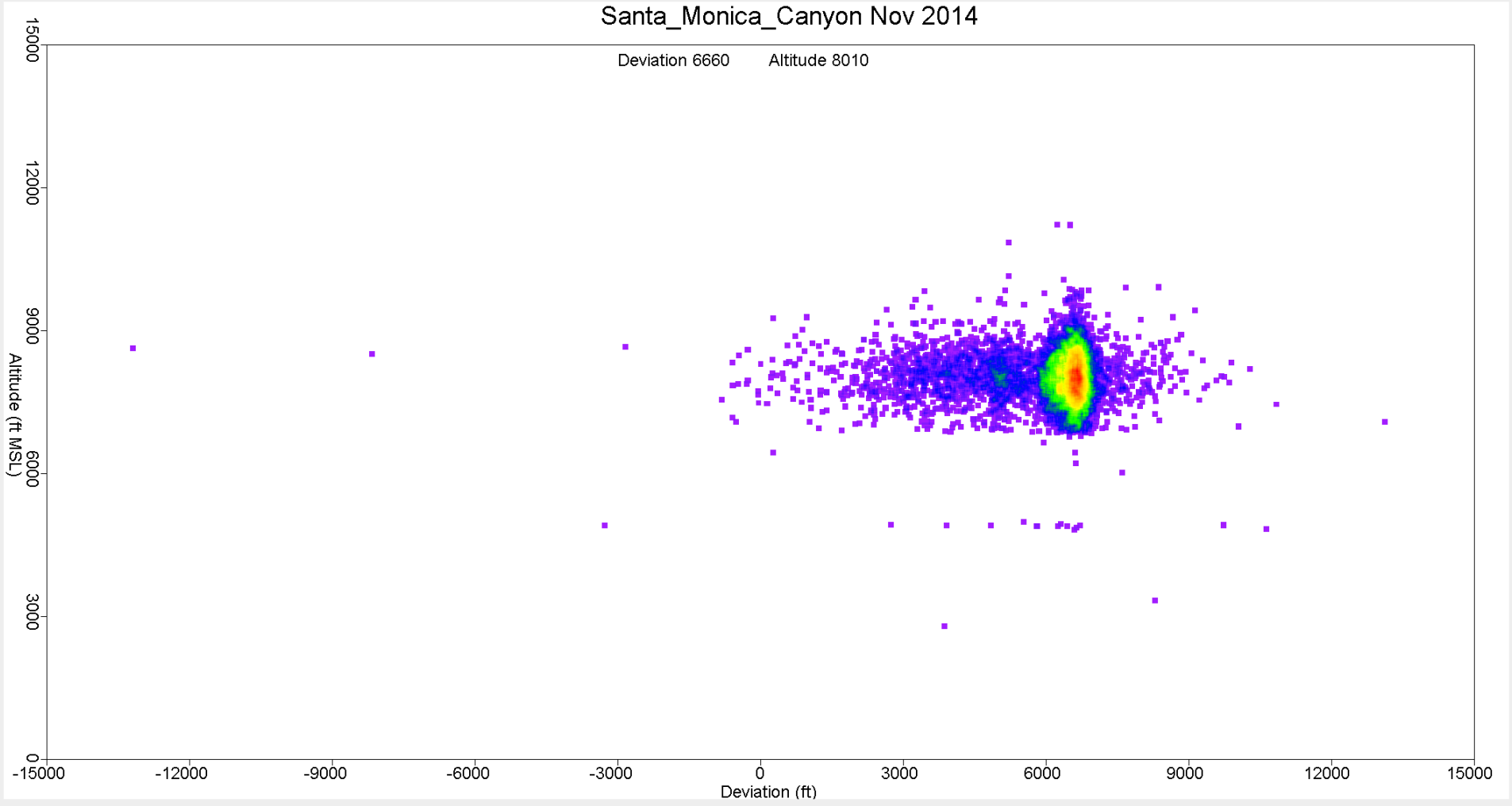

Santa_Monica_Canyon Jun 2014
Deviation 6525
Altitude 7980
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Jul 2014
Deviation 6540
Altitude 7725
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Aug 2014
Deviation 6540
Altitude 7950
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Sep 2014
Deviation 6525
Altitude 7950
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Oct 2014
Deviation 6555
Altitude 7845
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Nov 2014
Deviation 6660
Altitude 8010
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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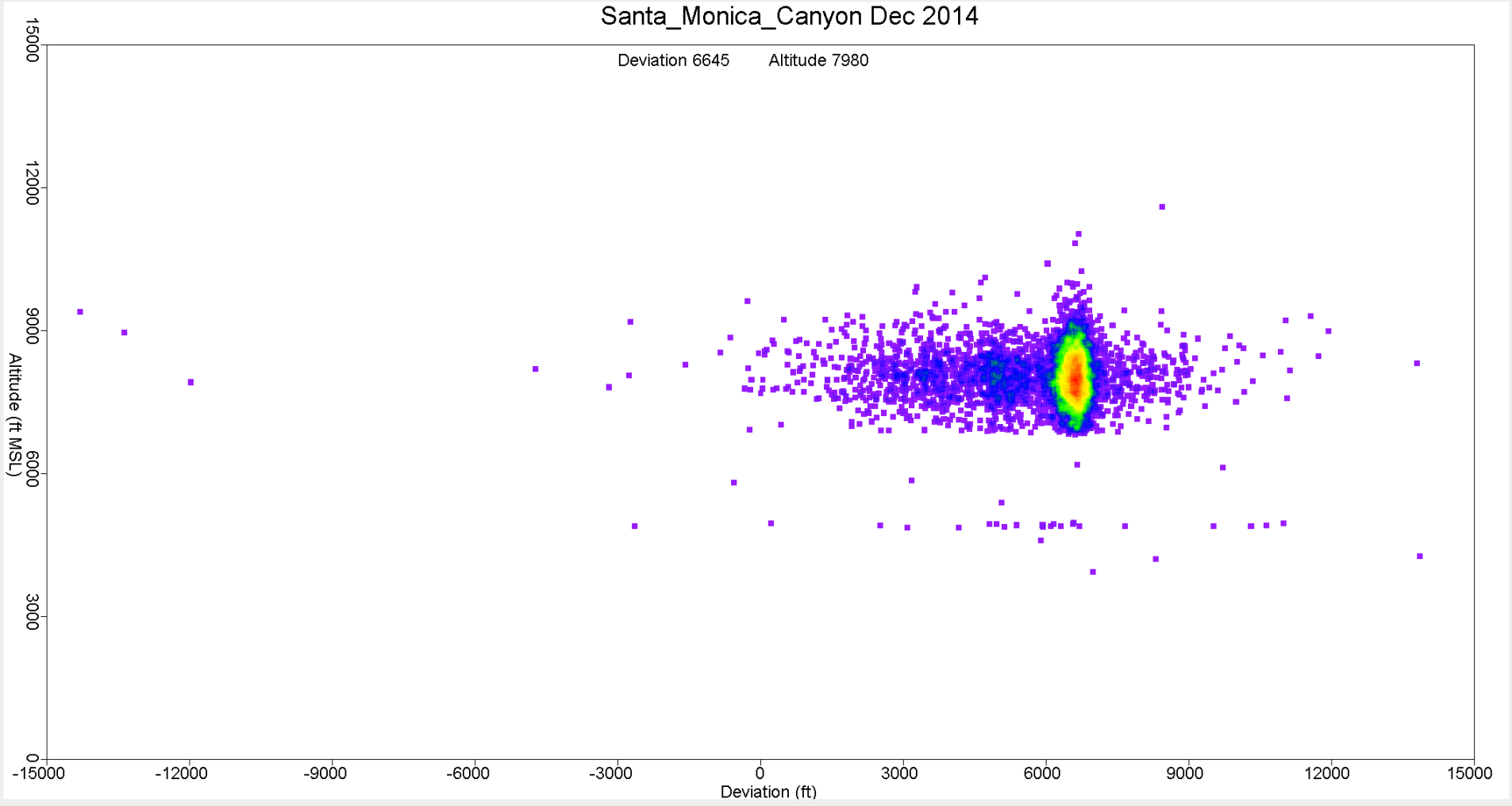
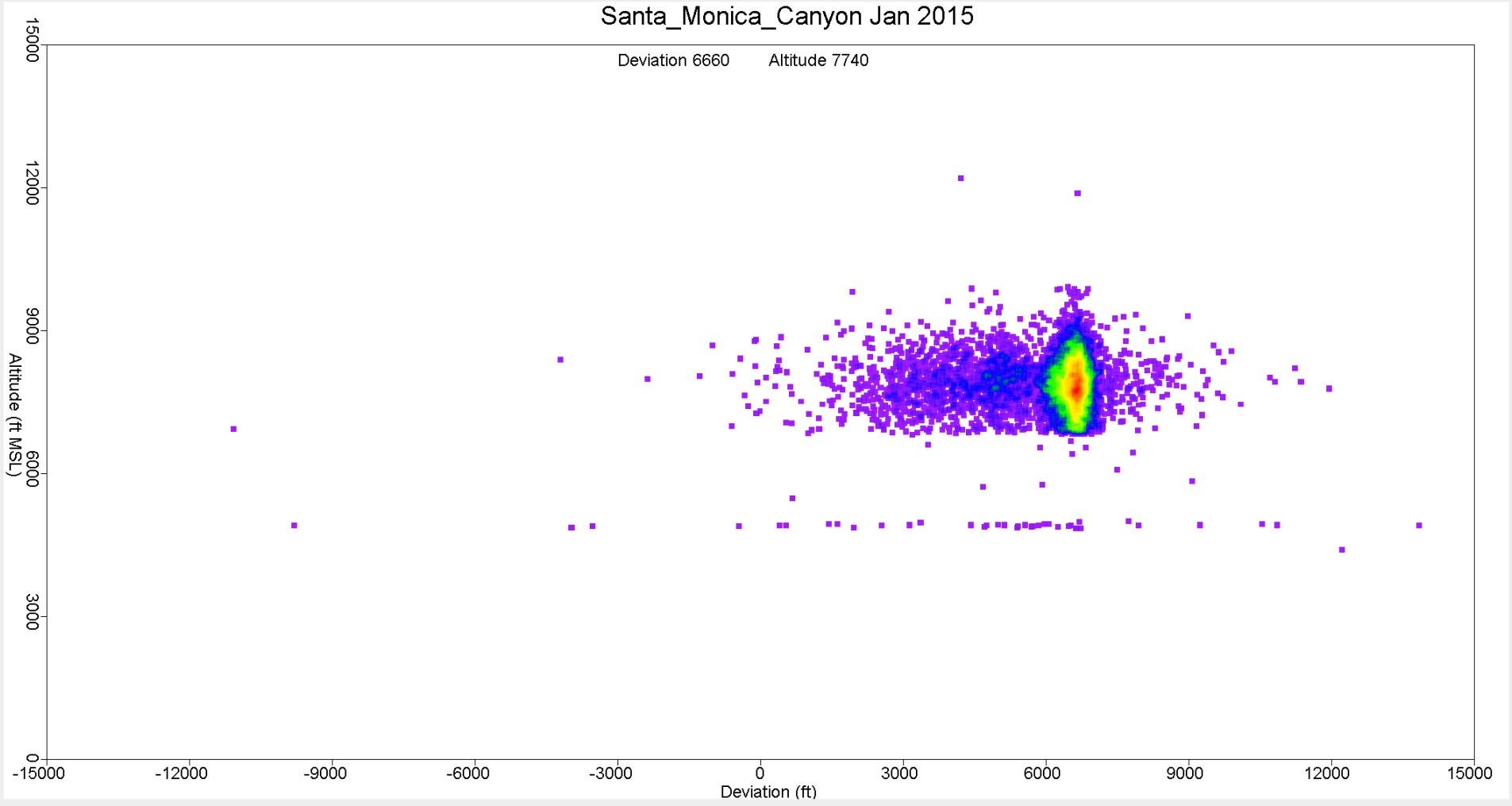
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Dec 2014
Deviation 6645
Altitude 7980
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Jan 2015
Deviation 6660
Altitude 7740
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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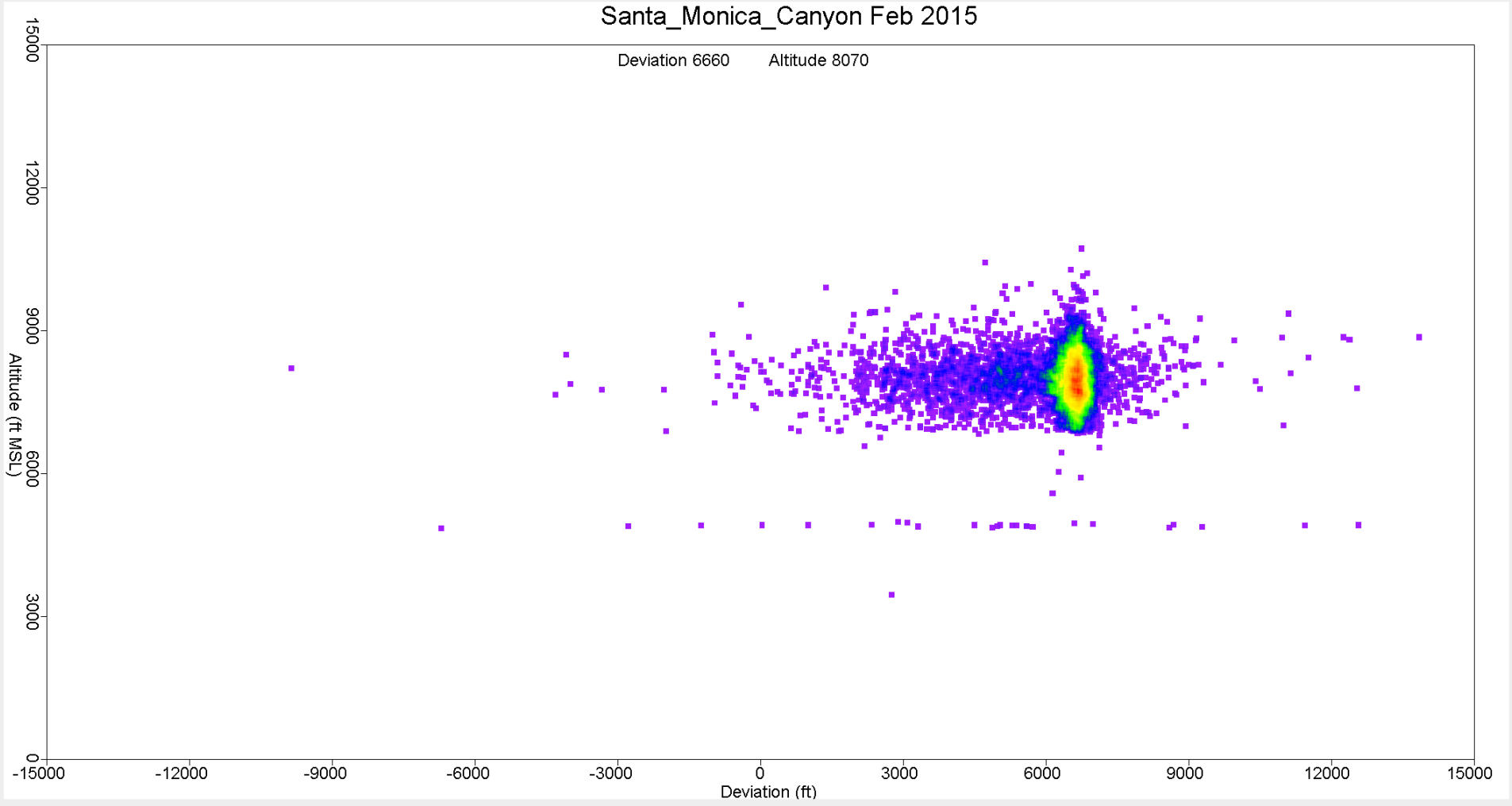
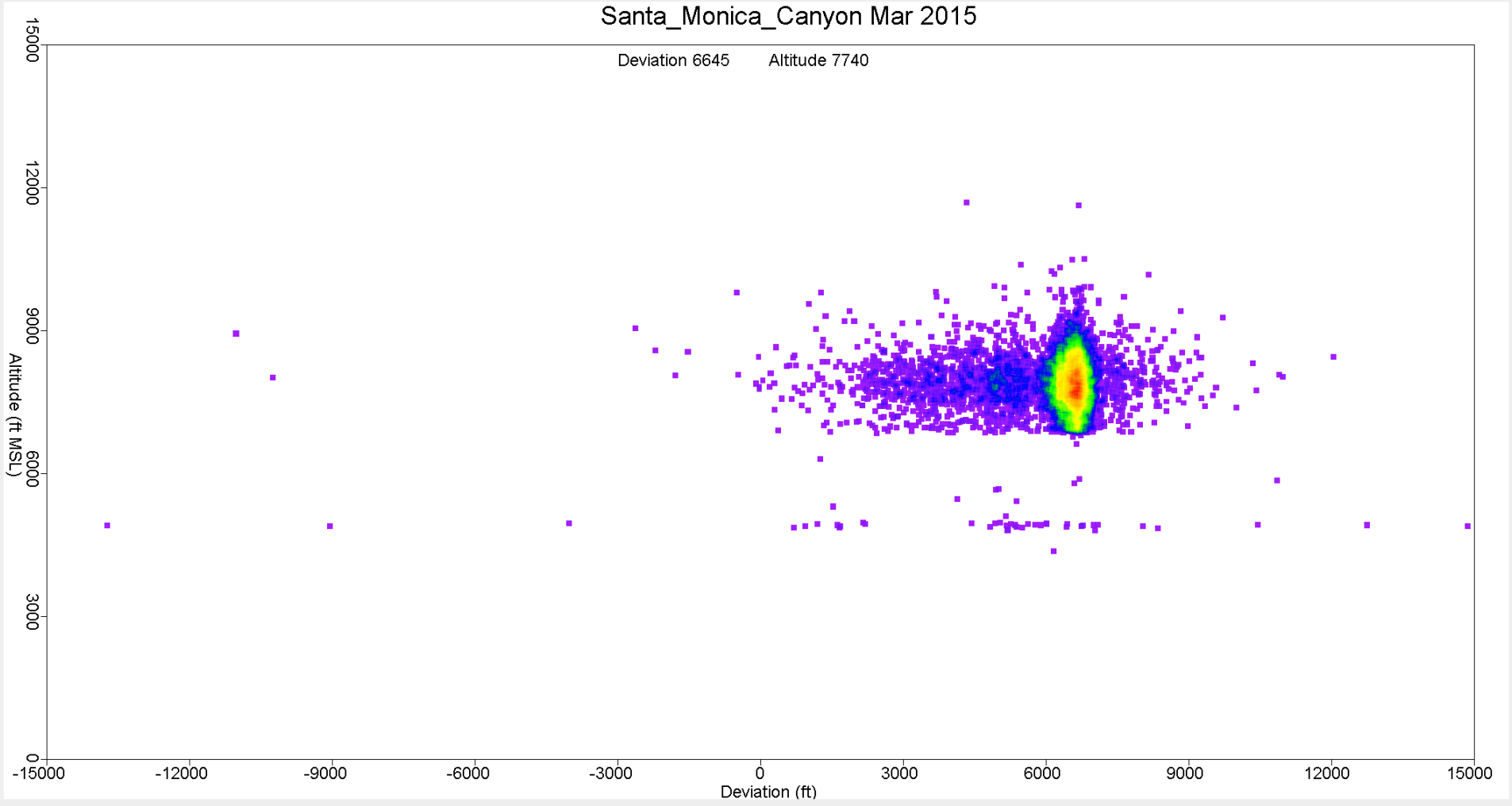
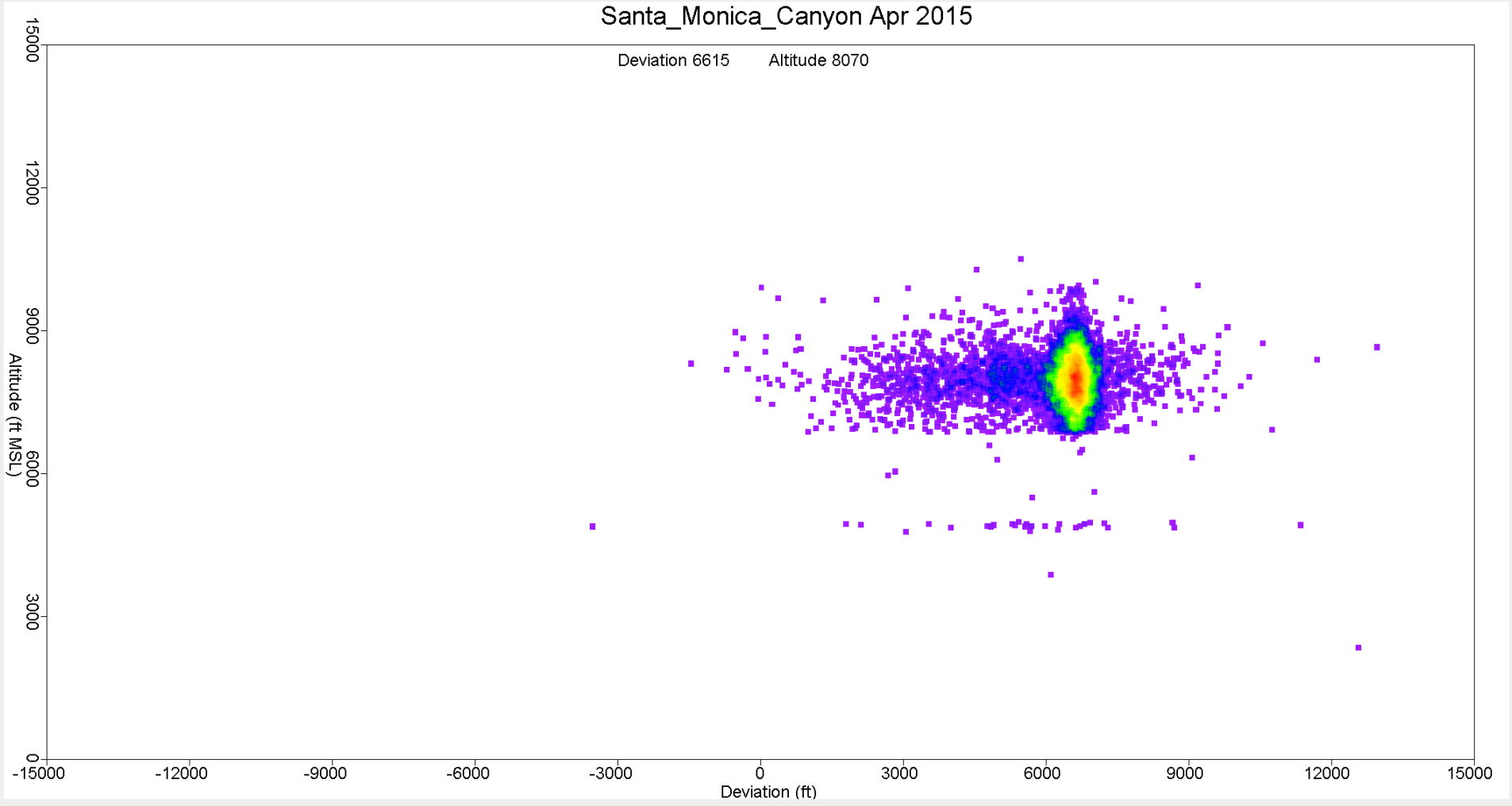
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Feb 2015
Deviation 6660
Altitude 8070
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Mar 2015
Deviation 6645
Altitude 7740
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Apr 2015
Deviation 6615
Altitude 8070
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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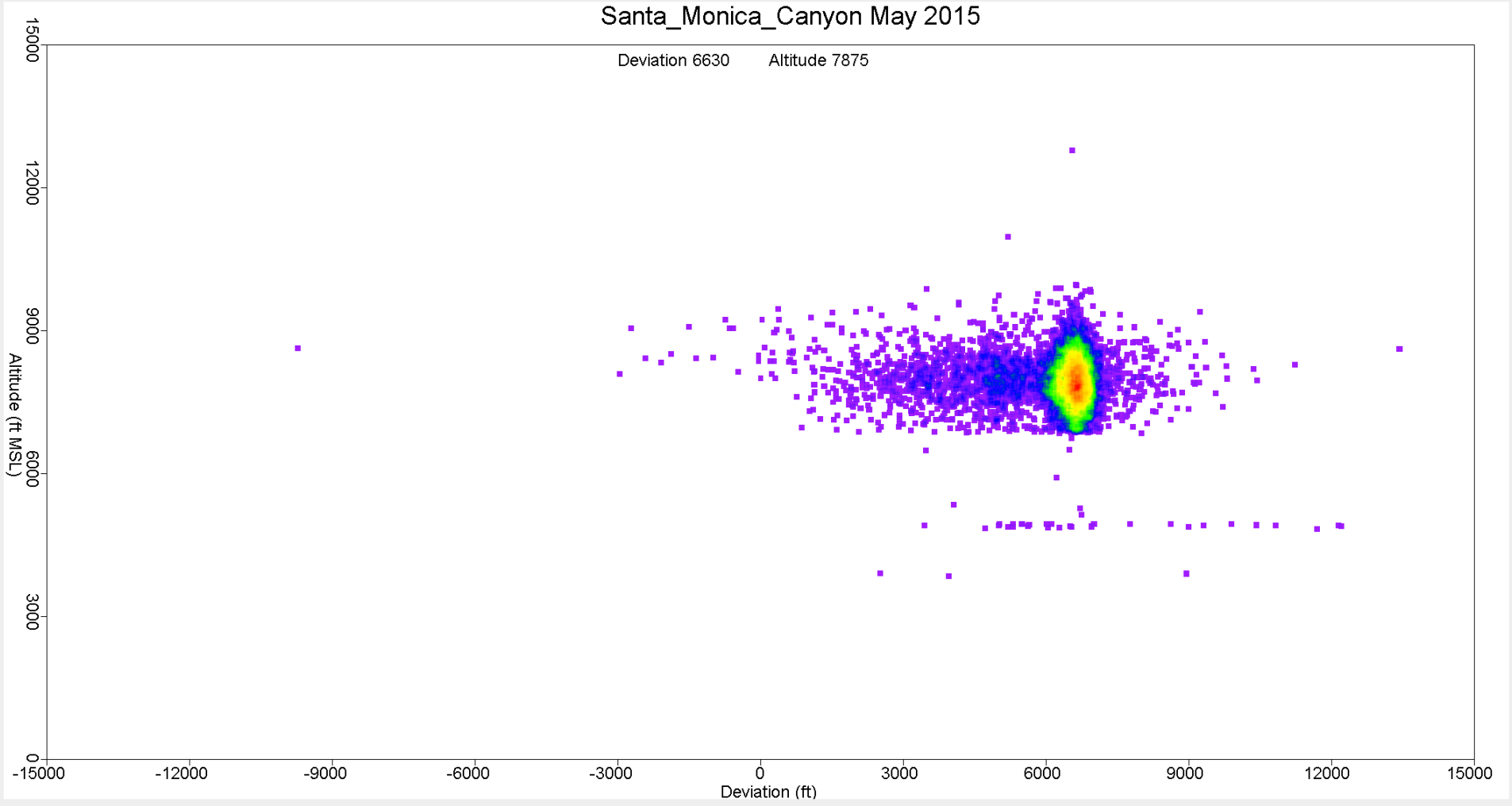
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon May 2015
Deviation 6630
Altitude 7875
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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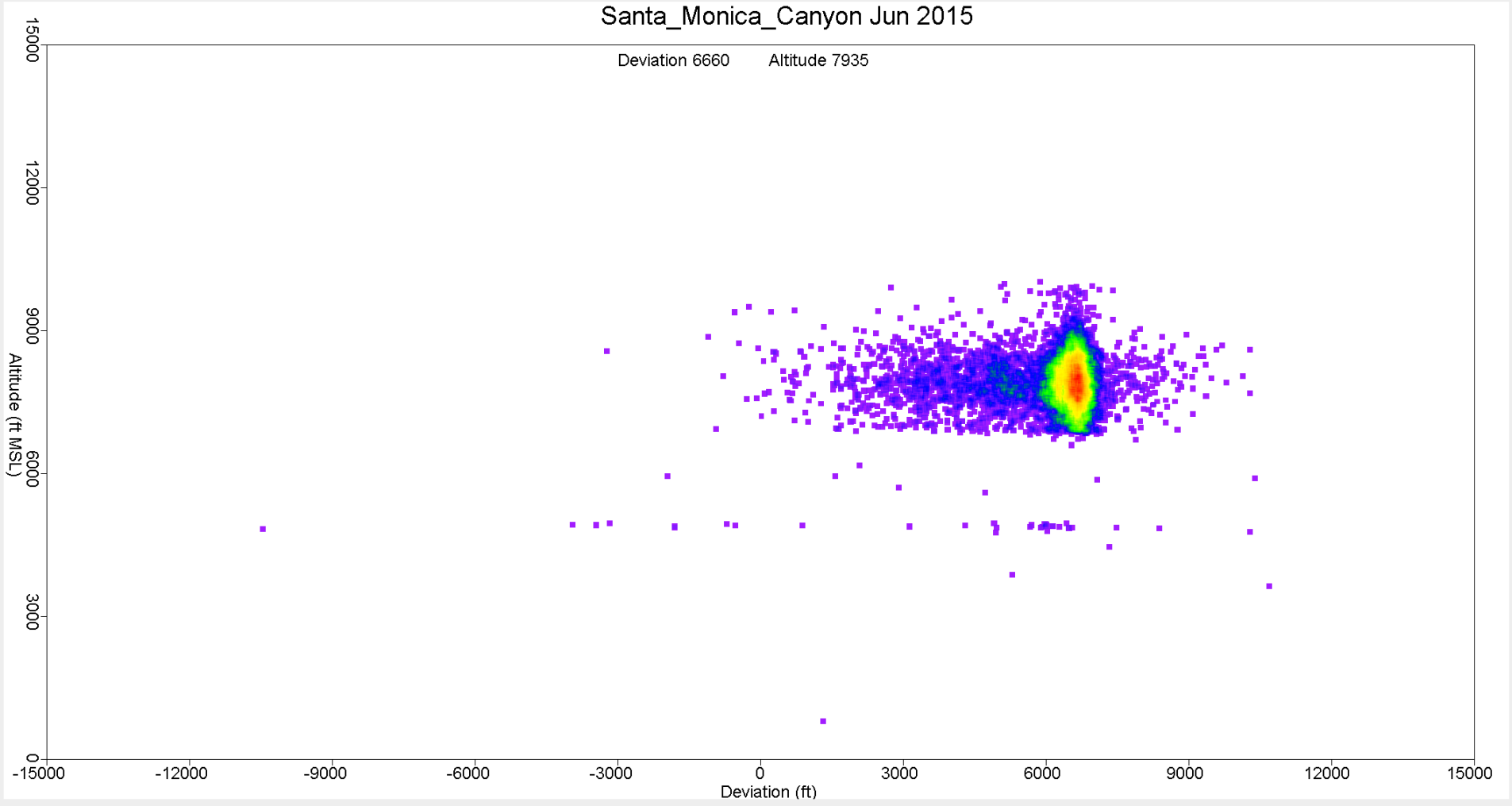
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Jun 2015
Deviation 6660
Altitude 7935
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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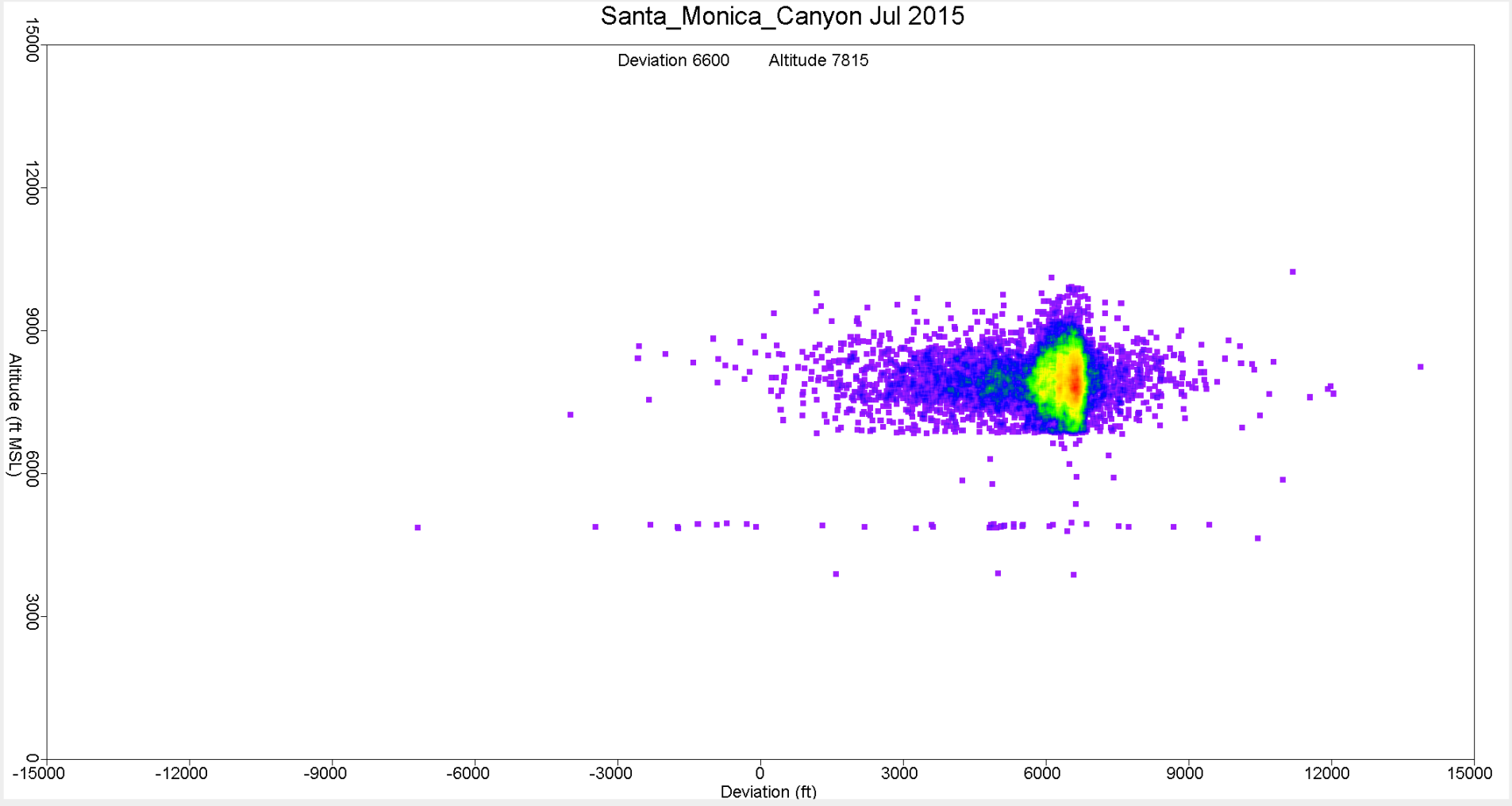
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Jul 2015
Deviation 6600
Altitude 7815
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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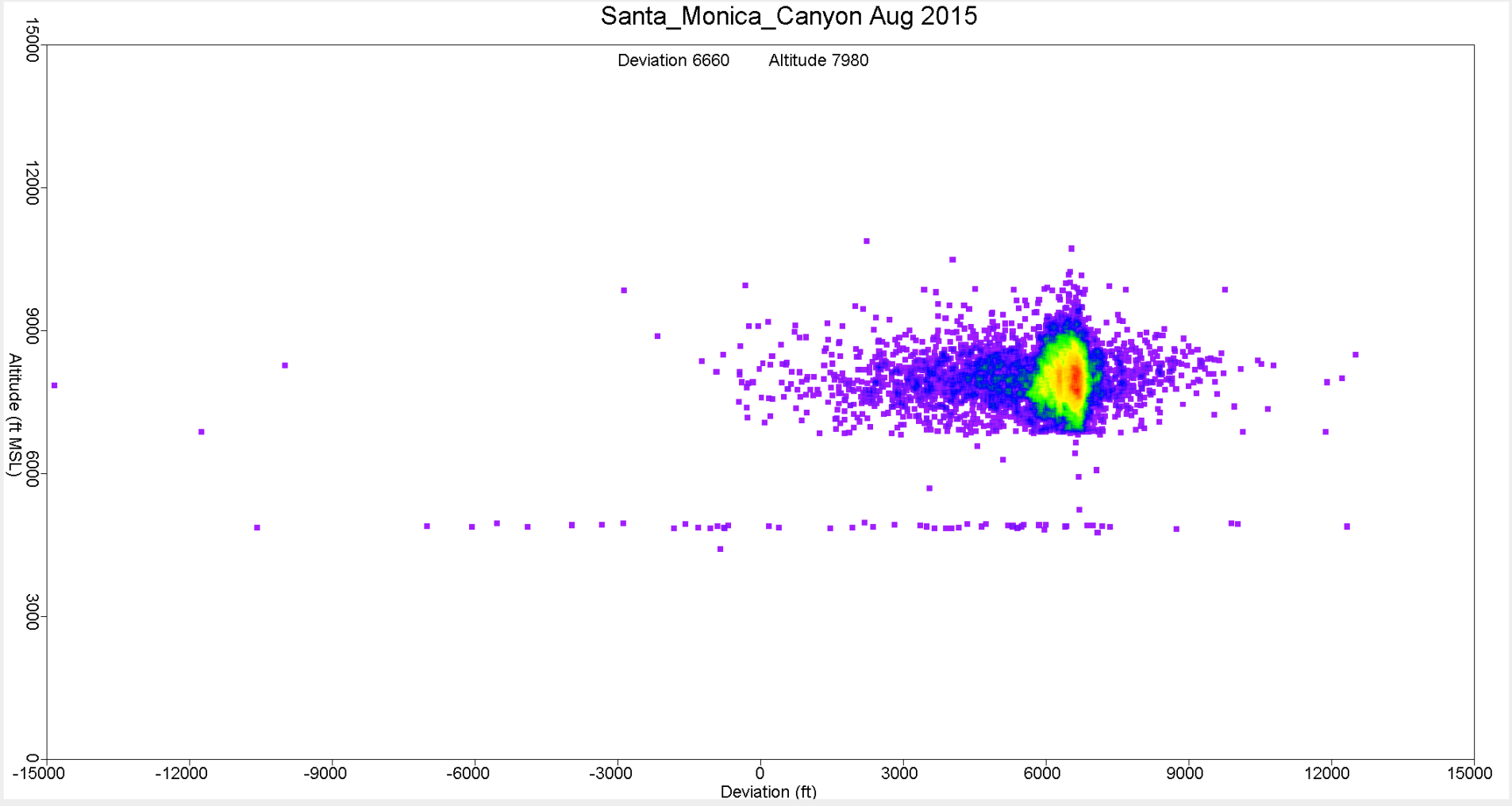
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Aug 2015
Deviation 6660
Altitude 7980
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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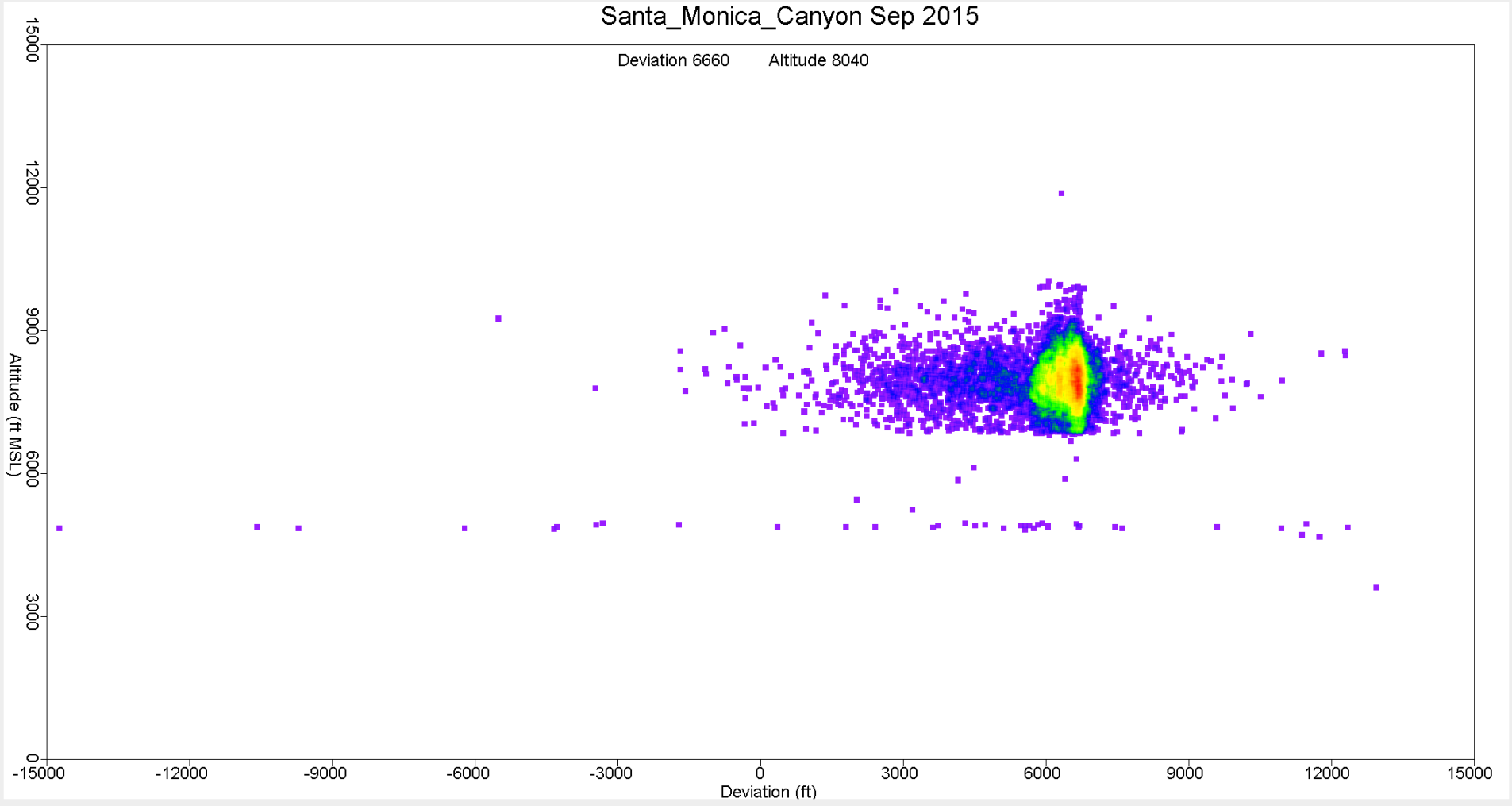
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Sep 2015
Deviation 6660
Altitude 8040
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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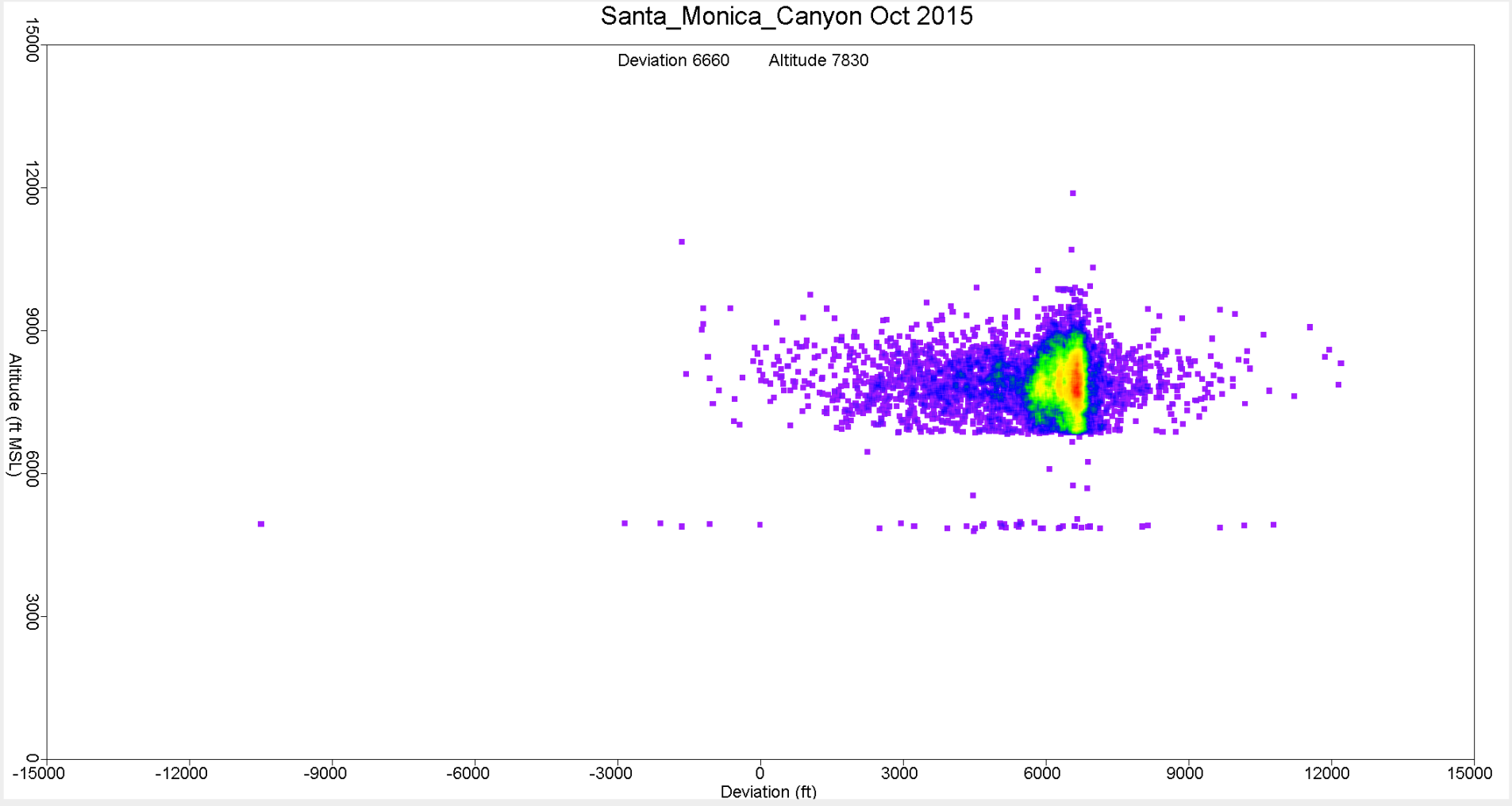
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Oct 2015
Deviation 6660
Altitude 7830
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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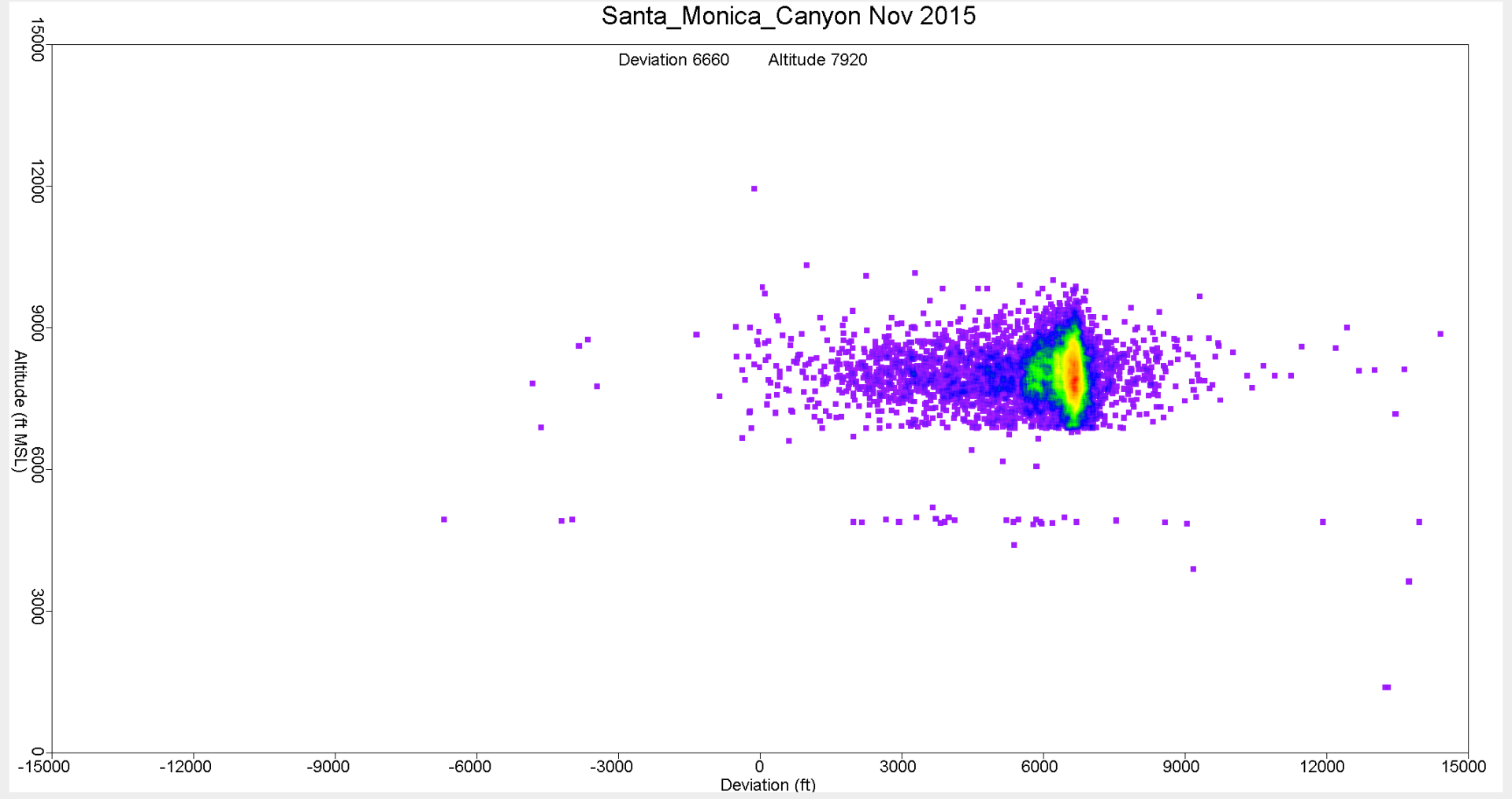
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Nov 2015
Deviation 6660
Altitude 7920
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
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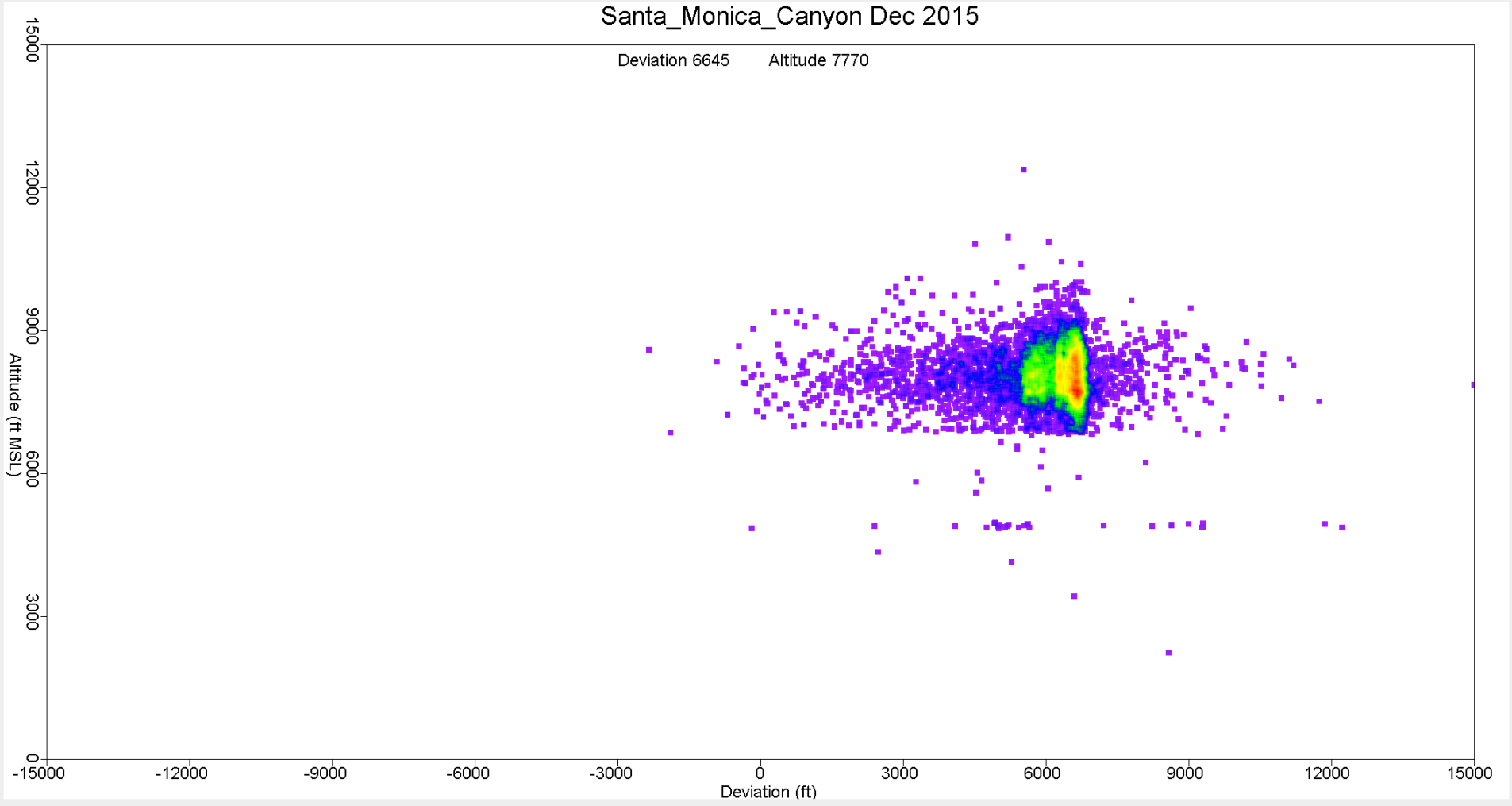
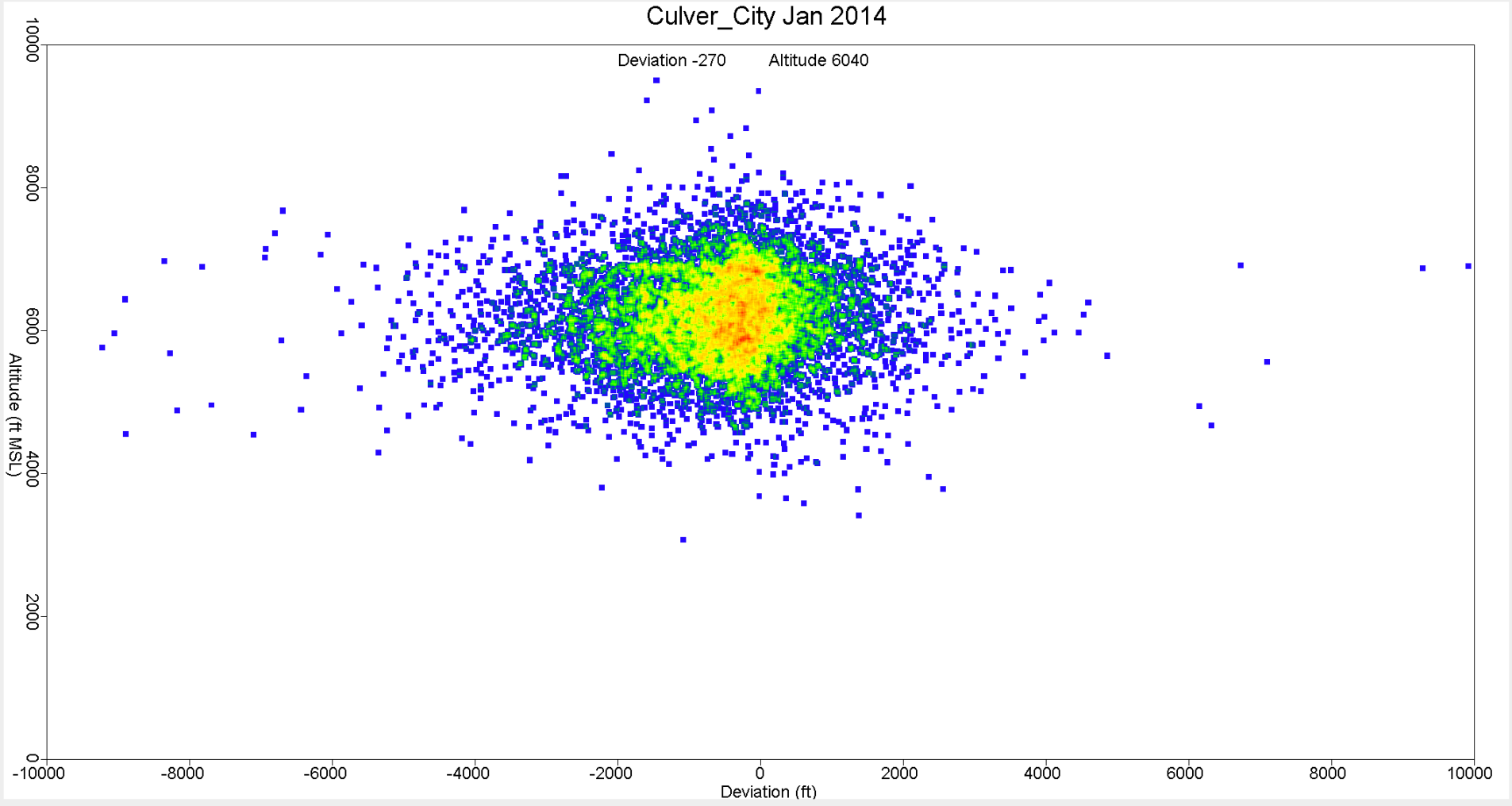
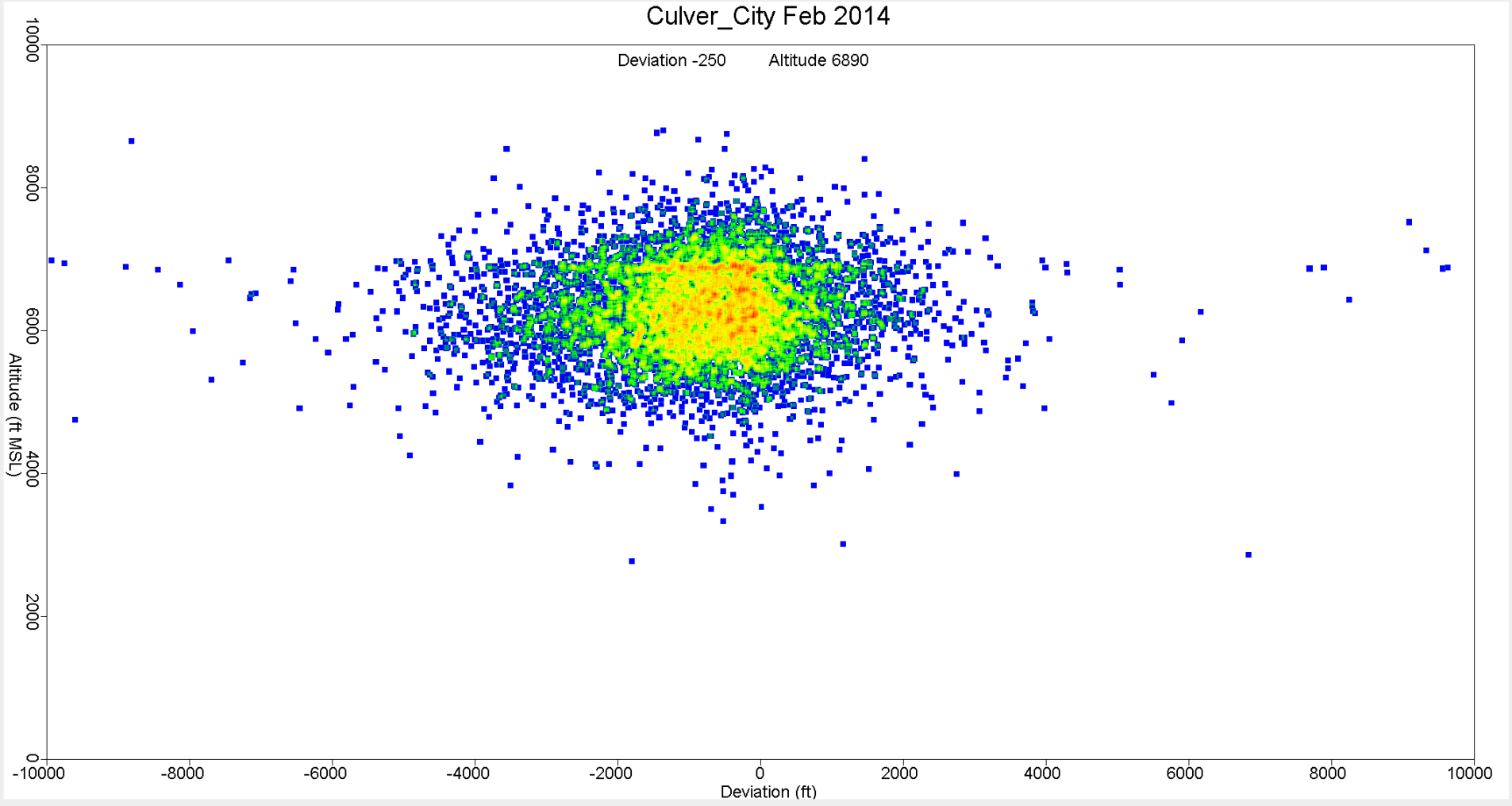
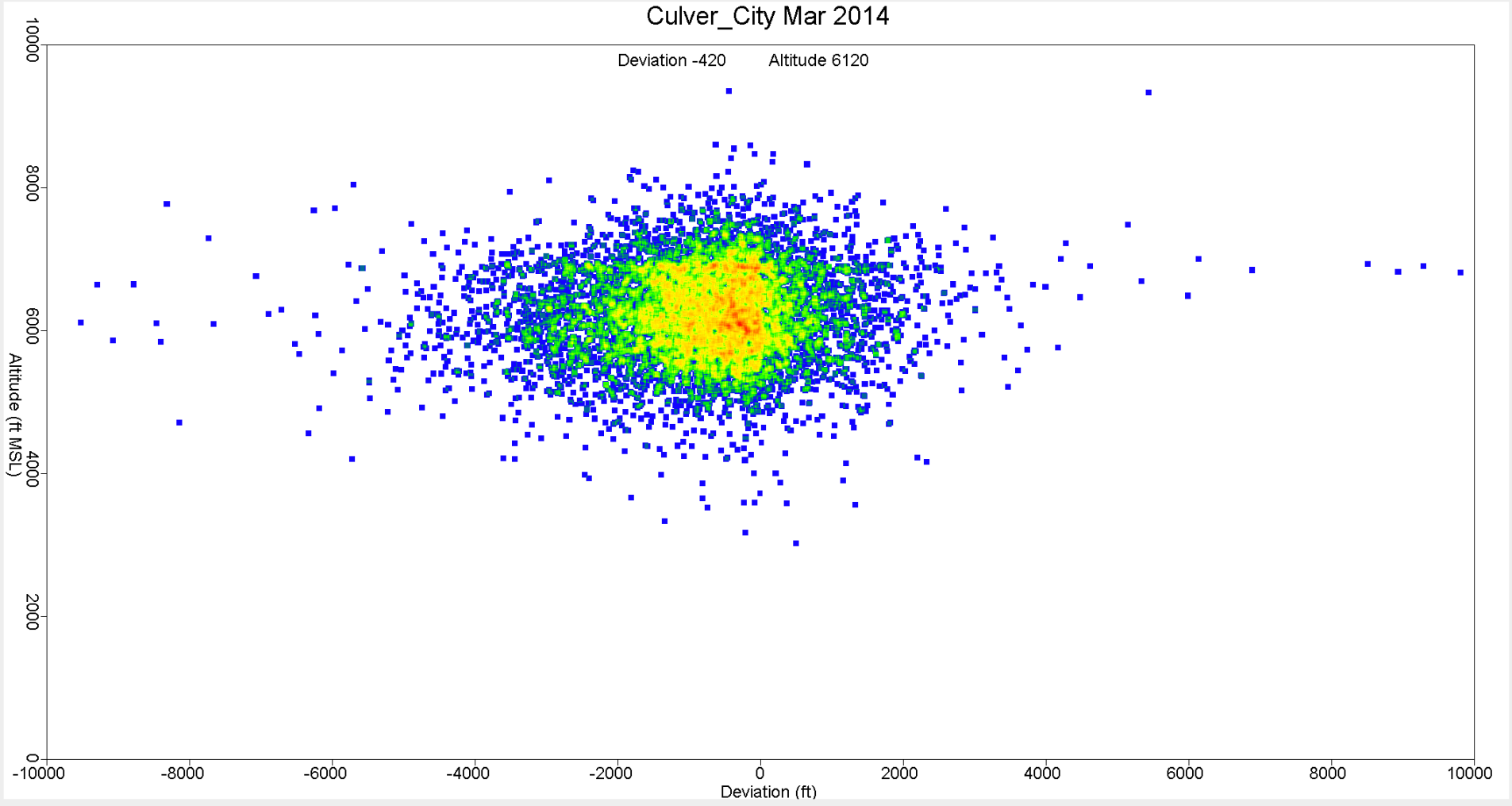
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Santa_Monica_Canyon Dec 2015
Deviation 6645
Altitude 7770
15000
12000
9000
6000
3000
0
Altitude (ft MSL)
-15000
-12000
-9000
-6000
-3000
0
3000
6000
9000
12000
15000
Deviation (ft)


Culver_City Jan 2014
Deviation -270
Altitude 6040
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)


Culver_City Feb 2014
Deviation -250
Altitude 6890
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)


Culver_City Mar 2014
Deviation -420
Altitude 6120
Altitude (ft MSL)
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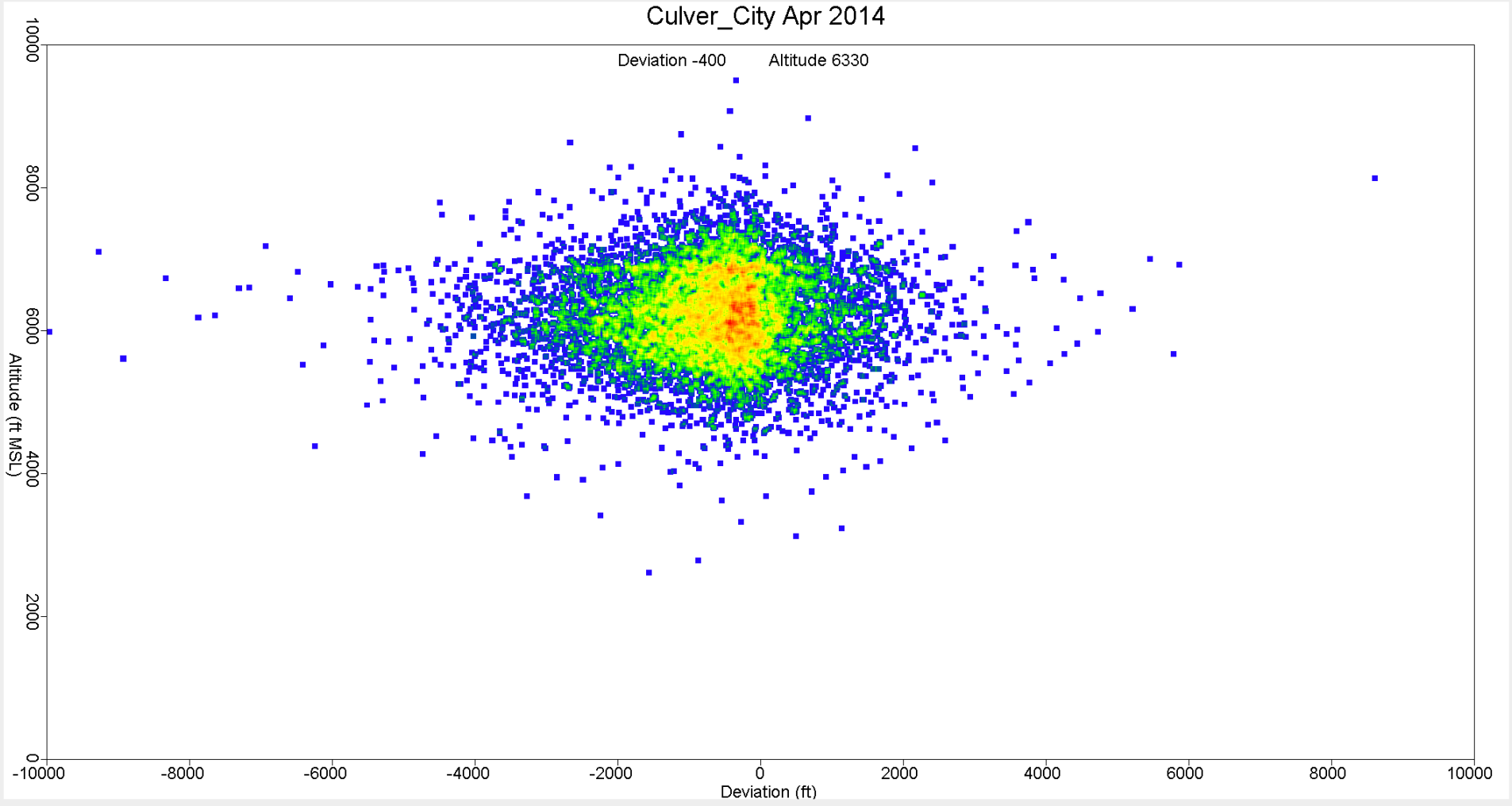
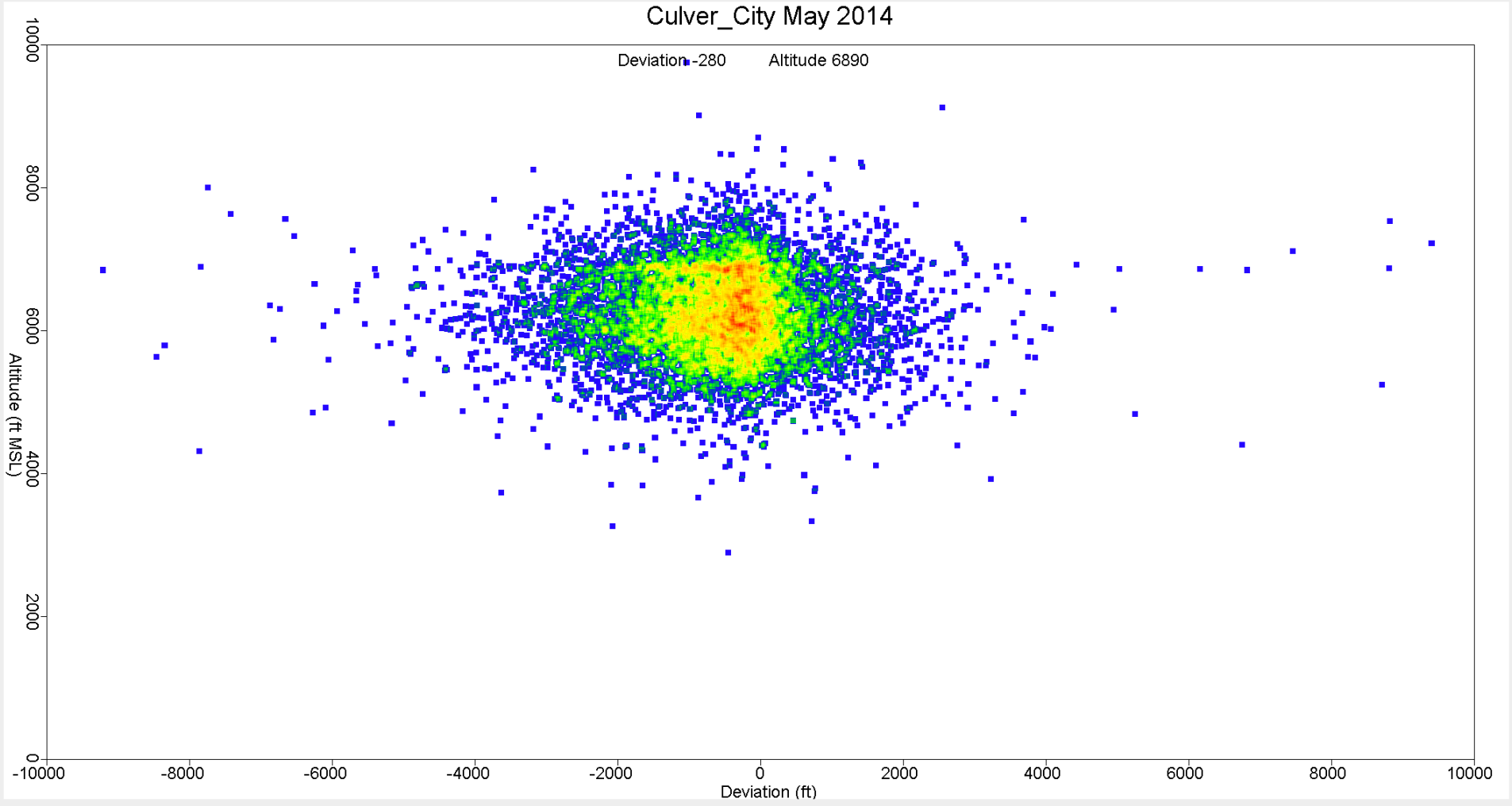
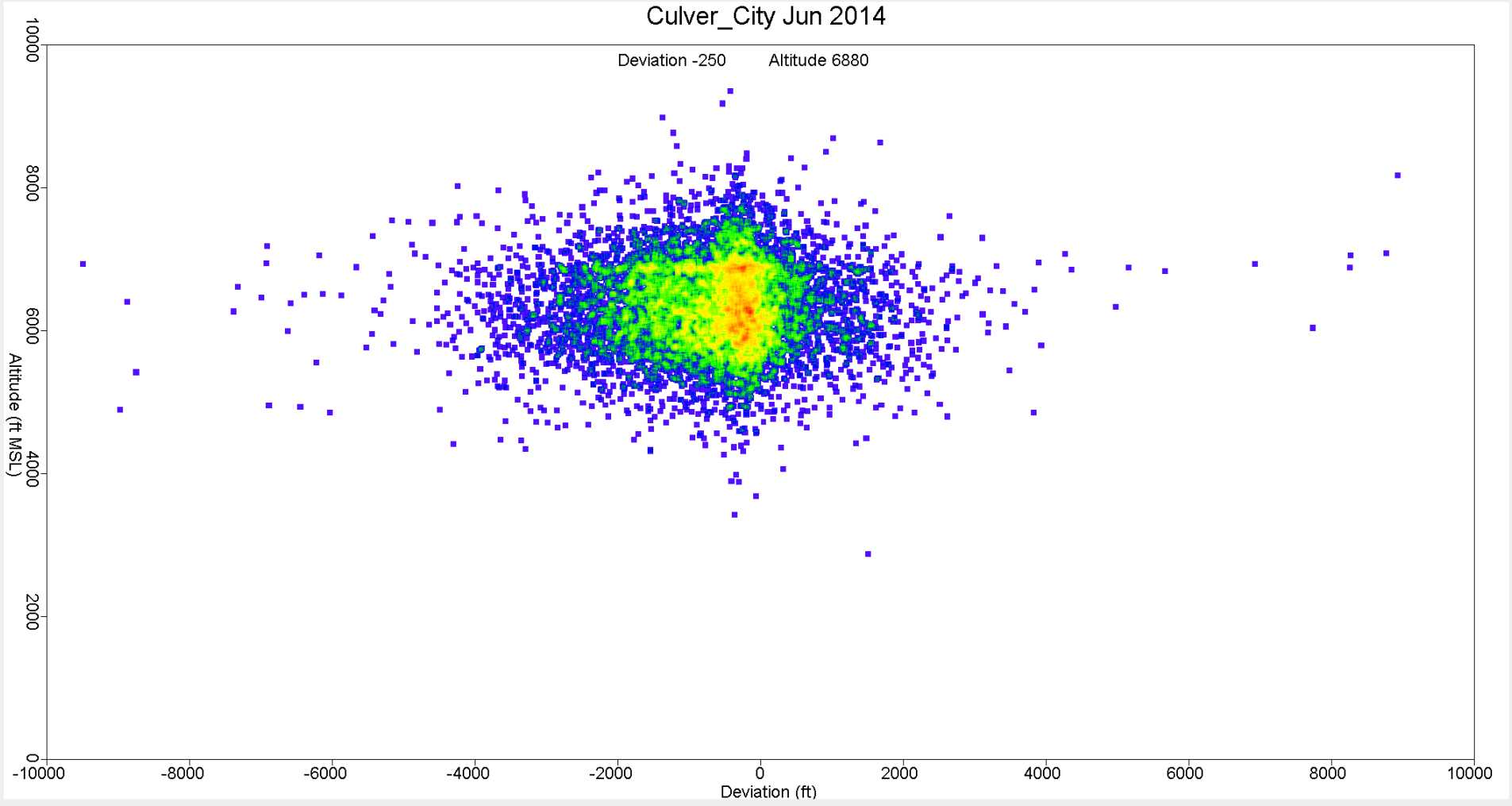
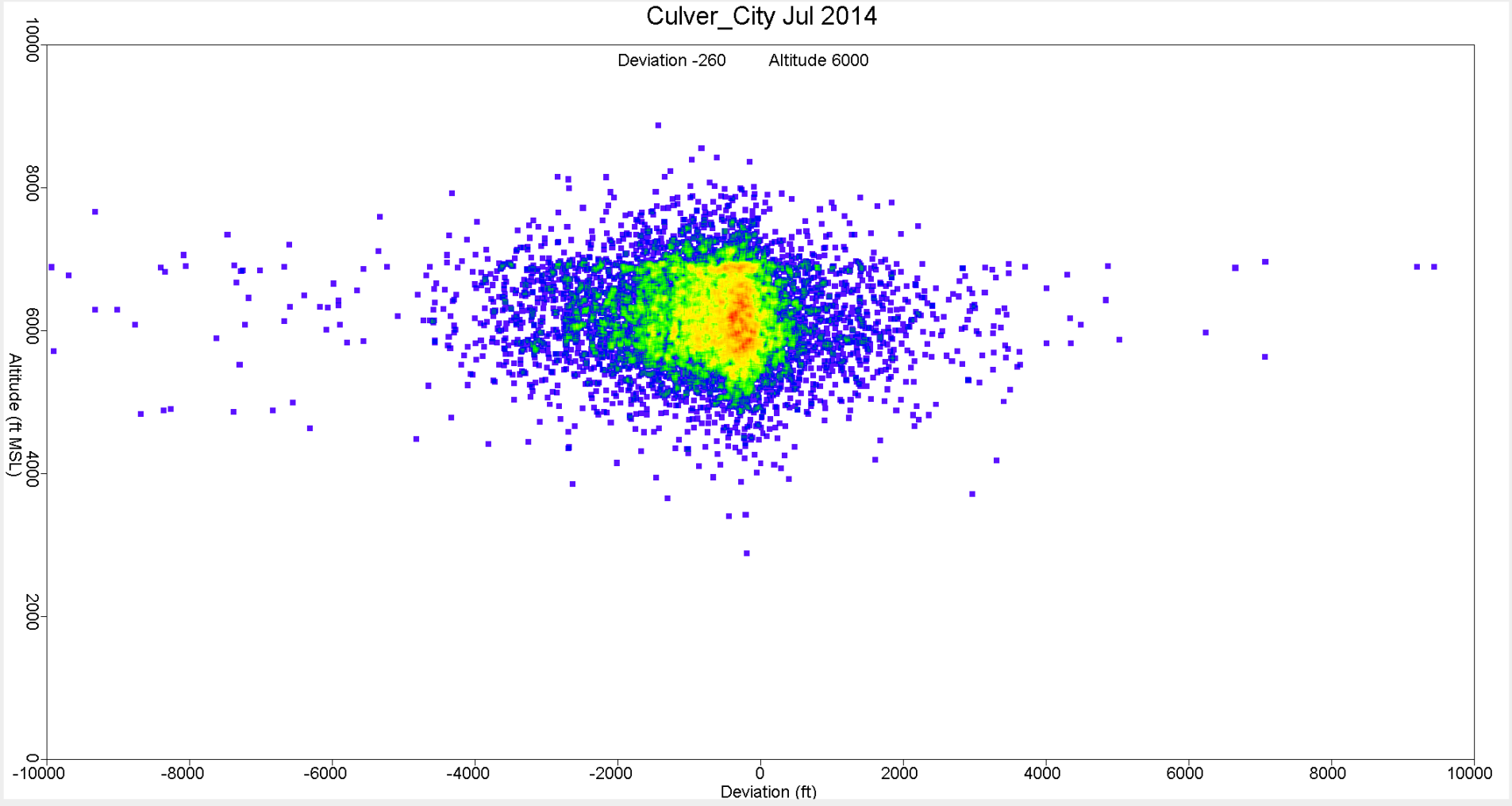
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)


Culver_City Apr 2014
Deviation -400
Altitude 6330
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)


Culver_City May 2014
Deviation -280
Altitude 6890
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)


Culver_City Jun 2014
Deviation -250
Altitude 6880
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)


Culver_City Jul 2014
Deviation -260
Altitude 6000
Altitude (ft MSL)
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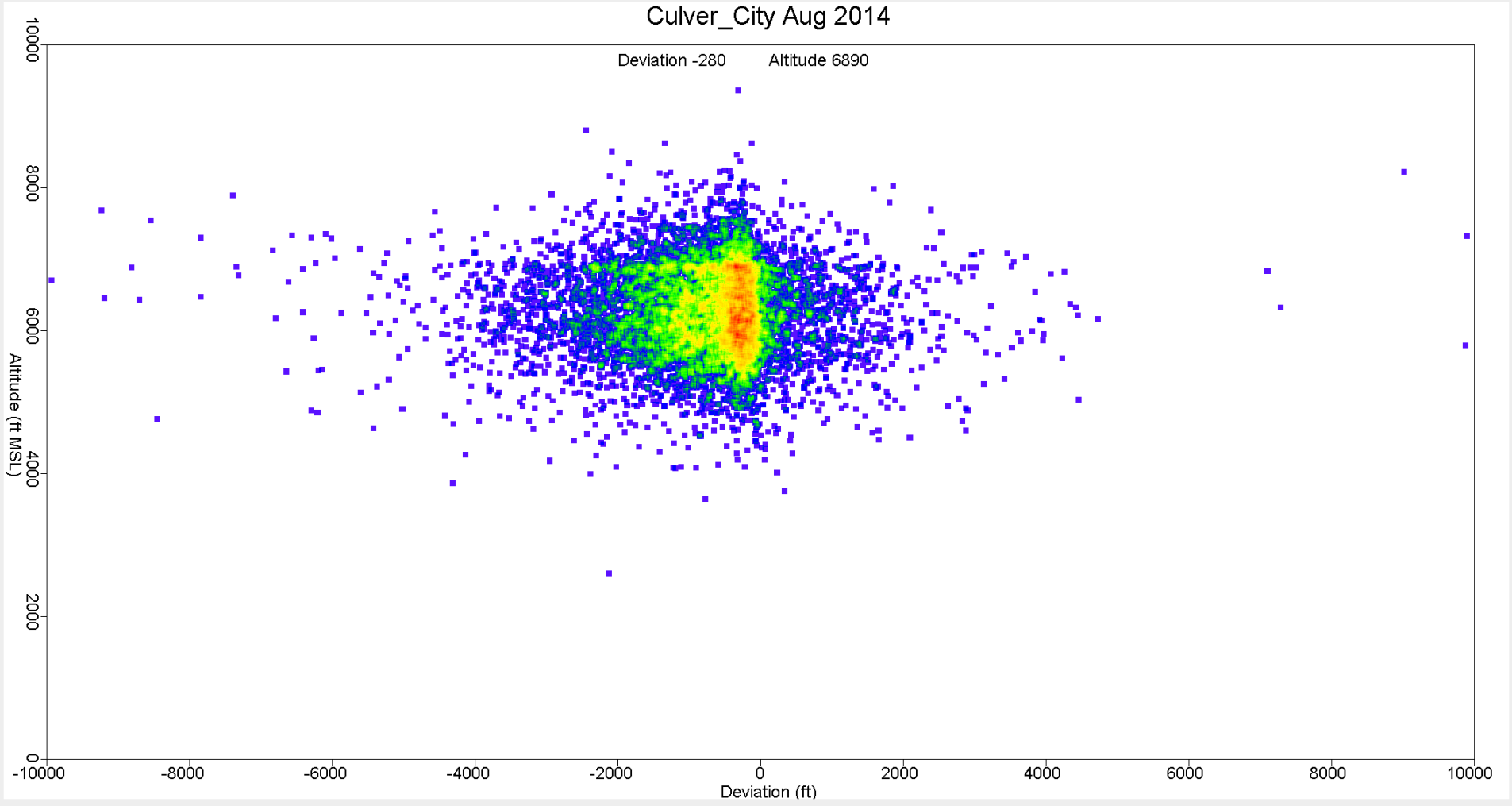
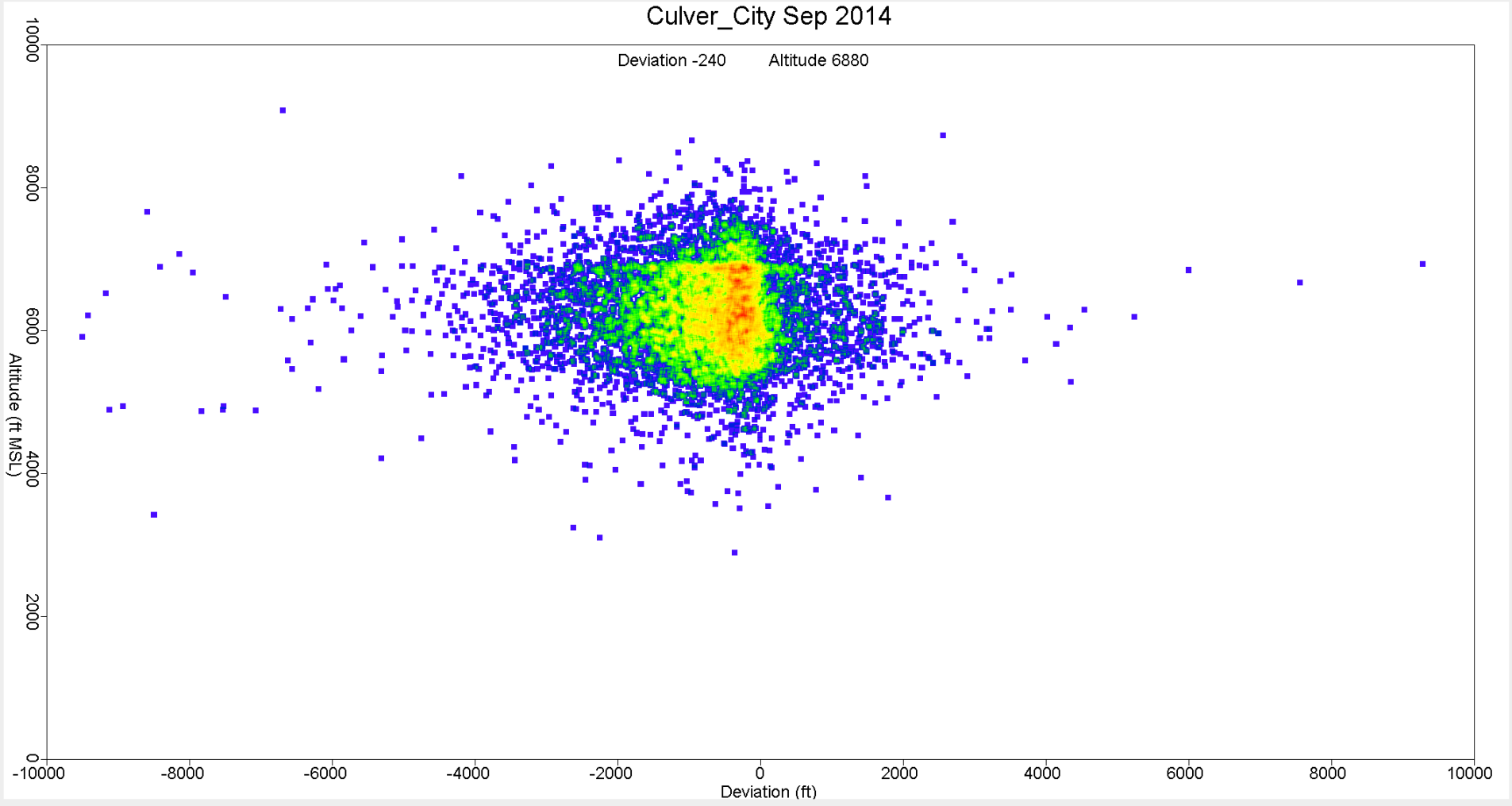
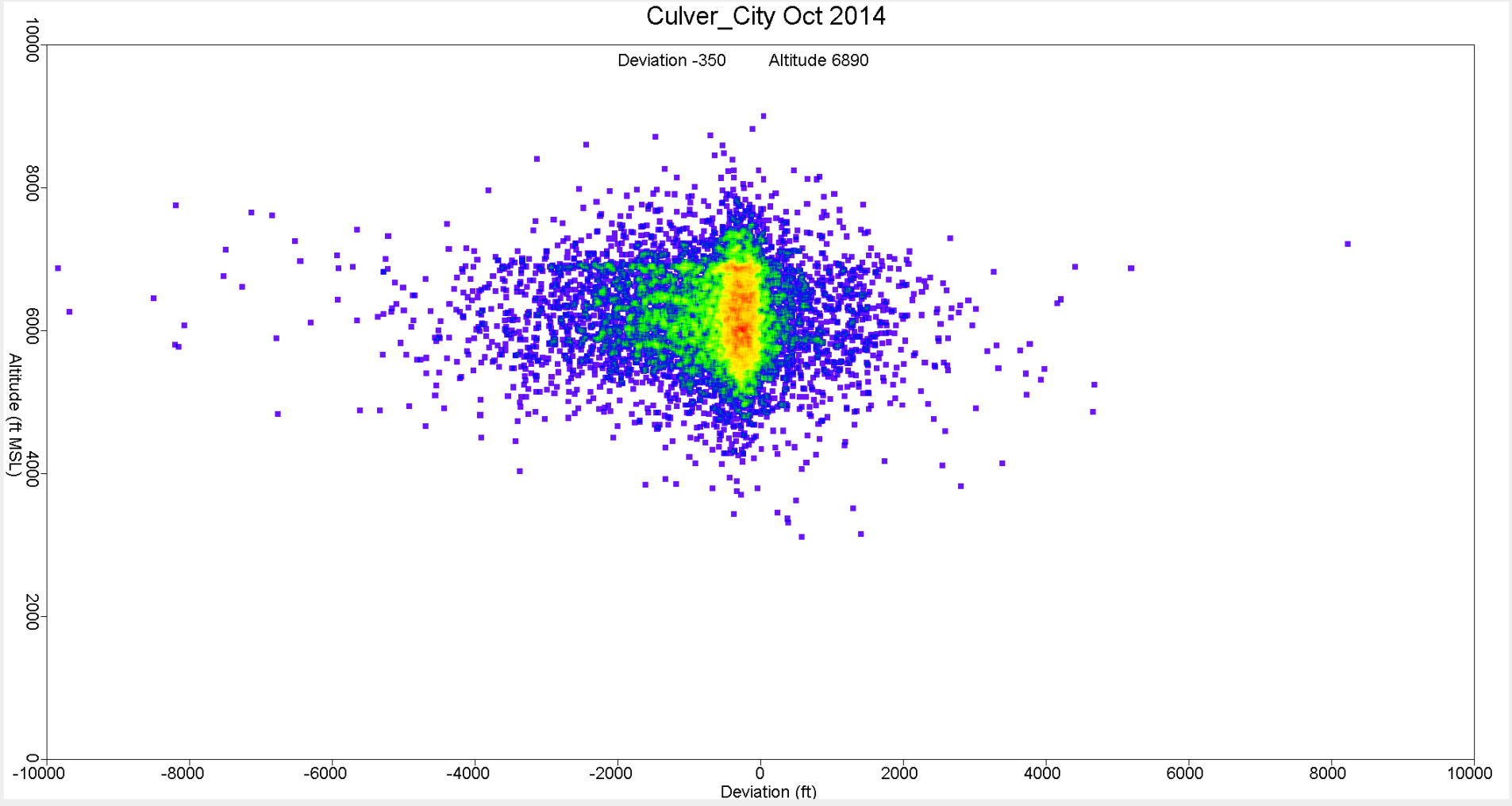
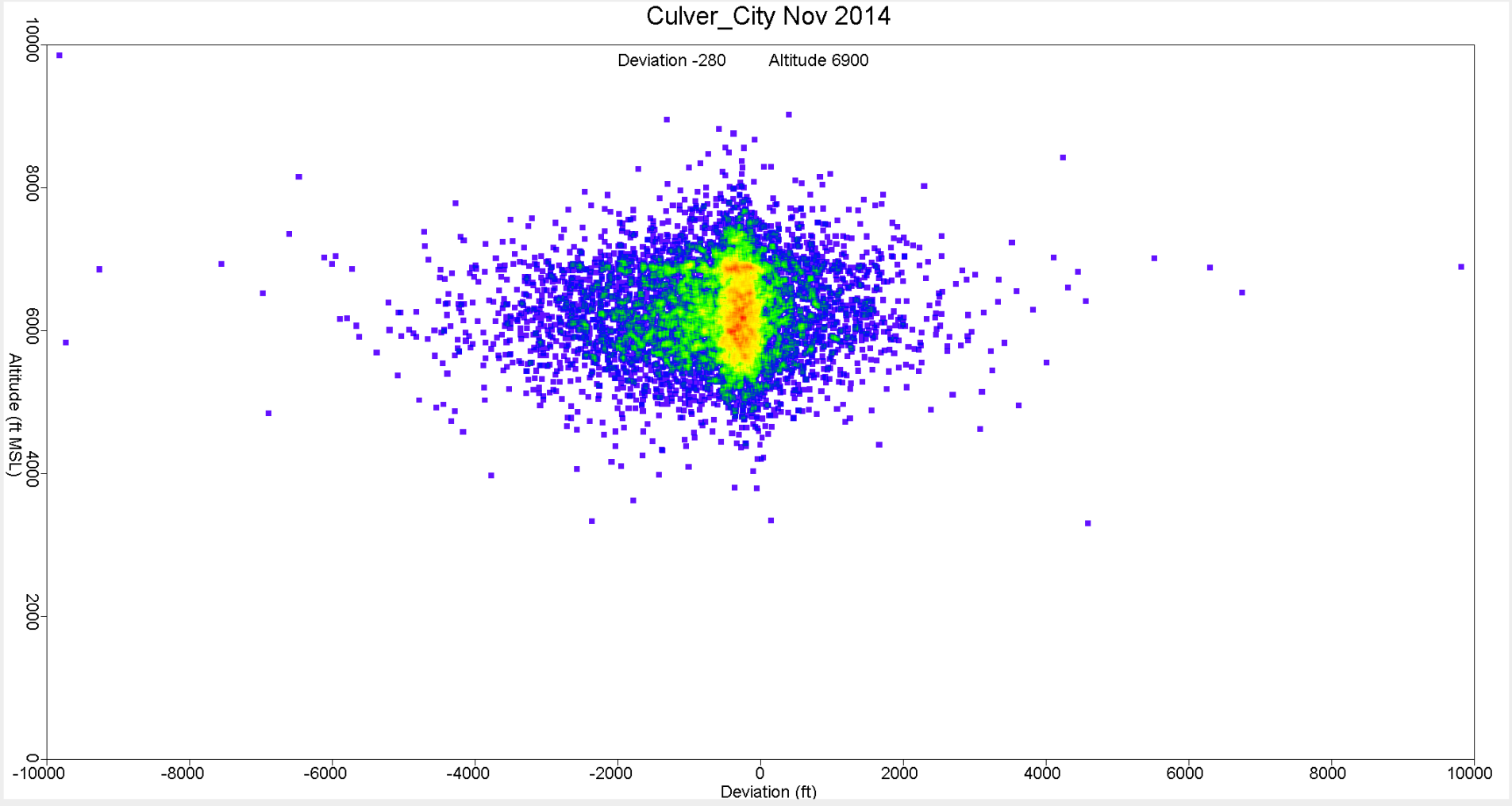
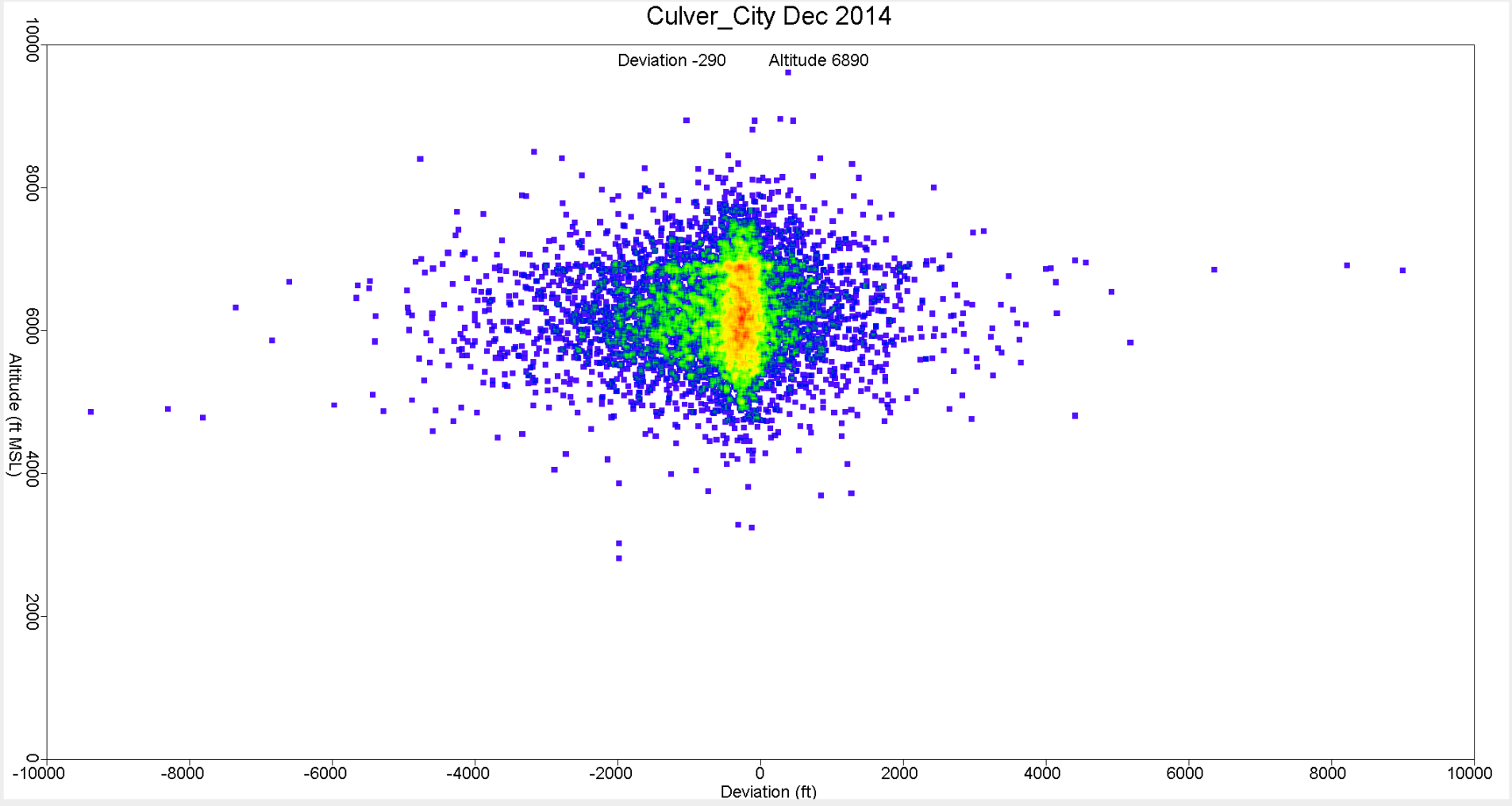
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

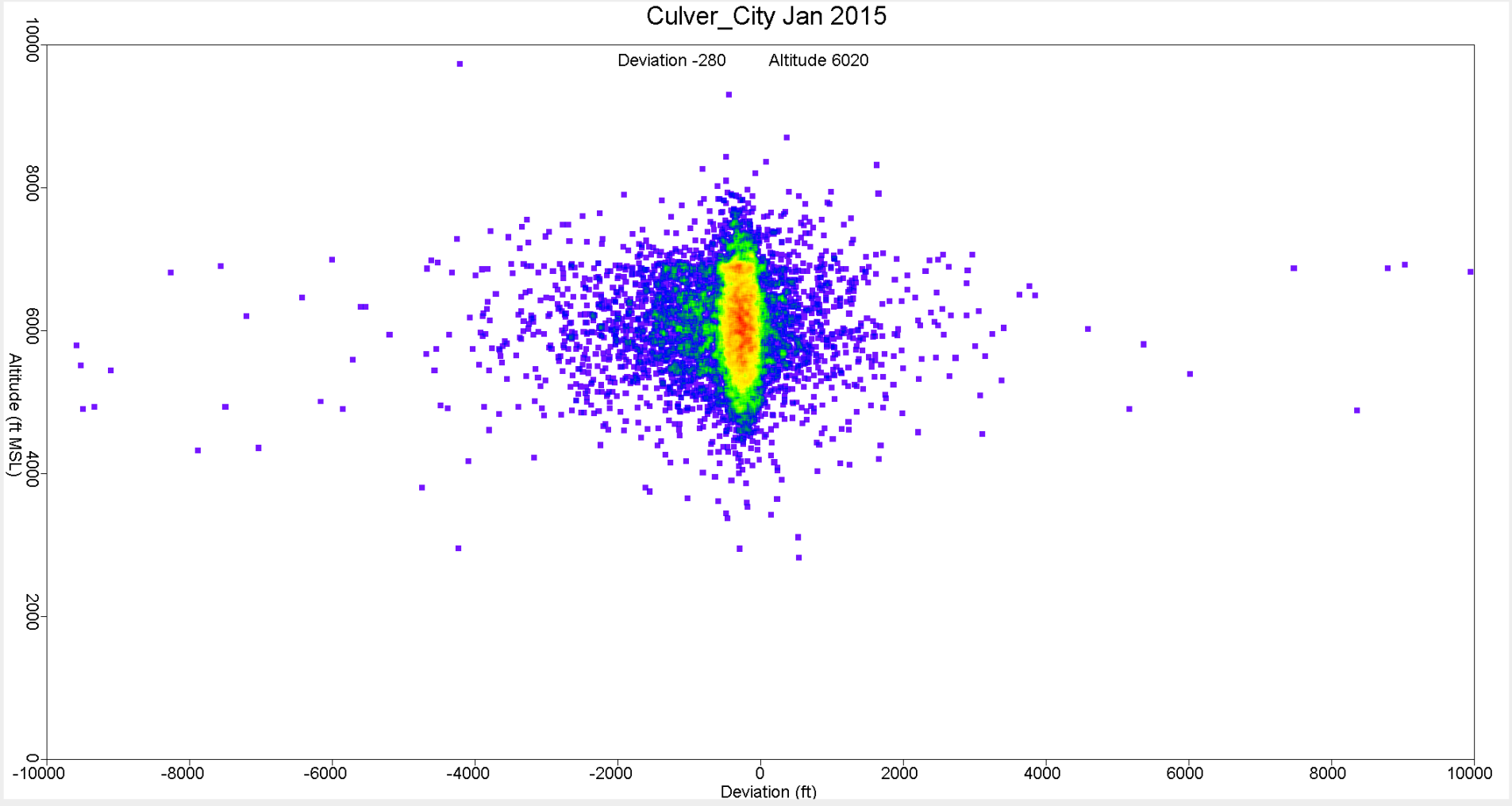

Culver_City Aug 2014
Deviation -280
Altitude 6890
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

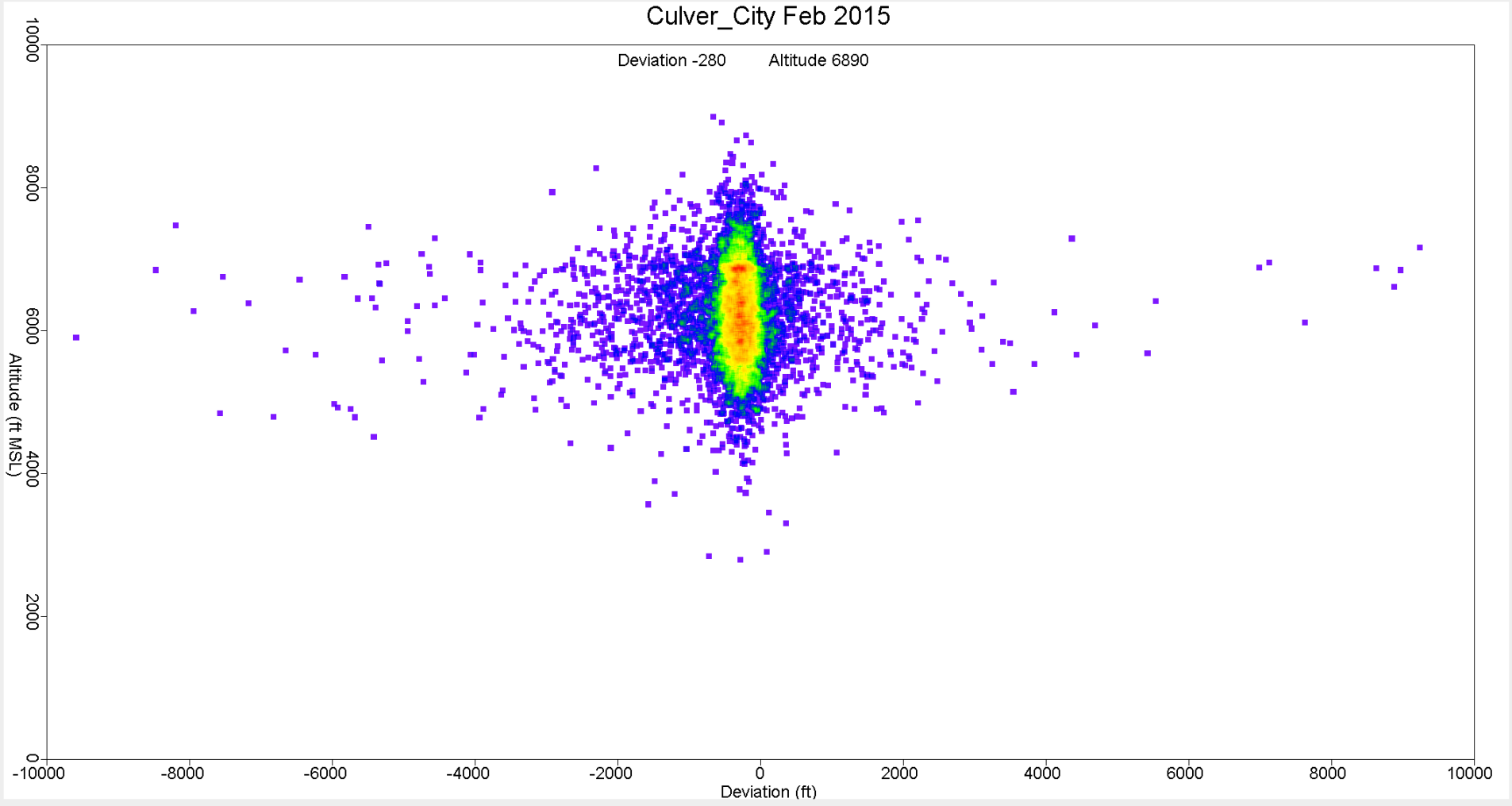

Culver_City Sep 2014
Deviation -240
Altitude 6880
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

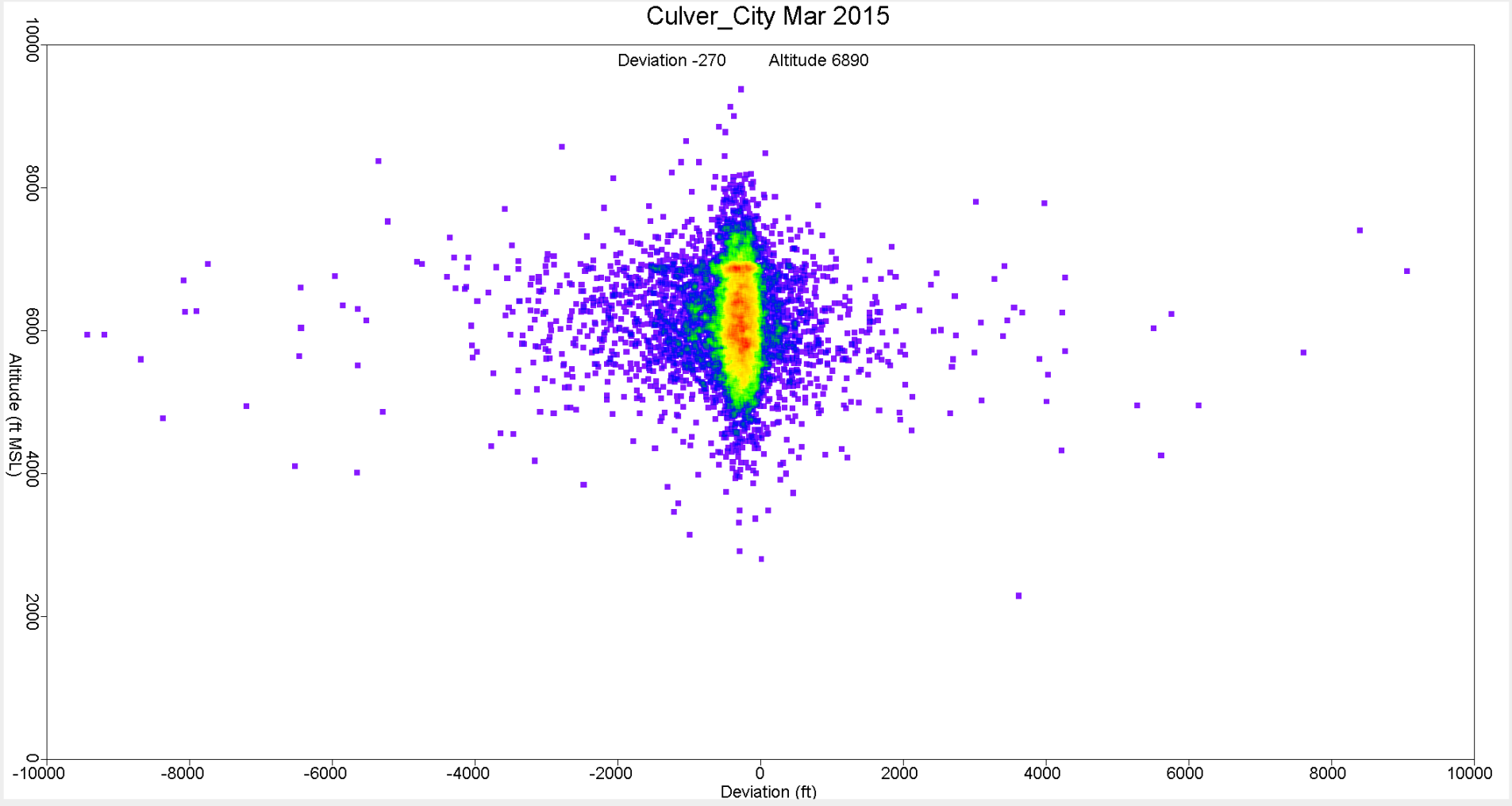

Culver_City Oct 2014
Deviation -350
Altitude 6890
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

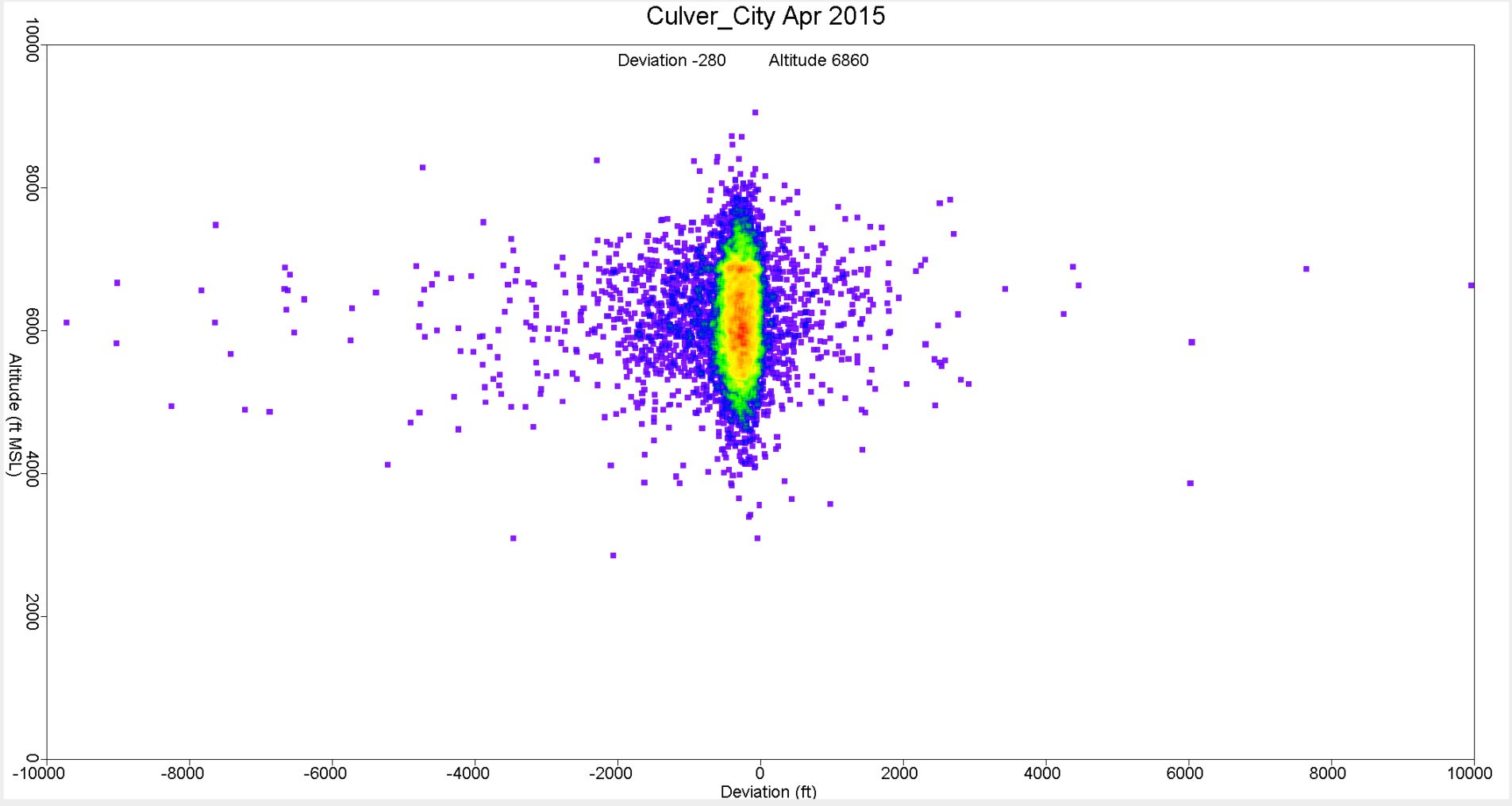

Culver_City Nov 2014
Deviation -280
Altitude 6900
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

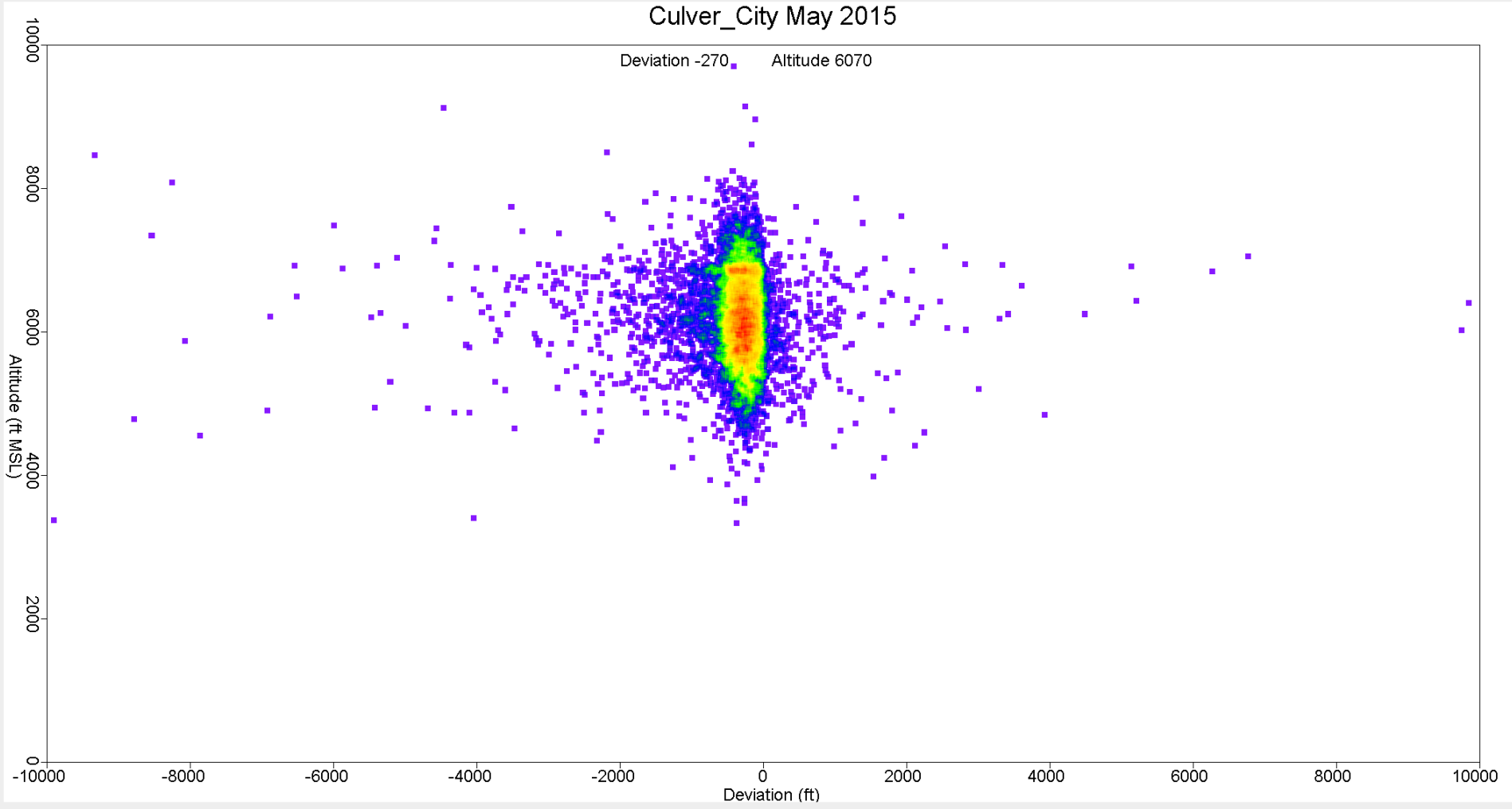

Culver_City Dec 2014
Deviation -290
Altitude 6890
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

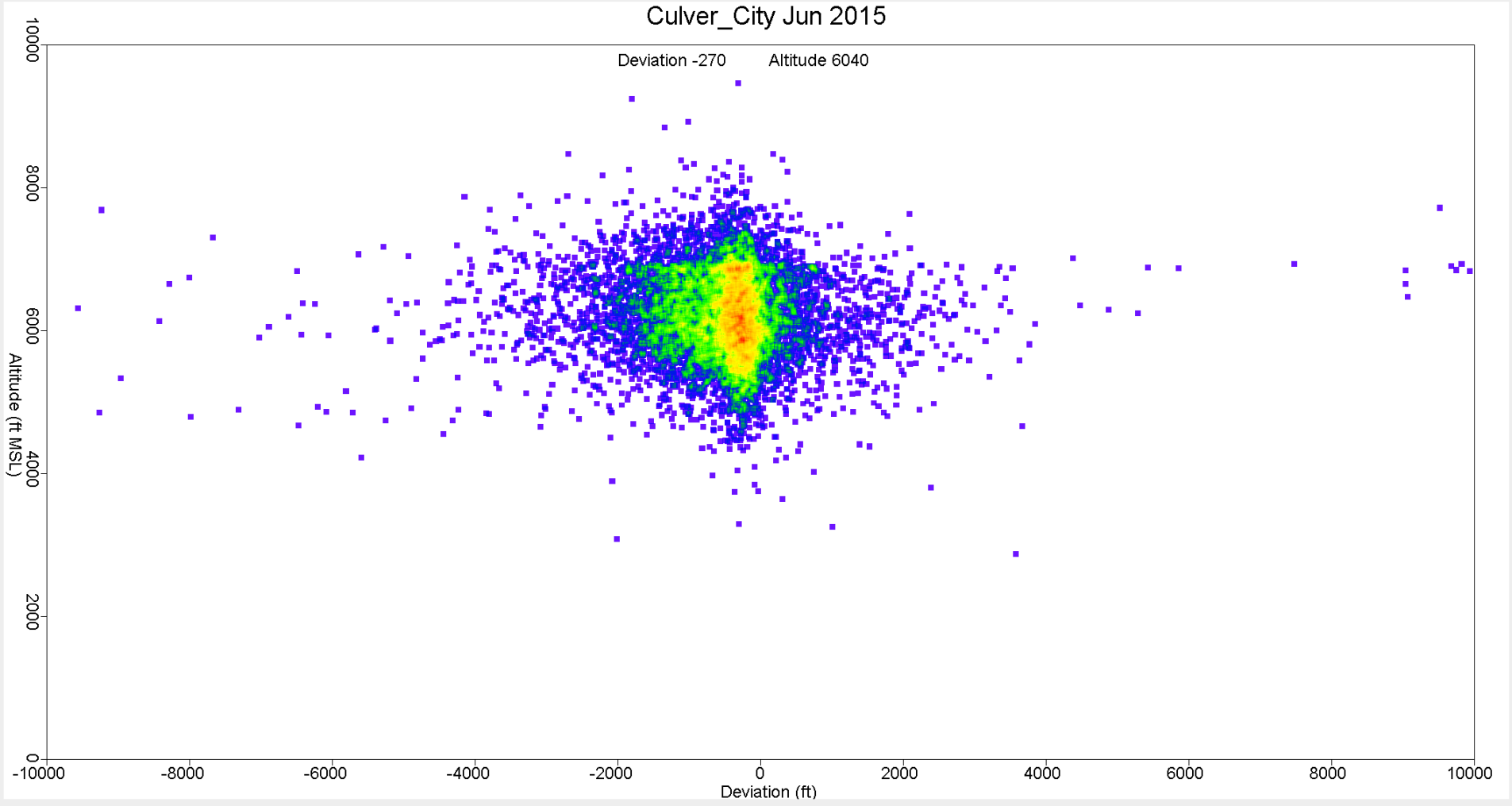

Culver_City Jan 2015
Deviation -280
Altitude 6020
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

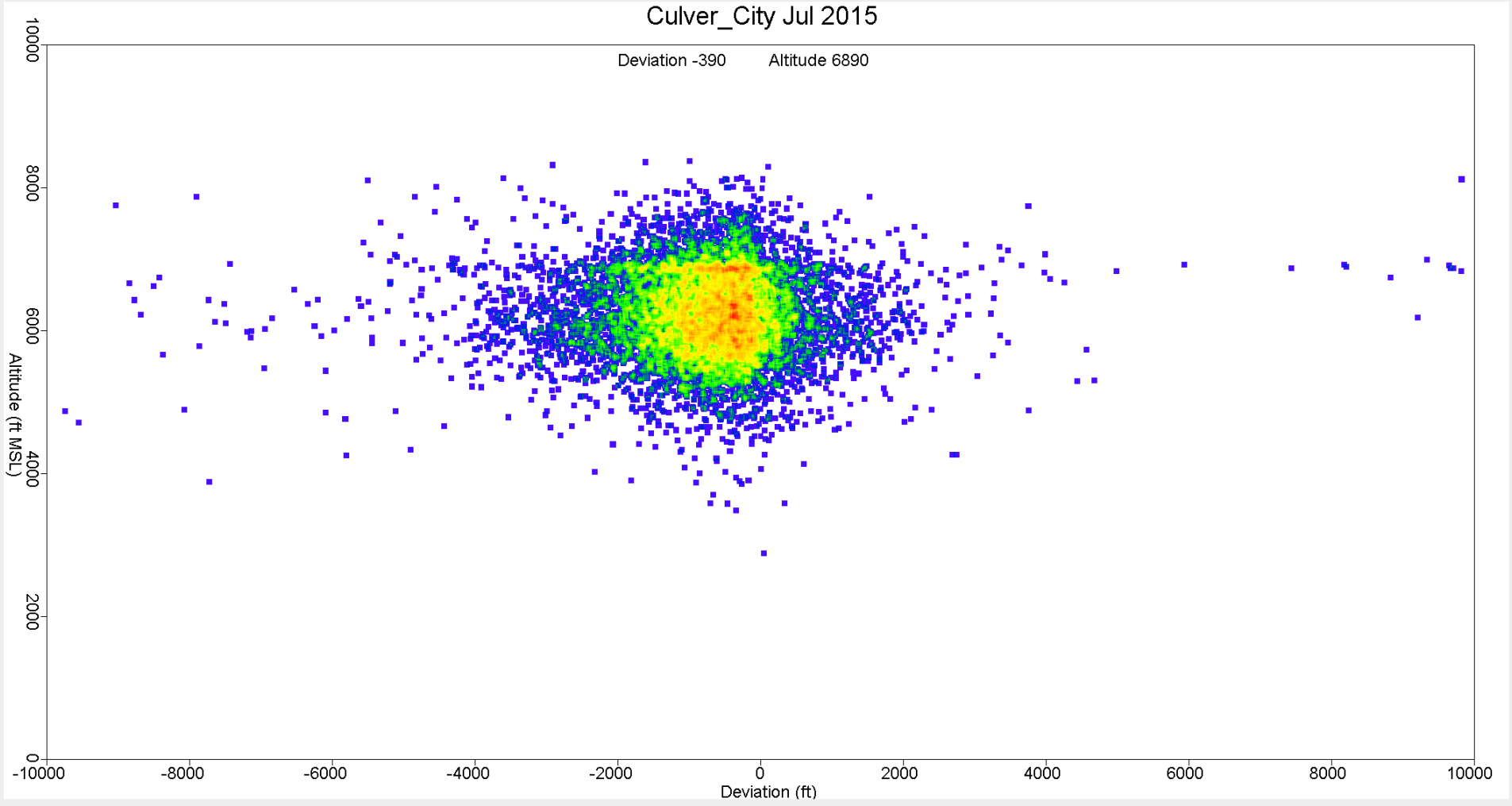

Culver_City Feb 2015
Deviation -280
Altitude 6890
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

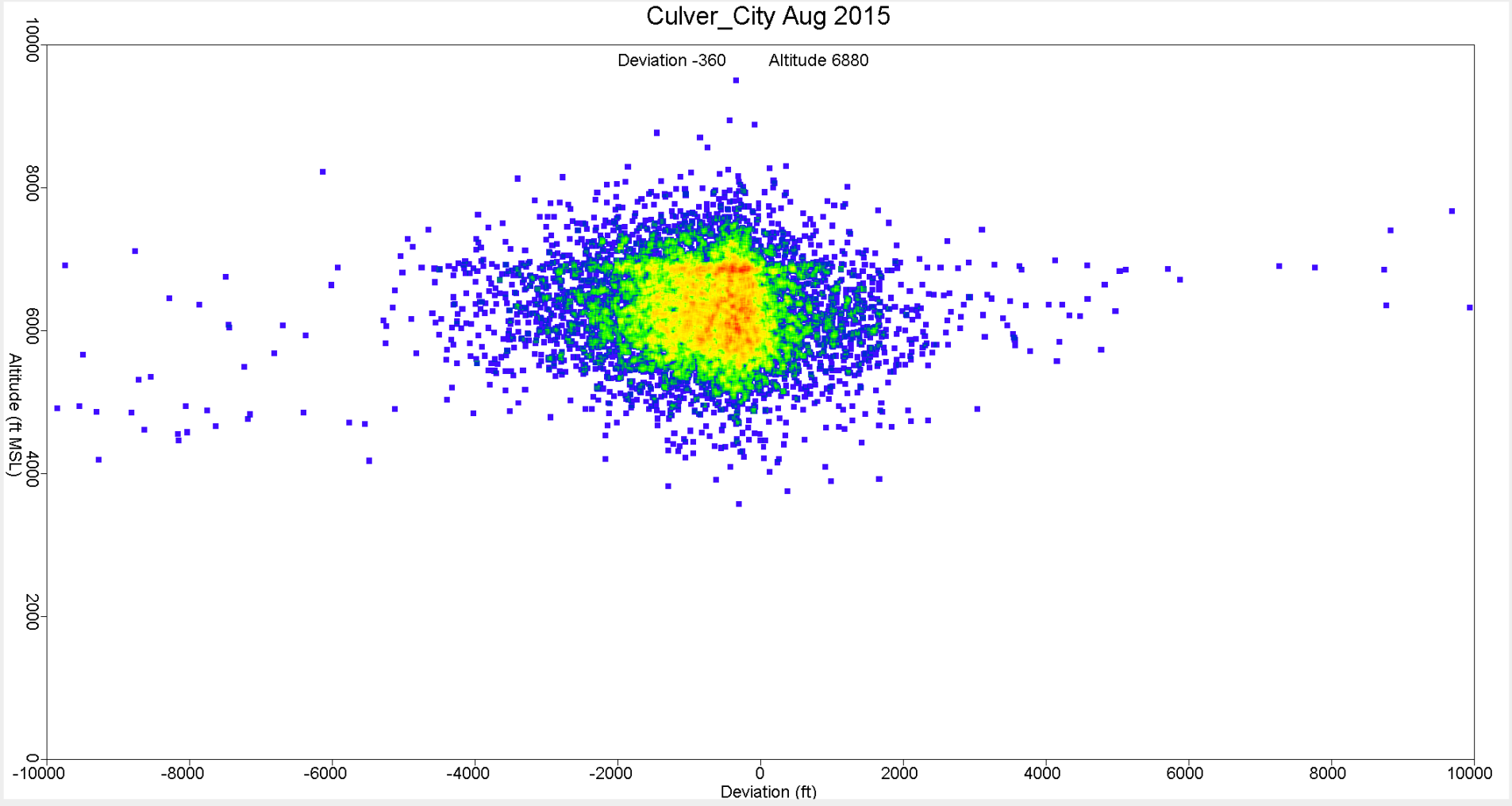

Culver_City Mar 2015
Deviation -270
Altitude 6890
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

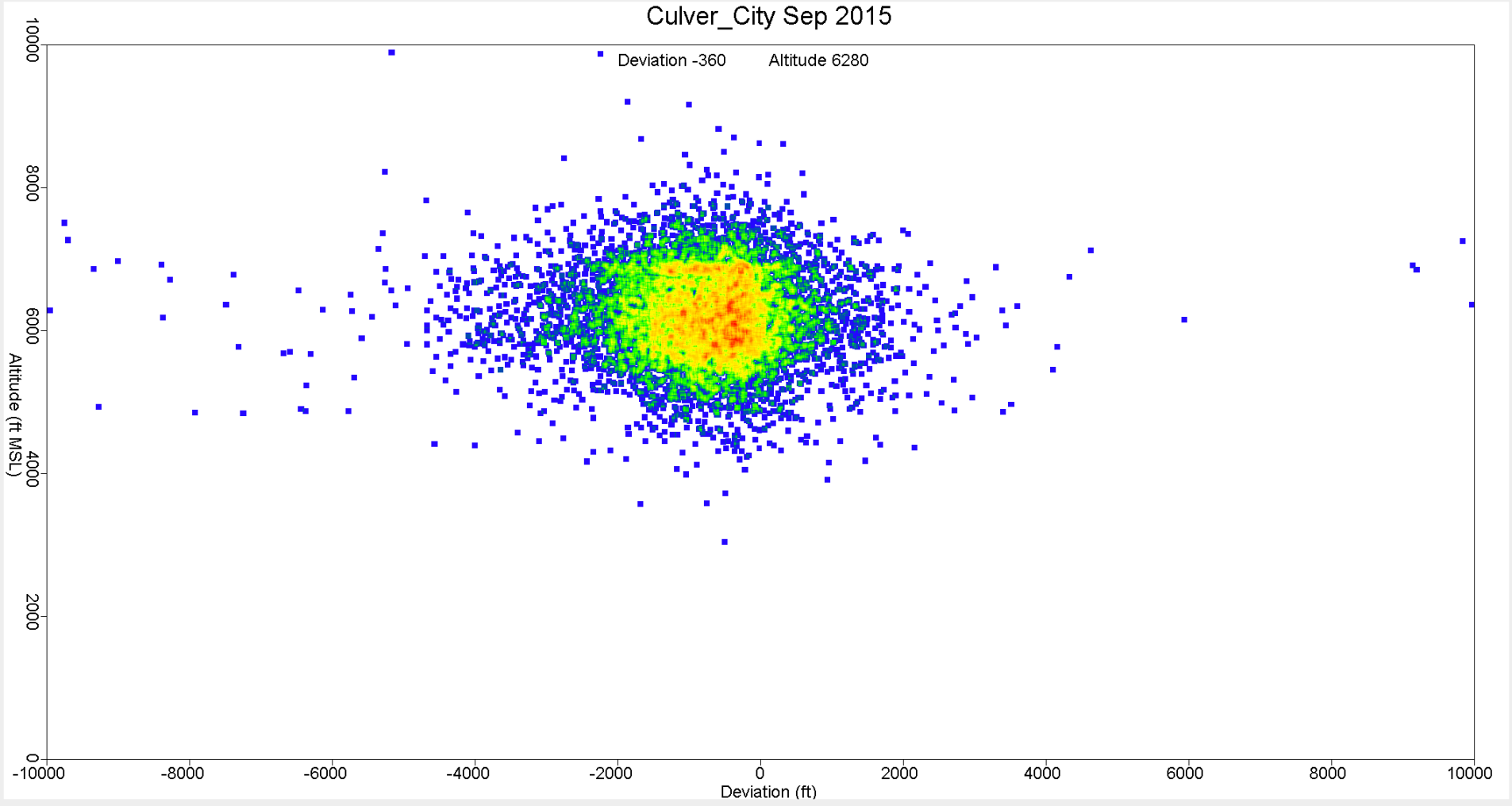

Culver_City Apr 2015
Deviation -280
Altitude 6860
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

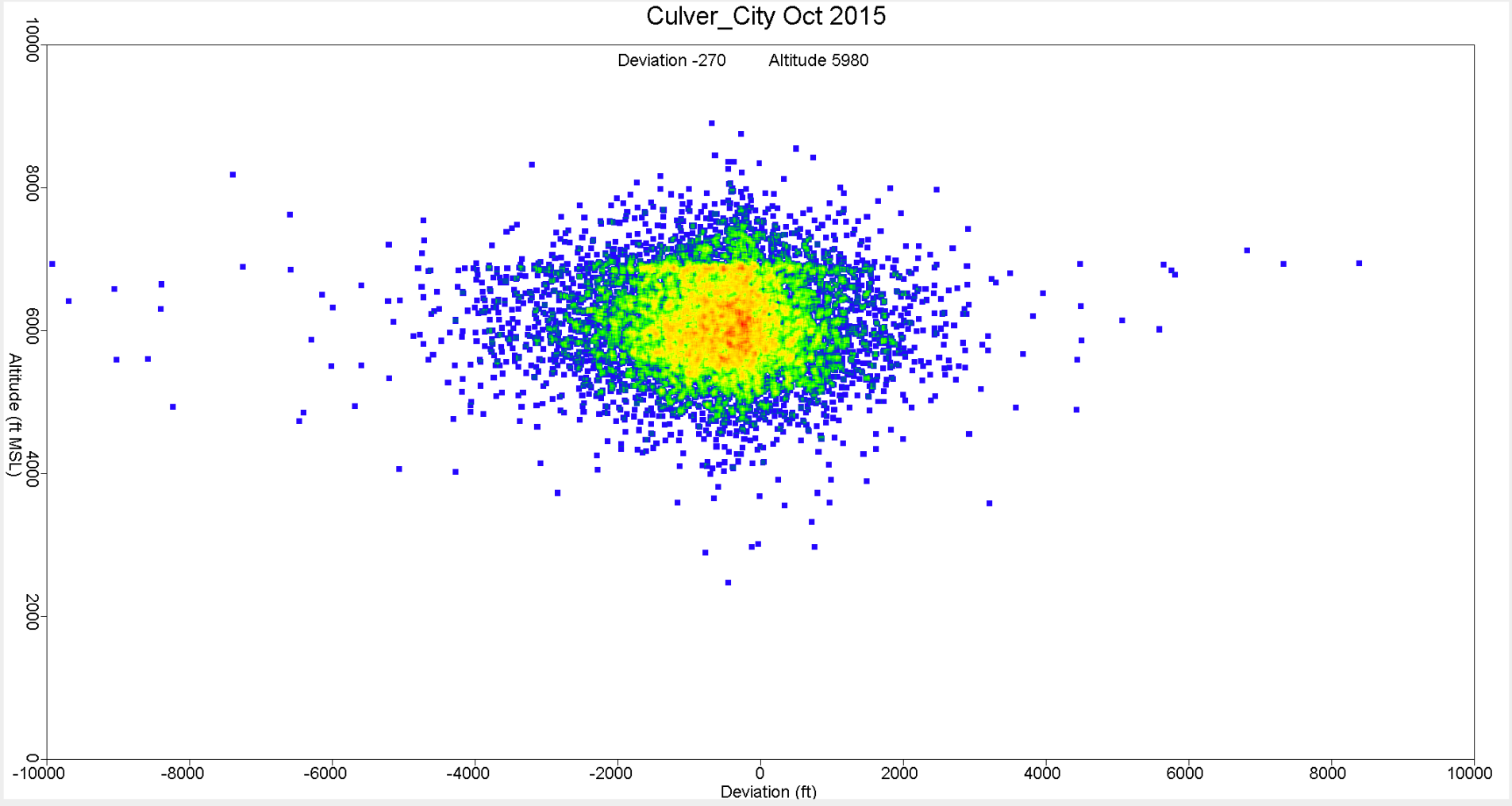

Culver_City May 2015
Deviation -270
Altitude 6070
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

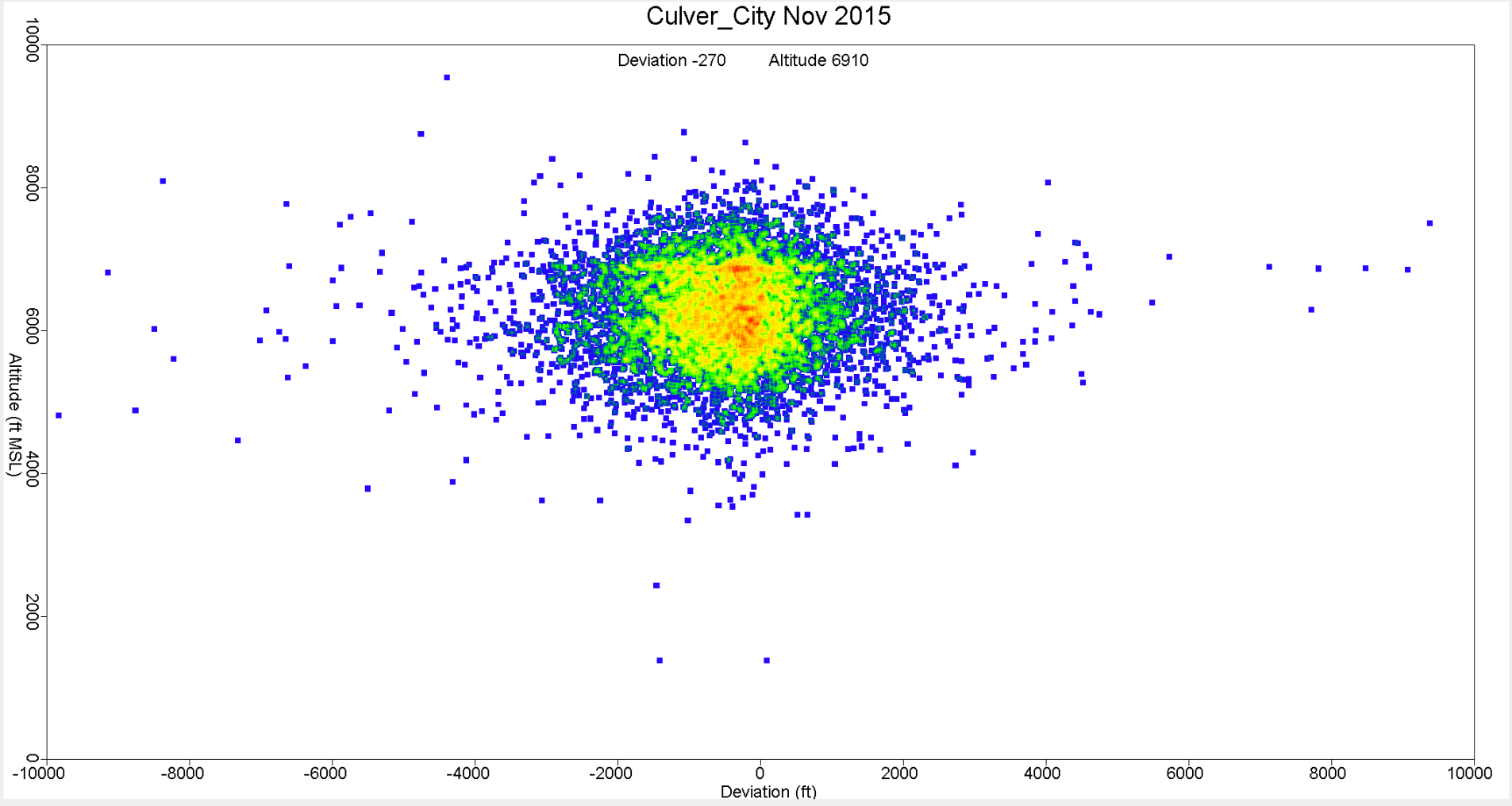

Culver_City Jun 2015
Deviation -270
Altitude 6040
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

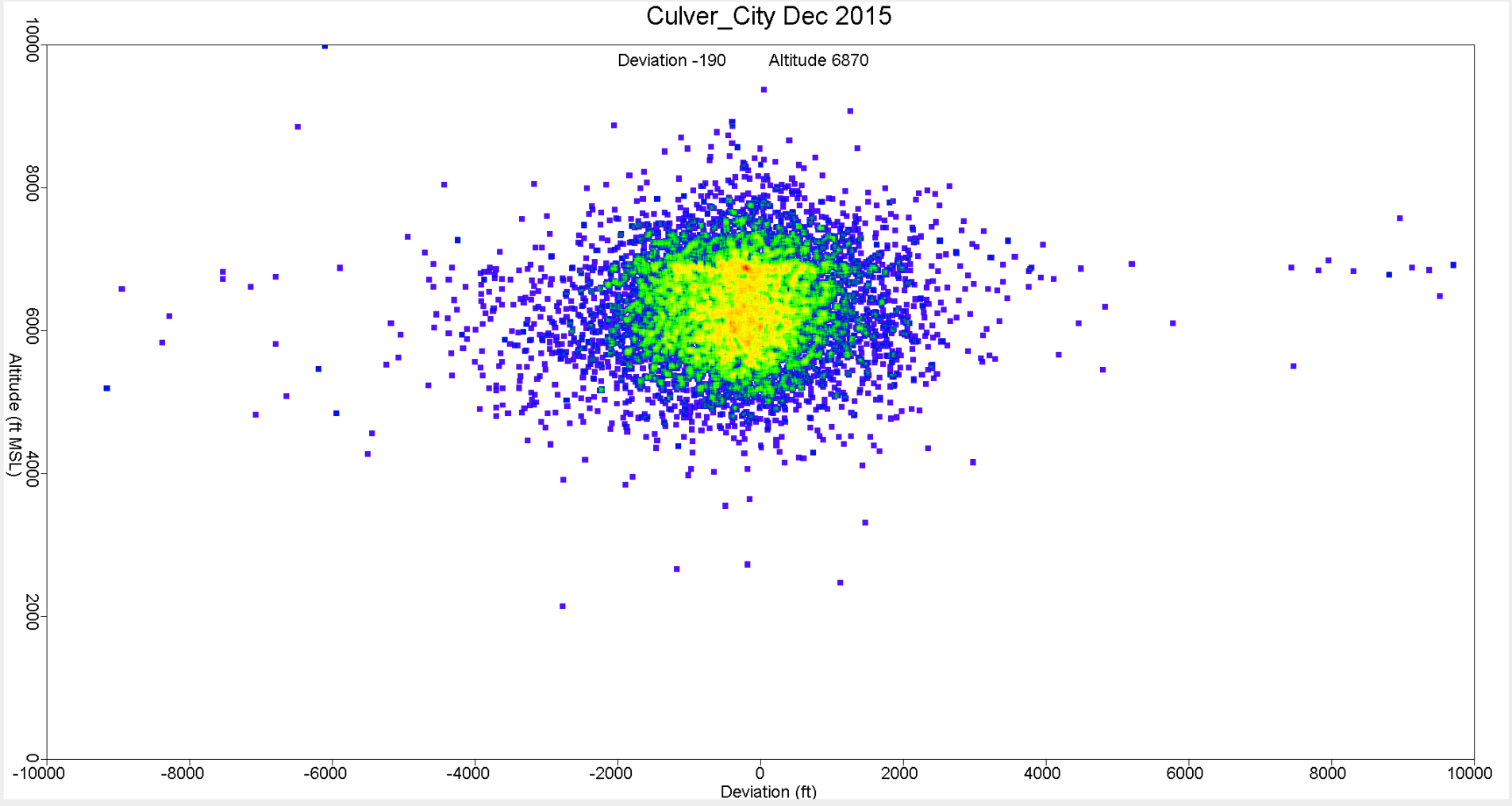

Culver_City Jul 2015
Deviation -390
Altitude 6890
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

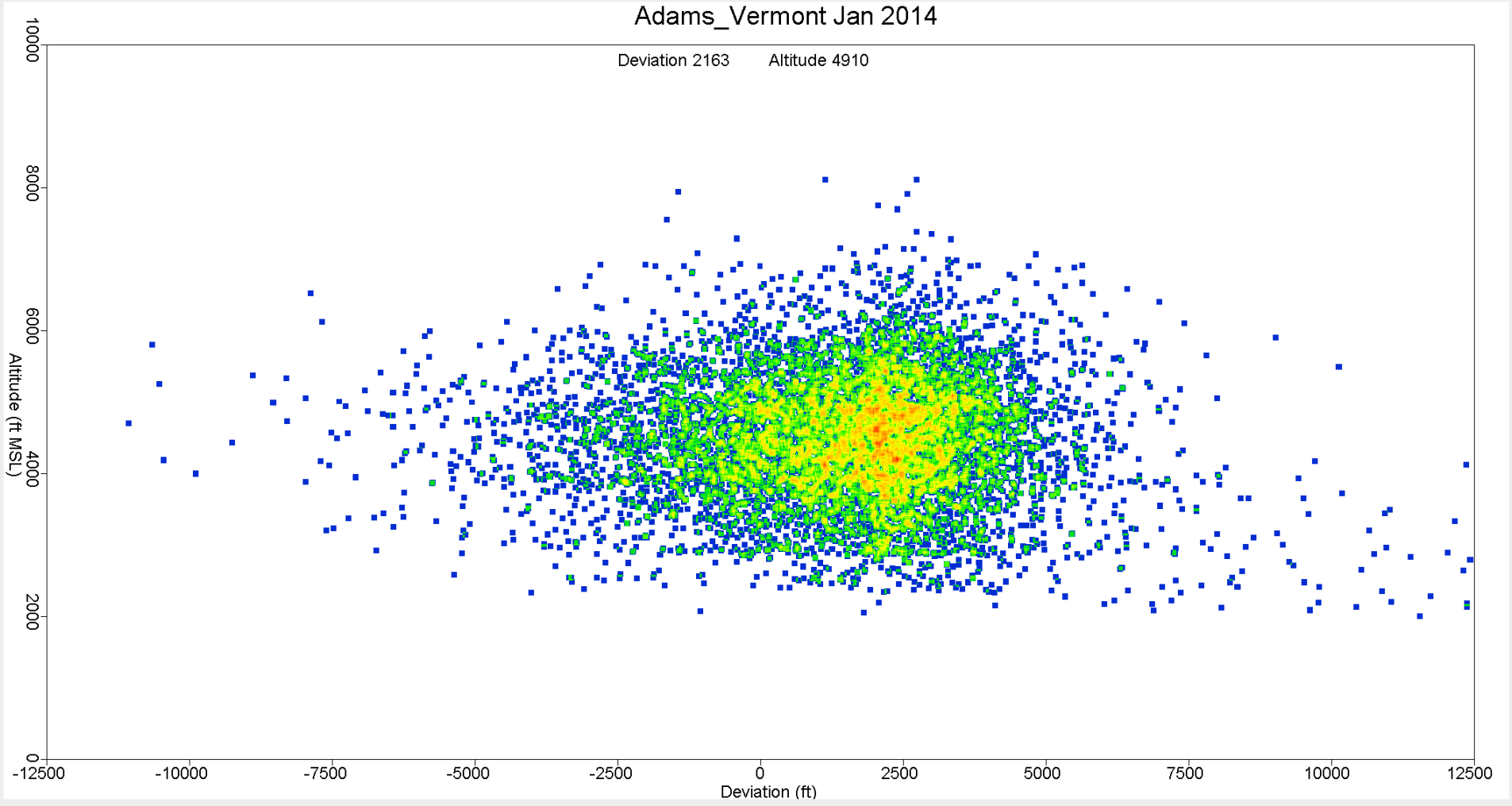

Culver_City Aug 2015
Deviation -360
Altitude 6880
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

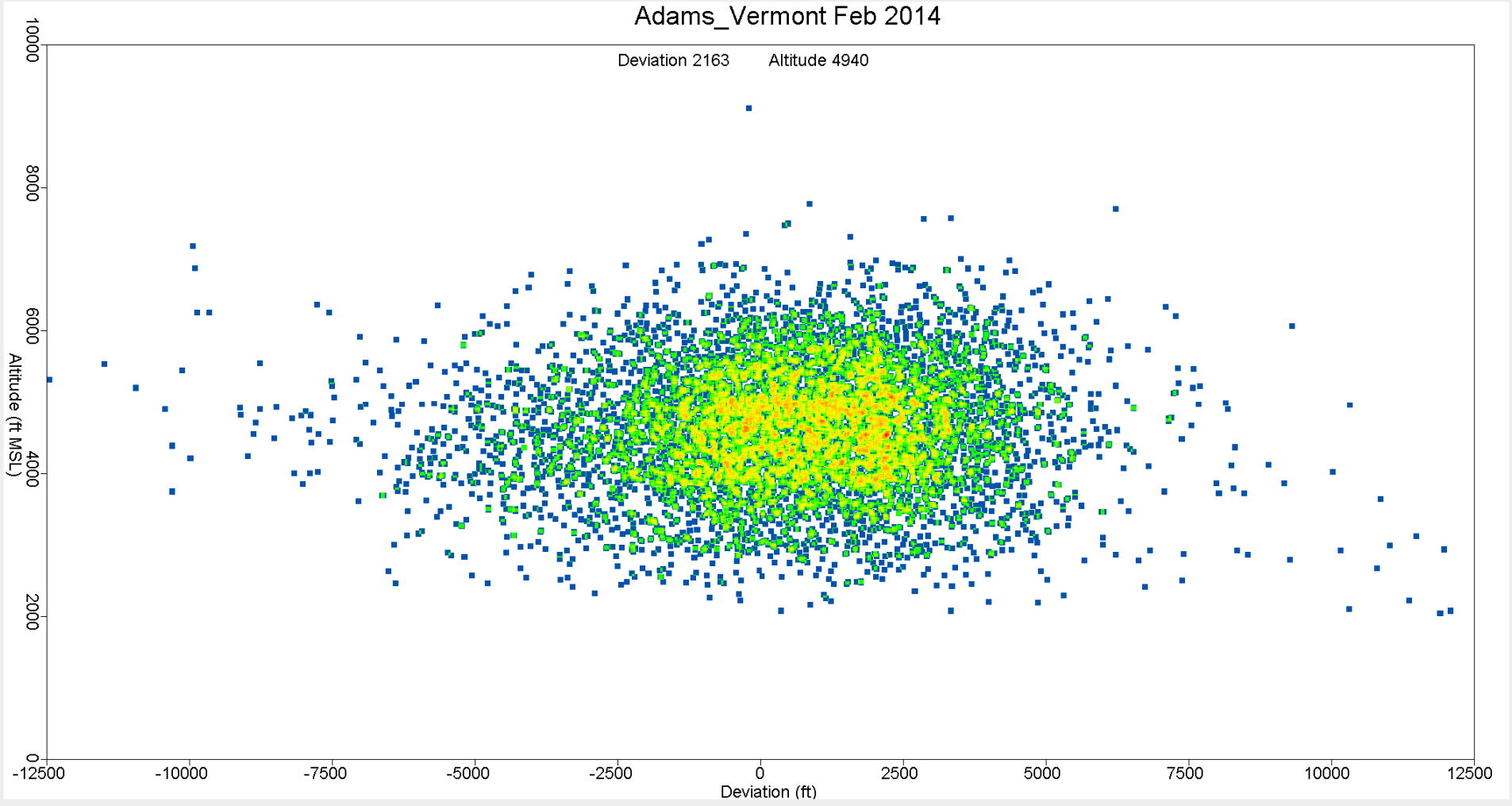

Culver_City Sep 2015
Deviation -360
Altitude 6280
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

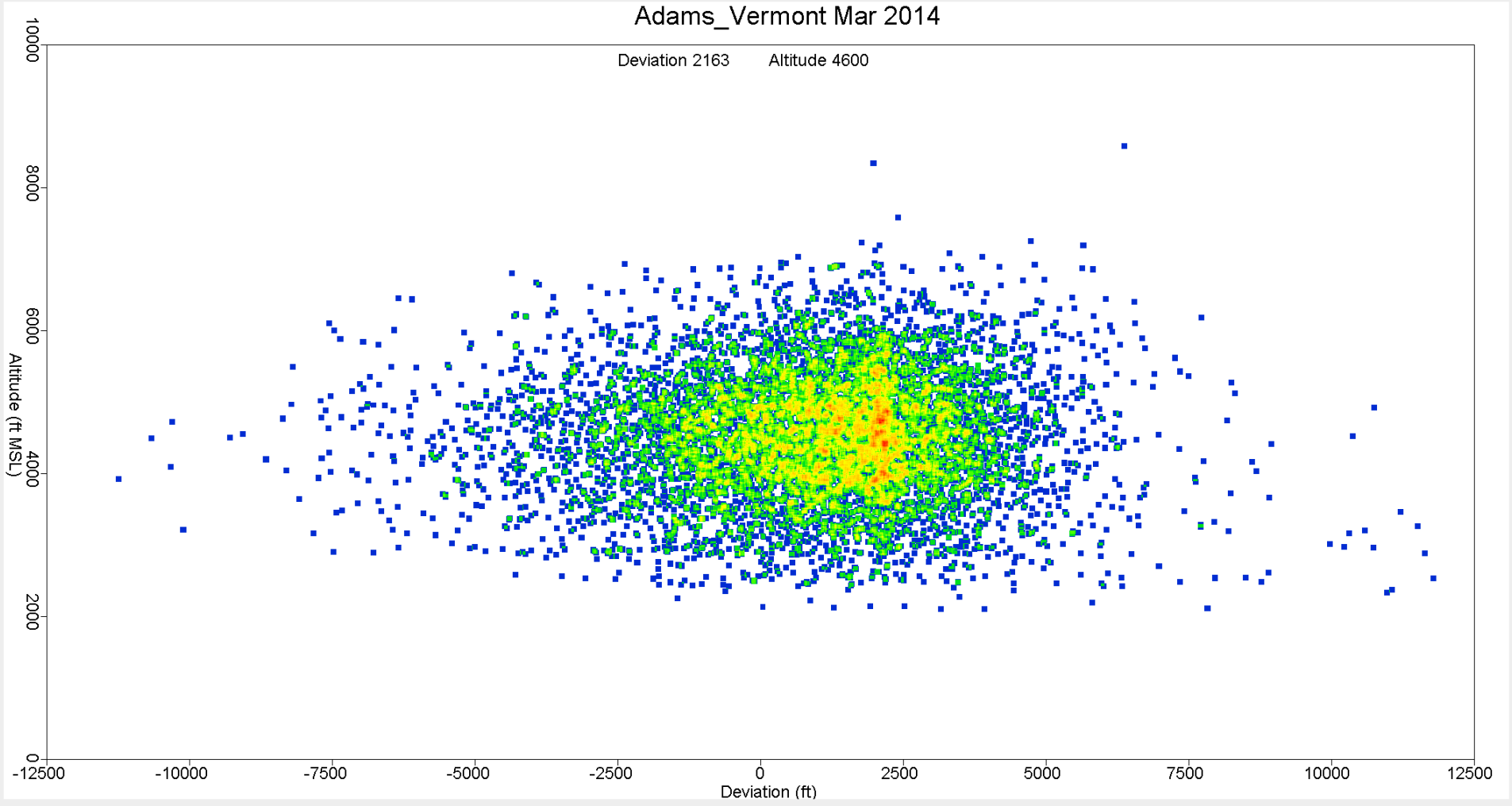

Culver_City Oct 2015
Deviation -270
Altitude 5980
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

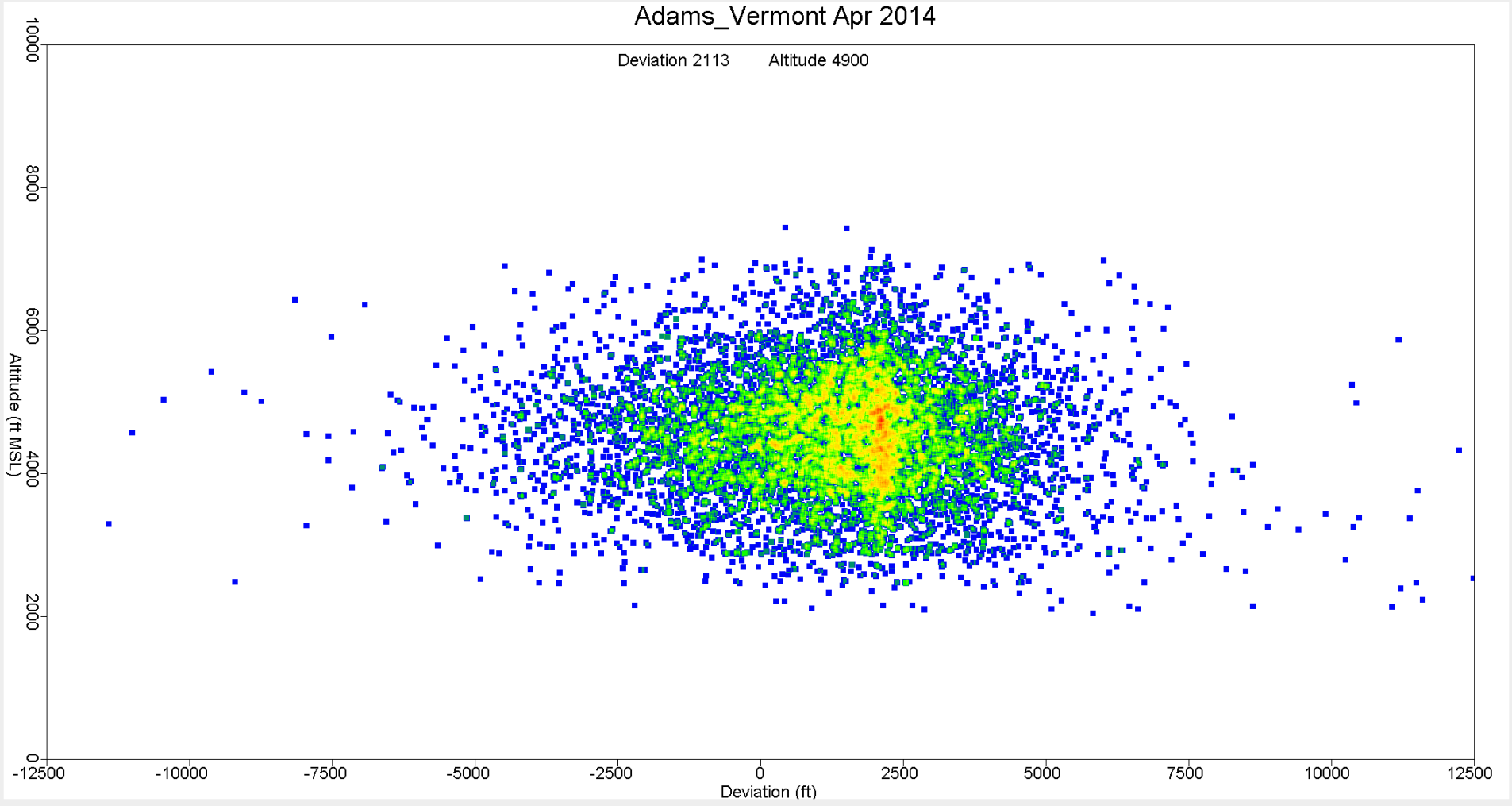

Culver_City Nov 2015
Deviation -270
Altitude 6910
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

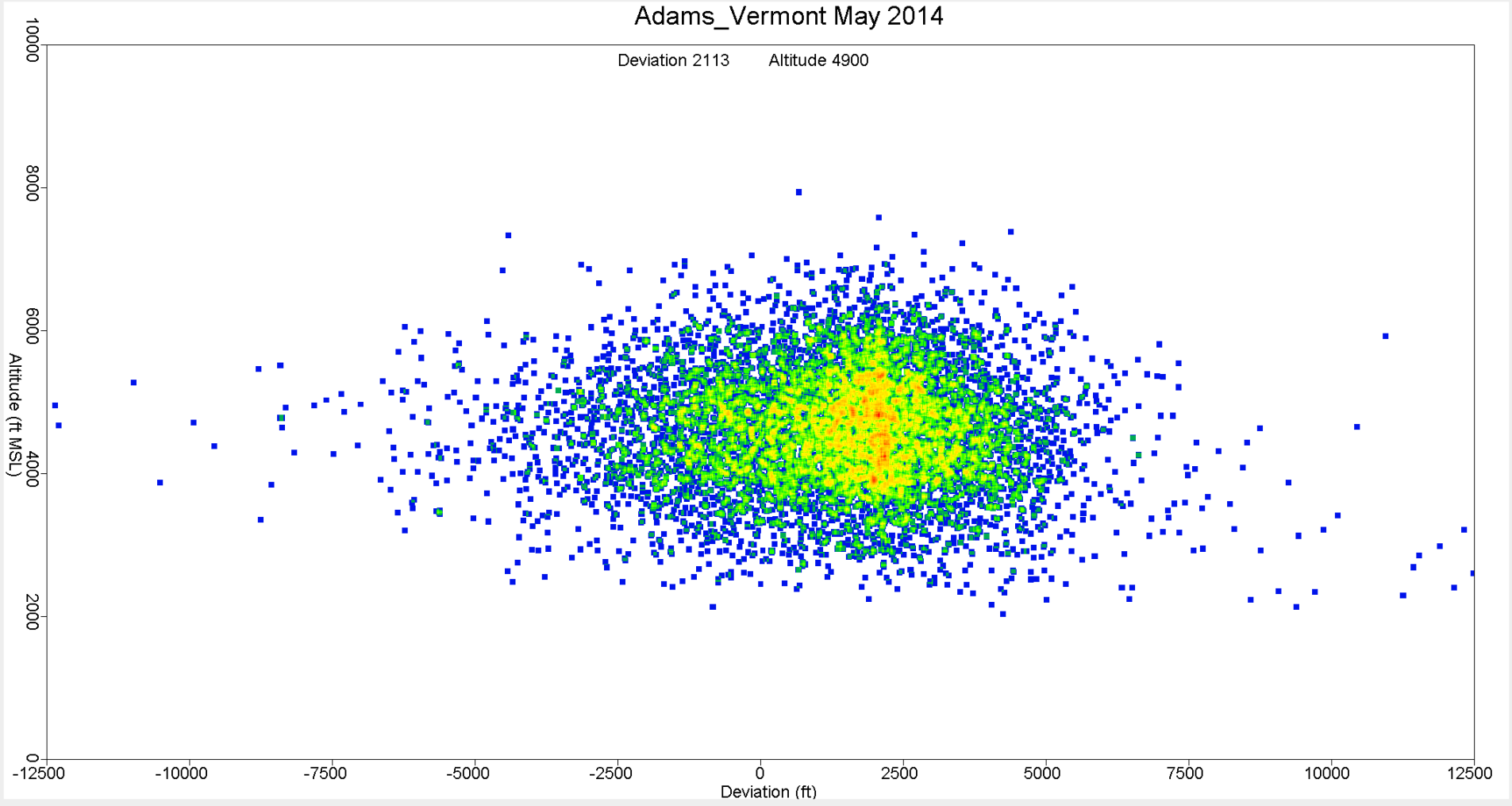

Culver_City Dec 2015
Deviation -190
Altitude 6870
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-10000
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
10000
Deviation (ft)

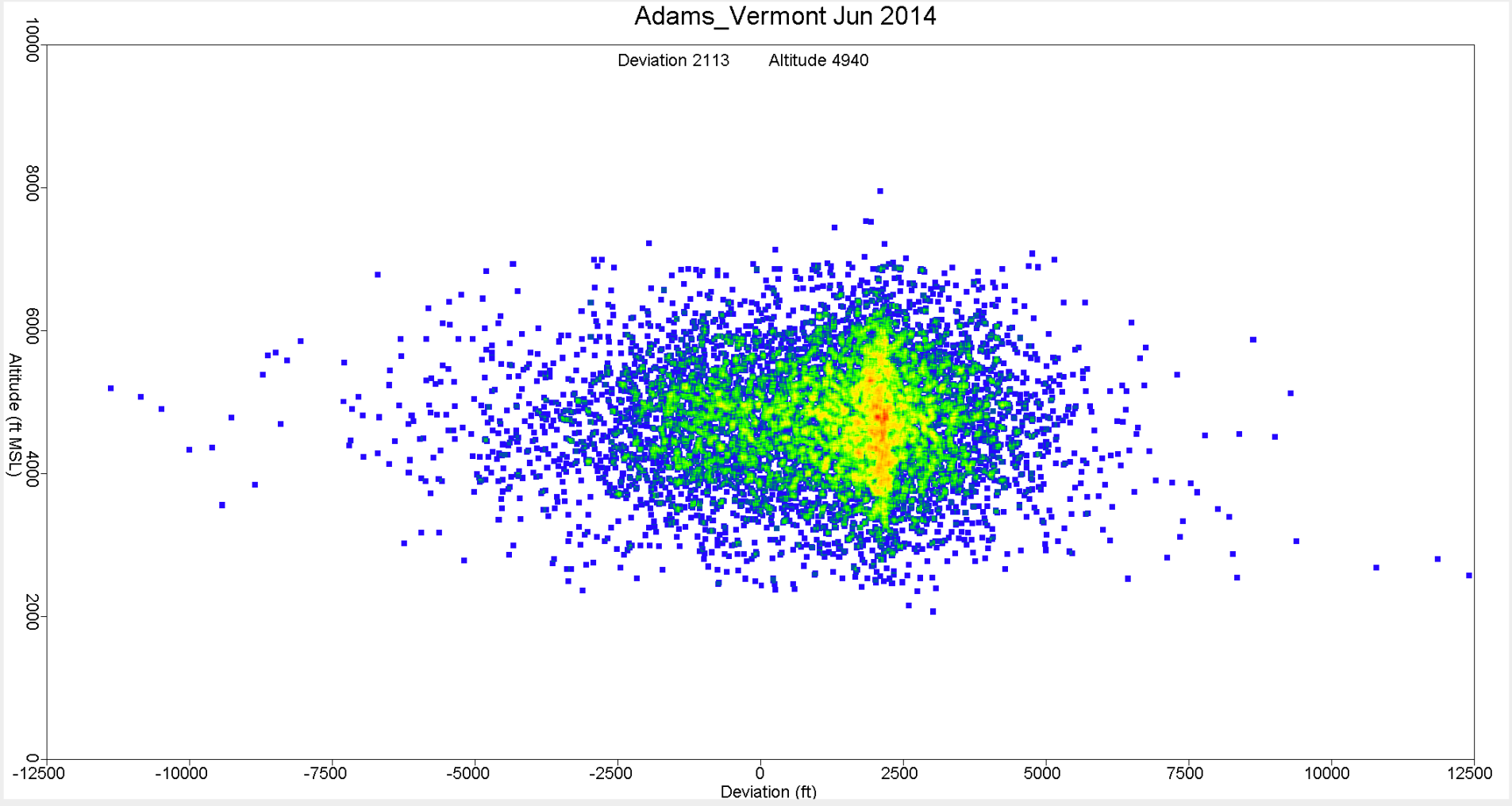

Adams_Vermont Jan 2014
Deviation 2163
Altitude 4910
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

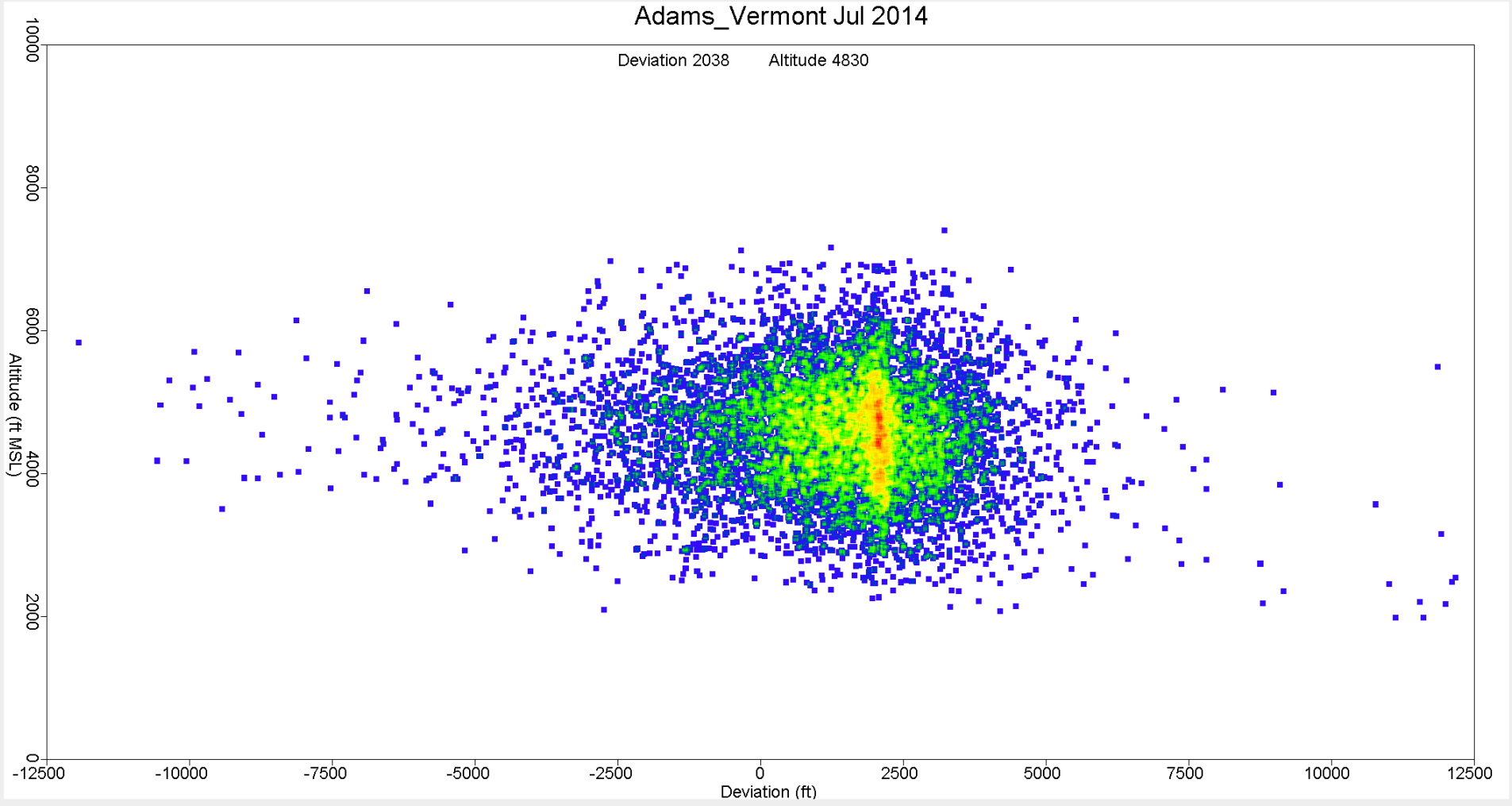

Adams_Vermont Feb 2014
Deviation 2163
Altitude 4940
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

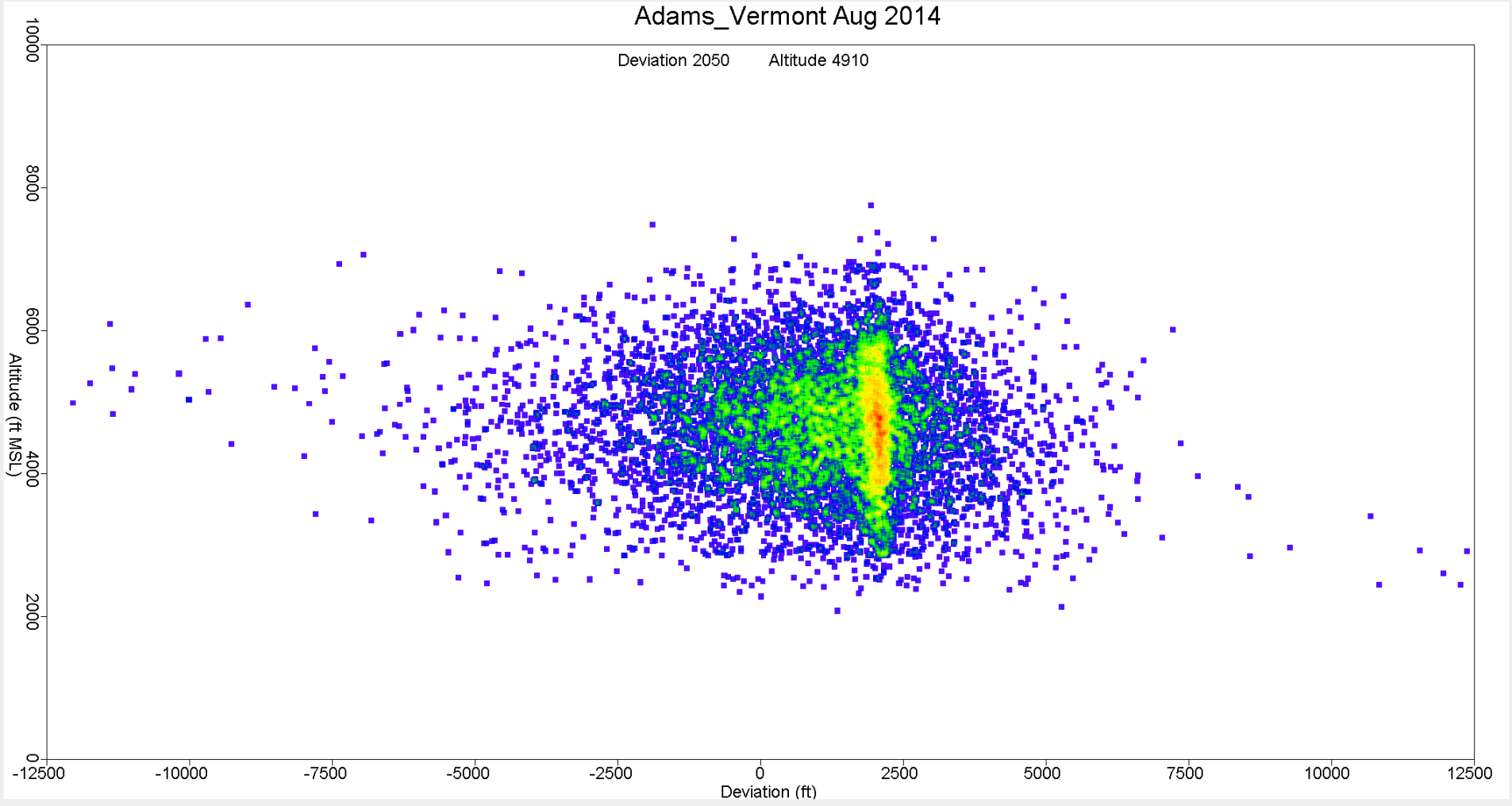

Adams_Vermont Mar 2014
Deviation 2163
Altitude 4600
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

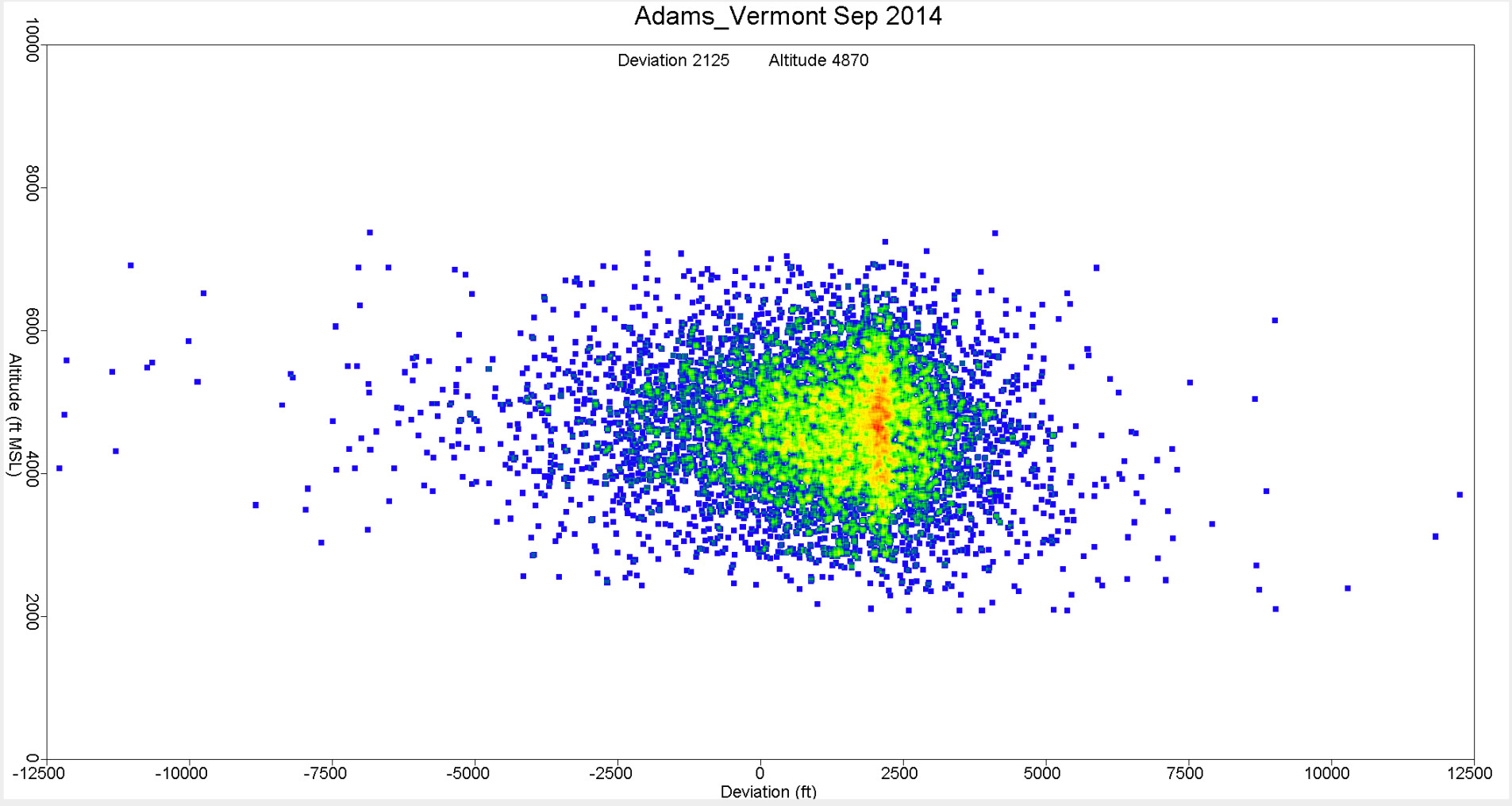

Adams_Vermont Apr 2014
Deviation 2113
Altitude 4900
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

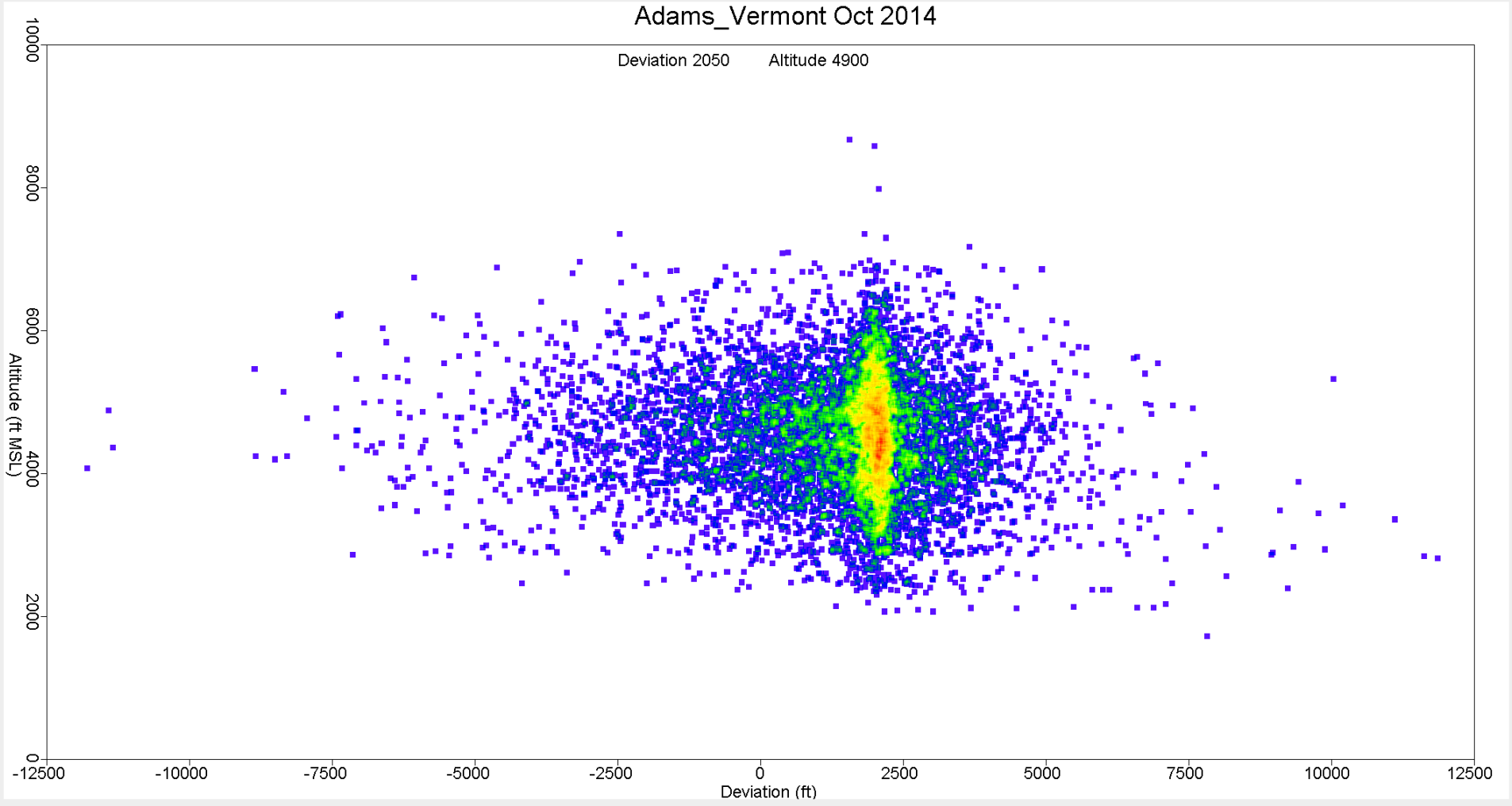

Adams_Vermont May 2014
Deviation 2113
Altitude 4900
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

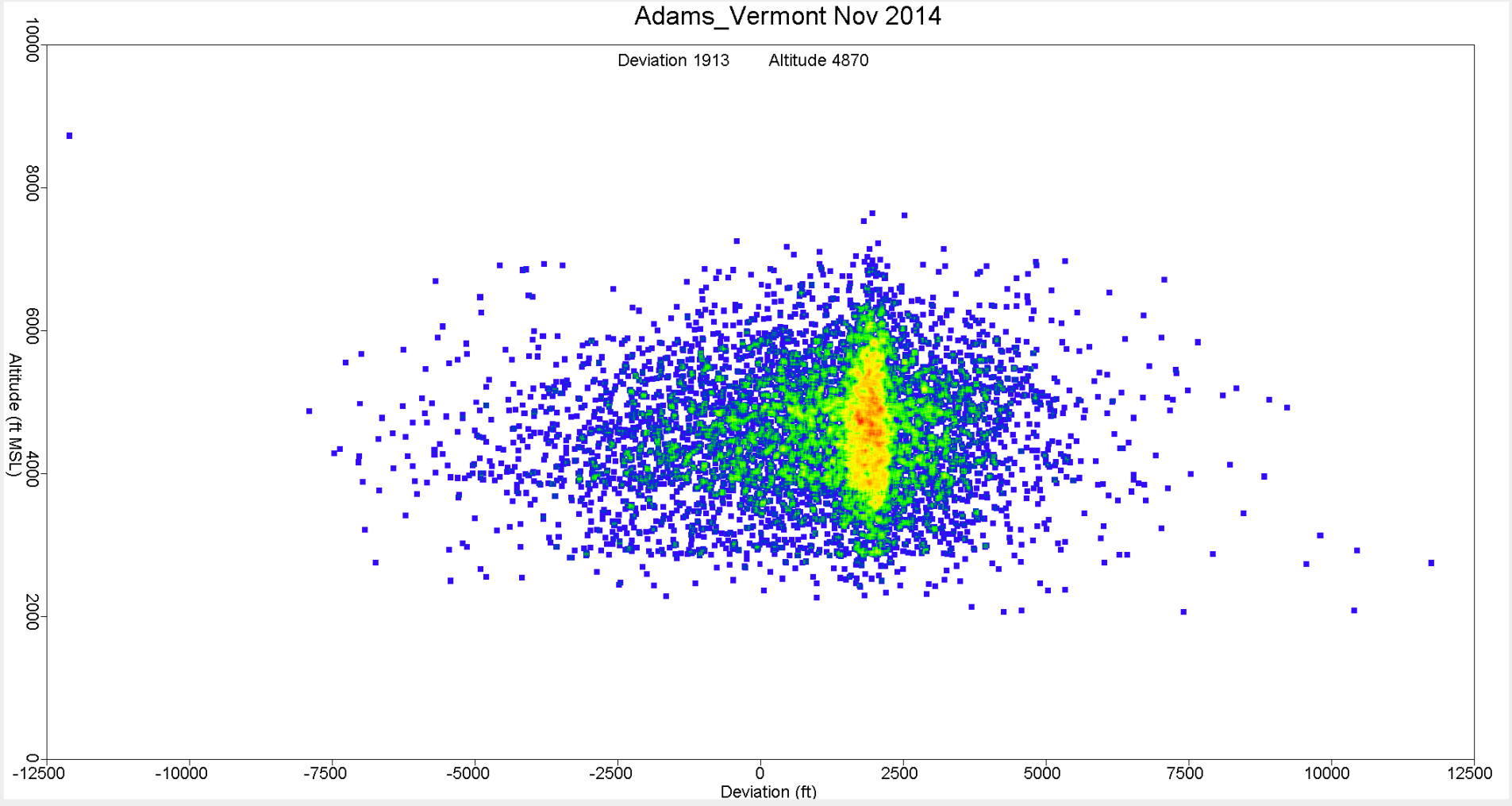

Adams_Vermont Jun 2014
Deviation 2113
Altitude 4940
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

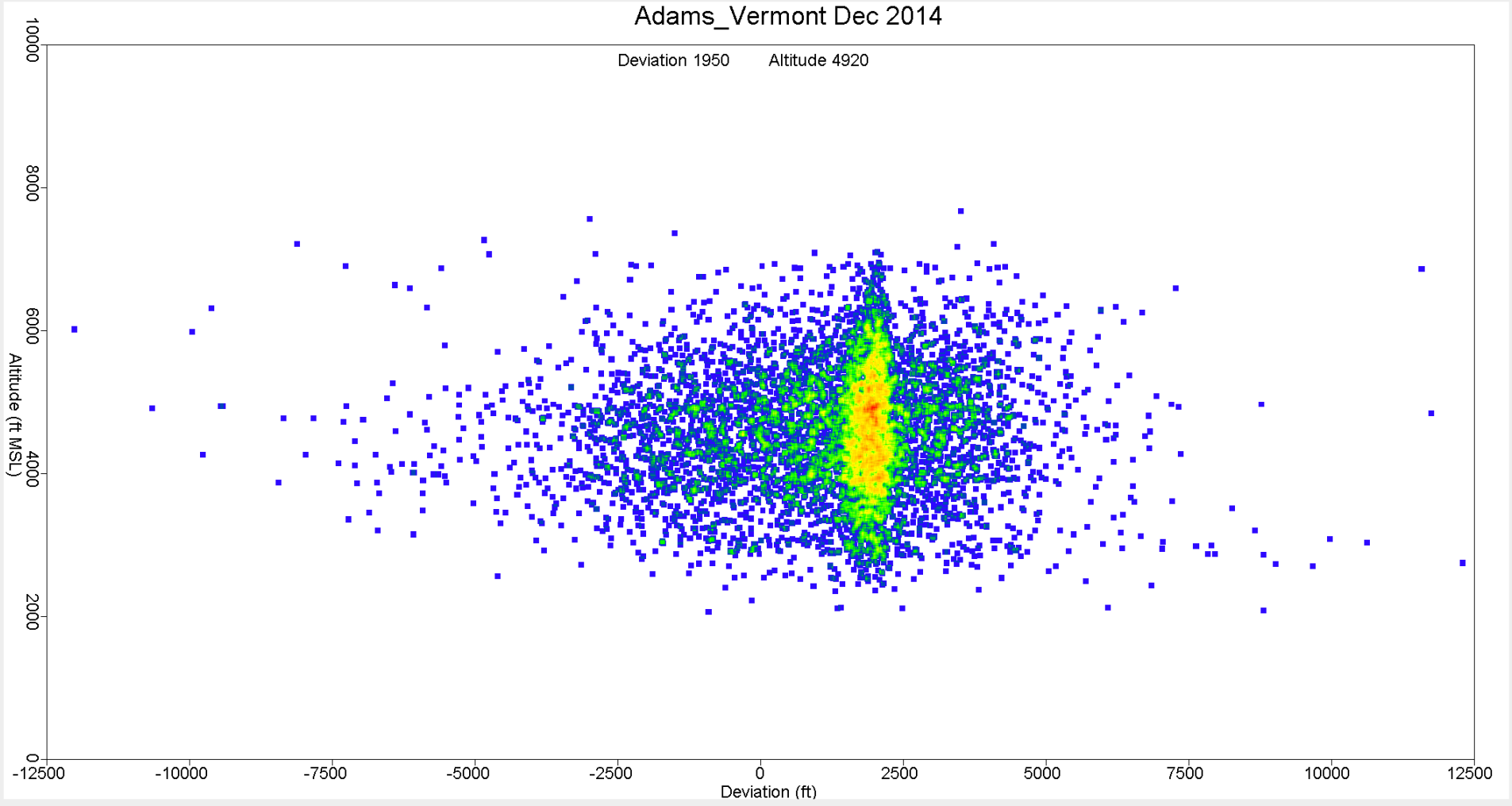

Adams_Vermont Jul 2014
Deviation 2038
Altitude 4830
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

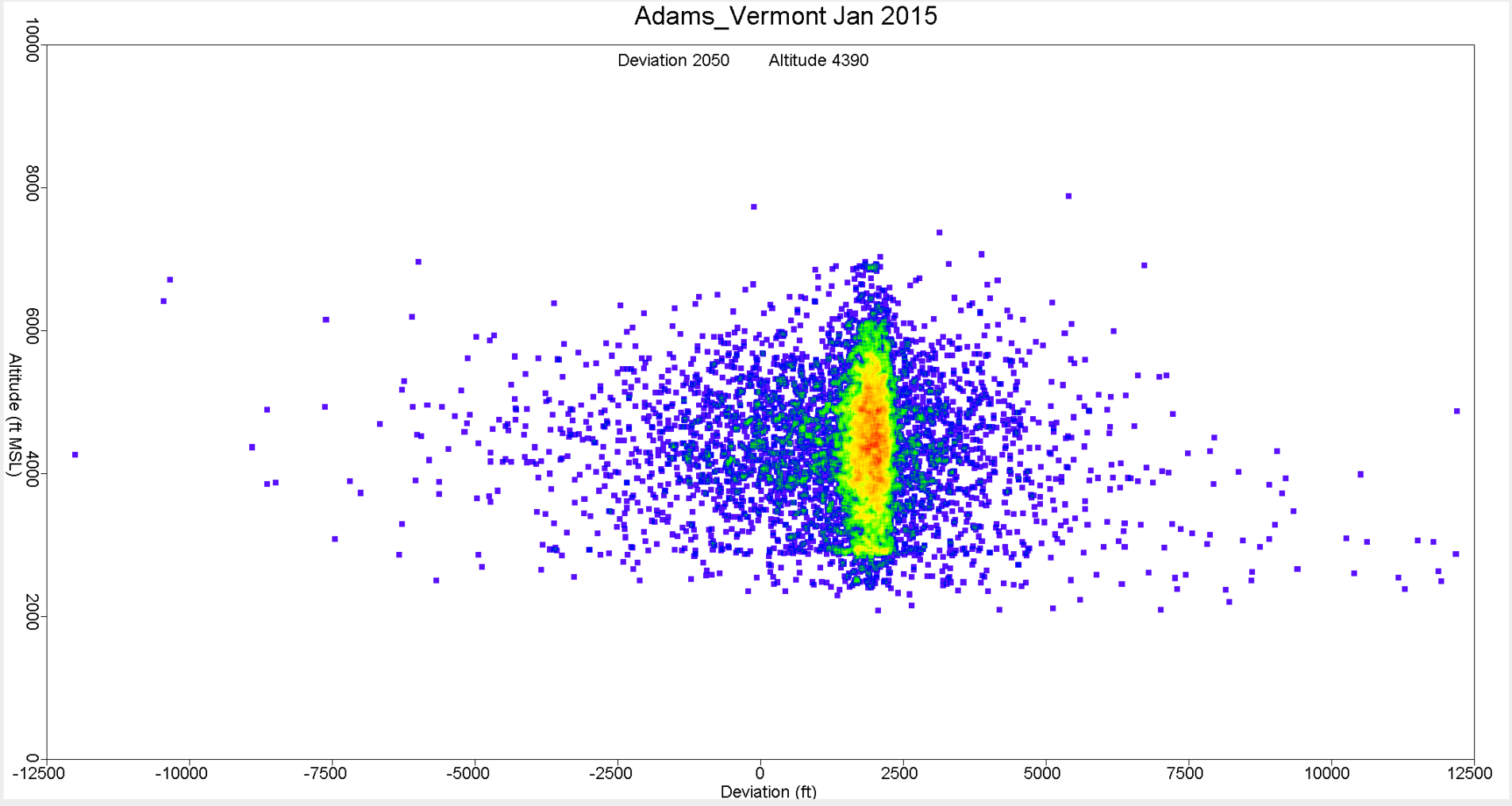

Adams_Vermont Aug 2014
Deviation 2050
Altitude 4910
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

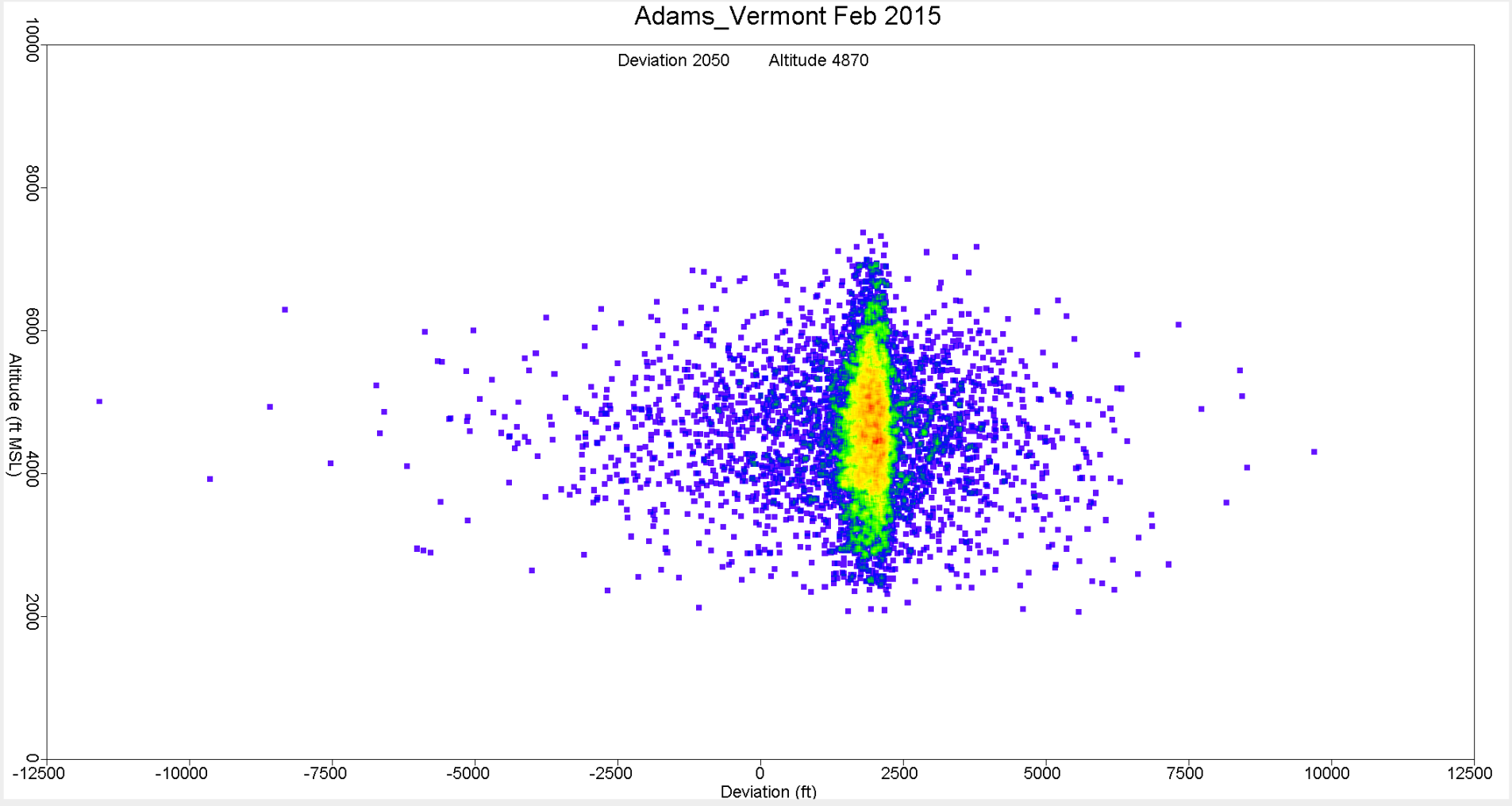

Adams_Vermont Sep 2014
Deviation 2125
Altitude 4870
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

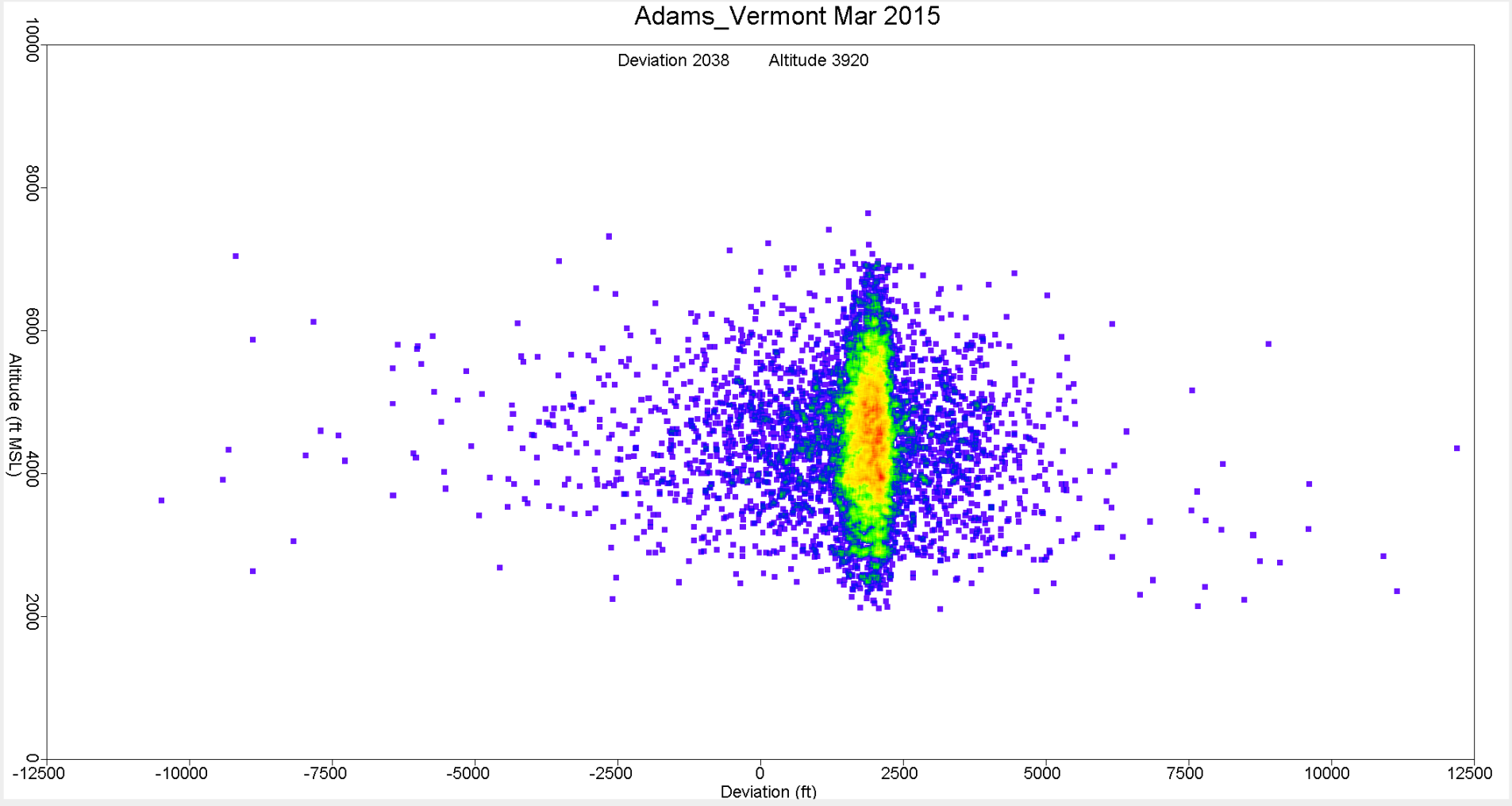

Adams_Vermont Oct 2014
Deviation 2050
Altitude 4900
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

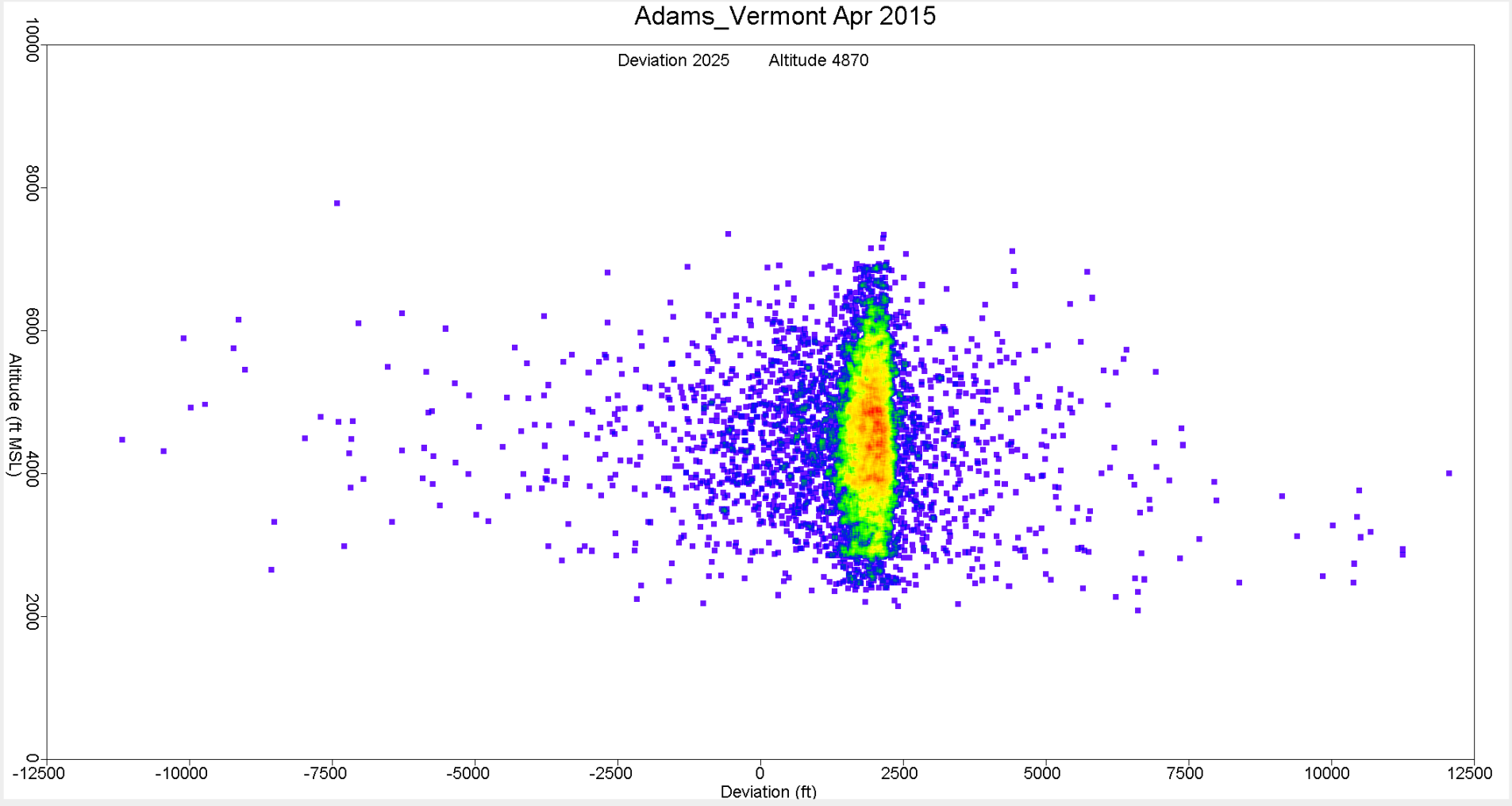

Adams_Vermont Nov 2014
Deviation 1913
Altitude 4870
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

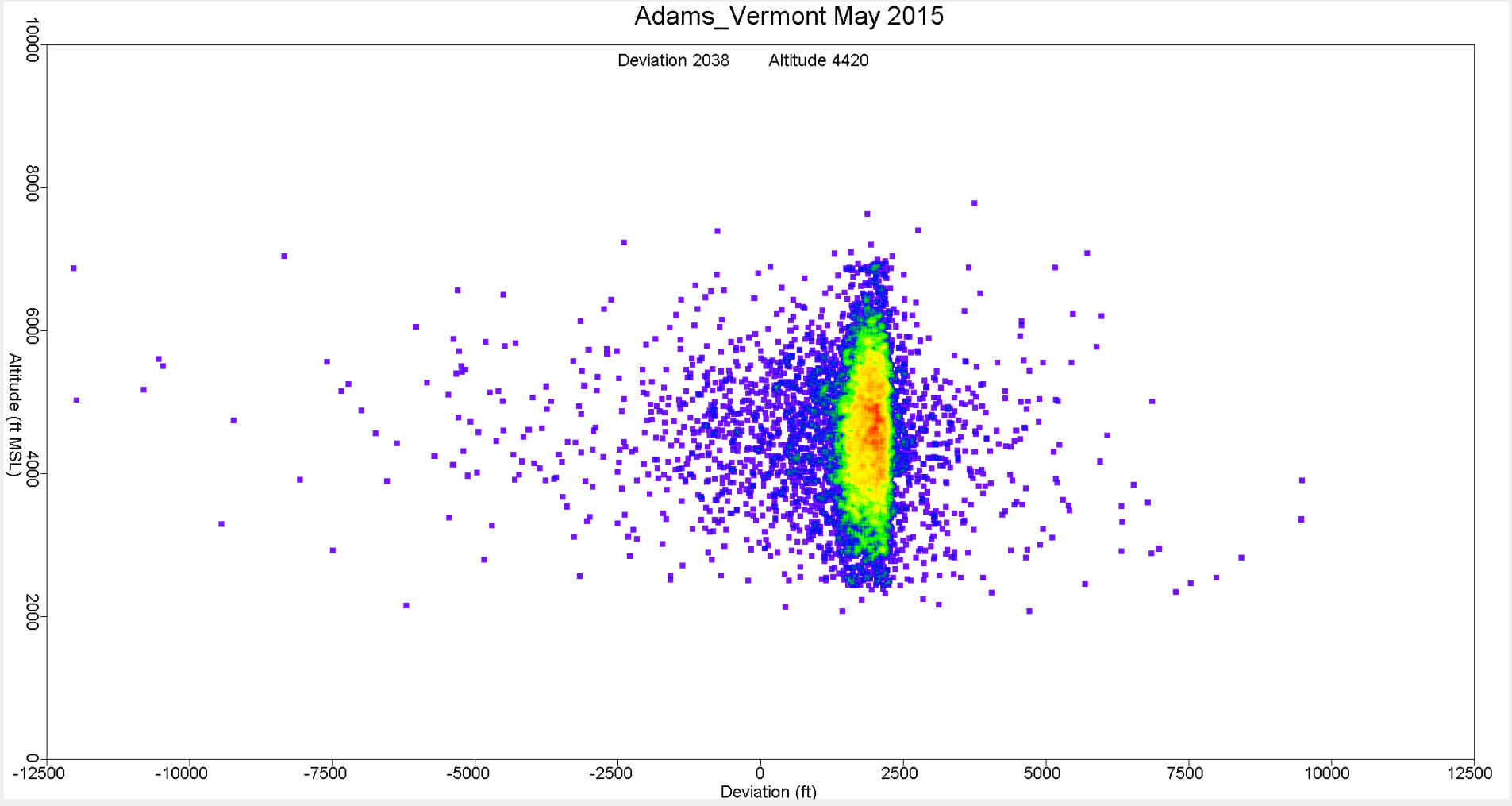

Adams_Vermont Dec 2014
Deviation 1950
Altitude 4920
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

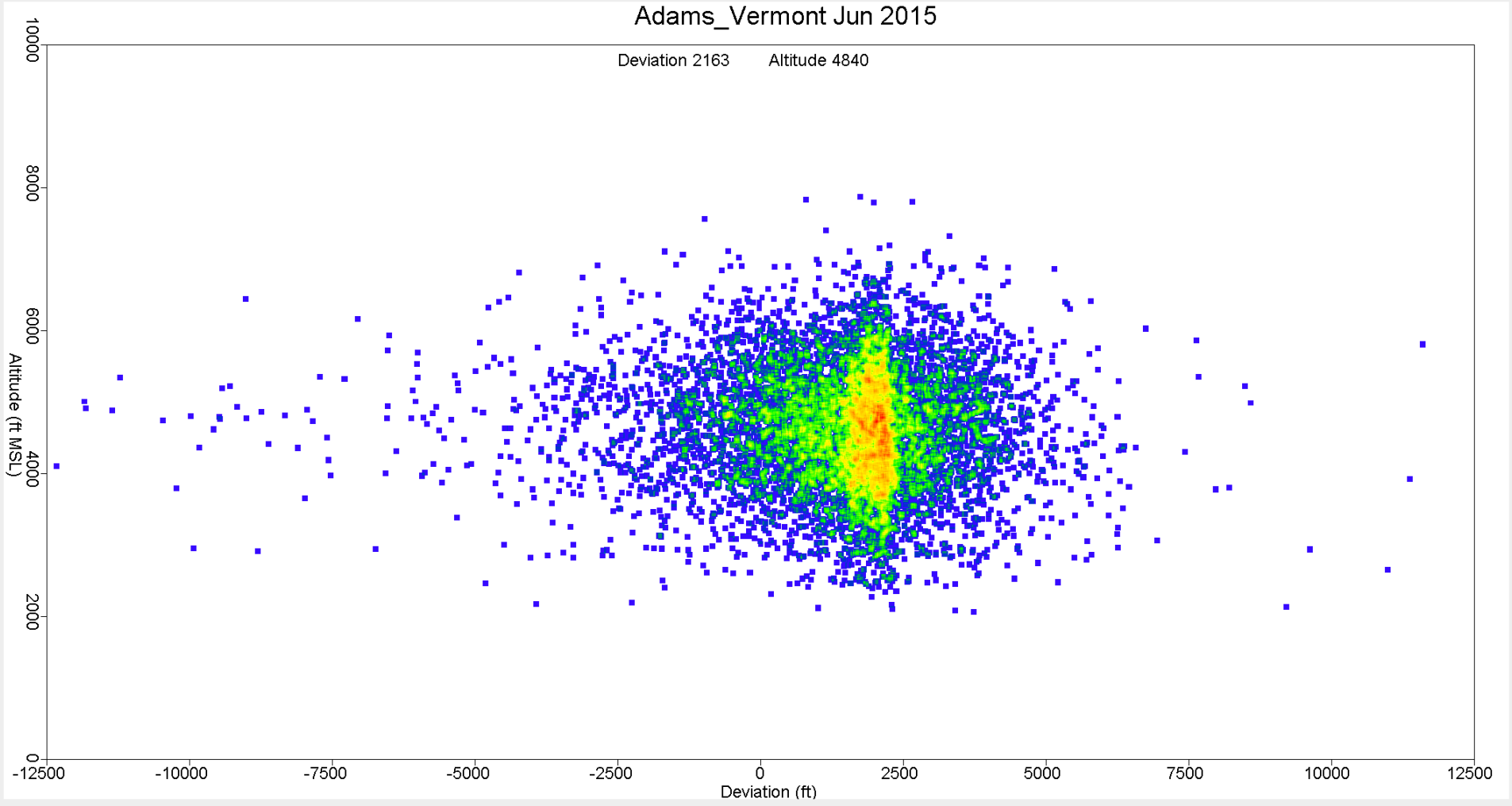

Adams_Vermont Jan 2015
Deviation 2050
Altitude 4390
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

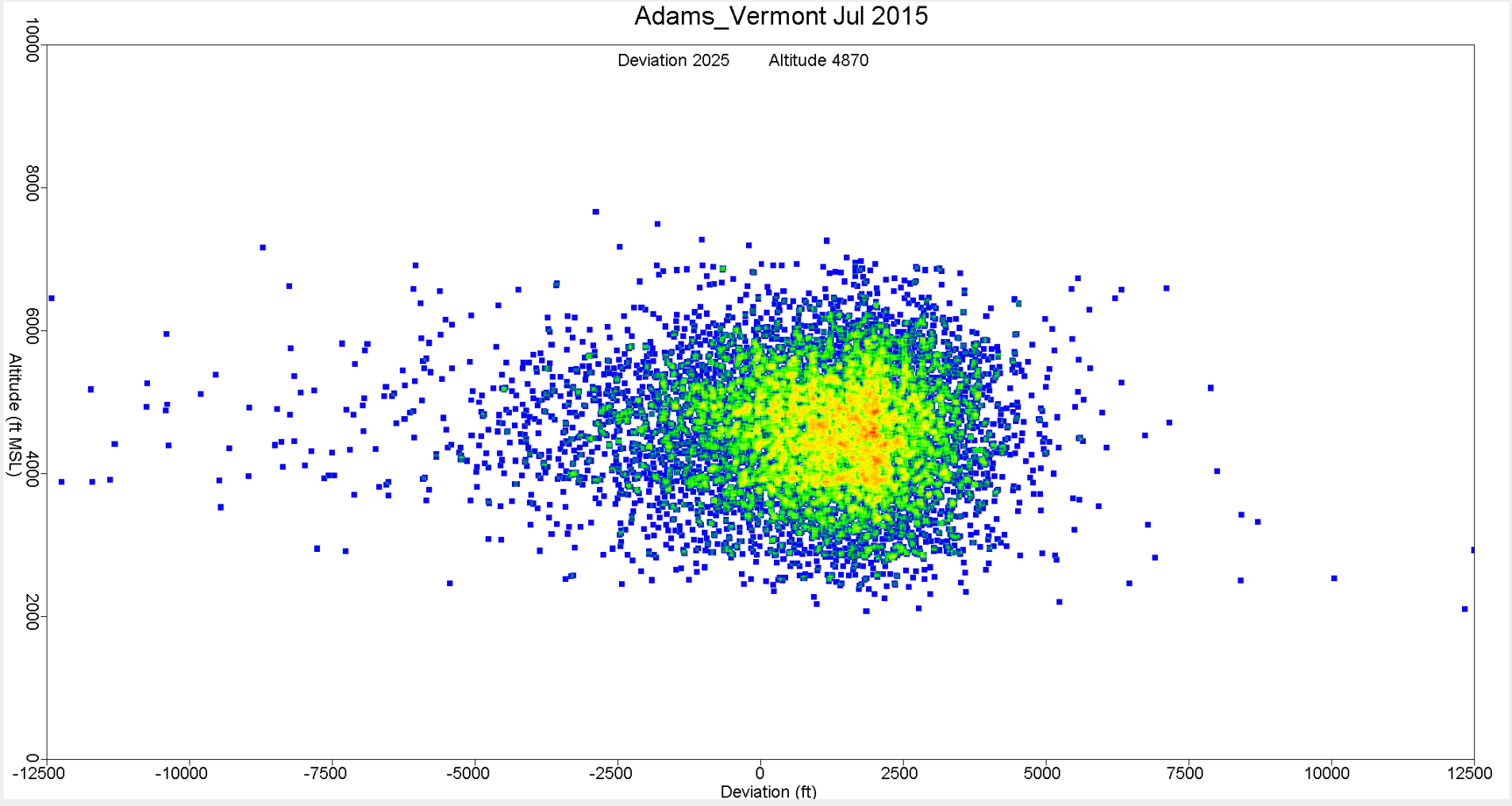

Adams_Vermont Feb 2015
Deviation 2050
Altitude 4870
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

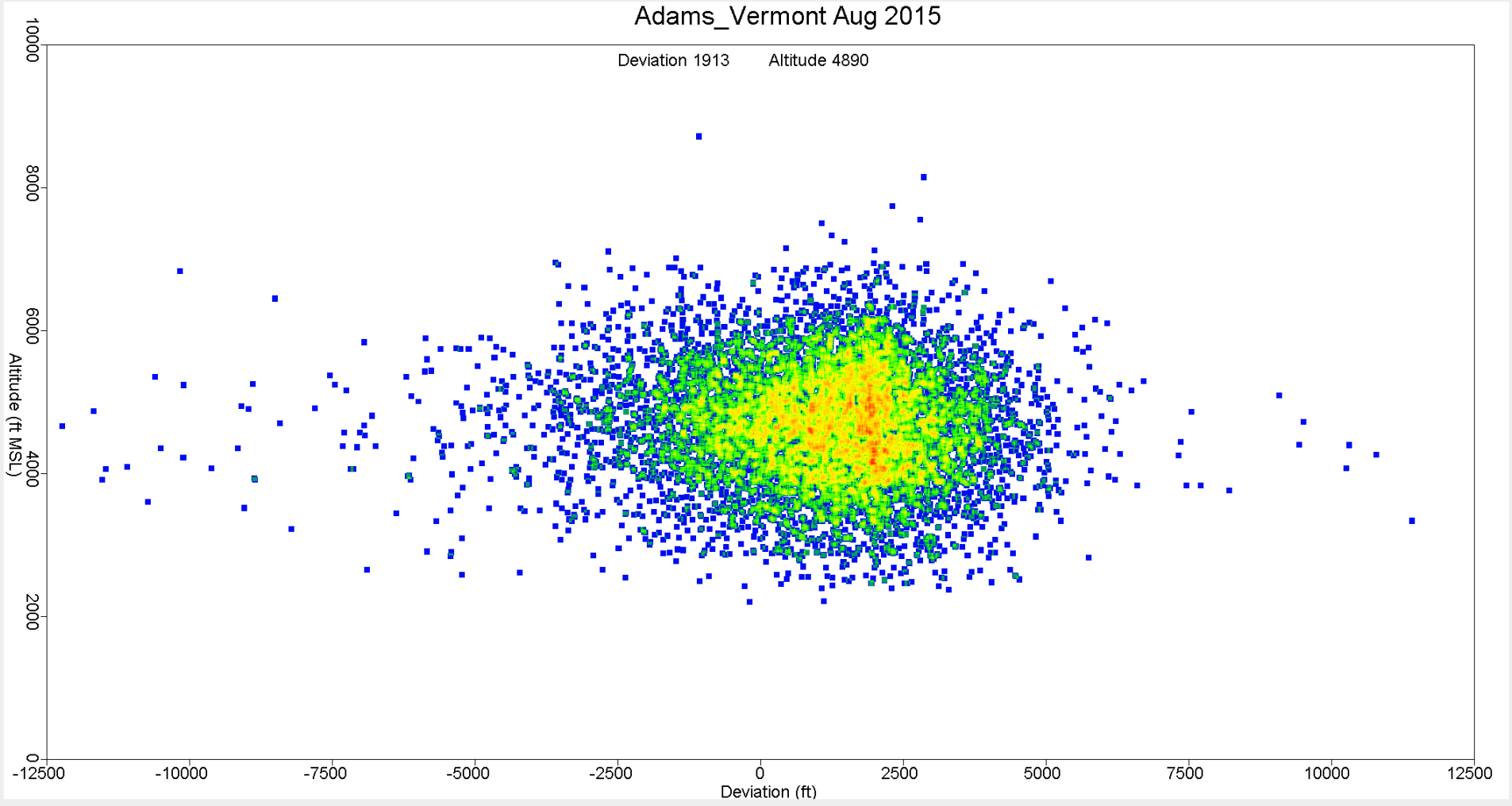

Adams_Vermont Mar 2015
Deviation 2038
Altitude 3920
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

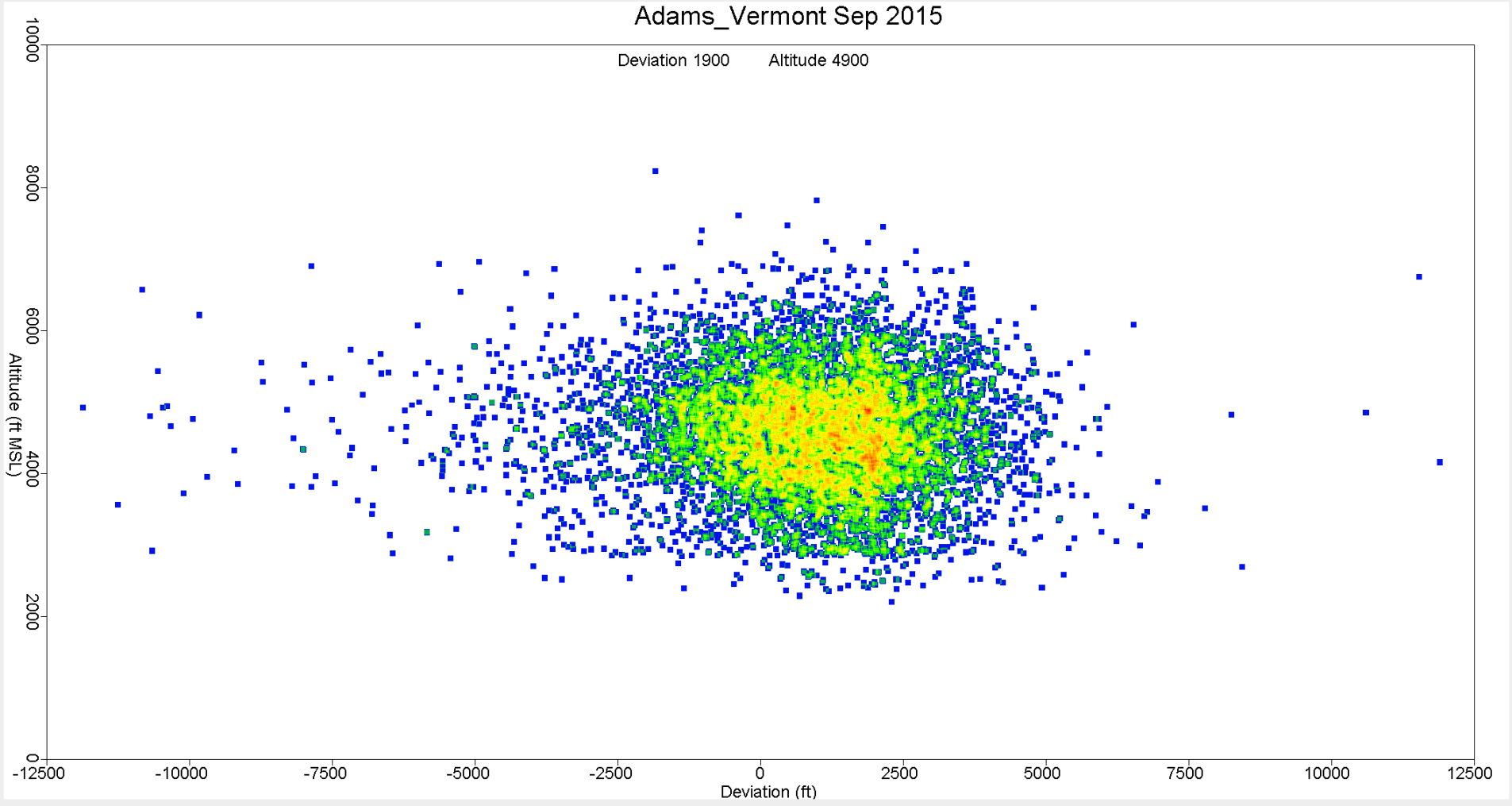

Adams_Vermont Apr 2015
Deviation 2025
Altitude 4870
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

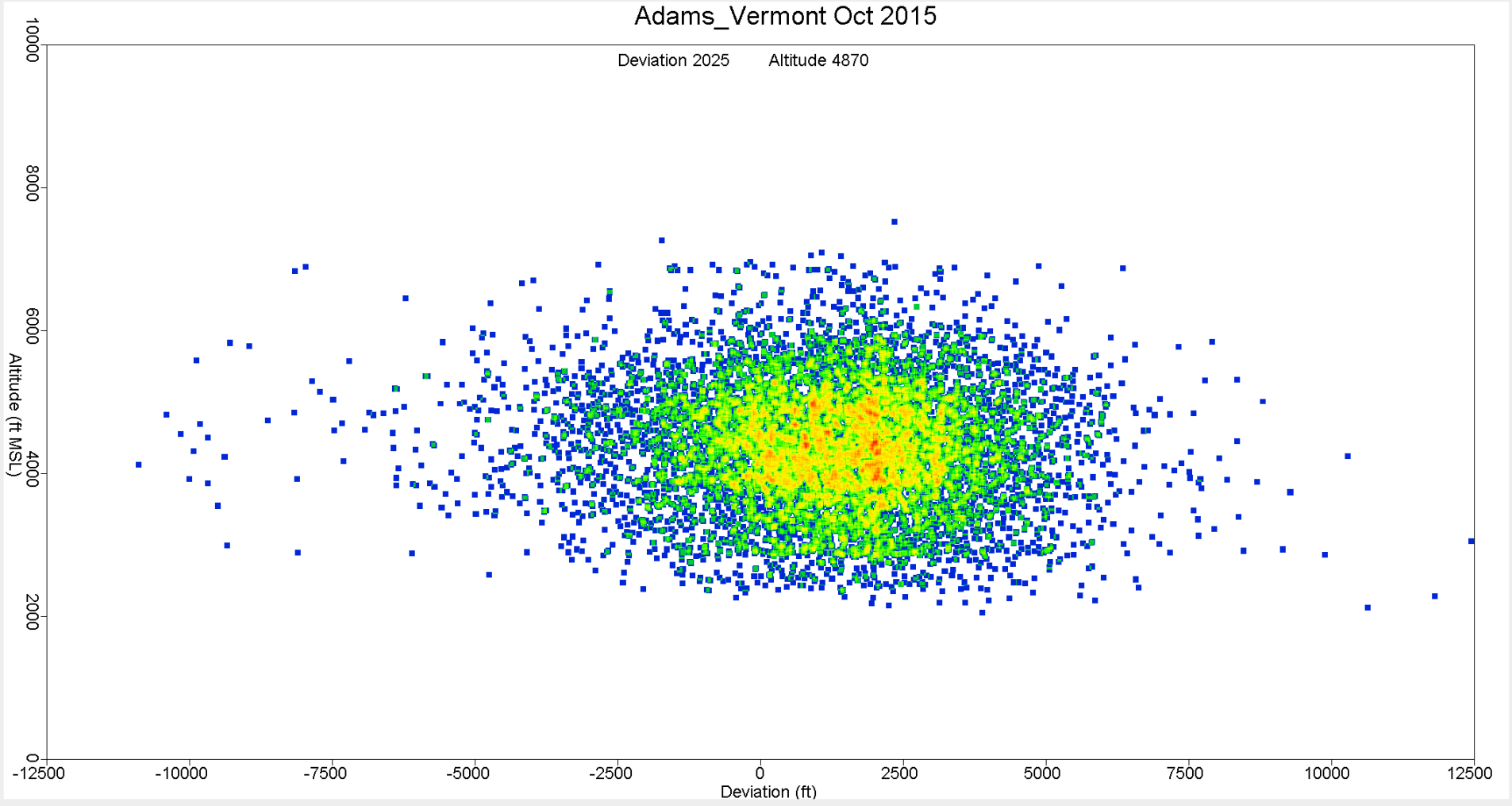

Adams_Vermont May 2015
Deviation 2038
Altitude 4420
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

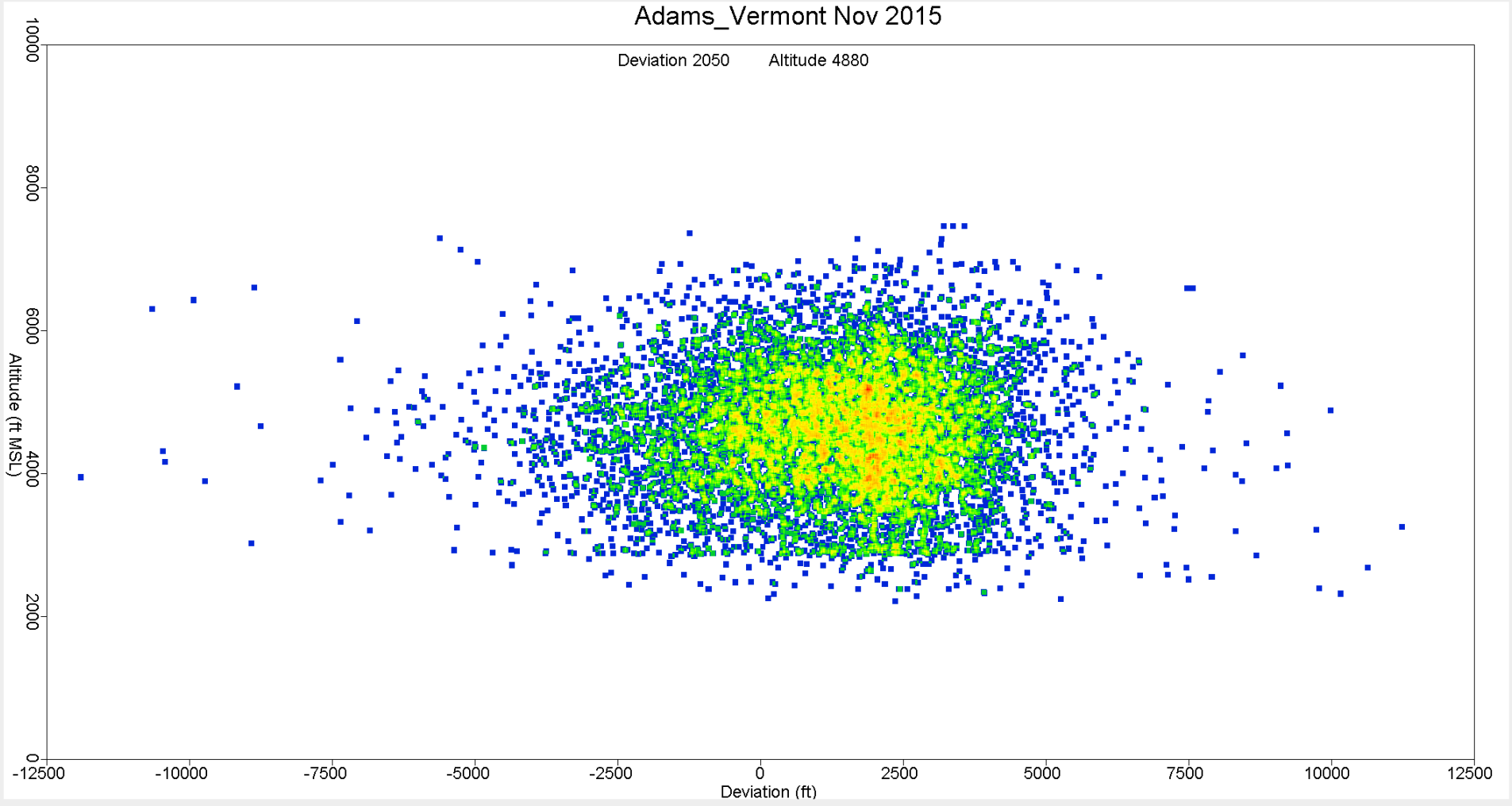

Adams_Vermont Jun 2015
Deviation 2163
Altitude 4840
10000
8000
6000
4000
2000
0
Altitude (ft MSL)
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

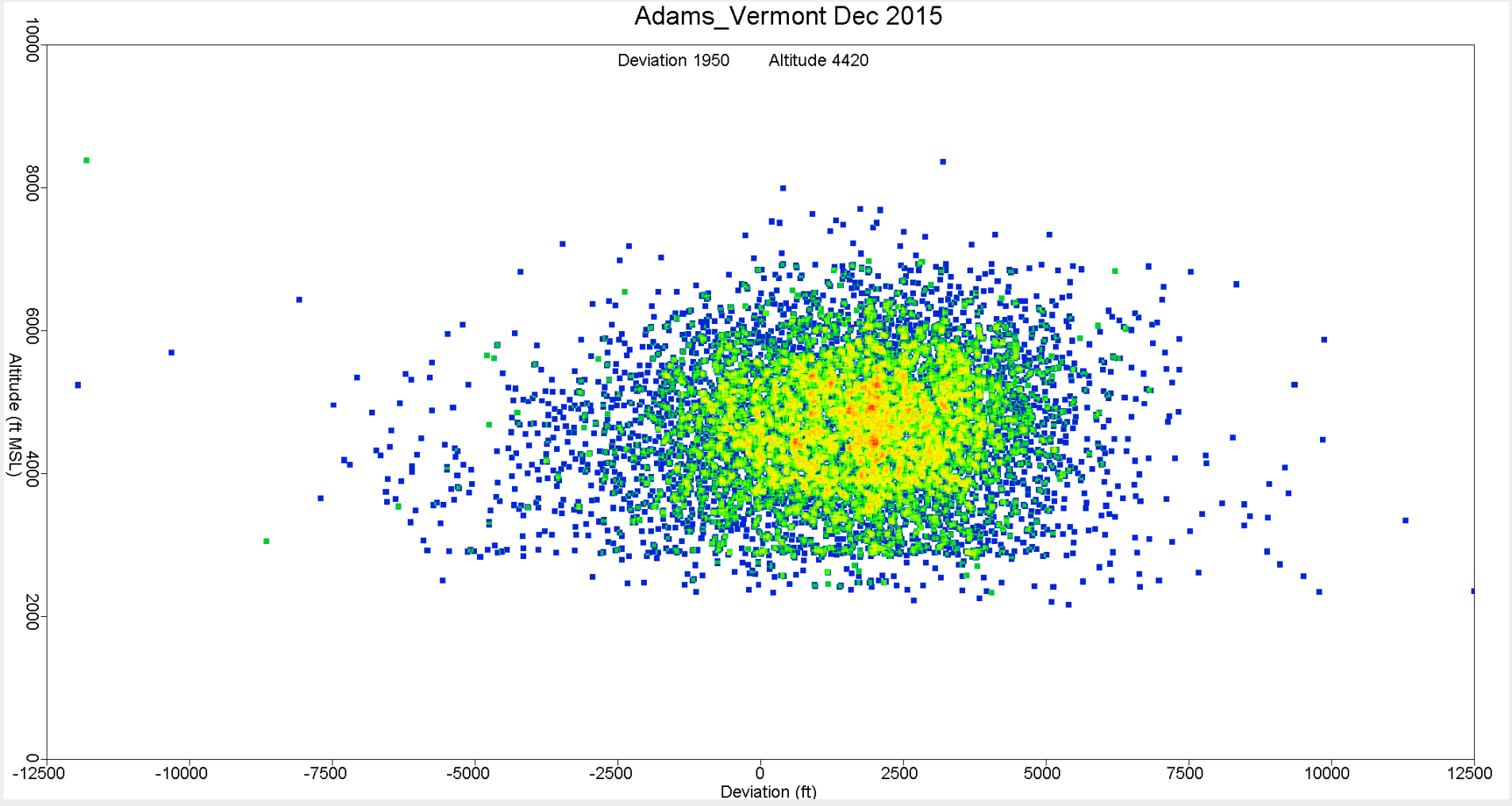

Adams_Vermont Jul 2015
Deviation 2025
Altitude 4870
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)


Adams_Vermont Aug 2015
Deviation 1913
Altitude 4890
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)


Adams_Vermont Sep 2015
Deviation 1900
Altitude 4900
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)


Adams_Vermont Oct 2015
Deviation 2025
Altitude 4870
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

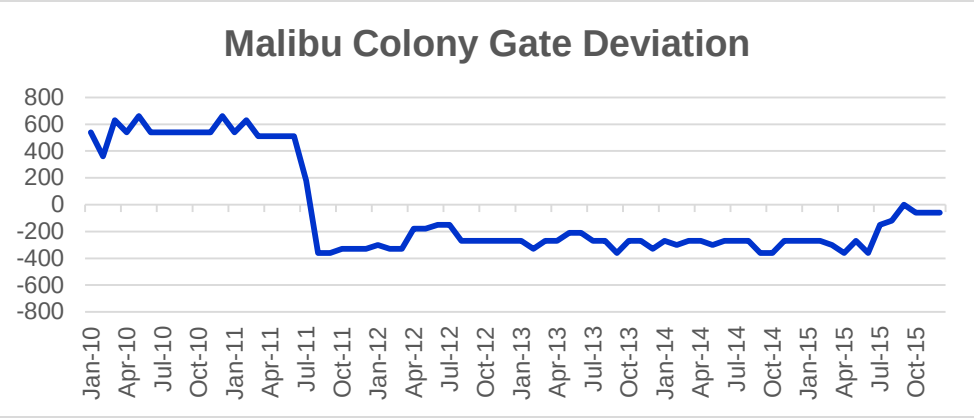

Adams_Vermont Nov 2015
Deviation 2050
Altitude 4880
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

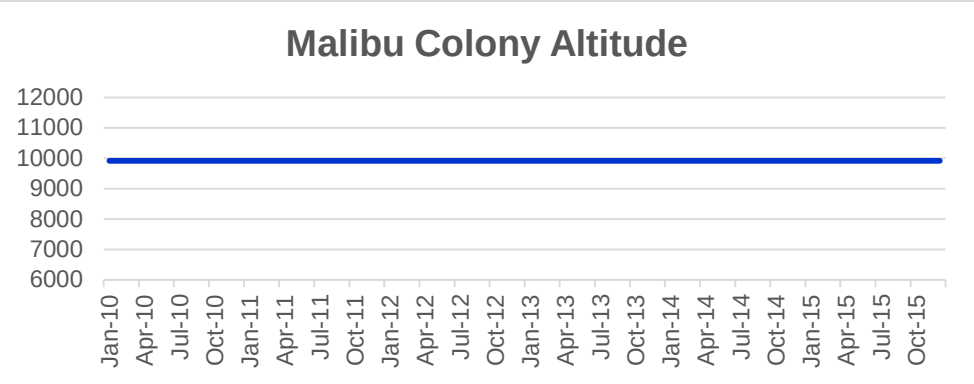

Adams_Vermont Dec 2015
Deviation 1950
Altitude 4420
Altitude (ft MSL)
10000
8000
6000
4000
2000
0
-12500
-10000
-7500
-5000
-2500
0
2500
5000
7500
10000
12500
Deviation (ft)

Study Results – Histogram Deviation Graphs

- For each altitude distribution graph, a histogram was created for the range of altitudes and relative gate location for each month for each gate
- The histogram peak altitude depicts where the most concentrated altitudes occurred, while the histogram deviation plot indicates changes in gate crossing locations
- These values were compared on a month-to-month basis for each gate to determine whether any changes occurred over the six-year period
- Two changes in the nominal location of flight tracks were revealed
  - One west of the SMO VOR in approximately July 2011
  - One east of the of the SMO VOR in approximately June of 2014

Study Results – Histogram Deviation Graphs



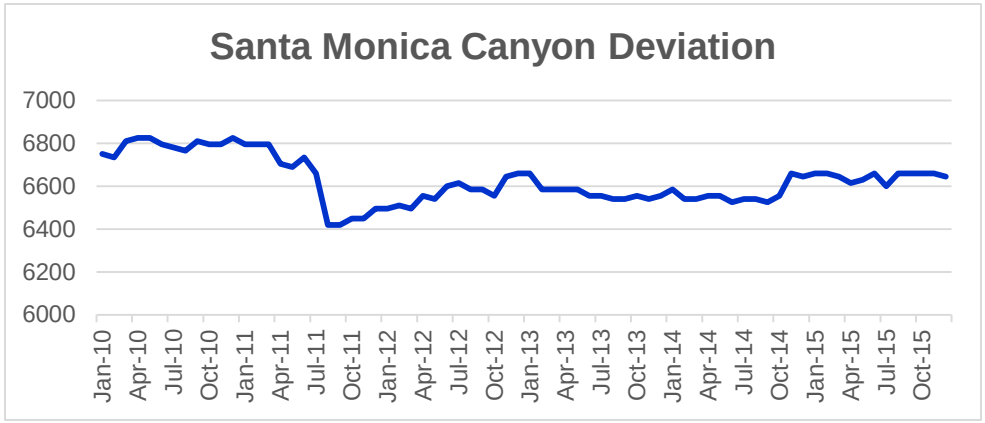


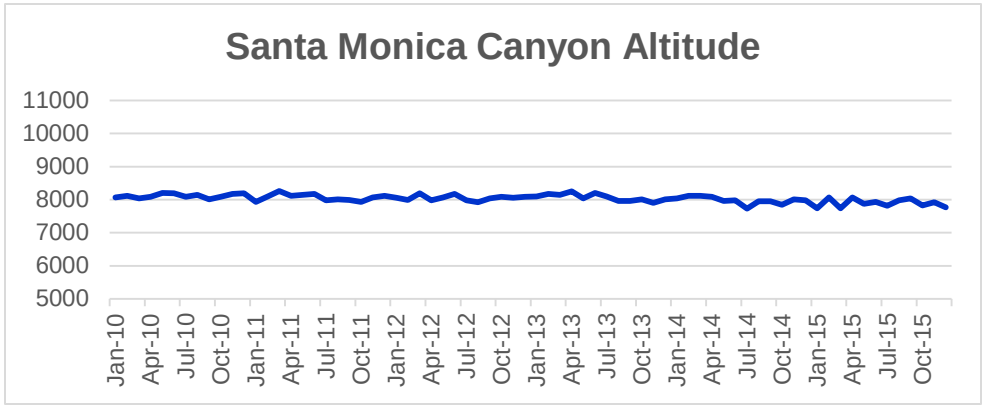
Source: HMMH 2016

- The gate deviation graph reflects a change in gate crossing location in approximately July 2011

- The altitude graph reflects a consistent histogram peak altitudes throughout the six-year study period

Study Results – Histogram Deviation Graphs



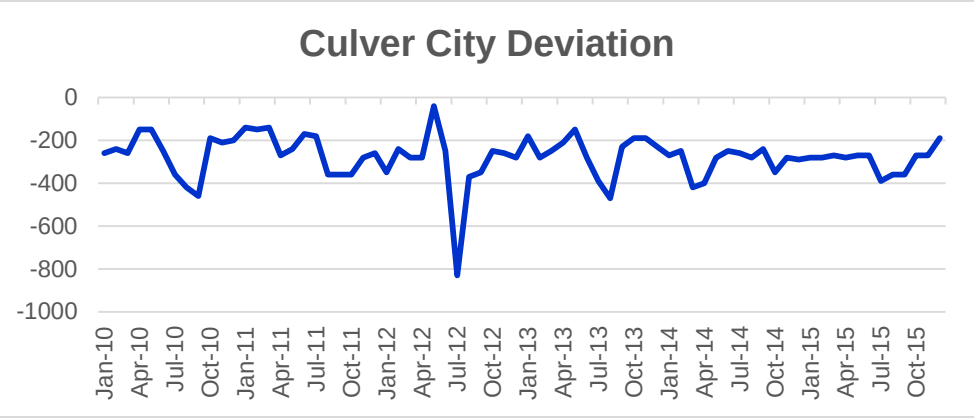


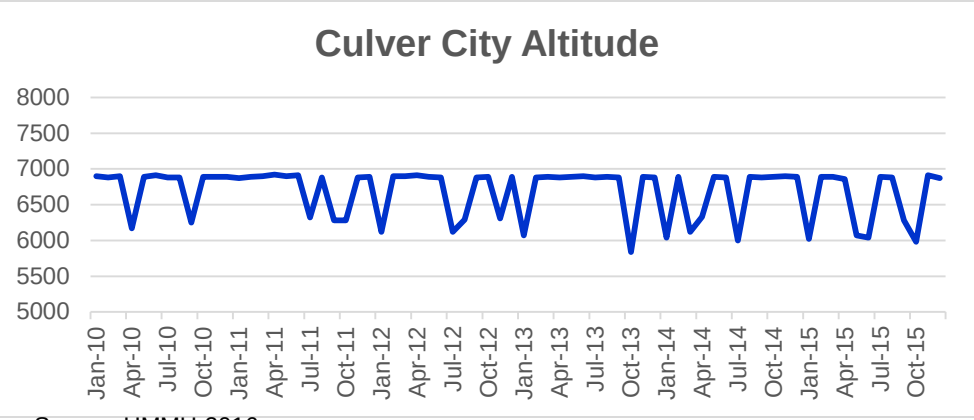
Source: HMMH 2016

- The gate deviation graph reflects a change in gate crossing location in approximately July 2011

- The altitude graph reflects a consistent histogram peak altitudes throughout the six-year study period

Study Results – Histogram Deviation Graphs



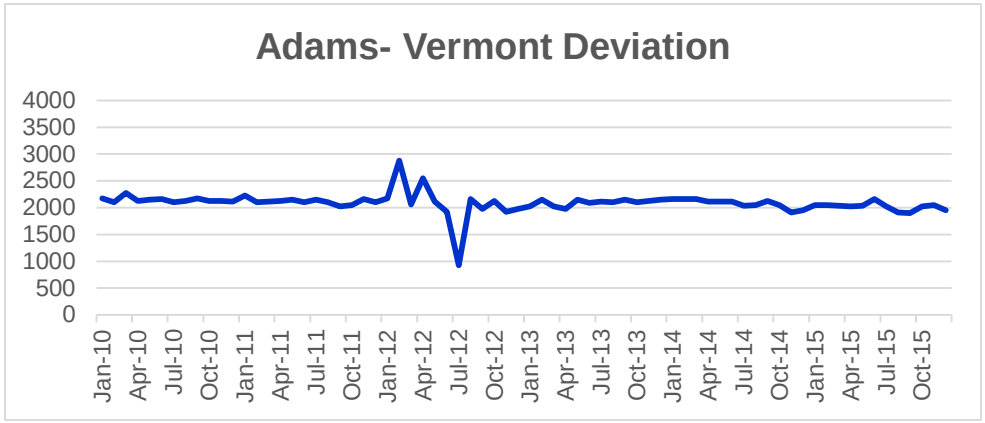


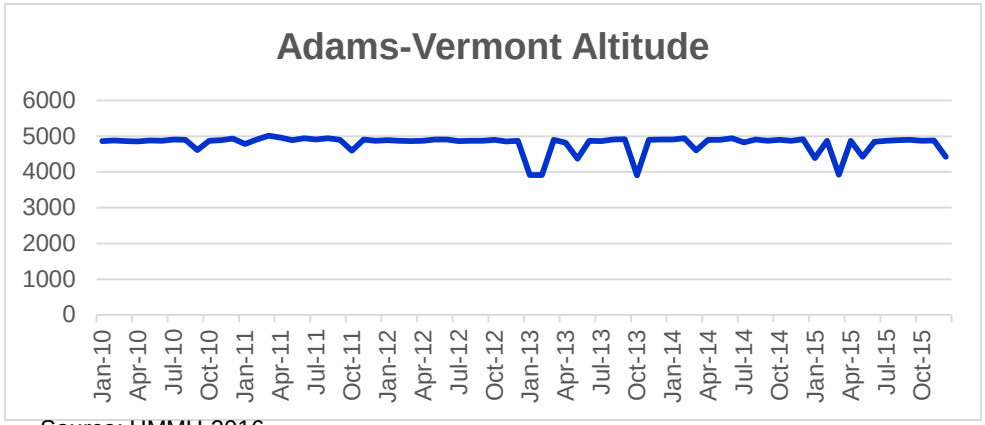
Source: HMMH 2016

- The gate deviation graph reflects changes in gate crossing locations from April through October 2012

- The altitude graph reflects a range from approximately 6,900 feet to 6,000 feet over the six-year study period

Study Results – Histogram Deviation Graphs





Source: HMMH 2016

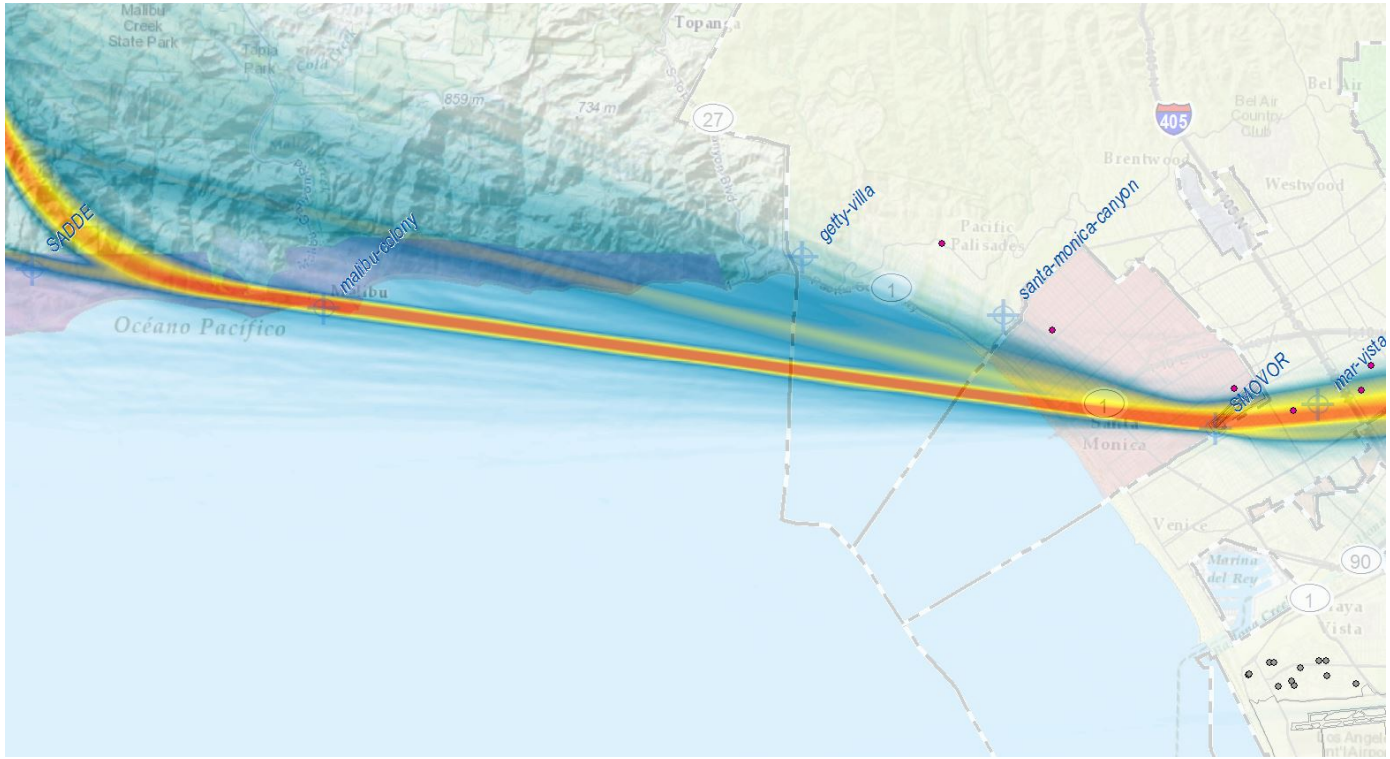
- The gate deviation graph reflects a couple of changes in gate crossing locations from January through August 2012

- The altitude graph reflects a range from approximately 4,900 feet to 3,900 feet over the six-year study period

Study Results – Complainant Distribution During 2014 and 2015

- To examine whether there was a correlation between the changes in aircraft flight tracks and noise complaints, LAWA staff plotted noise complainant locations over representative flight tracks
- The complainant locations were grouped into four six-month periods during 2014 and 2015
- For clarity, the complainant distribution plots are presented in two groups:
  - One for the areas to the west of the SMO VOR
  - One for the areas east of the SMO VOR

Study Results – Complainant Distribution West of SMO VOR



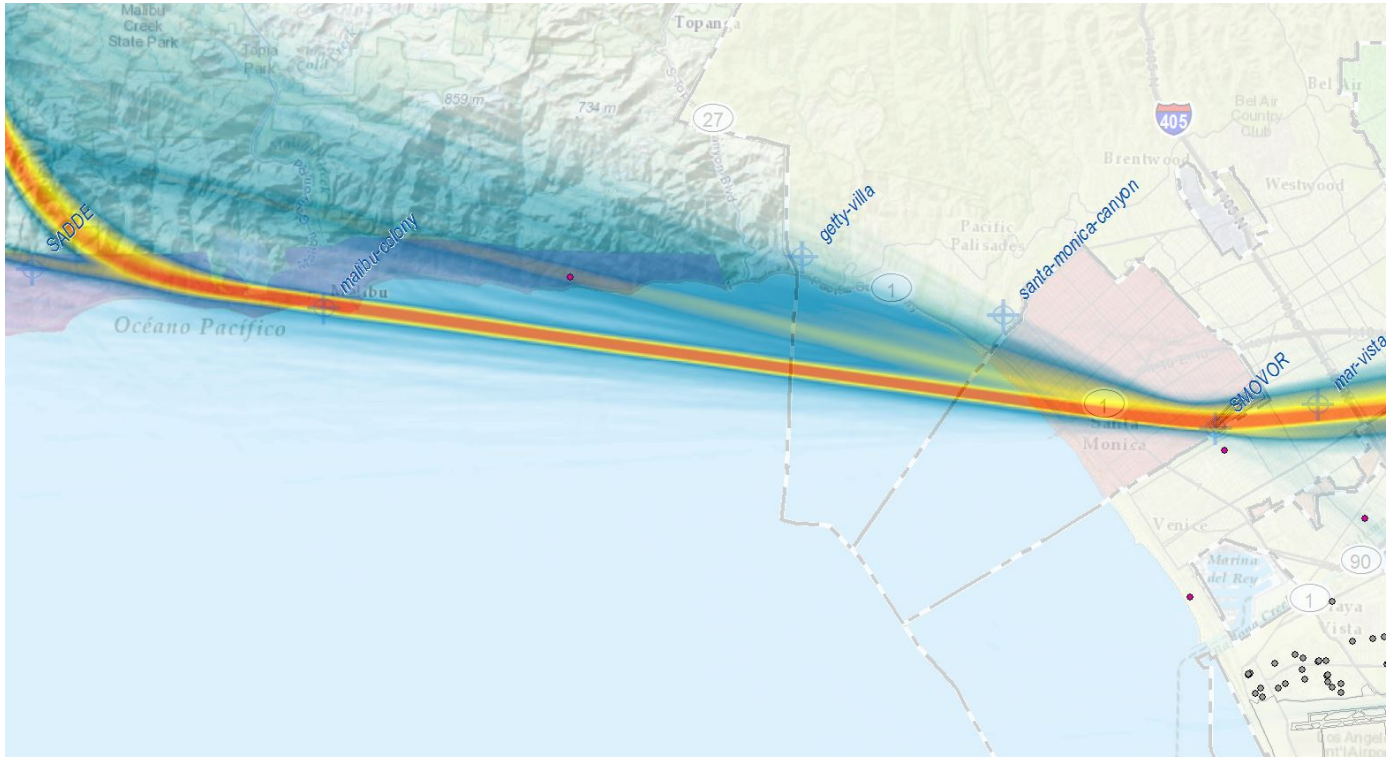
Complainant Data: January – June 2014

Flight Track Data: April 2014

- Complainant Location

Source: LAWA, HMMH 2016

Study Results – Complainant Distribution West of SMO VOR



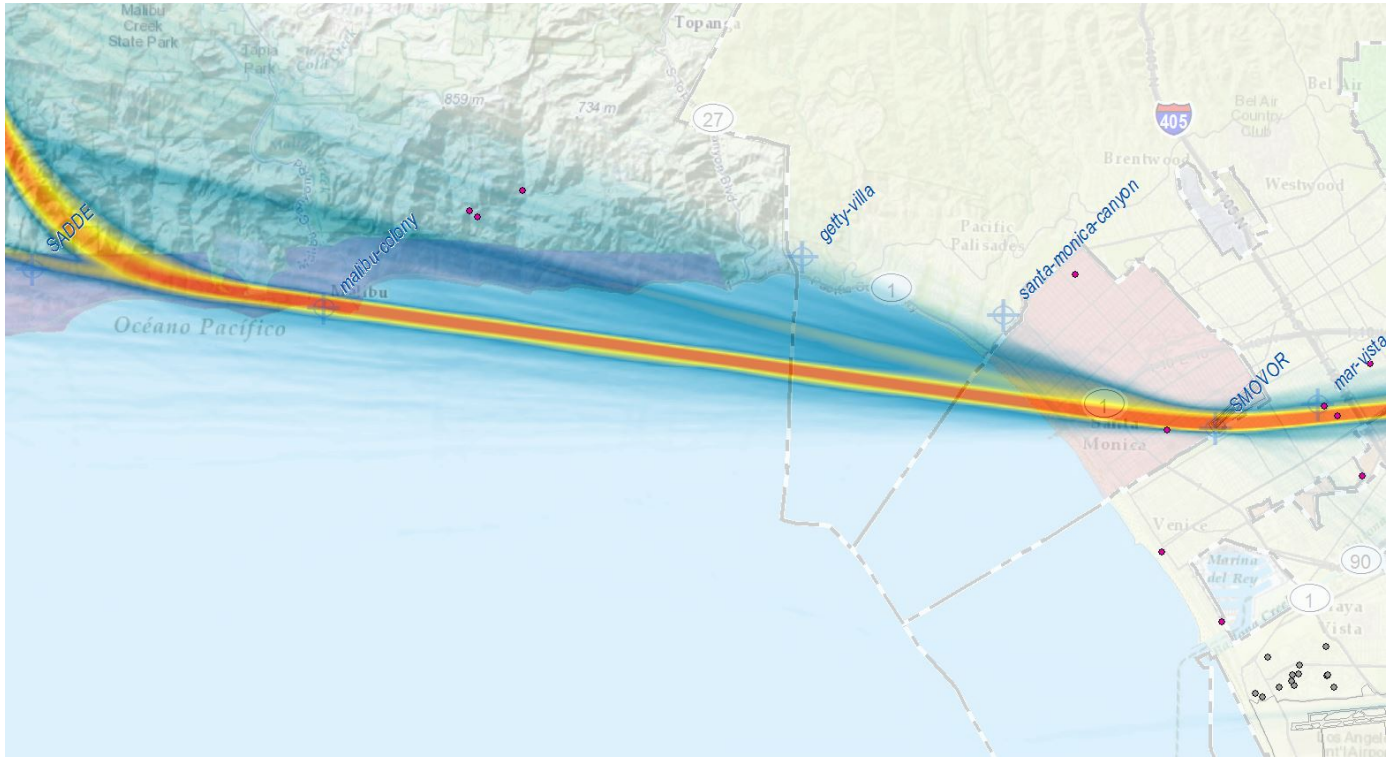
Complainant Data:
July – December 2014

Flight Track Data:
October 2014

- Complainant Location

Source: LAWA, HMMH 2016

Study Results – Complainant Distribution West of SMO VOR



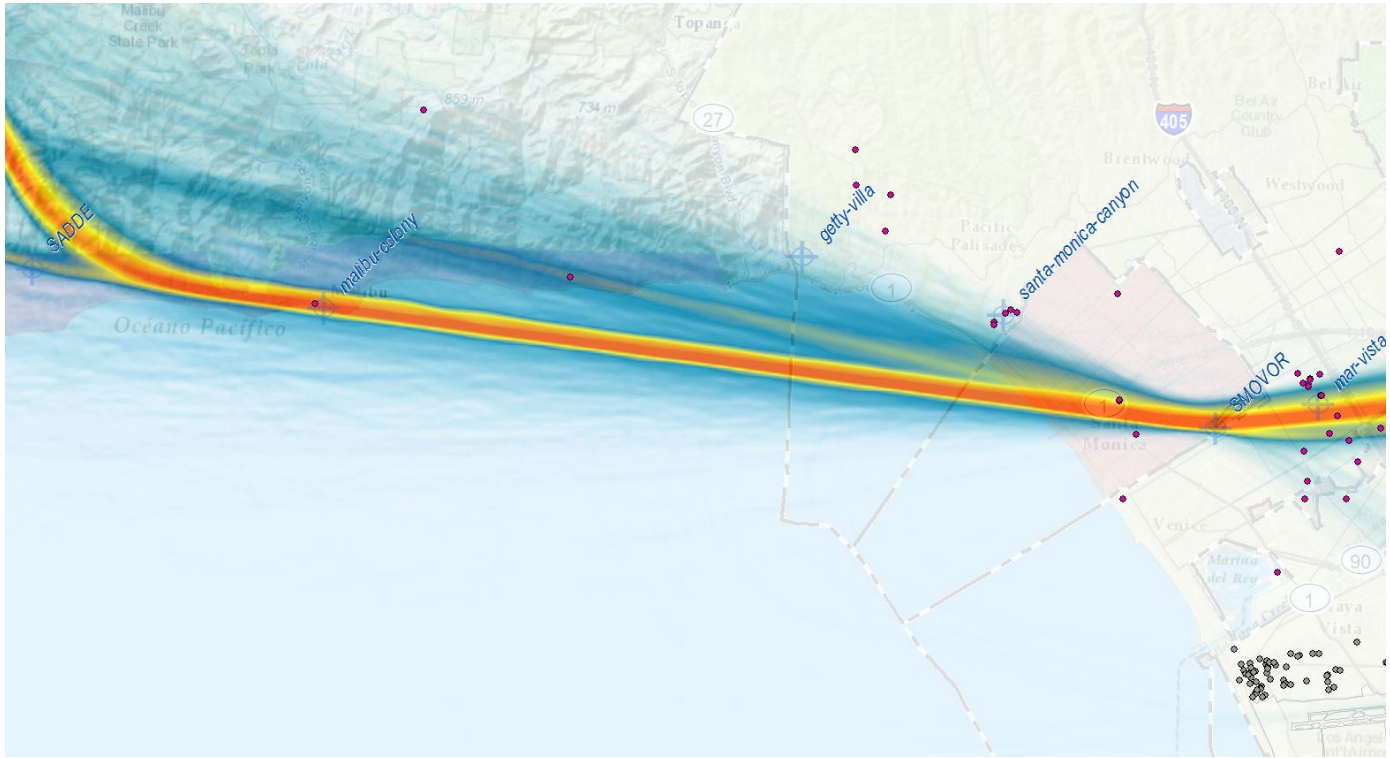
Complainant Data:
January – June 2015

Flight Track Data:
April 2015

- Complainant Location

Source: LAWA, HMMH 2016

Study Results – Complainant Distribution West of SMO VOR



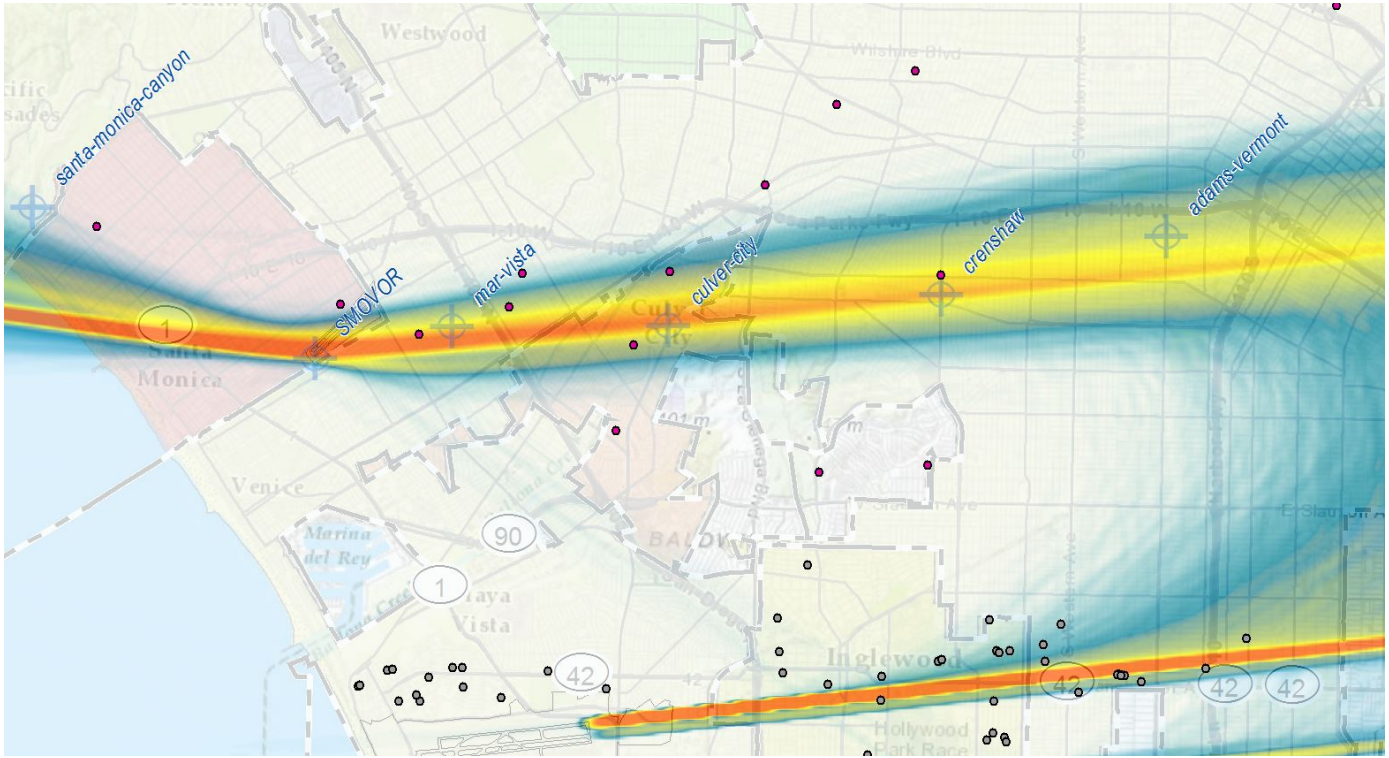
Complainant Data:
July – December 2015

Flight Track Data:
October 2015

- Complainant Location

Source: LAWA, HMMH 2016

Study Results – Complainant Distribution East of SMO VOR



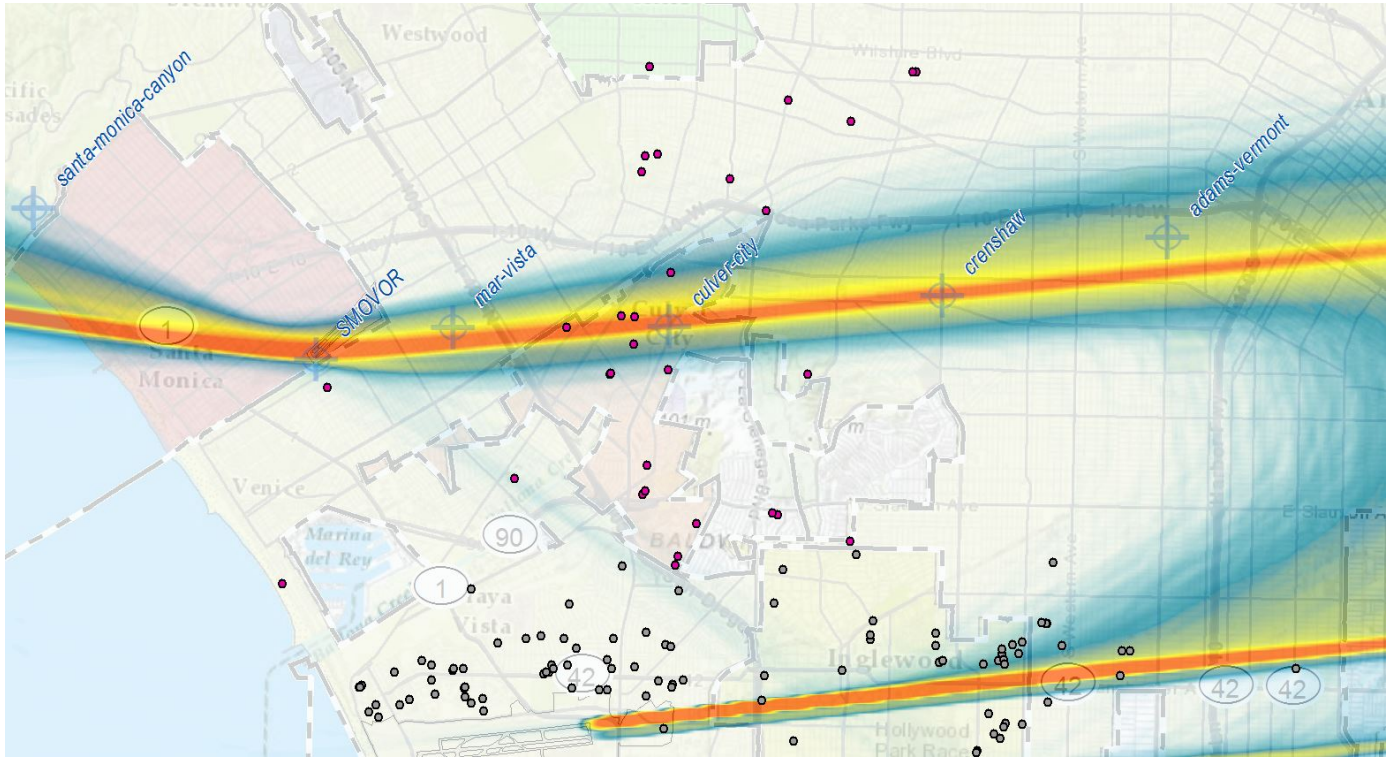
Complainant Data:
January – June 2014

Flight Track Data:
April 2014

- Complainant Location

Source: LAWA, HMMH 2016

Study Results – Complainant Distribution East of SMO VOR



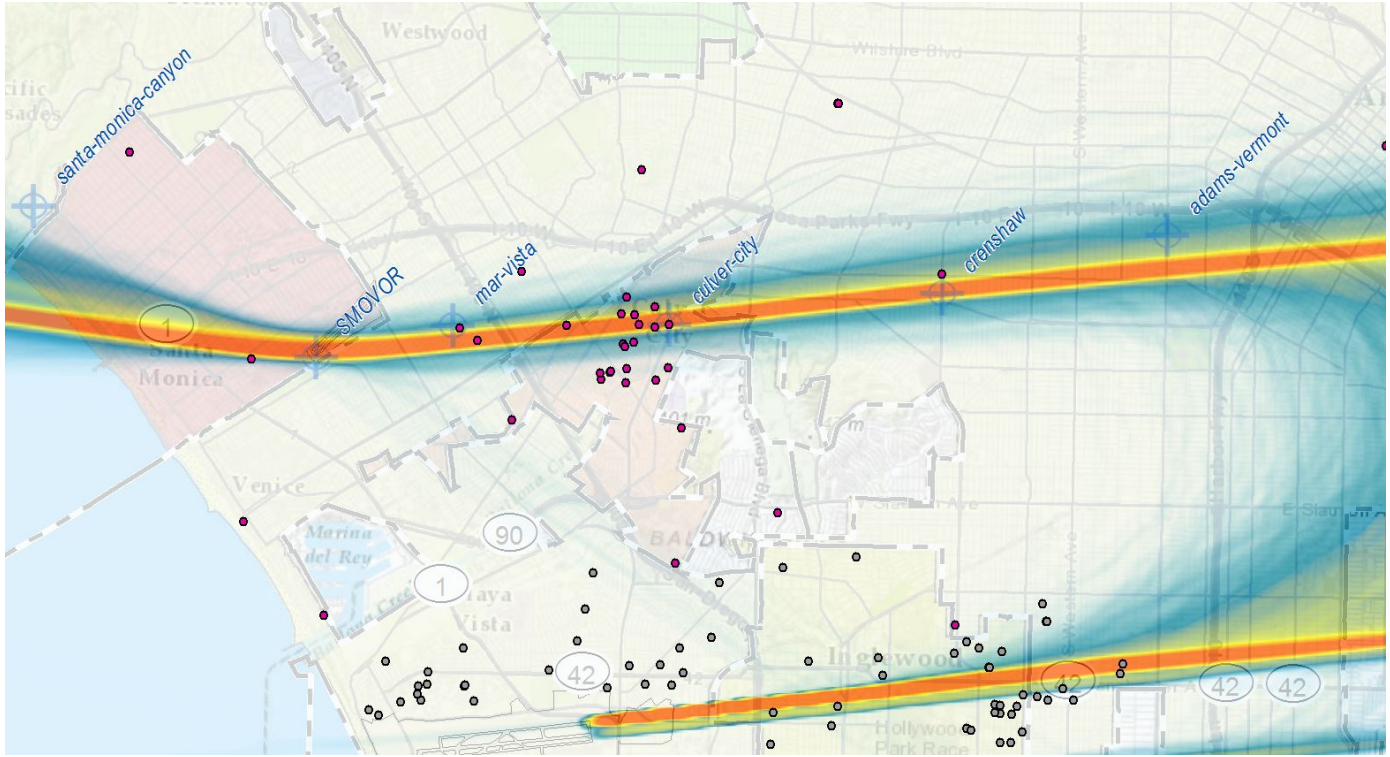
Complainant Data:
July – December 2014

Flight Track Data:
October 2014

- Complainant Location

Source: LAWA, HMMH 2016

Study Results – Complainant Distribution East of SMO VOR



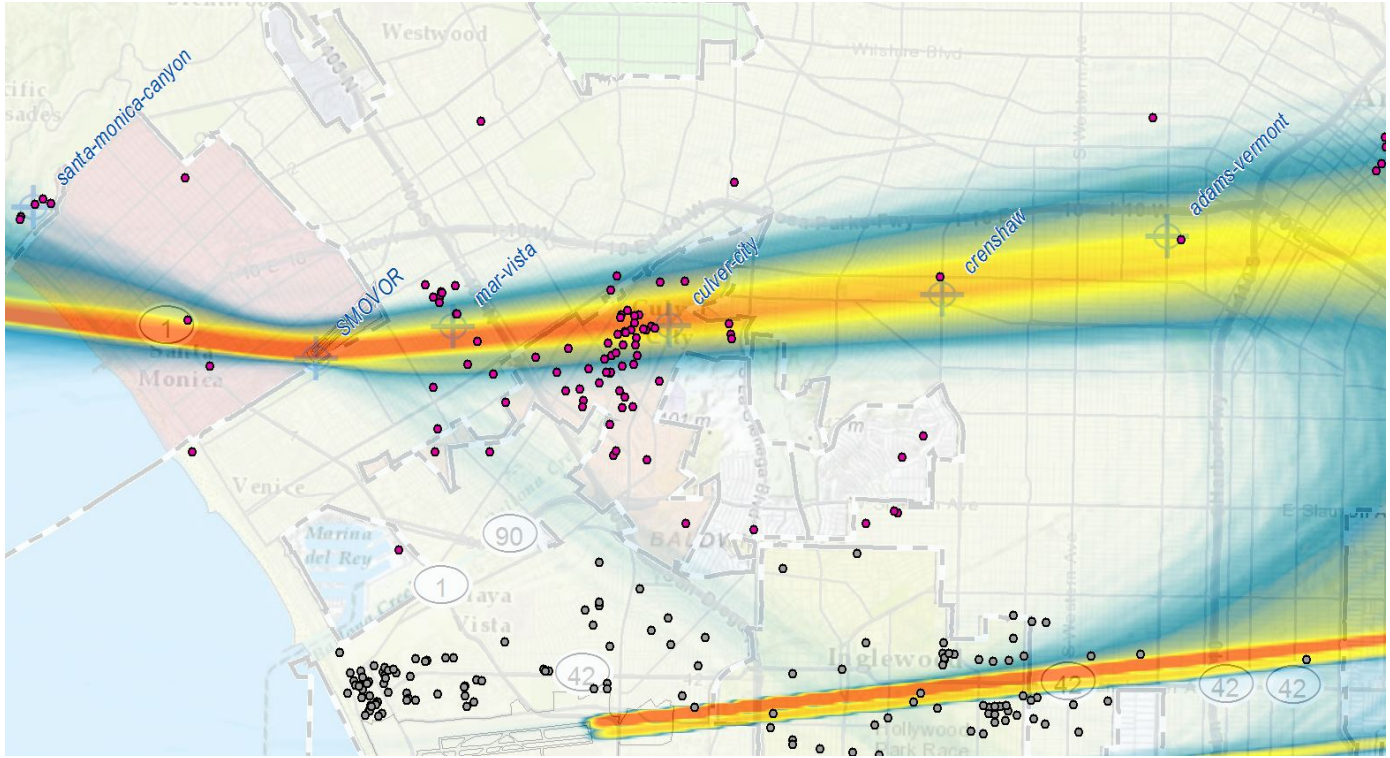
Complainant Data:
January – June 2015

Flight Track Data:
April 2015

- Complainant Location

Source: LAWA, HMMH 2016

Study Results – Complainant Distribution East of SMO VOR



Complainant Data:
July – December 2015

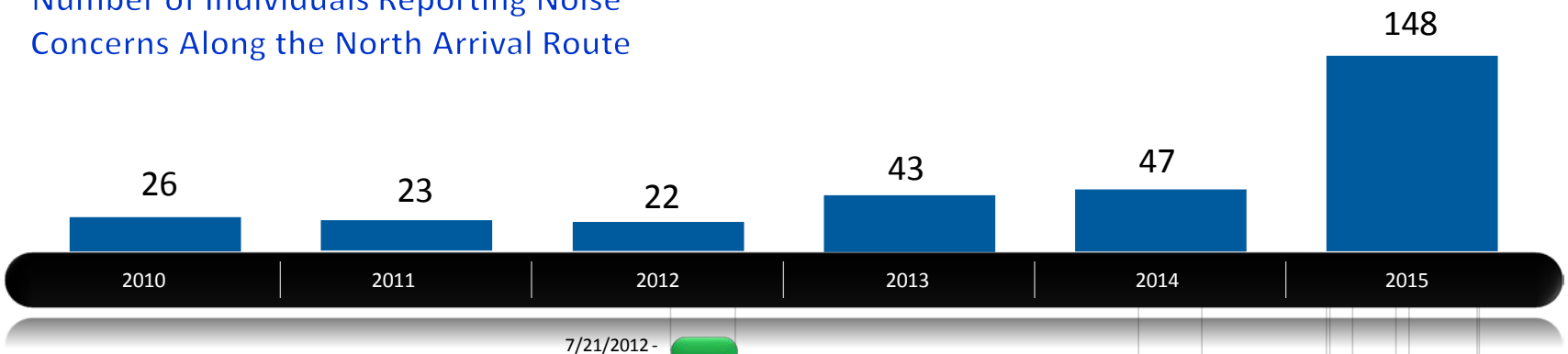
Flight Track Data:
October 2015

- Complainant Location

Source: LAWA, HMMH 2016

Study Results – Timeline 2010 - 2015

Number of Individuals Reporting Noise Concerns Along the North Arrival Route



Notable Events

7/21/2012 - 10/22/2012 Weekend RWY Closures - Marking Repairs

Temporary Narrowing of N. Arrival Flight Tracks

9/1/2014 - 2/28/2015 FAA LOOP Departure Test

3/6/2015 - 4/7/2015 RWY 25L Closure - RSA

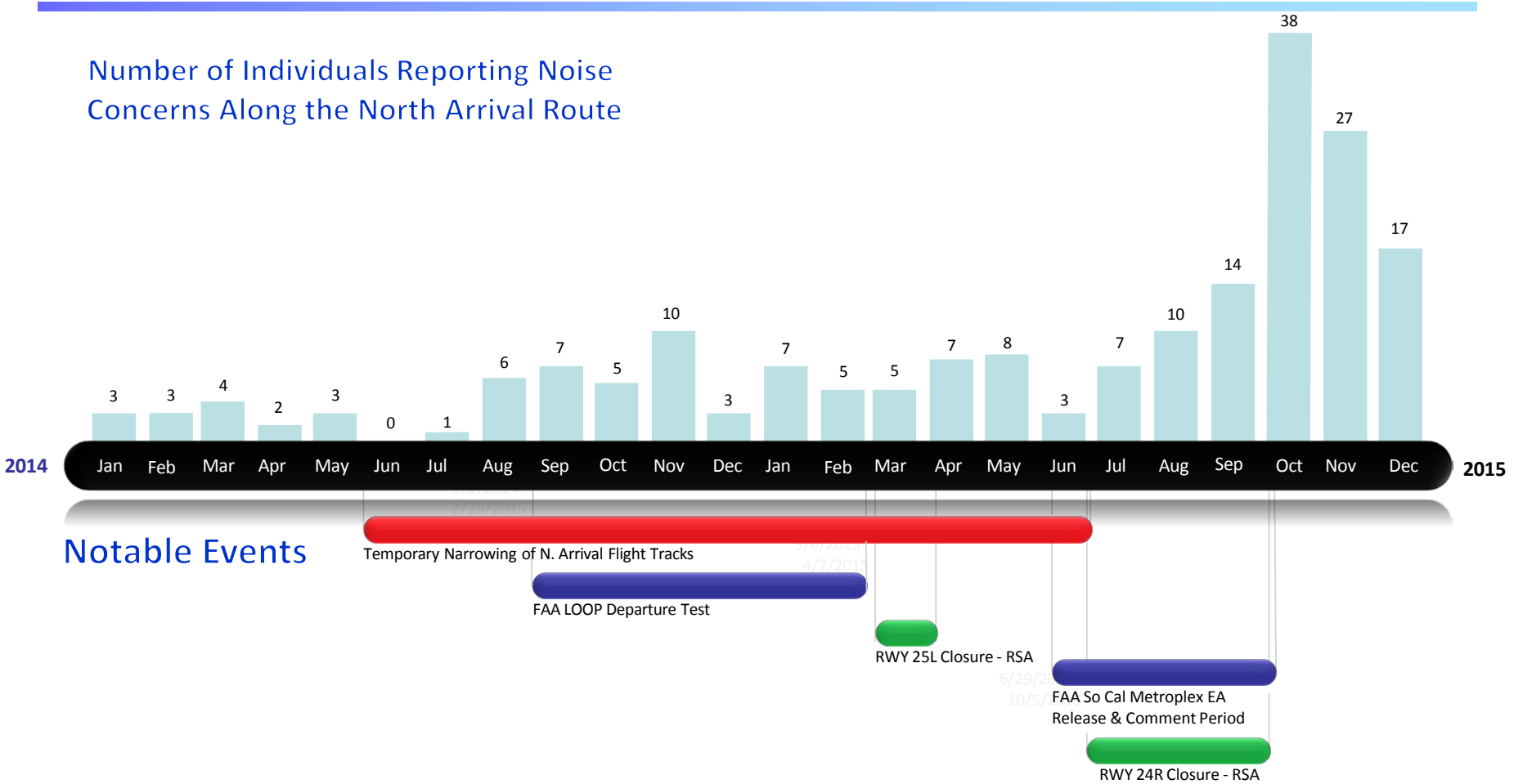
6/10/2015 - 10/8/2015 FAA So Cal Metroplex EA Release & Comment Period

6/29/2015 - 10/5/2015 RWY 24R Closure - RSA

Key Communities Along North Arrival Route:		
Malibu	Mar Vista	Palms
Pacific Palisades	Marina Del Rey	Leimert Park
Santa Monica	Ladera Heights	Fairfax / Miracle Mile
Culver City	View Park-Windsor Hills	Downtown LA

Study Results – Timeline 2014 - 2015

Number of Individuals Reporting Noise Concerns Along the North Arrival Route



Summary

- Increases in Operations from 2010 to 2015 – 22%
  - All aircraft types except non-jet aircraft
- Changing Fleet
  - More regional jets
  - Ten-fold increase in New Large Aircraft (A380 and B748)
  - Large two-engine aircraft (B777 and B787) replacing large four-engine aircraft (B747)
  - Fewer non-jet aircraft
- SEL “trends” reflect the changing fleet mix within each category
- Altitudes and slant distances remain largely unchanged

Summary

- Noticeable temporary change in flight track density from Summer 2014 through Summer 2015 in Mar Vista, Culver City, Crenshaw, and Adams-Vermont gates

- Slight change in the flight track centroid at Malibu-Colony, Santa Monica Canyon, and Getty Villa gates in July of 2011

- Various events have resulted in increased awareness of the traffic flow, and resulted in increasing numbers on individuals submitting complaints, but there is no one explanation for this increase

Questions

Thank you for your attention!