EVOLUTION OF SOUTH FLOW TRAFFIC TO SJC

2006 to 2017

Since 2012, air traffic into Mineta San Jose International Airport during 'south flow' conditions has undergone significant changes. Air traffic that was once evenly dispersed across most of Sunnyvale has been 'put on a rail' about a mile west of the earlier center of traffic. A new semicircular 'rail' has emerged over Mountain View and its traffic is rapidly growing. Since 2016, aircraft have been flying faster and making steeper descents. Noise complaints have soared.

This paper documents these changes and quantifies some of their effects. Establishing what has happened can only aid in finding solutions to the surge in noise complaints.

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v1.1 2/16/18

Contents

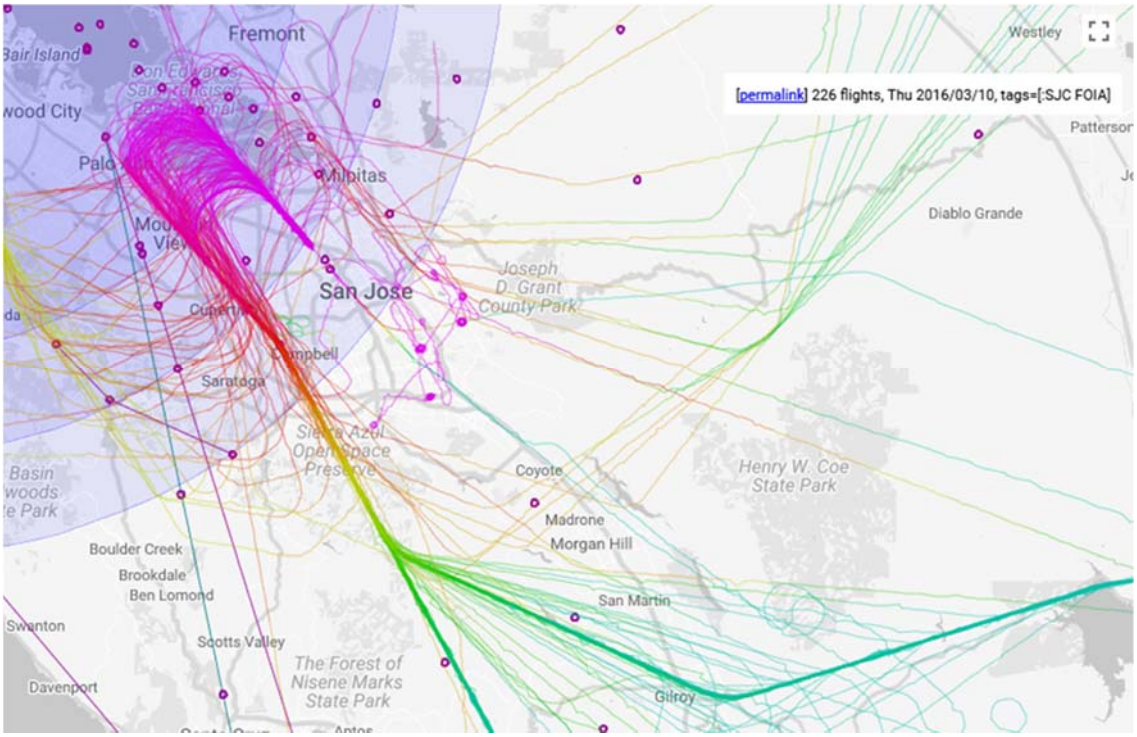
This paper documents changes to south flow air traffic into Mineta San Jose International Airport (SJC). These changes have significantly impacted communities on the ground and noise complaints have soared. To address the problem, it is important to agree on what changed, and why complaints for flights to SJC went from fewer than 1000 in 2012 to 180,000 in 2017.

> This document synthesizes data from multiple sources. Flight information for SJC was obtained from the FAA and is used extensively for maps, charts and graphs. The data stretches from 1/1/2006 to 7/31/2107, but is not perfect. A few dates are missing data, but the months of November and December of 2016 are so incomplete as to render FAA data for those months meaningless. All figures in this document based on FAA data share this limitation.

Introduction to South Flow Traffic

South flow conditions are determined by weather. Physics requires airplanes to land and take off into the wind. Typically, airplanes make their final descent into SJC from the southeast, but when southeasterly winds are expected to exceed 5 knots (5 nautical miles per hour – a nautical mile is 6076.12 feet), a south flow condition is declared and arrivals to SJC are routed to the Bay to make their final descent into the airport. Over 90% of airplanes arrive at the Bay from south of the airport, executing a 180-degree clockwise turn to land. These aircraft overfly Campbell, Cupertino, Sunnyvale and Mountain View. Many continue on to Palo Alto or East Palo Alto before making their turn.

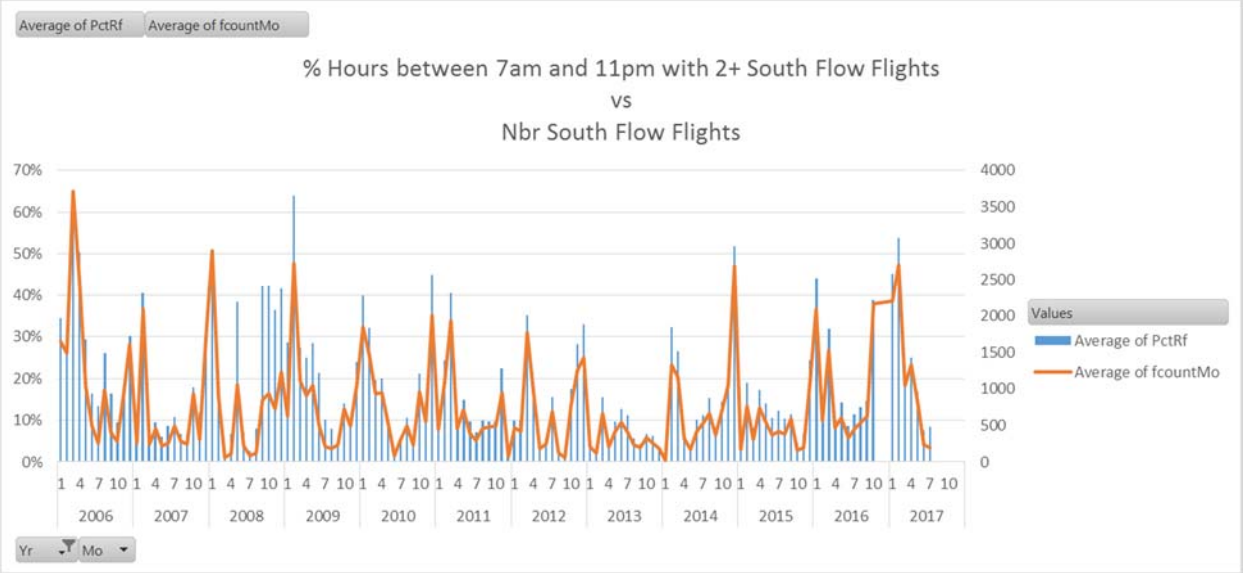
The typical approach path over the south bay can be seen in Figure 1.



Source: Derived from FAA data

Figure 1. Airplanes fly northwest to the Bay, make a 180 degree turn and fly southeast to land at the airport

Not surprisingly, if there are more hours of south flow conditions, more arrivals are likely to be affected, and Figure 2 shows this. The blue bars show the percent of hours between 7am and 11pm with two or more south flow flights. The orange line shows the number of south flow flights per month, with the scale on the right axis.



Source: Derived from data. Data for November and December 2016 is missing

Figure 2. Percent of Hours from 7am to 11pm with Two or More South Flow Flights vs. Number of South Flow Flights per Month

As SJC grows, we can expect the number of south flow flights per hour to increase. Today, we are once again reaching levels of south flow traffic not seen since 2006. Below is a list of the top 40 days of south flow arrivals since 2006. All the peak days are in the years around 2006 and 2017.

Year	Month	Day	South Flow Arrivals
2006	3	16	281
2006	11	2	272
2006	2	1	265
2006	3	2	264
2008	1	21	259
2007	4	19	259
2006	3	24	256
2006	11	26	255
2006	5	22	251
2008	1	24	250
2006	12	8	247
2006	3	30	247
2006	4	7	247
2006	4	4	245
2007	2	9	244
2006	12	12	244
2017	5	25	243
2008	1	25	243
2007	2	8	243
2006	4	11	243
2006	2	26	243

2017	4	6	242
2017	2	2	242
2016	9	13	241
2006	12	11	241
2017	3	24	240
2007	2	21	240
2006	12	26	240
2017	4	12	239
2015	9	14	239
2006	3	29	239
2007	10	9	238
2006	3	27	238
2006	2	27	238
2016	10	24	237
2006	3	13	237
2017	4	11	236
2017	2	3	236
2007	2	7	236

Source: derived from FAA data

Table 1. Peak South Flow Days Since 2006

SJC is projected to double in capacity between 2015 and 2027, from 74,954 to 151,300 air carrier operations for major airlines.[1]

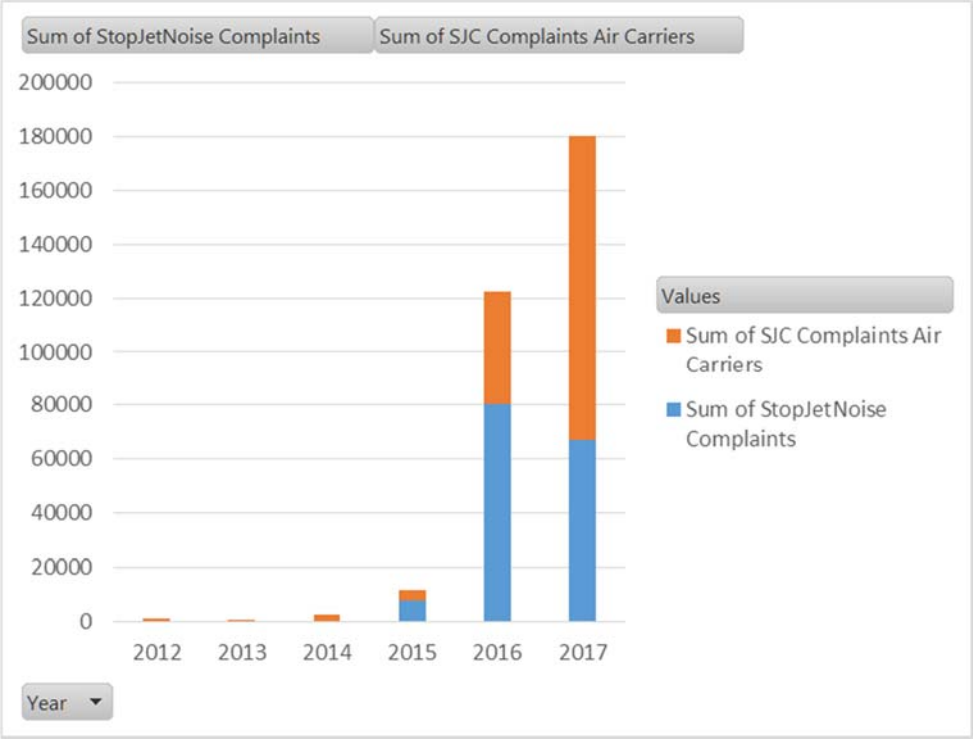
Weather Alone Does Not Explain the Dramatic Increase in Noise Complaints

Some have suggested that noise complaints increased in recent years because of an unusually high number of south flow days during this period. Figure 2, above, helps to put this argument into perspective. While it's true that the winters of 2015-6 and 2016-7 had many south flow days, those years are hardly unique. December 2014 was a particularly bad month as were the early months in 2006, when traffic into SJC was at its peak for the period covered by our data. The worst period of all was the winter of 2008-9.

SJC staff have kindly shared noise complaint data going back to 2012. This data tracks complaints entered at the SJC web site. Registering complaints at that site is not difficult, but it is not easy, either – it requires a fair amount of typing, making it inconvenient for frequent use. It is far easier to register complaints with an interface designed for usability. The most popular such interface in the Bay Area is www.stop.jetnoise.net. Bert Ganoung of the SFO Noise office recently claimed, perhaps imprecisely, that 98% of the noise complaints SFO receives come from that program. And, while SFO accepts input from stop.jetnoise.net for its analysis, SJC does not. The charts below show complaint data from both sources. Stop.jetnoise.net is relatively new, so its data begins in August 2015.

Figure 3 below shows that noise complaints of the past two years dwarf recent history. A deeper look would show that the complaints started rising after procedural changes introduced in March 2015.

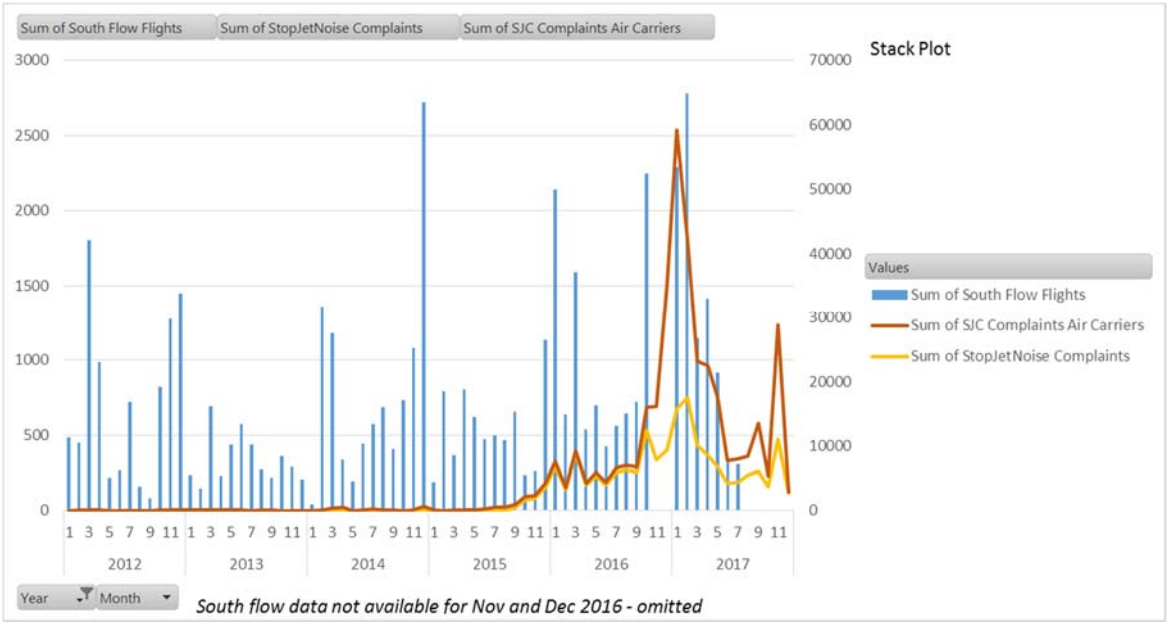
[1] Memorandum from Kimberly J. Becker, Director of Aviation to San Jose Mayor Sam Liccardo and City Council, *Annual Status Report on the Airport Master Plan* for the year 2015, May 3, 2016.



Sources: SJC Noise Office and StopJetNoise.net database

Figure 3. Noise Complaints: SJC Data for Air Carriers Only (arrivals and departures) Plus StopJetNoise.net Data for SJC Arrivals Only

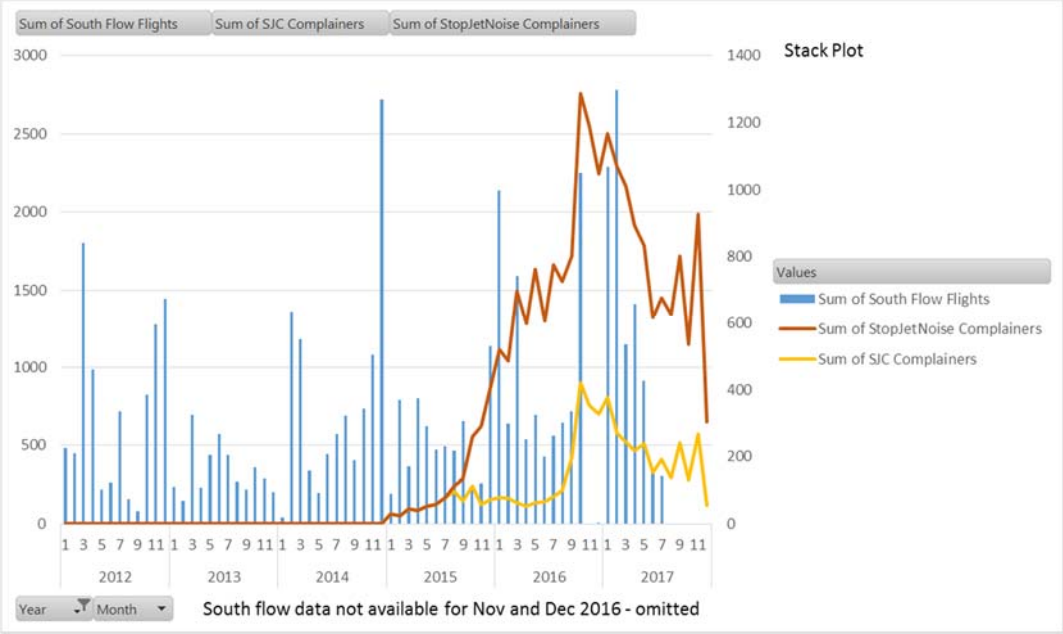
Graphing the number of complaints versus the number of south flow arrivals shows people are upset about something more than operational changes due to weather, because similar levels of south flow arrivals prior to 2015 generated few complaints.



Sources: Derived from FAA data, SJC Noise Office and StopJetNoise.net database

Figure 4. Number of Complaints per Month (right axis) vs. Number of South Flow Flights per Month (left axis)

Looking at the number of people complaining, rather than the number of complaints, tells a similar story.



Sources: Derived from FAA data, SJC Noise Office and StopJetNoise.net database

Figure 5. Number of Complainers per Month (right axis)
vs Number of South Flow Flights per Month (left axis)

Why, then, has the number of complaints skyrocketed?

Concentration of South Flow Traffic Has Increased Over Time

Traffic patterns can be divided into three phases:

- **Phase I - Before March 2012: Even Dispersal**. Before March 2012, traffic was more or less evenly dispersed across a 2.25m-wide band crossing Sunnyvale (between the PUCKK and ZORSA waypoints – see Figure 9).
- **Phase II - March 2012 to March 2015: Mile-wide Corridor East of ZORSA.** Between March 2012 and March 2015, concentration increased with most traffic shifting to a channel roughly a mile wide with its western edge at ZORSA. This change coincided with a shift in the final waypoint for the relevant STAR procedure from PUCKK to JESEN, five miles earlier.
- **Phase III - After March 2015: 'Rail' over ZORSA.** After March 2015[2], concentration sharply increased, with flights directly precisely at ZORSA. Perhaps ZORSA was included in the Flight Management System database loaded into aircraft at that time. As we shall learn later, this coincided with a shift in the final waypoint for the arrival procedures used by pilots from JESEN

[2] New RAZRR STAR and SILCN STAR procedures were introduced in March 2015 along with an updated RNP AR Z procedure. Errors in all these procedures made them unsafe, so ATC intervention was required until the errors were corrected. See AIN Online, March 8, 2015, "California RNAV Procedures Contain Errors", Robert P. Mark.

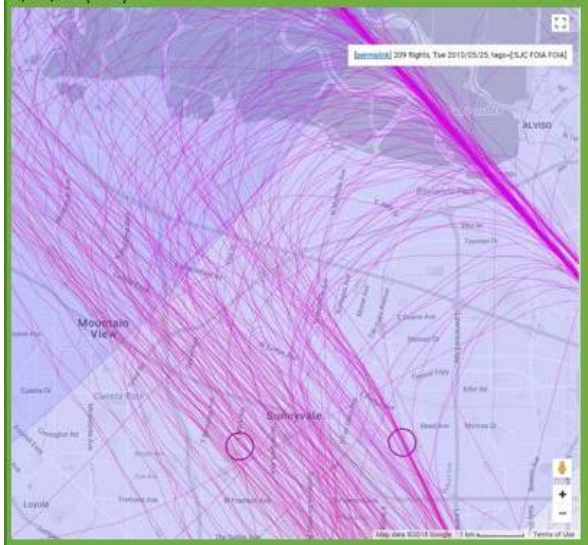
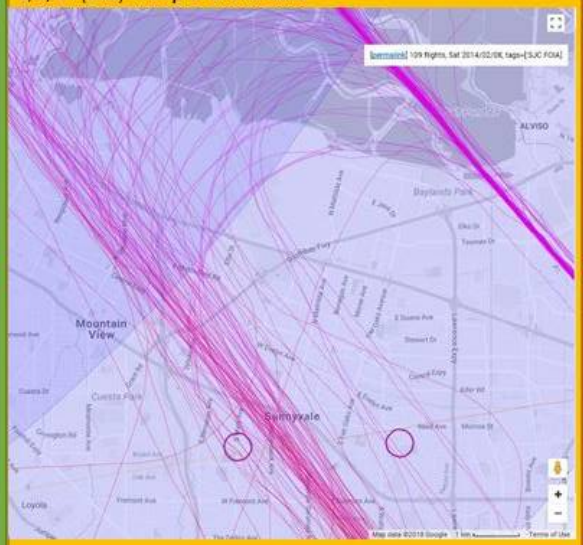
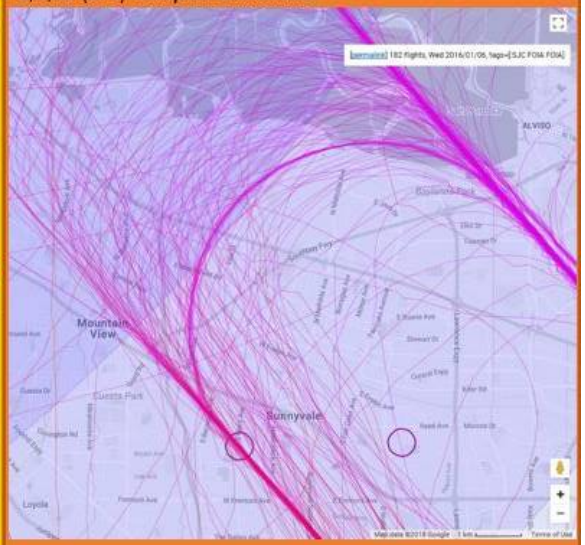
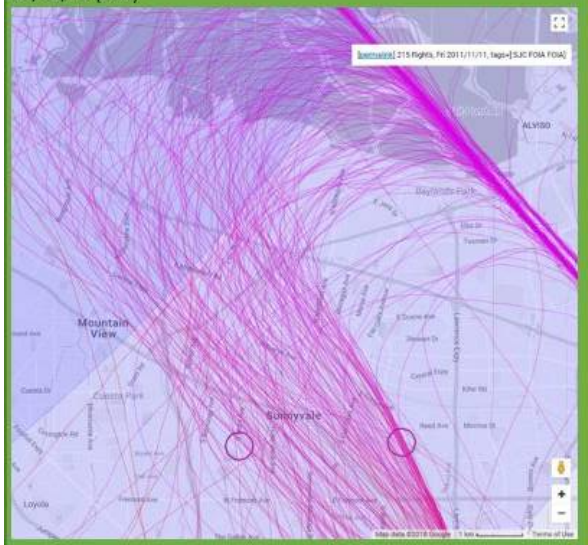
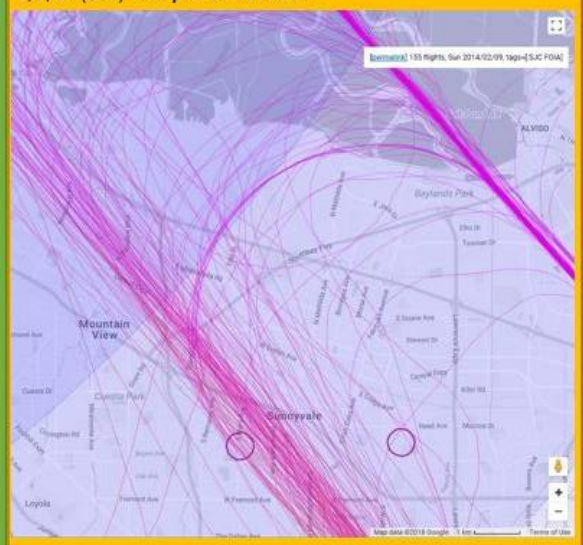
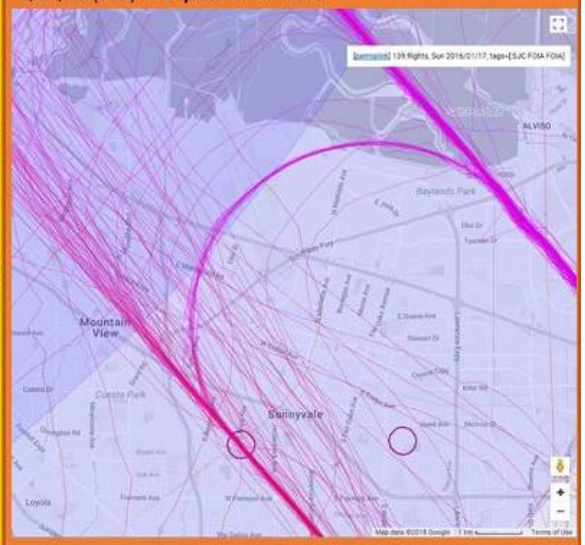
to ZORSA (the newly introduced RAZRR and SILCN STAR procedures replaced JAWWS for most aircraft). ZORSA is two nautical miles west of PUCKK.

Future: All planes on 'Rail'? The community is concerned that if nothing is done, Nextgen will drive all planes in the area to the 'rail', further increasing concentration. This will magnify the effect of the planned doubling in operations to SJC.

The following five pages illustrate these three phases. These 'vector maps' are all constructed from data provided by the FAA. Each page has a green column showing traffic patterns from Phase I, an amber column showing traffic patterns from Phase II and an orange column showing traffic patterns from Phase III.

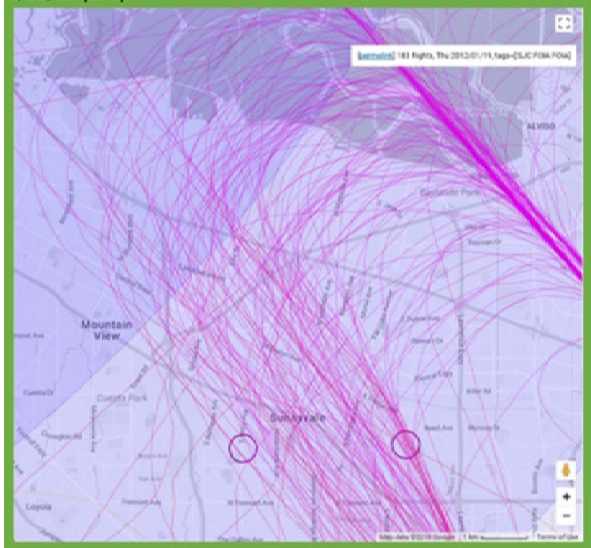
- The first three slides examine the ten dates chosen by the FAA for their presentation to the Ad Hoc Committee on January 26. Because the FAA's two slides comparing traffic patterns before and after Nextgen (aka 'OAPM changes') adopted a high altitude perspective and also combined data for five days into a single graph, the increase in concentration was not visible. The vector maps below, with traffic broken out by day and perspectives closer to the ground, clearly show the increase in concentration. In addition, a green column has been added that shows traffic during five days in Phase I.
- The bottom row of the third slide provides evidence that Phase II was implemented between February 6 and March 1, 2012.
- The fourth and fifth slides show the impact of concentration on different communities:
    - Sunnyvale, Mountain View, Palo Alto and East Palo Alto
    - West Valley Cities
    - Sunnyvale detail
    - Mountain View detail
- In the vector maps that follow, the numbers in parentheses following the dates show the number of south flow arrivals on each day.

Figures 6 (following pages). Vector Maps for Phases I, II and III

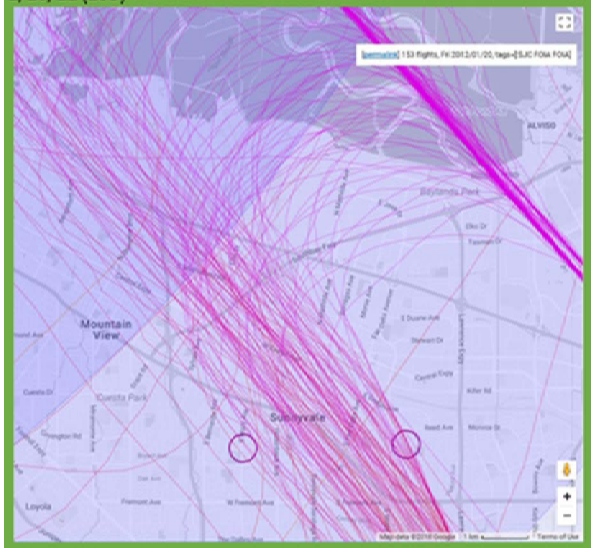
Phase I Before March 2012 – Even Dispersion	Phase II March 2012 to March 2015 – Mile wide Corridor	Phase III After March 2015 – 'Rail' over ZORSA
5/25/10 (209)	2/8/14 (108) *FAA pre-OAPM date*	1/6/16 (179) *FAA post-OAPM date*
		
11/11/11 (210)	2/9/14 (153) *FAA pre-OAPM date*	1/17/16 (138) *FAA post-OAPM date*
		

Phase I
Before March 2012 – Even Dispersion

1/19/12 (154)

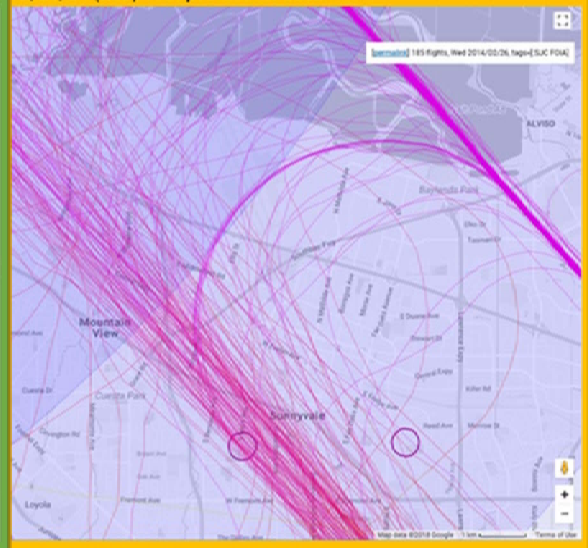


1/20/12 (153)

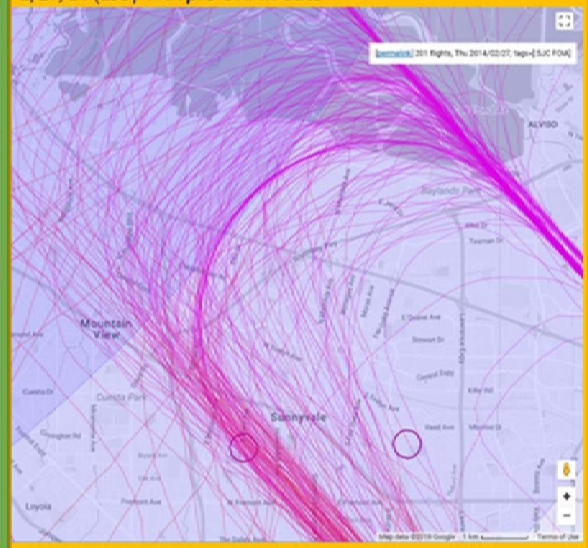


Phase II
March 2012 to March 2015 – Mile wide Corridor

2/26/14 (183) *FAA pre-OAPM date*

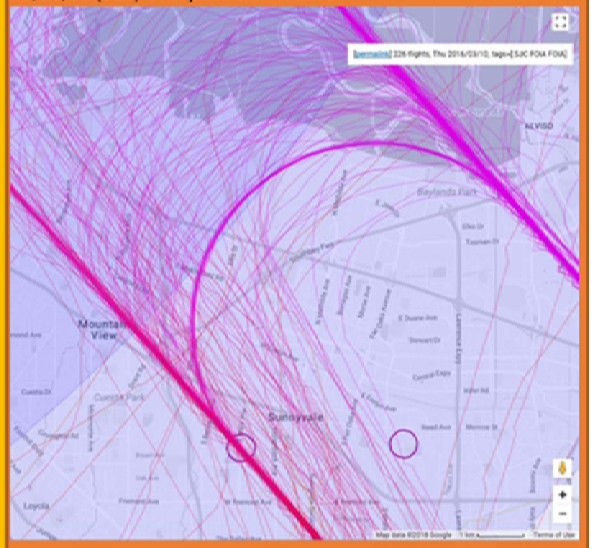


2/27/14 (199) *FAA pre-OAPM date*

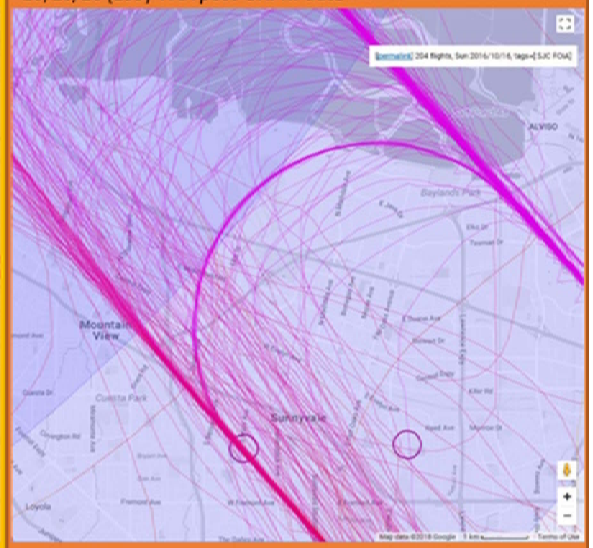


Phase III
After March 2015 – 'Rail' over ZORSA

3/10/16 (224) *FAA post-OAPM date*

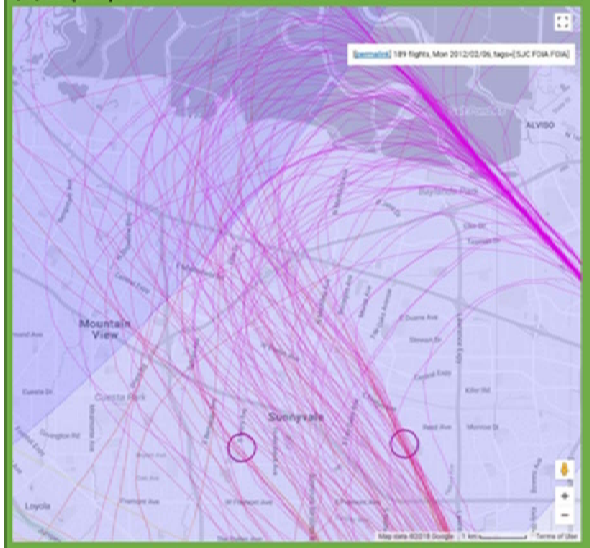


10/16/16 (199) *FAA post-OAPM date*

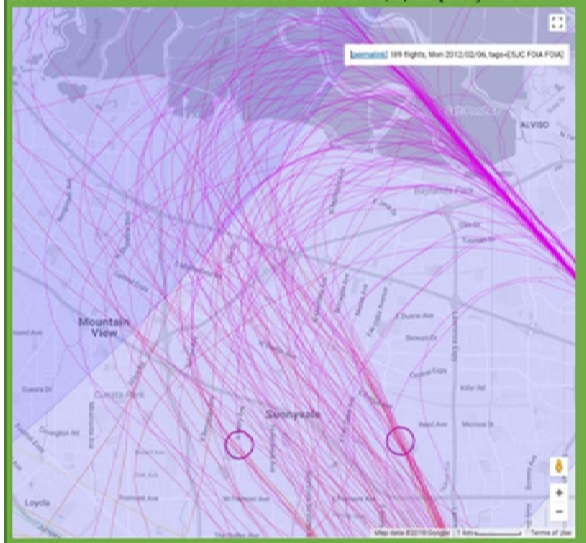


Phase I
Before March 2012 – Even Dispersion

2/6/12 (107)

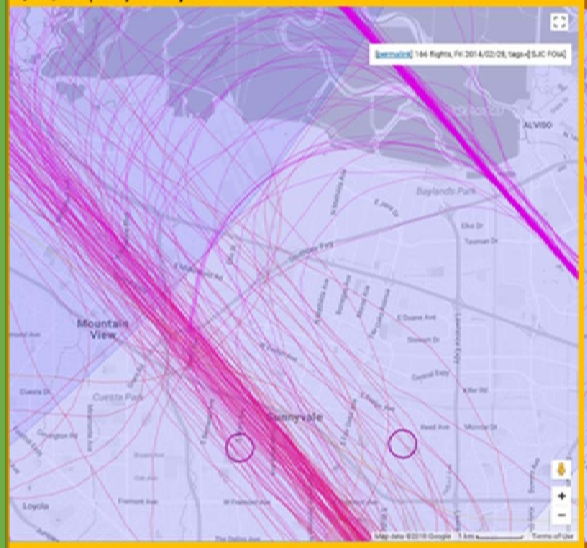


Concentration was first increased between 2/6/12 (107) and ...

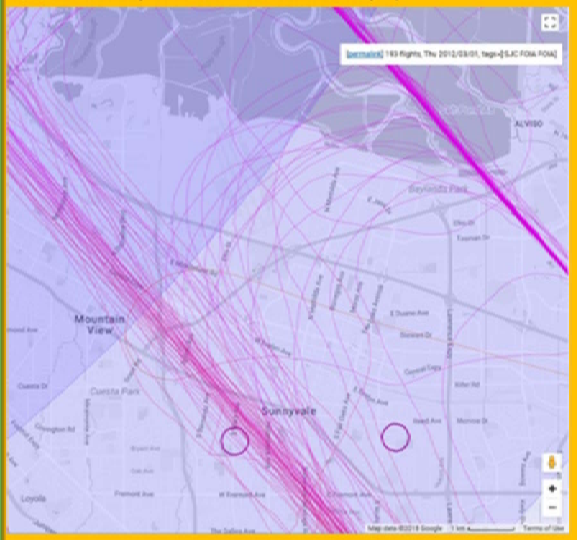


Phase II
March 2012 to March 2015 – Mile wide Corridor

2/28/14 (165) *FAA pre-OAPM date*

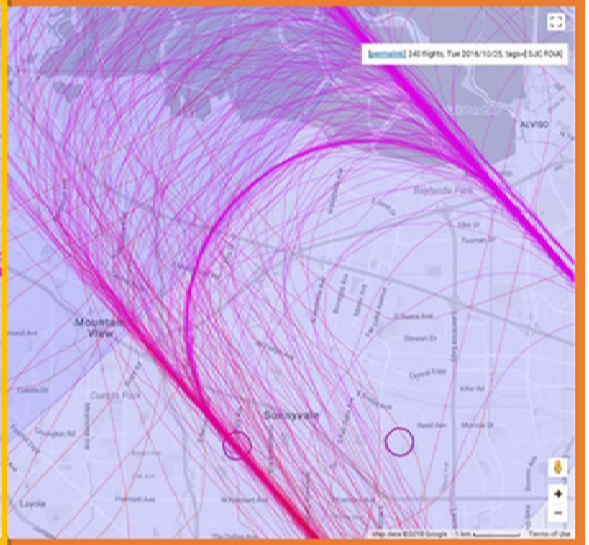


3/1/12 First day of Phase II concentration (78)



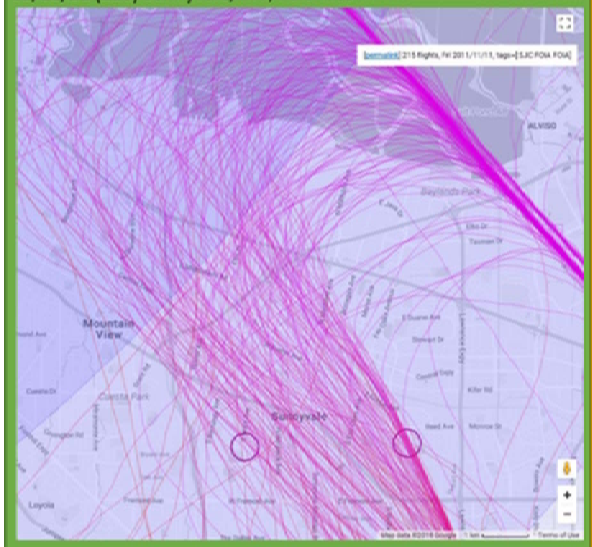
Phase III
After March 2015 – 'Rail' over ZORSA

10/25/16 (235) *FAA post-OAPM date*

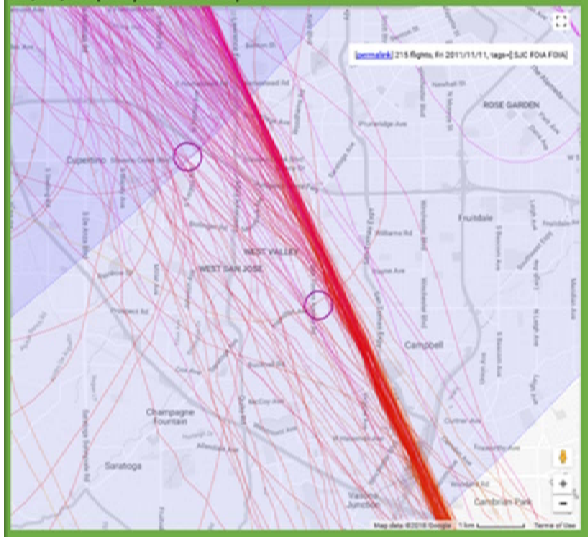


Phase I
Before March 2012 – Even Dispersion

11/11/11 (210) Sunnyvale, MV, Palo Alto

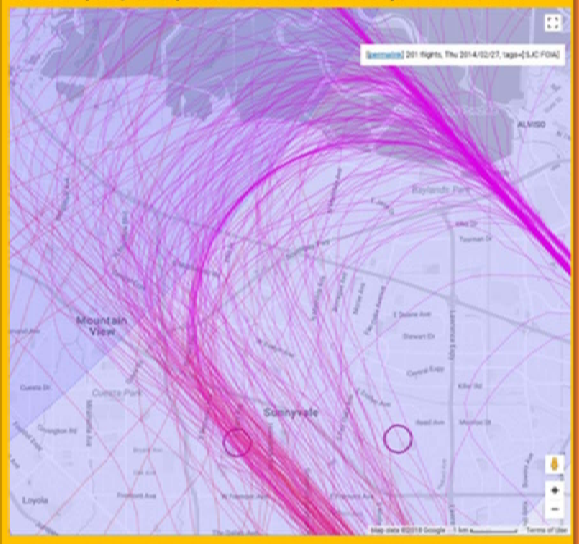


11/11/11 (210) West Valley Cities

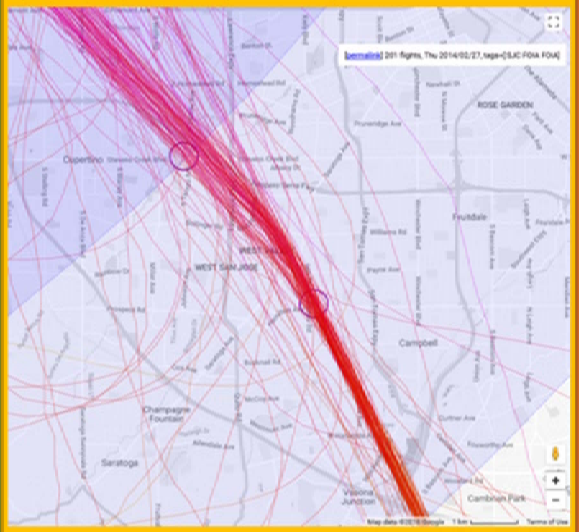


Phase II
March 2012 to March 2015 – Mile wide Corridor

2/27/14 (199) Sunnyvale, MV, Palo Alto ***FAA pre-OAPM date***

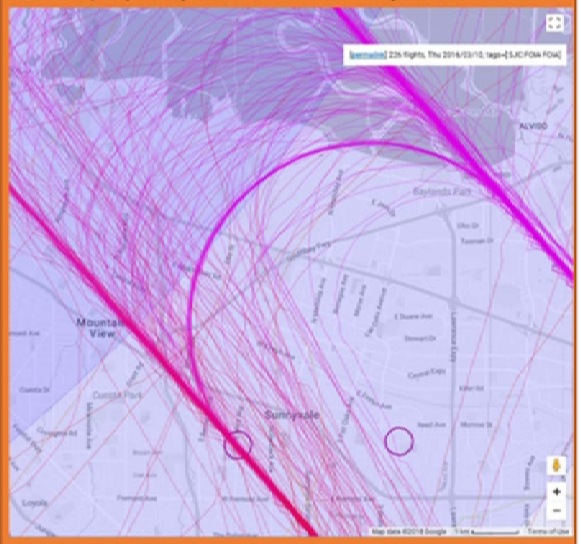


2/27/14 (199) West Valley Cities ***FAA pre-OAPM date***

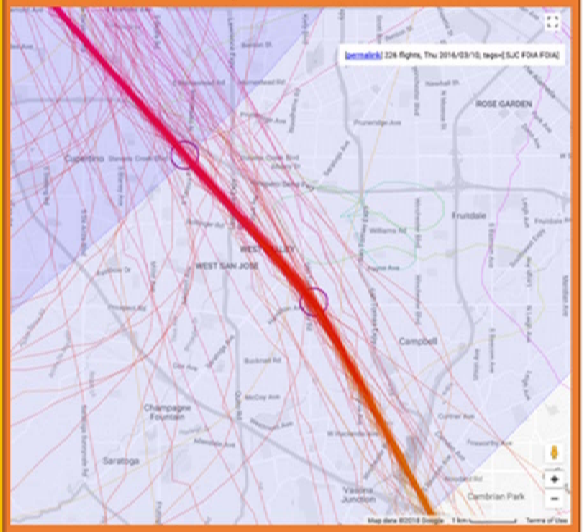


Phase III
After March 2015 – 'Rail' over ZORSA

3/10/16 (224) Sunnyvale, MV, Palo Alto ***FAA post-OAPM date***

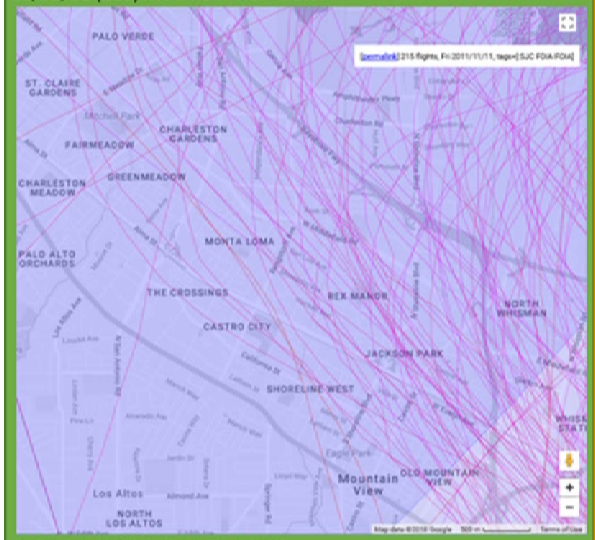


3/10/16 (224) West Valley Cities ***FAA post-OAPM date***

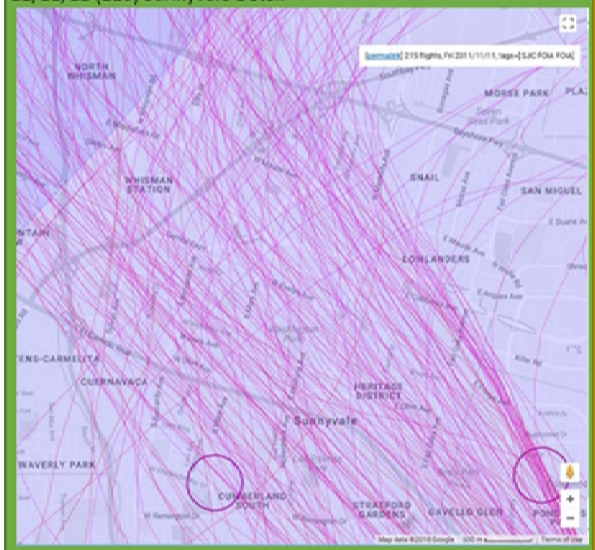


Phase I
Before March 2012 – Even Dispersion

11/11/11 (210) Mountain View Detail

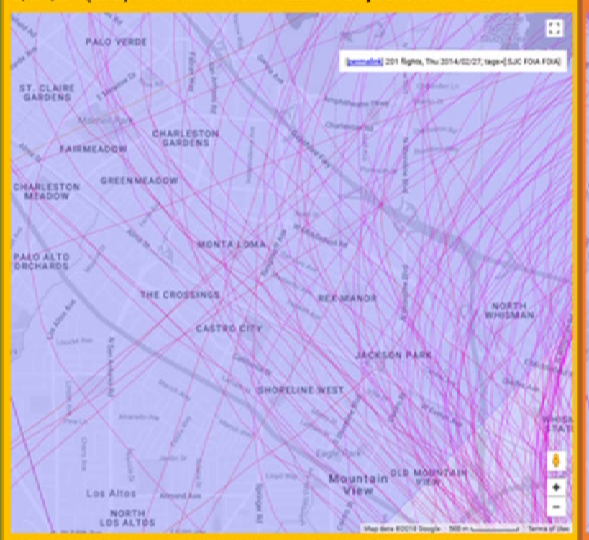


11/11/11 (210) Sunnyvale Detail

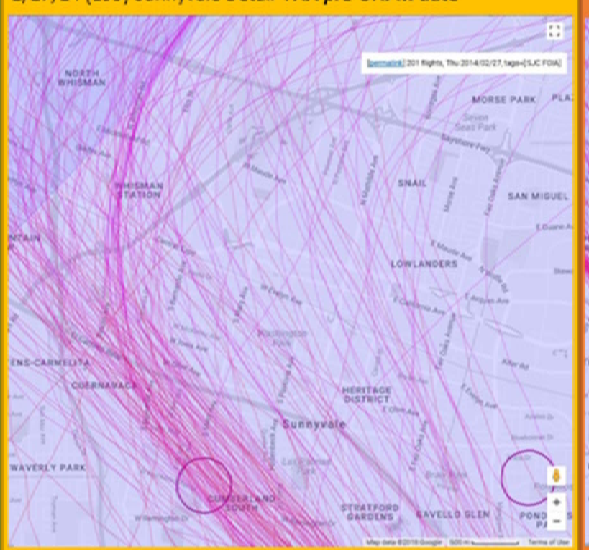


Phase II
March 2012 to March 2015 – Mile wide Corridor

2/27/14 (199) Mountain View Detail *FAA pre-OAPM date*

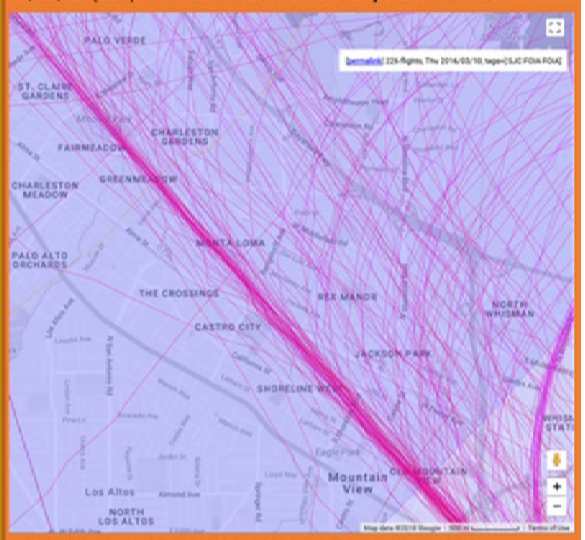


2/27/14 (199) Sunnyvale Detail *FAA pre-OAPM date*

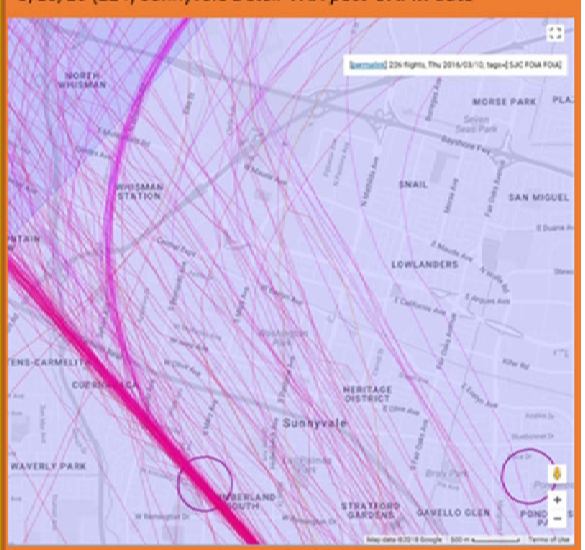


Phase III
After March 2015 – 'Rail' over ZORSA

3/10/16 (224) Mountain View Detail *FAA post-OAPM date*



3/10/16 (224) Sunnyvale Detail *FAA post-OAPM date*

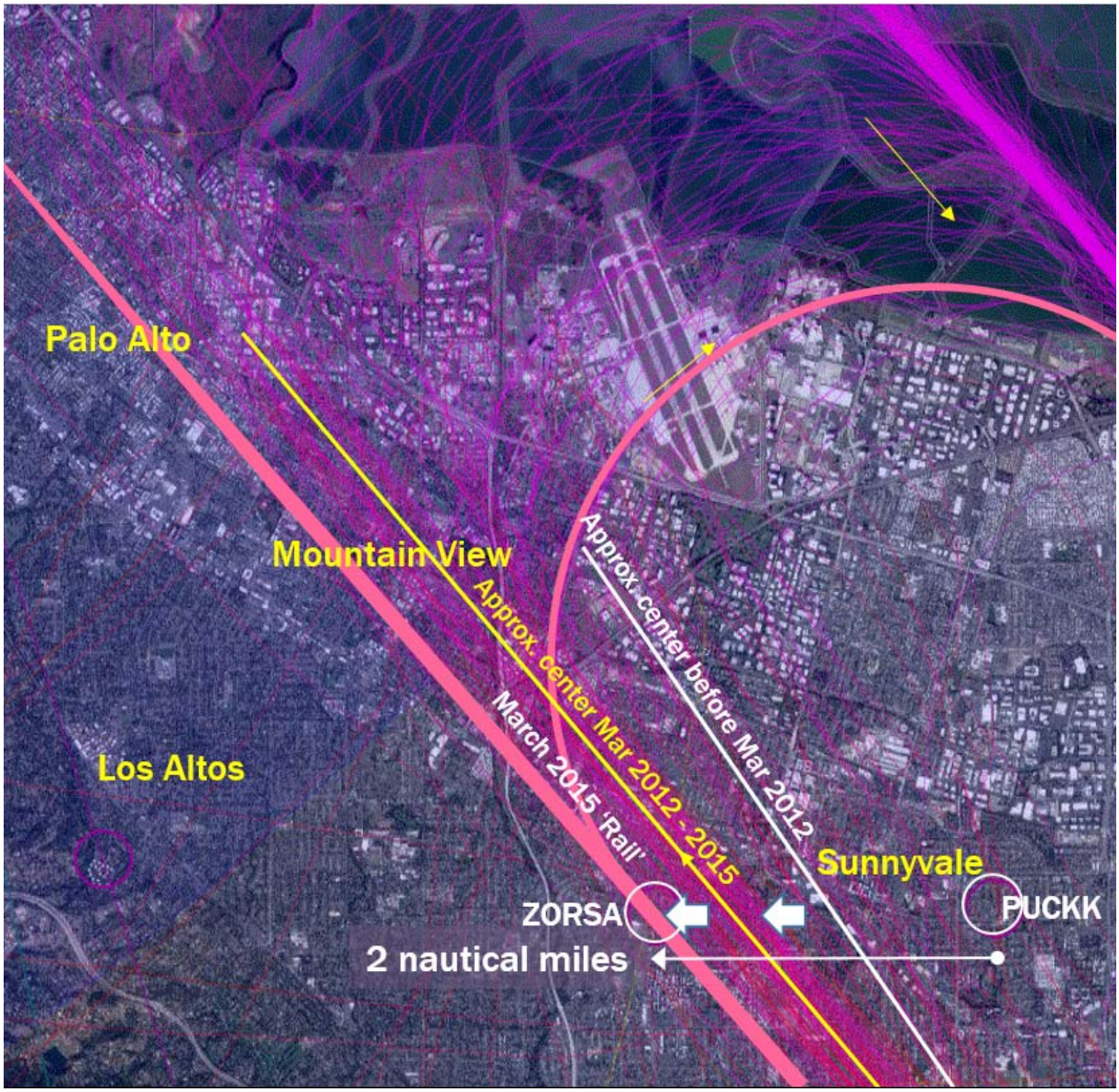


The Center of Traffic Has Been Shifted West Twice Since 2012

- **Phase I - Before March 2012**, the center of traffic was about a mile east of ZORSA, about midway between ZORSA and PUCKK.
- **Phase II - March 2012 to March 2015**, the center of traffic was shifted to a line perhaps a half mile east of ZORSA.
- **Phase III - March 2015**, a 'rail' of concentration was established precisely at ZORSA – about a mile west of the center of traffic before March 2012.

Future: All planes to the 'Rail' over ZORSA? Again, the community is concerned that if nothing is done, Nextgen will drive <u>all</u> planes to the 'rail' over ZORSA, shifting still more flights west.

2012 and 2016 lines are superimposed on a vector map of traffic for 12/5/14



Source: Author's estimates of flight centers based on maps derived from FAA data

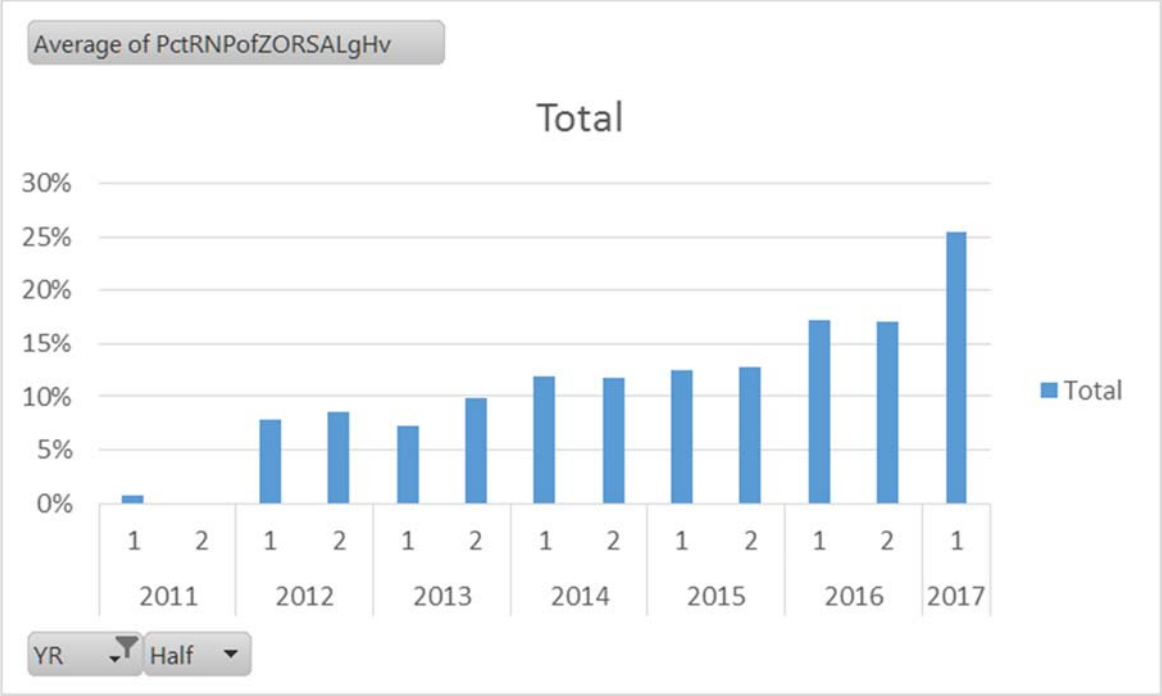
Figure 7. The Westward Shift of Traffic from Phase I to Phase II to Phase III

An Entirely New Flight Path Has Been Established over Mountain View – Its Use is Growing Rapidly

The pink semicircle in Figure 7 on the previous page describes a relatively new approach to SJC. The vector maps above show use of that path emerging in Phase II and well-defined in Phase III.

- The approach is called the 'RNP AR Z' approach. That stands for 'Required Navigation Performance – Approval Required'. The procedure requires more advanced flight management systems. Crews must file to fly this approach and they must have special training.
- Most airplanes taking this approach seem to stay within a corridor that is extremely narrow – often a few streets wide. The aircraft navigation systems required to fly this approach must be able to calculate aircraft position to within 0.15 or 0.30 nautical miles, laterally.
- The RNP AR Z approach was defined by 2009 but it was rarely if ever used before 2012. Since then, its use has increased rapidly. Figure 8 shows that in 2017, 25% of large or heavy flights arriving ZORSA continued on to this approach.

The community is concerned that going forward, use of the RNP approach will be mandated for SJC arrivals, per the general direction stated in a 2006 strategy document from the FAA.[3]



Source: Derived from FAA data

Figure 8. Percentage of Large/Heavy Flights taking the RNP Approach

for flights with 1m of ZORSA

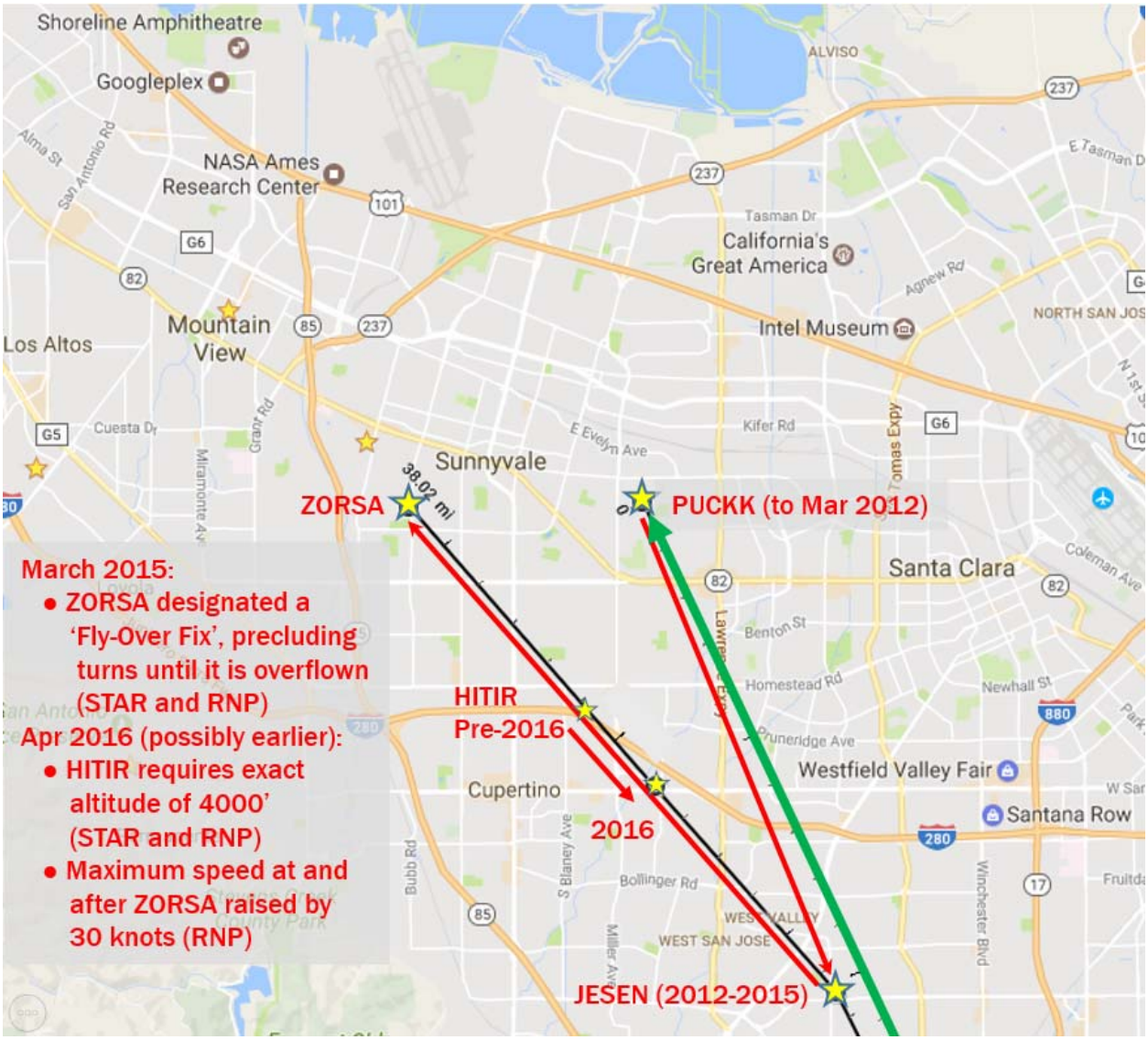
[3] FAA, Roadmap for Performance-Based Navigation, July 2006, Version 2.0, p11. From the document: "Far Term (2016-2025): Mandate RNP in busy en route and terminal airspace."

The Flight Plates For South Flow Arrivals and Approaches Have Been Altered Significantly

Flight plates are annotated maps that describe procedures used to guide pilots through each phase of flight, including departure from the airport of origin, 'en route' at altitude, and final approach to the destination airport. A Standard Terminal Arrival Route or 'STAR' procedure provides pilots in the 'en route' phase with instructions for arriving to a point near the destination airport. Near the airport, congestion becomes an important consideration and Air Traffic Control (ATC) becomes critically important, often specifying approach procedures to be used by arriving aircraft. ATC might require 'vectoring' which is used to delay an arriving flight to better allow it to 'zipper in' with other flights that are queued for the same airport. 'Approach' procedures specify how to get from a point near the airport to the runway itself. The last point targeted by the STAR procedure is often the initial approach fix (IAF) for an approach procedure. Per Wikipedia, "STARs can be very detailed (as is often the case in Europe), allowing pilots to go from descent to approach entirely on their own once ATC has cleared them for the arrival, or they can be more general (as is often the case in the United States), providing guidance to the pilot, which is then supplemented by instructions from ATC."

Pilots use 'flight plates' for STAR procedures and approach procedures (such as the RNP AR Z approach) to understand details that they must comply with. These flight plates include guidance about the path of travel, air speed and altitude requirements, among other things. Flight plates are published frequently and are redesigned or updated as procedures evolve.

The following map describes significant changes that can be found by comparing flight plates impacting south flow traffic over the past six years.



Source: Derived from FAA flight plates

Figure 9. Significant Changes to Flight Plates Since 2012

In Phase I, until March 2012, aircraft approached the PUCKK waypoint along the green line (see the vector map for West Valley Cites – 11/11/11) using the JAWWS TWO STAR procedure. Many flights initiated a slight turn after reaching a point just east of JESEN, with most flights having turned before reaching PUCKK. This introduced considerable dispersion.

In Phase II, beginning in March 2012, the final waypoint on the STAR procedure (now JAWWS THREE) was moved back five miles to JESEN, above Hamilton Avenue in Campbell. It appears that ATC gave pilots instructions to turn at JESEN, causing air traffic to shift toward the ZORSA waypoint (which was not at that time on the STAR procedure, but existed on the RNP approach). Vector maps show that the

timing of this turn varied very slightly, but still retained some dispersion, albeit less than existed during Phase I.

2012 also saw the first regular use of the RNP procedure, which always targets ZORSA.

In Phase III, beginning in March 2015, the JAWWS procedure was mainly superseded by the RAZRR and SILCN RNAV procedures as part of the rollout of Nextgen. RNAV or 'area navigation' uses GPS technology to guide airplanes. On these new RNAV procedures, ZORSA was designated as a 'fly-over fix', which prevents aircraft from turning before that fix is overflown unless they have alternate instructions from ATC. (Although many planes still bleed off to the east slightly before reaching ZORSA.)

In addition, sometime between March of 2015 and March of 2016, the RNAV and RNP procedures assigned a required absolute altitude of 4000' at HITIR. The coordinates for HITIR were also shifted 4400' to the southeast, toward JESEN.

Comparing the flight plates, two other things are worth noting:

- The Minimum Enroute Altitude (MEA) for ZORSA was adjusted, probably in March 2015, from 3200' to 3000', allowing planes above ZORSA to fly 200' lower. (ZORSA was only on the RNP plate before 2015.) This is the lowest altitude at which it is safe to fly.
- The maximum permissible speed at ZORSA was increased from 180 KIAS (knots indicated air speed) to 210 KIAS sometime between March 2015 and March 2016, per the RNP plates. Because aircraft are now routinely directed to ZORSA whether or not they are flying the RNP approach, it seems likely that if aircraft flying the RNP approach are, in fact, flying faster, then aircraft not flying the RNP approach, but also flying to ZORSA, would need to fly faster as well. It doesn't seem safe to have two different speed limits for one lane of traffic.[4]

Ground Speed – Airplanes Have Been Flying Faster Since 2016

Data from the FAA seems to show that since 2016, airplanes have approached JESEN faster on average, and that they have been continuing faster through Sunnyvale, into Mountain View and perhaps beyond.

Even a small increase in speed can cause significant noise – other things being equal. Technical papers, some of them old, suggest that the sound energy produced by the airframe increases at somewhere between the 4.5 and 6th powers of aircraft velocity.[5][6][7][8] Sound energy from the airframe is often the largest component of noise on approach.

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[4] The RNAV STAR plates don't indicate speed guidance for ZORSA, although the very first such plate, SILCN ONE, specified a precise speed of 210 KIAS and a precise altitude of 3000' for ZORSA. It was immediately discontinued for safety reasons, but those reasons did not cite the changes at ZORSA.

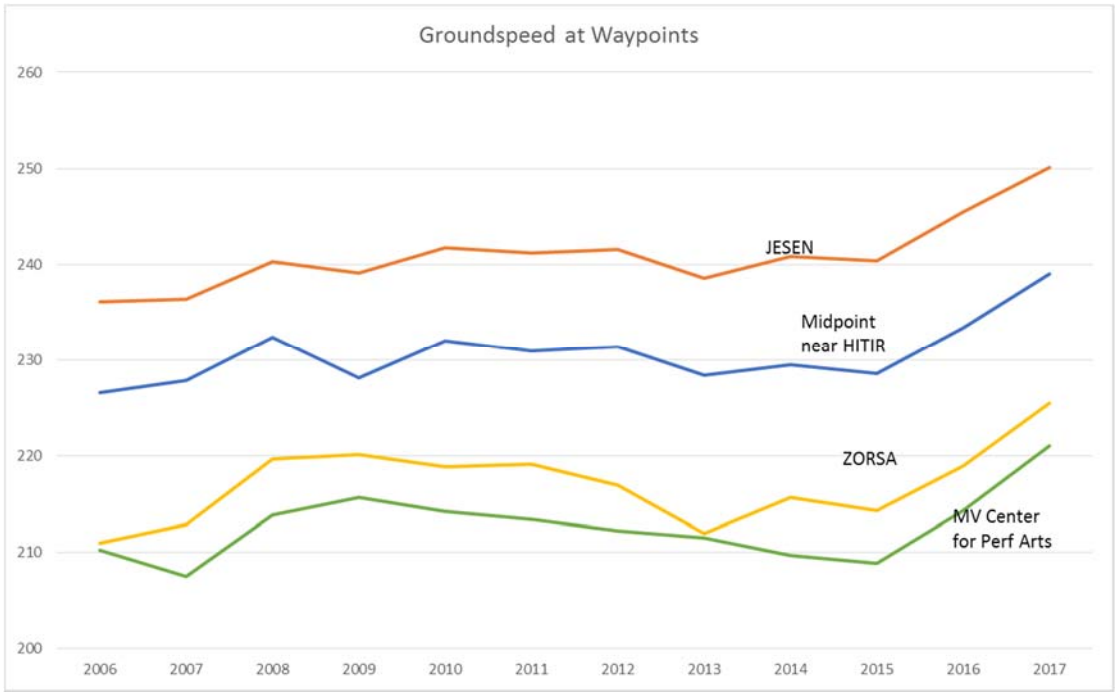
[5] Fink, Martin R., Approximate Prediction of Airframe Noise, J. Aircraft, Vol 13, No. 11, November 1986, p833

[6] Heller, H.H. and Dobrzynski, W.M., A Comprehensive Review of Airplane Noise Research, Proceedings of the 11th Congress of ICAS, Lisboa, Portugal, 1978, p42

[7] Kanjere, Kondwani (2013) Aeroacoustic investigation of aircraft spoiler during steep approach *University of Southampton, Engineering and the Environment, Doctoral Thesis* , 183pp.

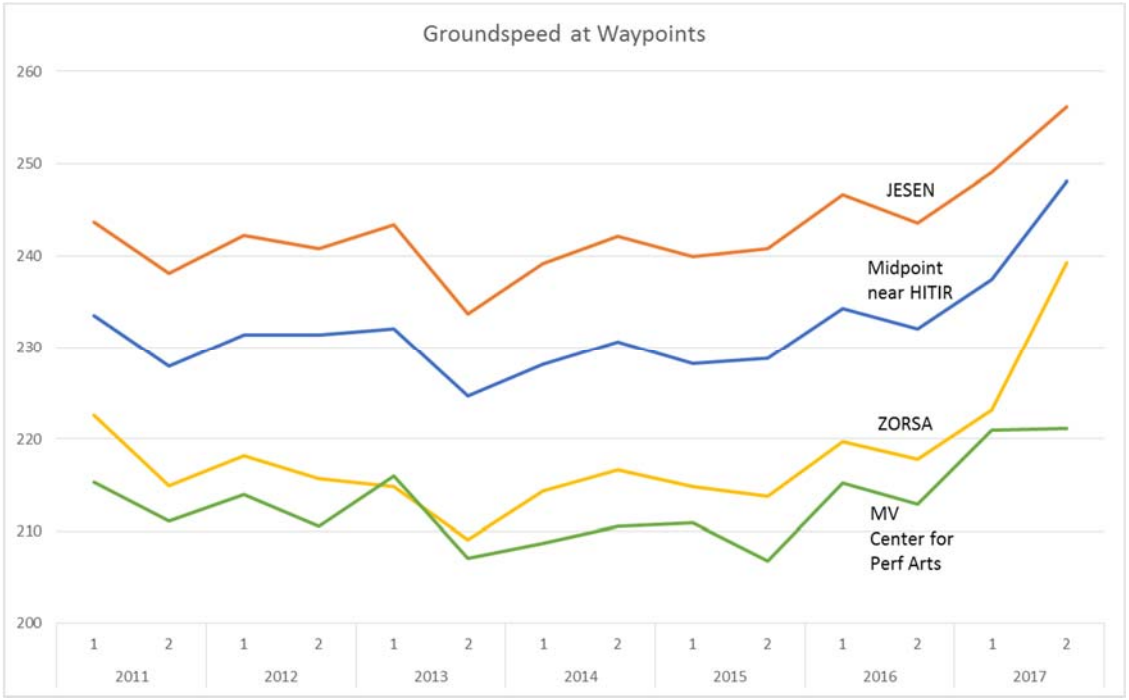
[8] Caveat: these papers are very technical and the author is not an acoustic engineer.

In the graphs below, note that average ground speeds are now at their highest levels ever, while they were at their lowest in 2006 when the number of south flow flights per day was at a peak that has not been attained since.



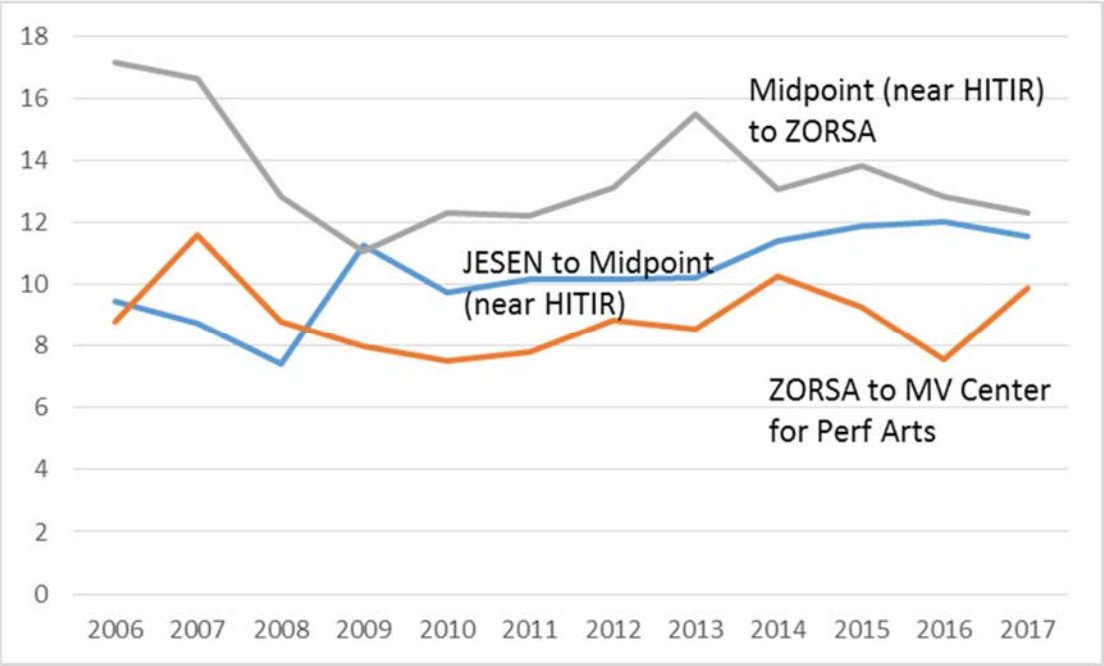
Source: Derived from FAA data. Speed approximations are imprecise.

Figure 10. Average Groundspeed – 2006 through July 2017 by Year



Source: Derived from FAA data. 2H17 data only includes July. Speed approximations are imprecise.

Figure 11. Average Groundspeed – 2011 through July 2017 by Half Year



Source: Derived from FAA data. 2H17 data only includes July. Speed approximations are imprecise.

Figure 12. Average Loss of Groundspeed – 2006 through July 2017 by year

Figure 11 suggests that airplanes are, on average, decelerating somewhat more as they approach ZORSA, although the effect doesn't appear to be large. (The 'Midpoint near HITIR' is equidistant from ZORSA and JESEN.) This could signal use of noisy air surfaces. More analysis could answer whether airplanes preparing to make the RNP turn decelerate faster than airplanes continuing on the straight 'rail' over Mountain View.

Note: Ground speed data should be considered with some caution. Speeds in the graphs above are calculated by the difference in distance and time between adjacent 'track points', which capture data that is emitted by airplanes, typically every five seconds. Speed is not reported, but must be derived. For planes traveling at high speeds, this means that any individual groundspeed reading is suspect due to the 'jitter' in the derived measurement. With a large enough number of readings, the effects of jitter should cancel out. The author calculated ground speed using a second technique that considers the difference in time over a distance of miles and patterns similar to those seen above emerged.

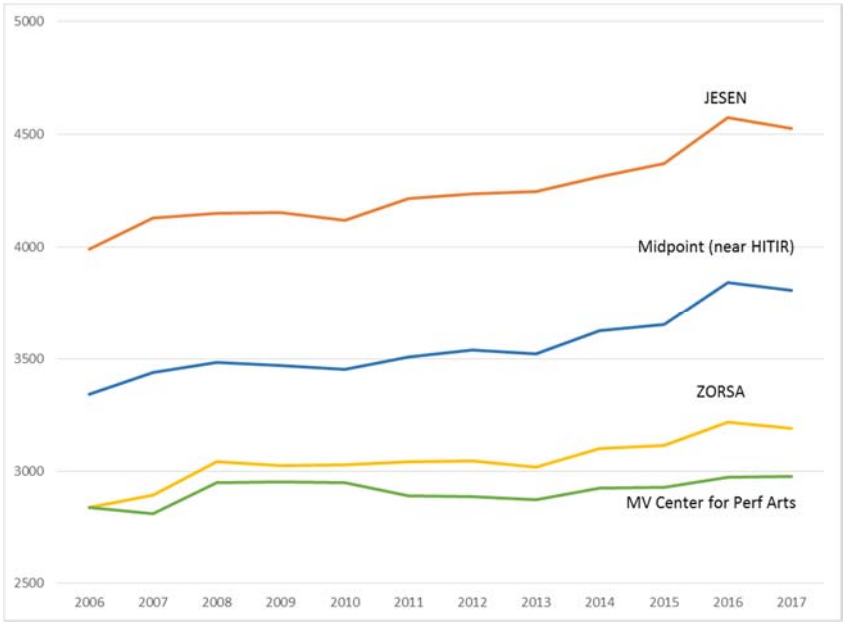
Another caution is that ground speed is not the same as air speed, which is what pilots really need to optimize. Ground speed does not account for ambient wind. The KIAS guidance on flight plates (knots indicated air speed) instructs pilots to fly at a speed relative to the prevailing winds. KIAS would be a better indicator of noise than ground speed. Still, the author believes that the broad trend indicated in the above graphs indeed represents faster flights, on average, and – potentially – a source of increased noise.

Altitudes - Airplanes are Higher, on Average, with Steeper Descents

As noted above, the Minimum Enroute Altitude at ZORSA was lowered 200' around 2015, however, that is only a minimum safety clearance and data suggests that airplanes are actually flying at higher

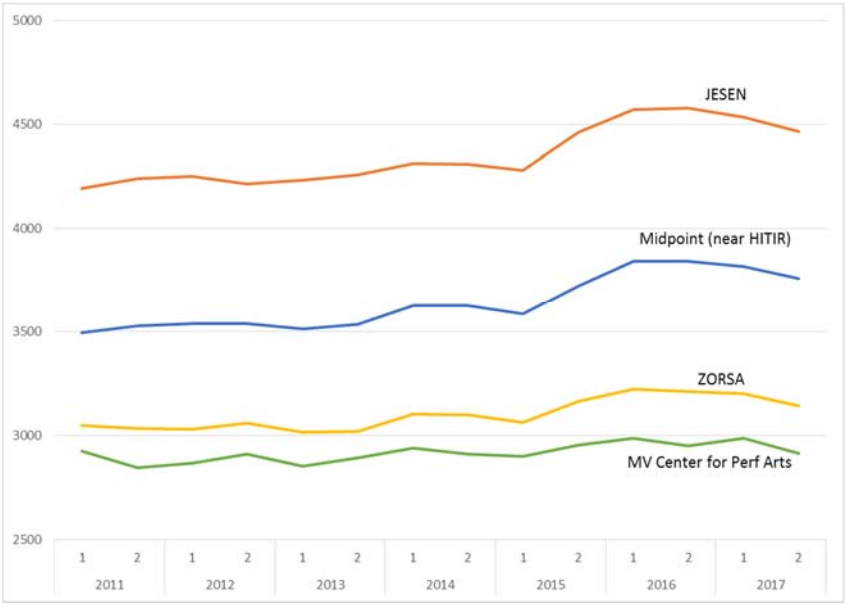
altitudes on average than they did during Phases I and II. It is possible that these averages mask the fact that some aircraft are flying at lower altitudes than before, but this preliminary analysis does not bolster the suggestion that the increase in noise complaints is due to planes flying at lower altitudes.

Another factor is at play: the increase in altitude is most pronounced at JESEN and least at the Mountain View Center for Performing Arts, meaning that the angle of descent has increased on average. Figure 15 below shows that the increase in angle of descent has mainly affected the path between the Midpoint (of JESEN and ZORSA, near HITIR) to ZORSA. How this might have affected noise is unclear.



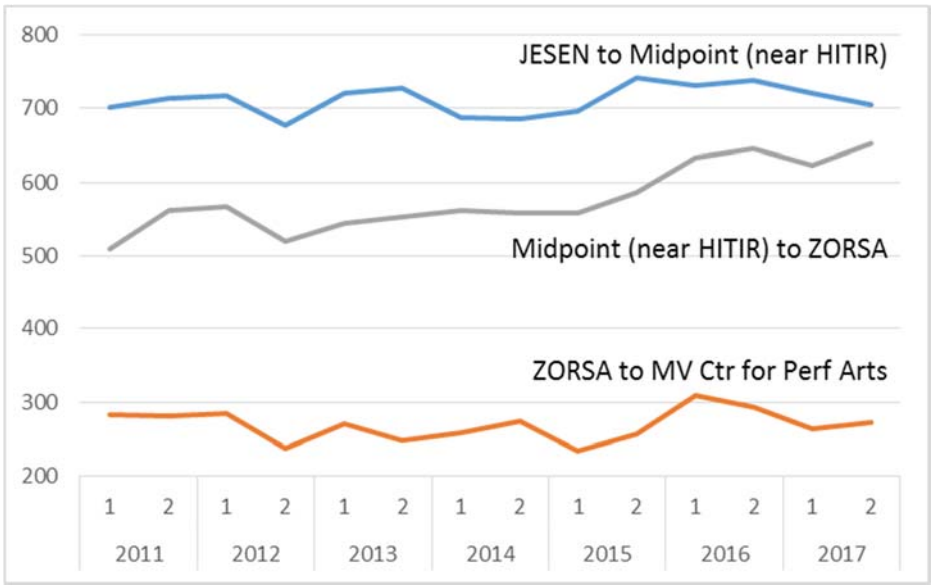
Source: Derived from FAA data. 2H17 data only includes July.

Figure 13. Average Altitude 2006 through July 2017 by Year



Source: Derived from FAA data. 2H17 data only includes July.

Figure 14. Average Altitude 2011 through July 2017 by Half Year



Source: Derived from FAA data. 2H17 data only includes July.

Figure 15. Average Drop in Altitude 2011 through July 2017 by Half Year

Night Time Air Carrier Operations Have Increased Recently as a Percentage of All Operations

Finally, there has been an uptick in air carrier operations between the hours of 11pm and 7am recently, as a percent of all operations. While the numbers are small, this bears watching. Unlike the other charts in this document, this data is not specific to South Flow flights.

Source: Derived from data provided by San Jose International Airport

Figure 16. Increase in Night Operations of Air Carriers as a Percent of Total

Conclusion

Noise complaints have skyrocketed for reasons that have little to do with weather. Rather, the increase in complaints dovetails with a dramatic increase in concentration of south flow traffic. South flow traffic has seen three phases of concentration in the past six years. Airplanes that were once evenly dispersed across a 2.25 mile band over Sunnyvale (Phase I) have been put on a narrow 'rail' (Phase III), and the center of this new rail is about a mile west of the old (Phase I) center of traffic. In addition, a new RNP approach has emerged over the last six years, with 25% of flights now using that approach. There is reason to believe that the FAA will increase concentration still further along these two rails if nothing is done.

Other factors contributing to noise complaints should be explored. FAA data suggests that airplanes are flying faster, which can contribute significantly to noise. Aircraft are also making steeper descents, on average, than in the past. Whether that was good or bad for noise is unclear. On the other hand, airplanes are flying at higher altitudes, on average, than they did before the 2015 changes, which suggests (but does not prove) that the cause of the noise complaints is not likely to be found in altitude.

Causes for each of these effects can be found in changes to the flight plates used by pilots for south flow arrivals, which have been significantly altered since 2012.

About the Author

Robert Holbrook is a resident of Mountain View who has been affected by changes to south flow traffic procedures into SJC.

Disclaimer: Mr. Holbrook is a layman. He is not an acoustic engineer, a pilot, an attorney or any other professional with regard to the topics discussed in this paper. The statements made in this document are believed to be accurate, but errors are possible.