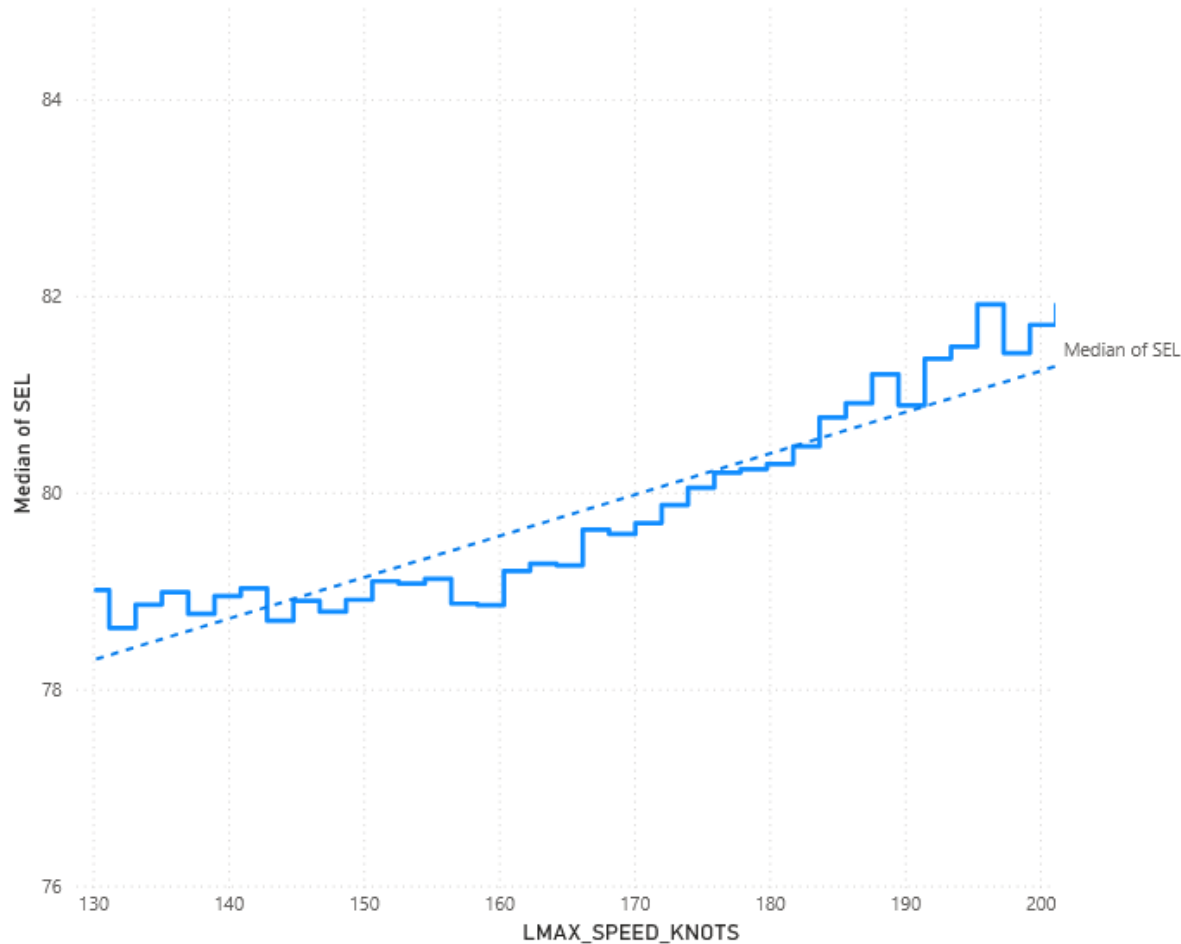


FINAVIA

FOR SMOOTH TRAVELLING



Helsinki Airport approach speed restriction & noise analysis

Envirosuite FORUM25

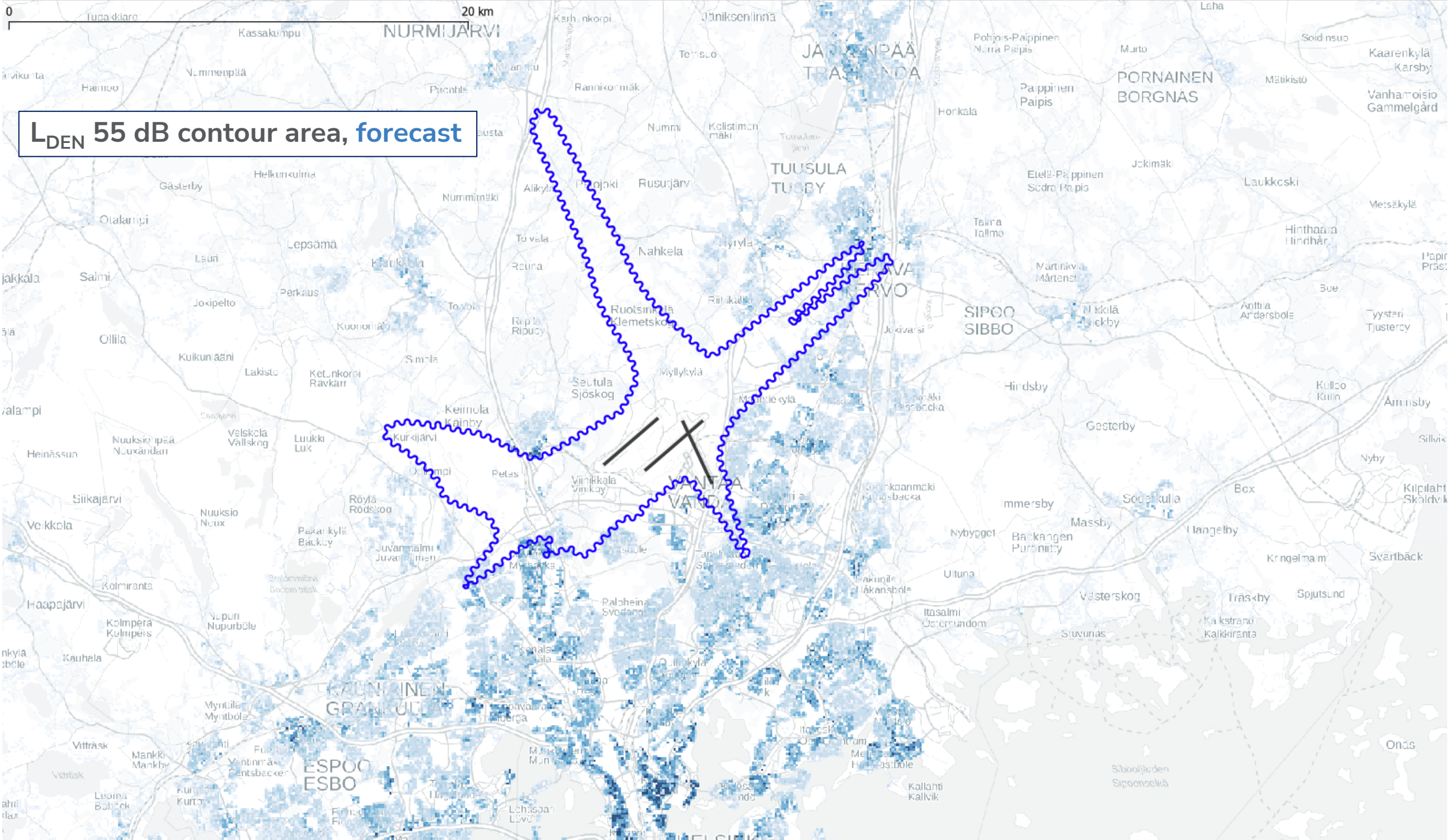
19.9.2025 Ari Pietilä

Finavia, head of aircraft noise management

Presentation

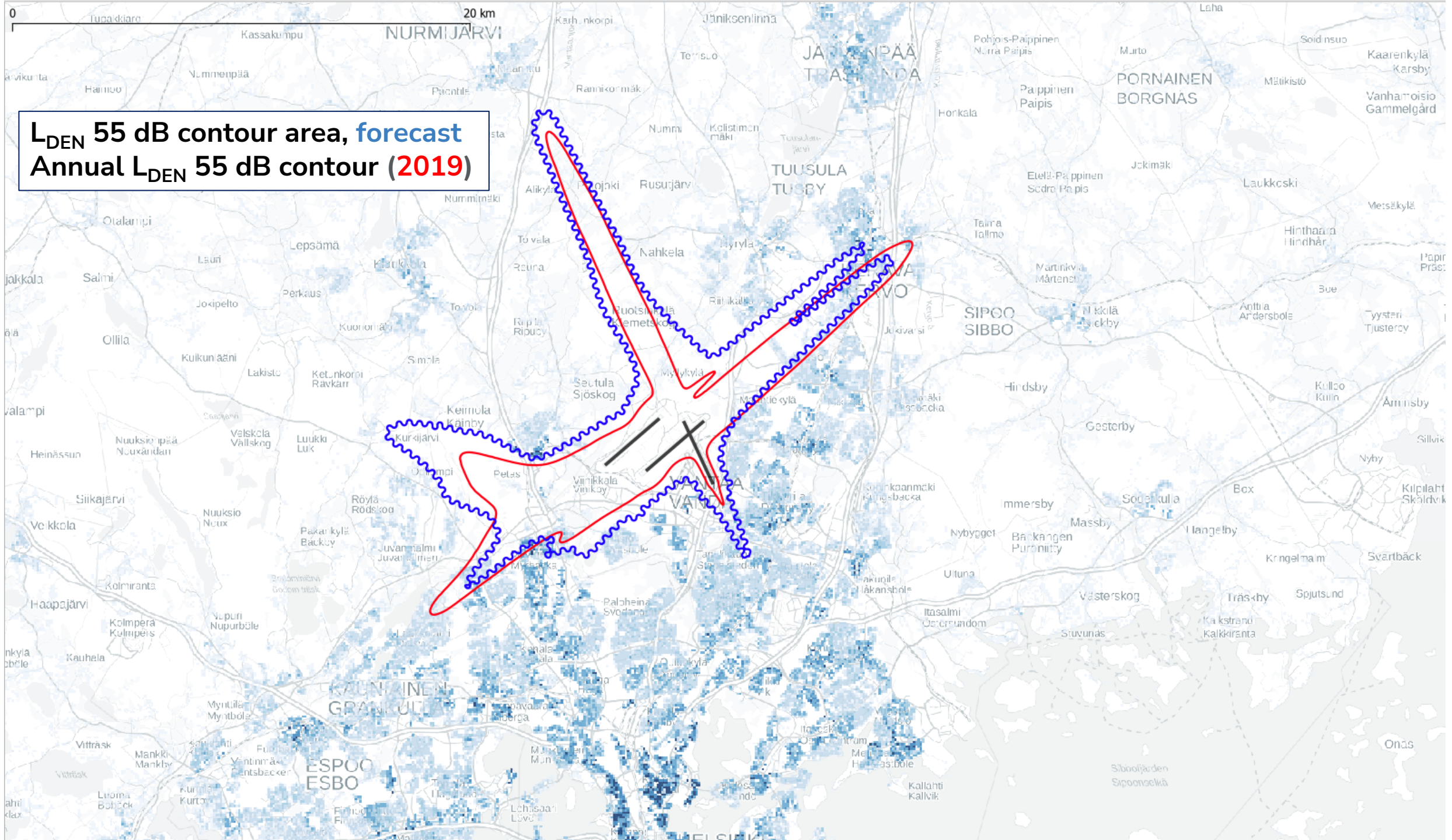
1. Helsinki Airport noise problem
2. Examining approach noise
 - Single flights
 - Annual medians
3. Solution
4. Effects
5. Discussion and conclusion

Problem



$L_{DEN} 55$ dB contour area, forecast

L_{DEN} 55 dB contour area, forecast
Annual L_{DEN} 55 dB contour (2019)

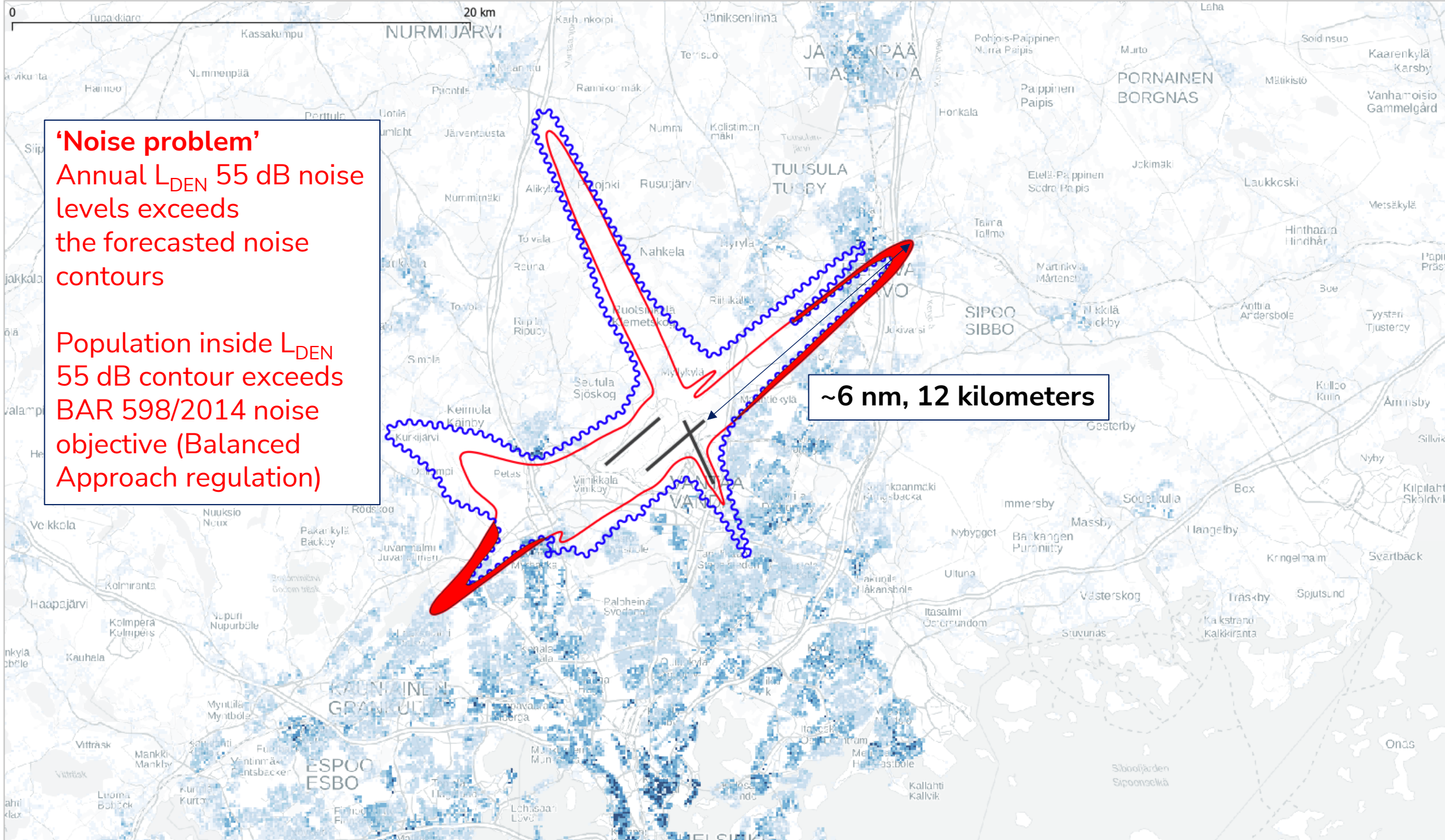


'Noise problem'

Annual L_{DEN} 55 dB noise levels exceeds the forecasted noise contours

Population inside L_{DEN} 55 dB contour exceeds BAR 598/2014 noise objective (Balanced Approach regulation)

~6 nm, 12 kilometers

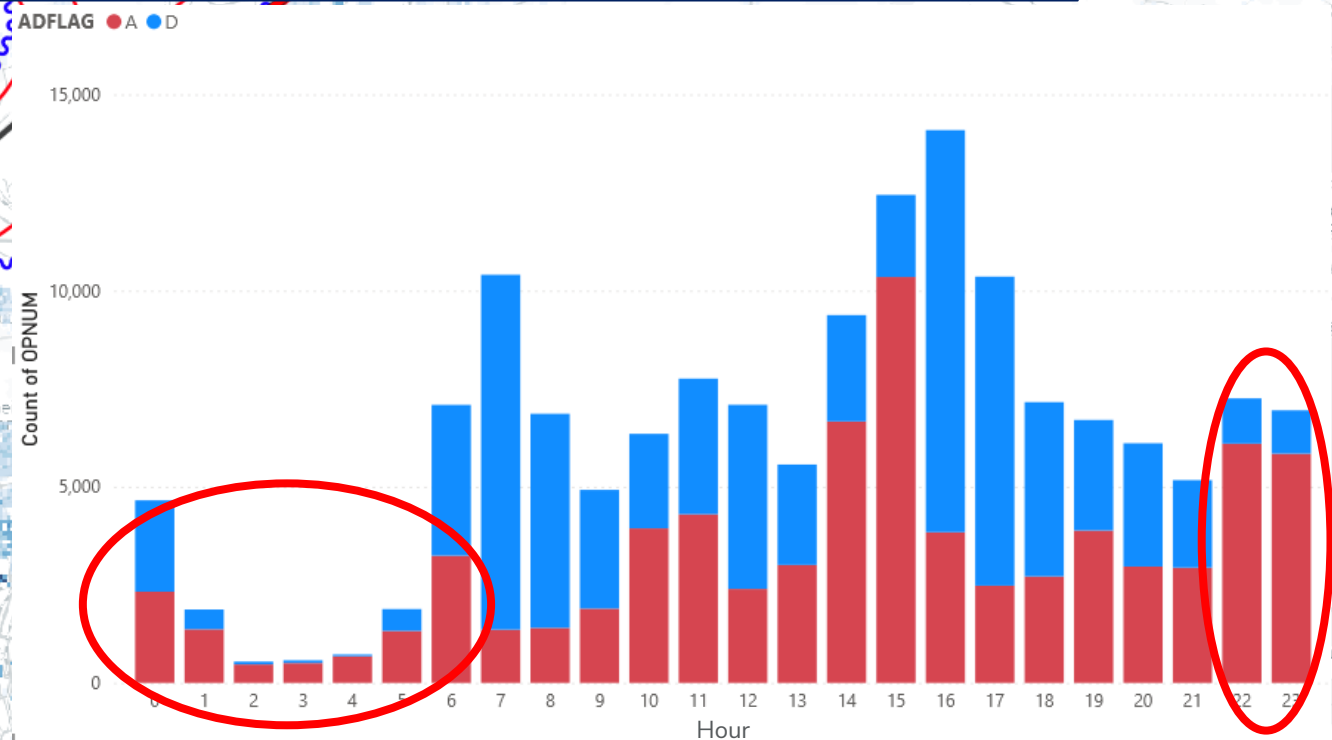


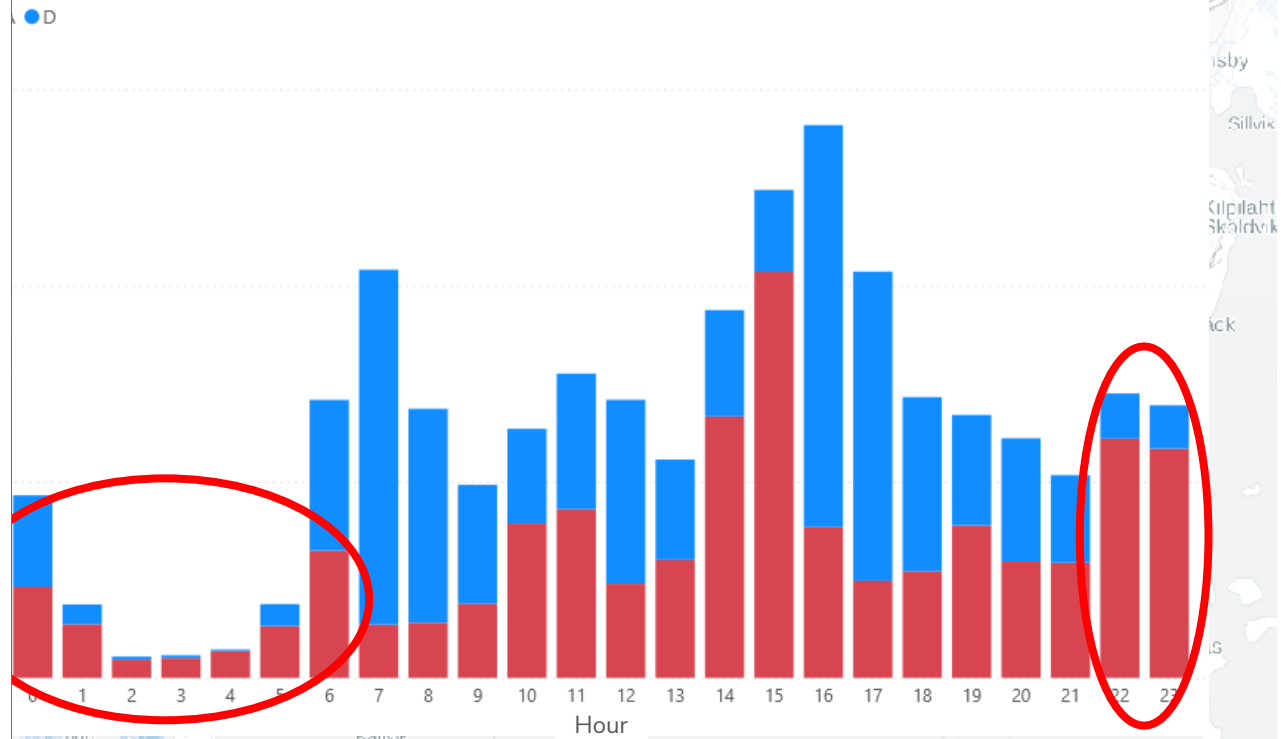
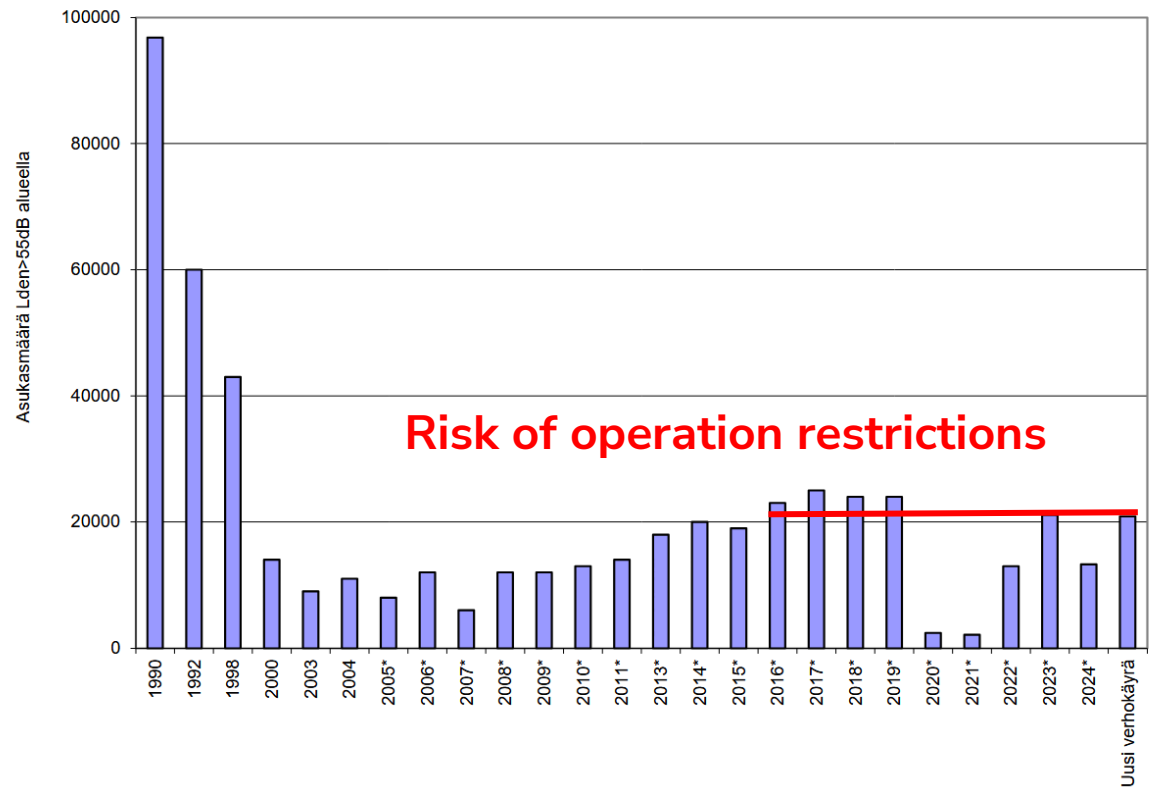
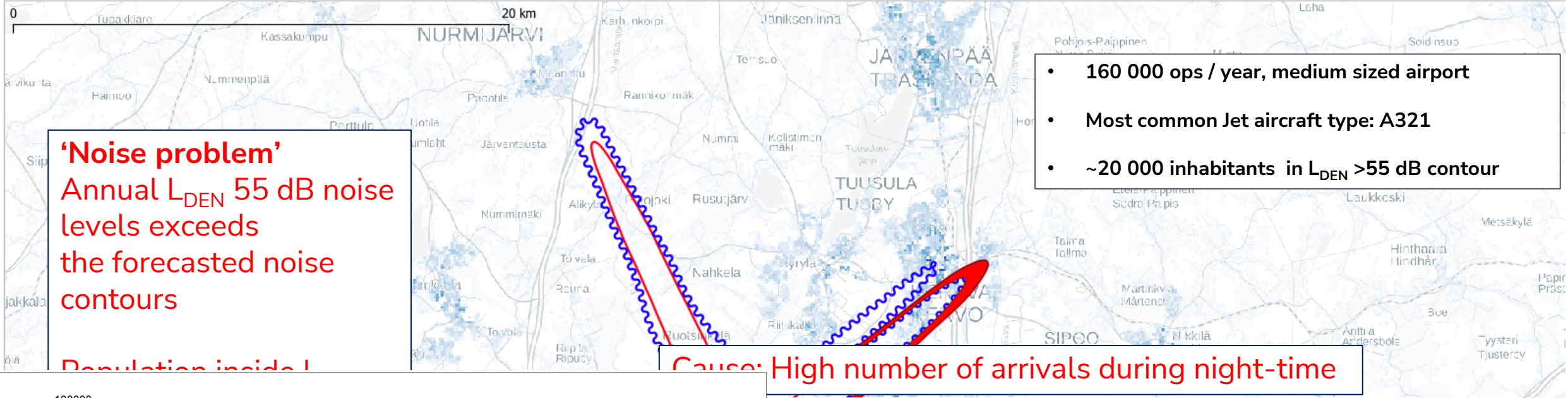
'Noise problem'

Annual L_{DEN} 55 dB noise levels exceeds the forecasted noise contours

Population inside L_{DEN} 55 dB contour exceeds BAR 598/2014 noise objective (Balanced Approach regulation)

Cause: High number of arrivals during night-time

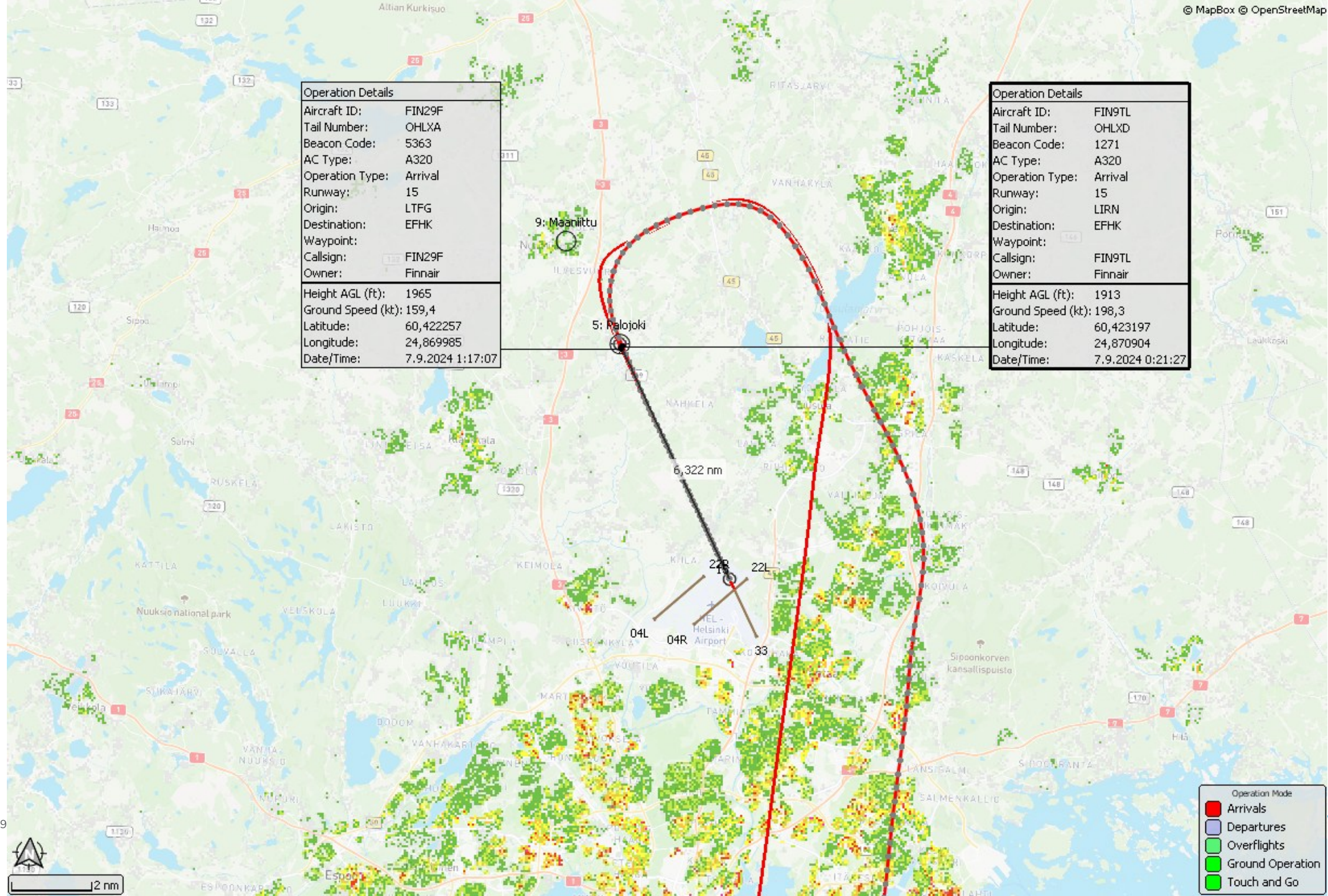




Examining approach noise

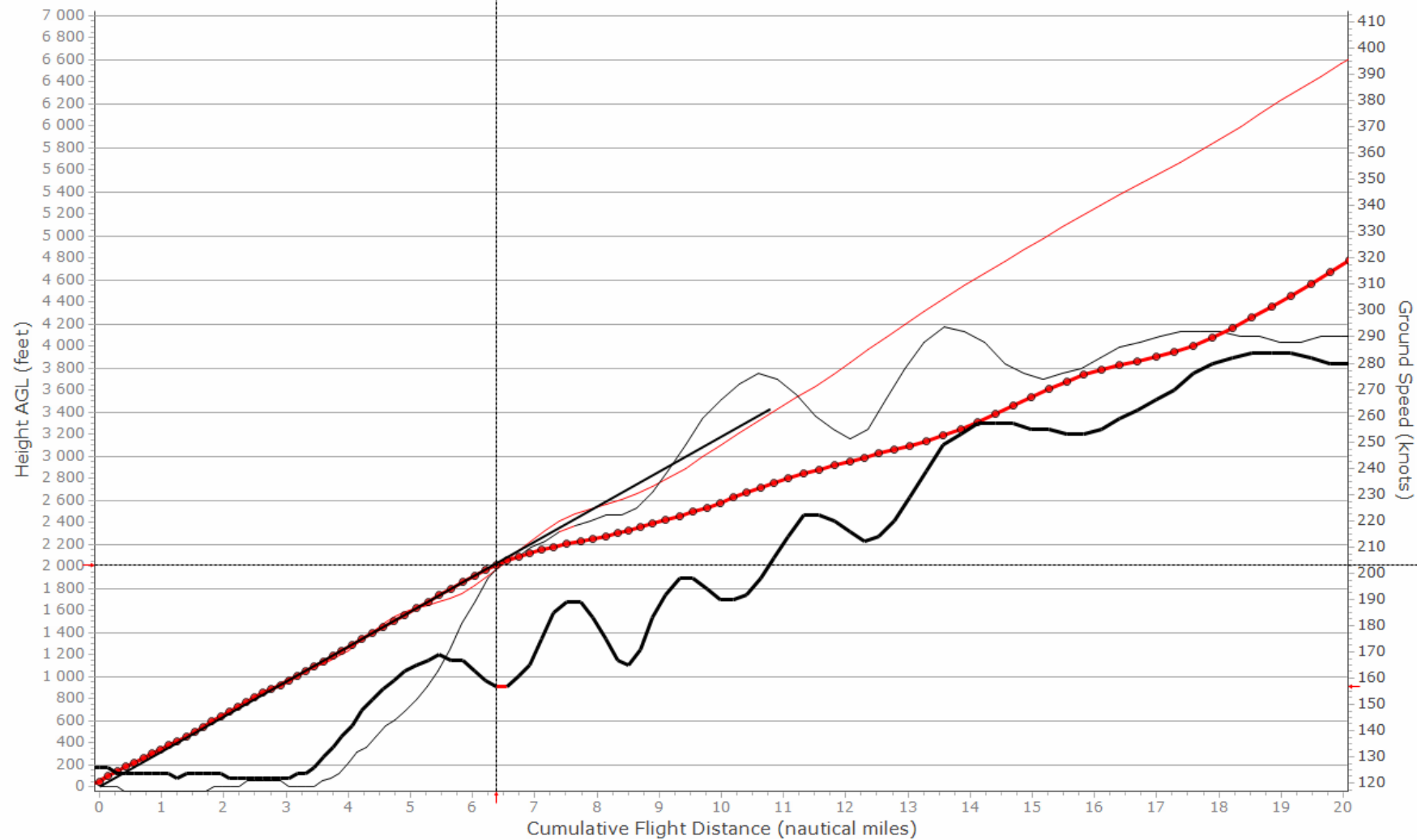
Operation Details	
Aircraft ID:	FIN29F
Tail Number:	OHLXA
Beacon Code:	5363
AC Type:	A320
Operation Type:	Arrival
Runway:	15
Origin:	LTFG
Destination:	EFHK
Waypoint:	
Callsign:	FIN29F
Owner:	Finnair
Height AGL (ft): 1965	
Ground Speed (kt): 159,4	
Latitude: 60,422257	
Longitude: 24,869985	
Date/Time: 7.9.2024 1:17:07	

Operation Details	
Aircraft ID:	FIN9TL
Tail Number:	OHLXD
Beacon Code:	1271
AC Type:	A320
Operation Type:	Arrival
Runway:	15
Origin:	LIRN
Destination:	EFHK
Waypoint:	
Callsign:	FIN9TL
Owner:	Finnair
Height AGL (ft): 1913	
Ground Speed (kt): 198,3	
Latitude: 60,423197	
Longitude: 24,870904	
Date/Time: 7.9.2024 0:21:27	



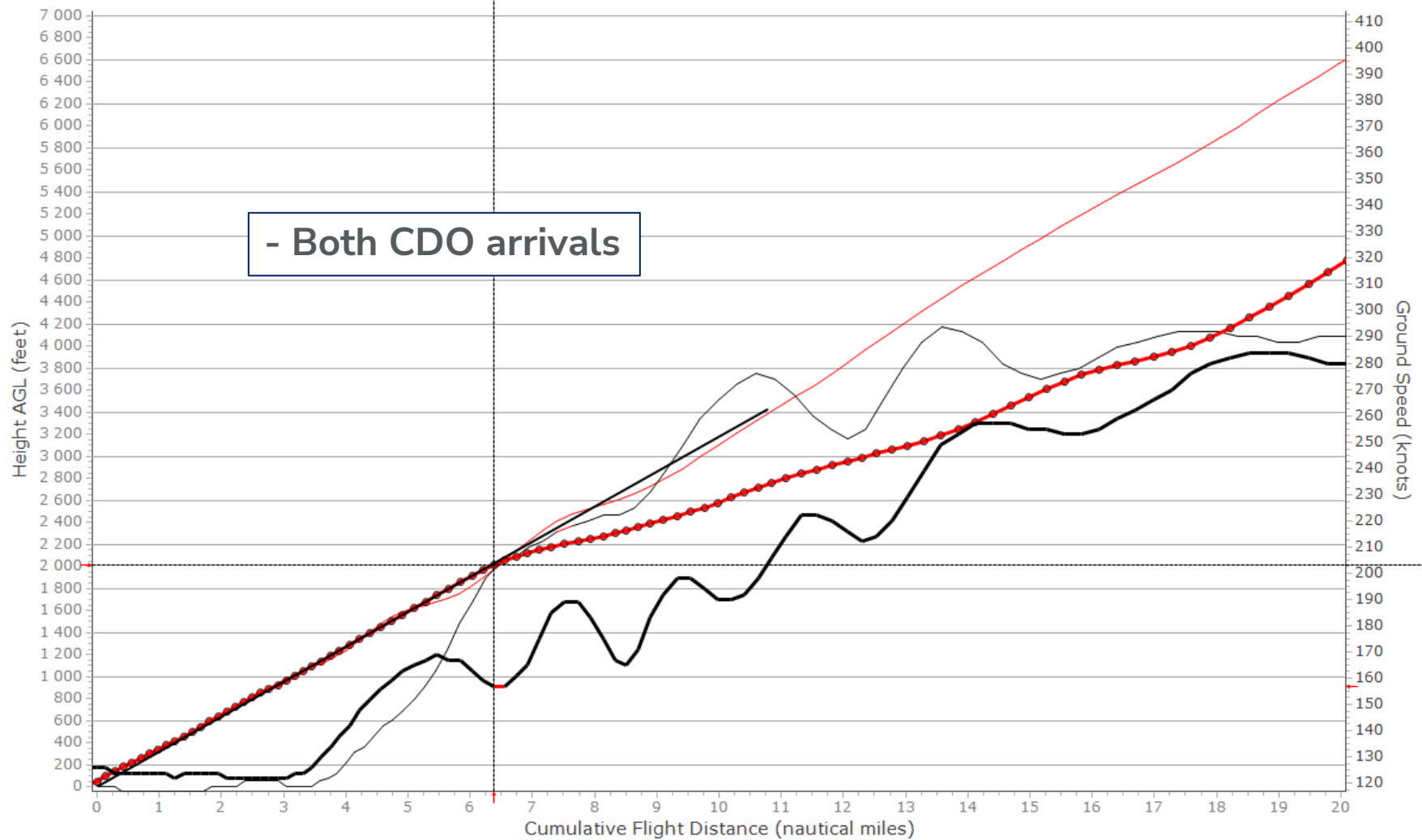
Operation Mode	
Arrivals	Red line
Departures	Blue line
Overflights	Green line
Ground Operation	Yellow line
Touch and Go	Orange line

Helsinki Airport
Multiple Track Profiles
7.9.2024 0:08:27 - 7.9.2024 1:19:59



Event No	Start Date/Time	Corr ID	Loc 1	Location
2006767089	7.9.2024 0:34:48	15105835	5	Palojoki
2006767175	7.9.2024 5:46:19	15105852	5	Palojoki
2006767088	7.9.2024 0:28:28	15105834	5	Palojoki
2006767117	7.9.2024 1:16:46	15105842	5	Palojoki
2006767176	7.9.2024 5:49:53	15105853	5	Palojoki
2006767380	7.9.2024 10:41:59	15105925	5	Palojoki
2006767389	7.9.2024 11:14:48	15105931	5	Palojoki
2006768192	7.9.2024 21:55:51	15106140	5	Palojoki
2006768207	7.9.2024 22:16:32	15106144	5	Palojoki
2006768274	7.9.2024 23:05:13	15106163	5	Palojoki
2006768283	7.9.2024 23:10:18	15106169	5	Palojoki
2006767998	7.9.2024 18:57:41	15106102	5	Palojoki
2006767086	7.9.2024 0:21:09	15105831	5	Palojoki

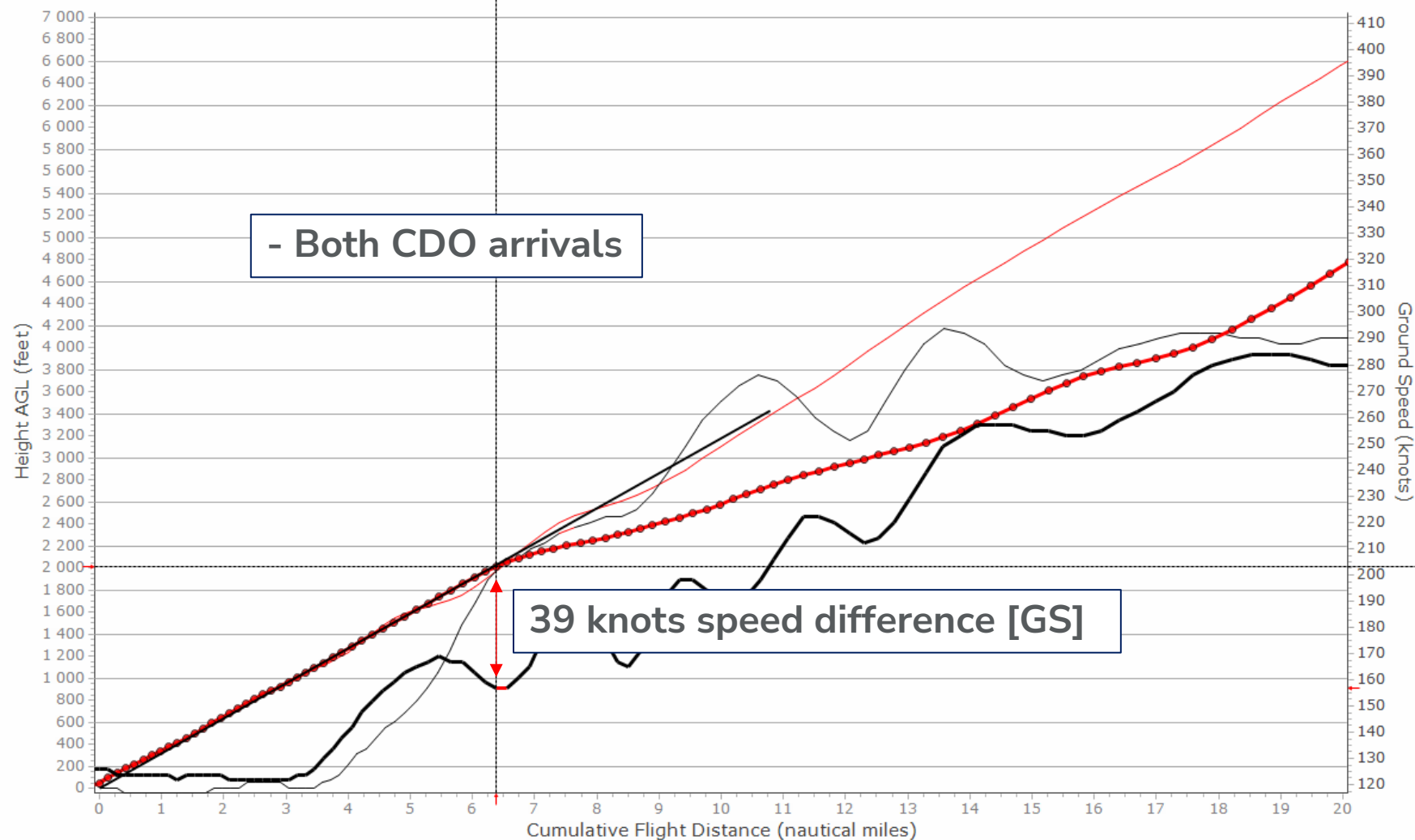
Helsinki Airport
Multiple Track Profiles
7.9.2024 0:08:27 - 7.9.2024 1:19:59



— Arrivals — Departures — Overflights — Touch and Go
— Ground Speed (knots)

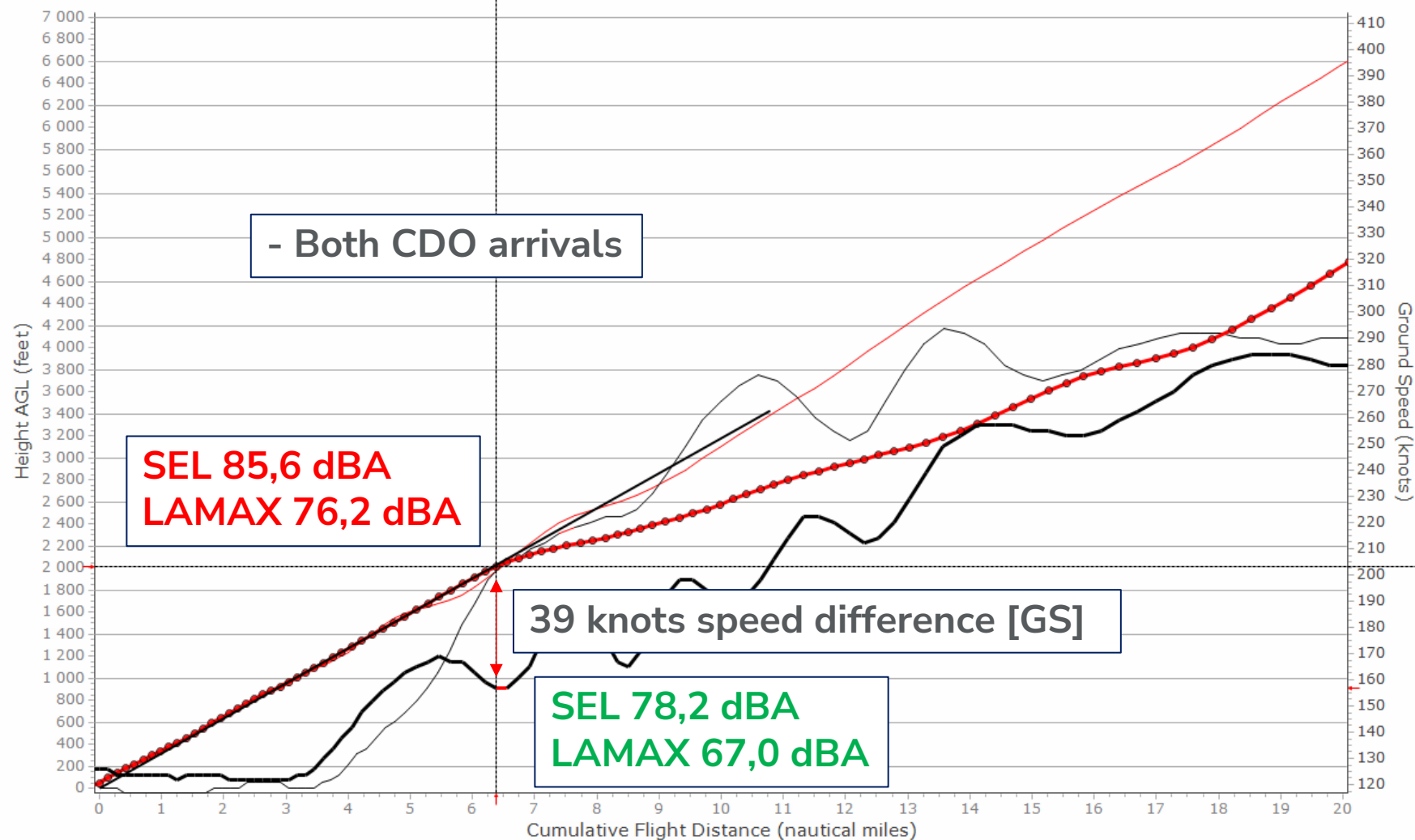
Event No	Start Date/Time	Corr ID	Loc 1	Location
2006767089	7.9.2024 0:34:48	15105835	5	Palojoki
2006767175	7.9.2024 5:46:19	15105852	5	Palojoki
2006767088	7.9.2024 0:28:28	15105834	5	Palojoki
2006767117	7.9.2024 1:16:46	15105842	5	Palojoki
2006767176	7.9.2024 5:49:53	15105853	5	Palojoki
2006767380	7.9.2024 10:41:59	15105925	5	Palojoki
2006767389	7.9.2024 11:14:48	15105931	5	Palojoki
2006768192	7.9.2024 21:55:51	15106140	5	Palojoki
2006768207	7.9.2024 22:16:32	15106144	5	Palojoki
2006768274	7.9.2024 23:05:13	15106163	5	Palojoki
2006768283	7.9.2024 23:10:18	15106169	5	Palojoki
2006767998	7.9.2024 18:57:41	15106102	5	Palojoki
2006767086	7.9.2024 0:21:09	15105831	5	Palojoki

Helsinki Airport
Multiple Track Profiles
7.9.2024 0:08:27 - 7.9.2024 1:19:59



Event No	Start Date/Time	Corr ID	Loc 1	Location
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2006767088	7.9.2024 0:28:28	15105834	5	Palojoki
2006767117	7.9.2024 1:16:46	15105842	5	Palojoki
2006767176	7.9.2024 5:49:53	15105853	5	Palojoki
2006767380	7.9.2024 10:41:59	15105925	5	Palojoki
2006767389	7.9.2024 11:14:48	15105931	5	Palojoki
2006768192	7.9.2024 21:55:51	15106140	5	Palojoki
2006768207	7.9.2024 22:16:32	15106144	5	Palojoki
2006768274	7.9.2024 23:05:13	15106163	5	Palojoki
2006768283	7.9.2024 23:10:18	15106169	5	Palojoki
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2006767086	7.9.2024 0:21:09	15105831	5	Palojoki

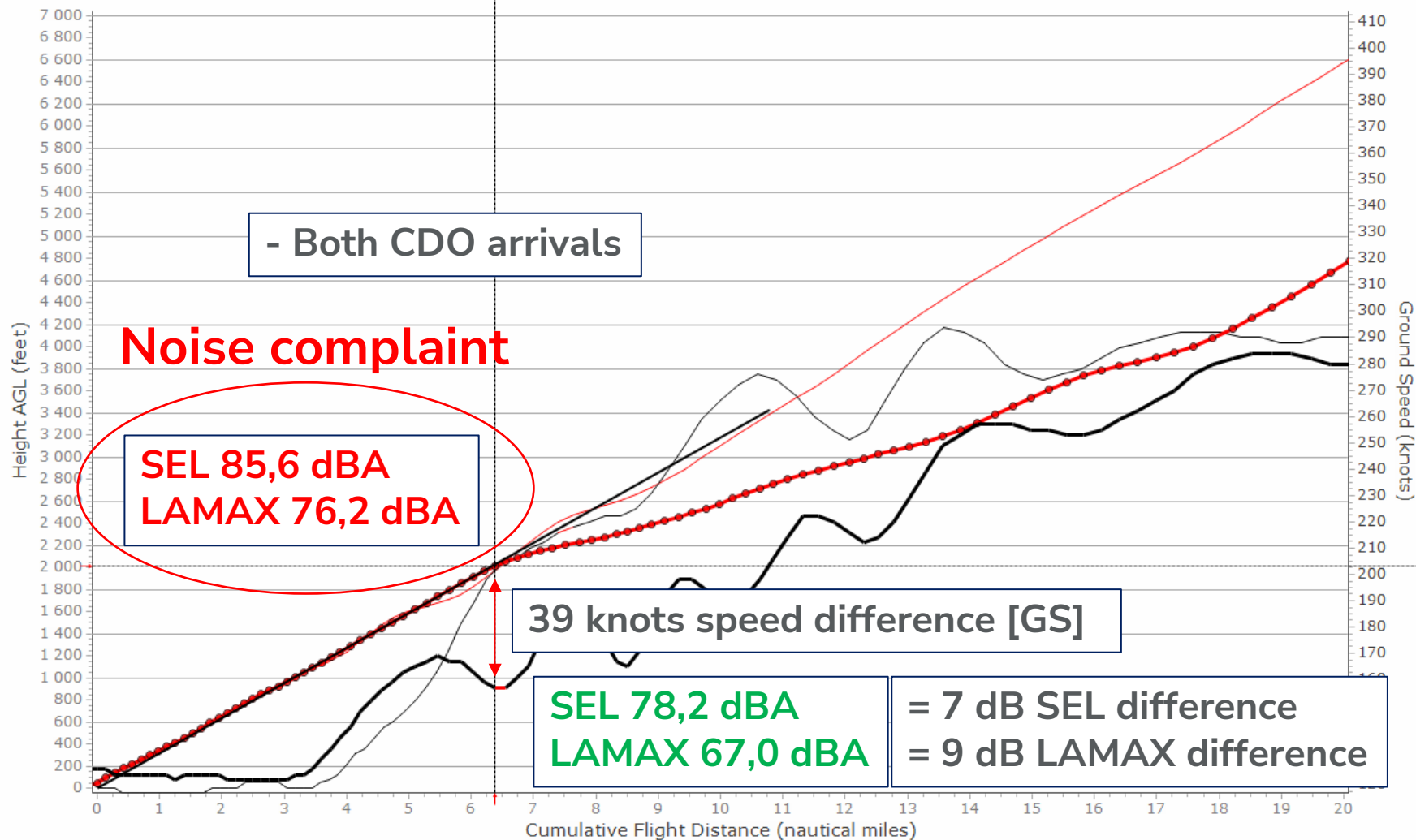
Helsinki Airport
Multiple Track Profiles
7.9.2024 0:08:27 - 7.9.2024 1:19:59



— Arrivals — Departures — Overflights — Touch and Go
— Ground Speed (knots)

Event No	Start Date/Time	Corr ID	Loc 1	Location
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2006767380	7.9.2024 10:41:59	15105925	5	Palojoki
2006767389	7.9.2024 11:14:48	15105931	5	Palojoki
2006768192	7.9.2024 21:55:51	15106140	5	Palojoki
2006768207	7.9.2024 22:16:32	15106144	5	Palojoki
2006768274	7.9.2024 23:05:13	15106163	5	Palojoki
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2006767998	7.9.2024 18:57:41	15106102	5	Palojoki
2006767086	7.9.2024 0:21:09	15105831	5	Palojoki

Helsinki Airport
Multiple Track Profiles
7.9.2024 0:08:27 - 7.9.2024 1:19:59



- Both CDO arrivals

Noise complaint

SEL 85,6 dBA
LAMAX 76,2 dBA

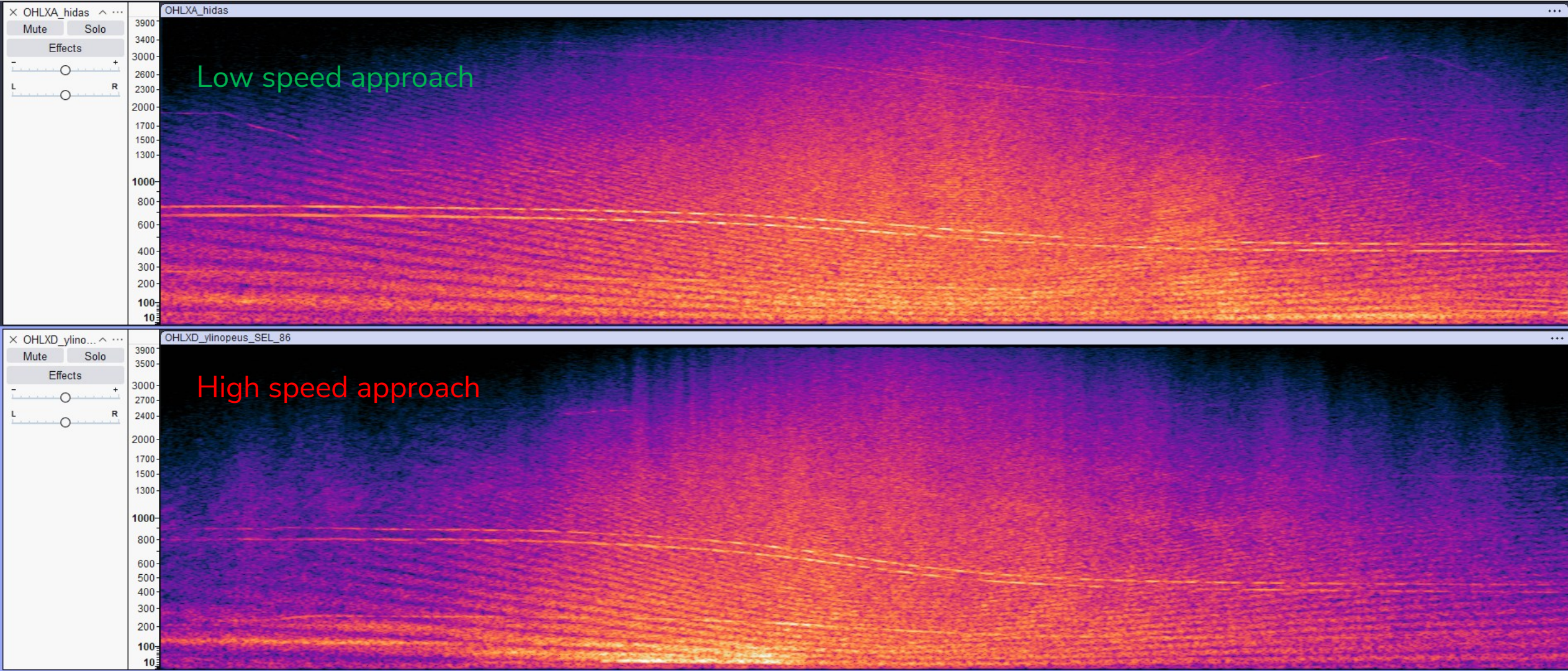
39 knots speed difference [GS]

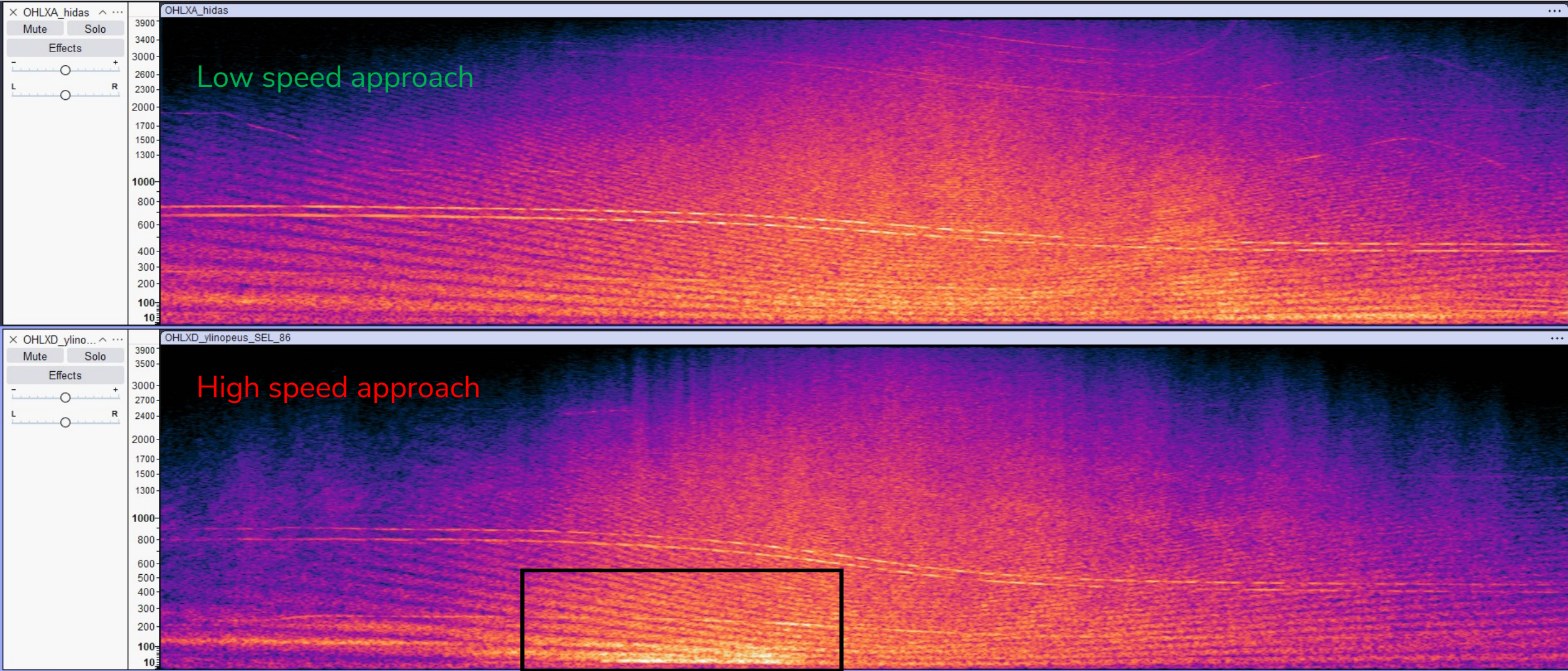
SEL 78,2 dBA
LAMAX 67,0 dBA

= 7 dB SEL difference
= 9 dB LAMAX difference

— Arrivals — Departures — Overflights — Touch and Go
— Ground Speed (knots)

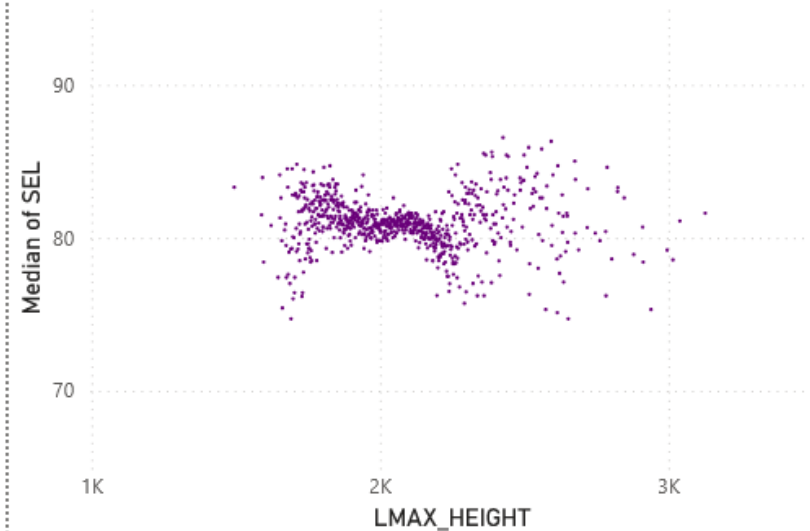
Event No	Start Date/Time	Corr ID	Loc 1	Location
2006767089	7.9.2024 0:34:48	15105835	5	Palojoki
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2006767176	7.9.2024 5:49:53	15105853	5	Palojoki
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2006768192	7.9.2024 21:55:51	15106140	5	Palojoki
2006768207	7.9.2024 22:16:32	15106144	5	Palojoki
2006768274	7.9.2024 23:05:13	15106163	5	Palojoki
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2006767998	7.9.2024 18:57:41	15106102	5	Palojoki
2006767086	7.9.2024 0:21:09	15105831	5	Palojoki





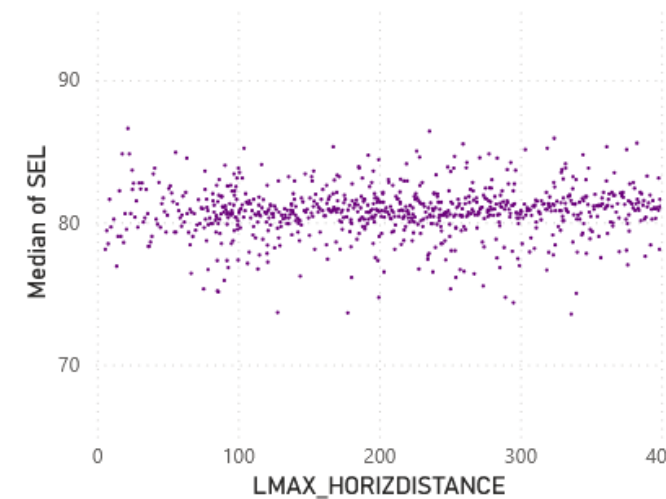
Median of SEL by RMTID and LMAX_HEIGHT

RMTID ● 6



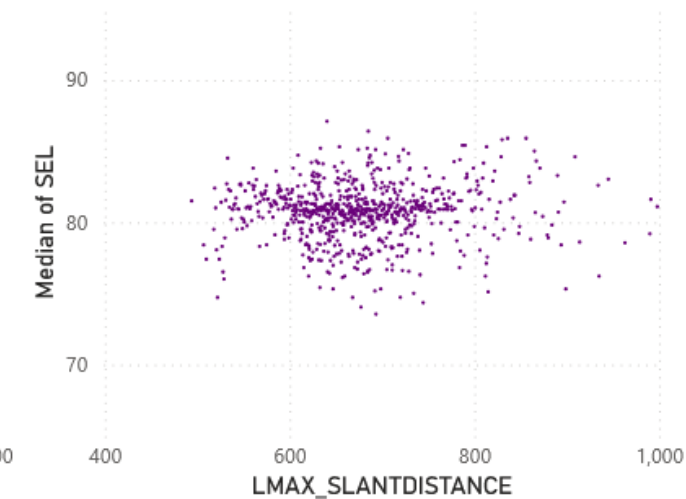
Median of SEL by RMTID and LMAX_HORIZDISTANCE

RMTID ● 6



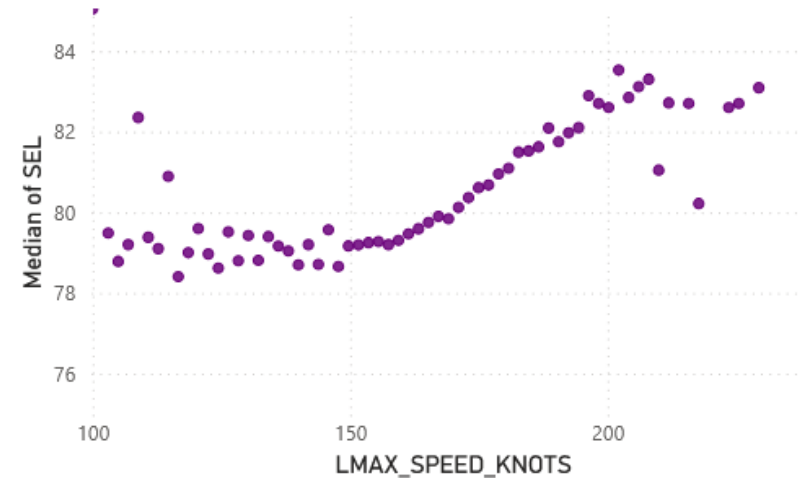
Median of SEL, Median of SEL and Median of MAXLEVEL by RMTID and LMAX_SLANTDISTANCE

RMTID ● 6



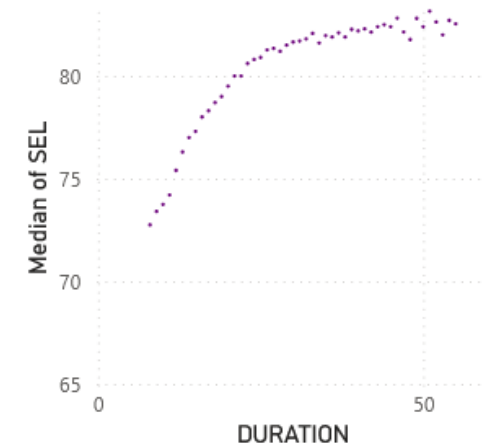
Median of SEL by RMTID and LMAX_SPEED_KNOTS

RMTID ● 6



Median of SEL by RMTID and DURATION

RMTID ● 6



- ☐ 1.00
- ☐ 5.00
- ☒ 6.00
- ☐ 9.00
- ☐ 68.00
- ☐ 69.00
- ☐ 70.00
- ☐ 201.00

RUNW... ▾

- ☐ 04L
- ☐ 15
- ☒ 22L

ADFL...

A

70.80 80.75
Average of MAXLEVEL Average of SEL

AIRCRAF.

- ☐ A306
- ☐ A308
- ☐ A310
- ☐ A318
- ☐ A319
- ☒ A320
- ☐ A321
- ☐ A332
- ☐ A333
- ☐ A339
- ☐ A340

70.78 80.90
Median of MAXLEVEL Median of SEL

2.57 17.18K
Standard devi... Count of OPNUM

ACTUALTIME

1/1/2017

9/18/2025

RMTID, MAXLEVEL and SEL

RMTID ● 6



STAGELENGTH, MAXLEVEL and SEL

STAGELENGTH ● 1



Sel-Lmax

5.00 15.00

LMAX_SLANTDISTANCE

56.00 3,500.00

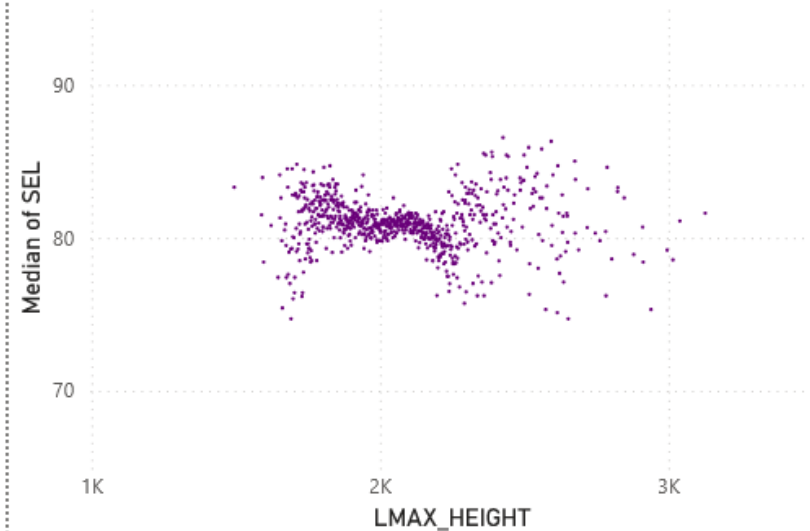
STAGELENGTH

1.00

VIA

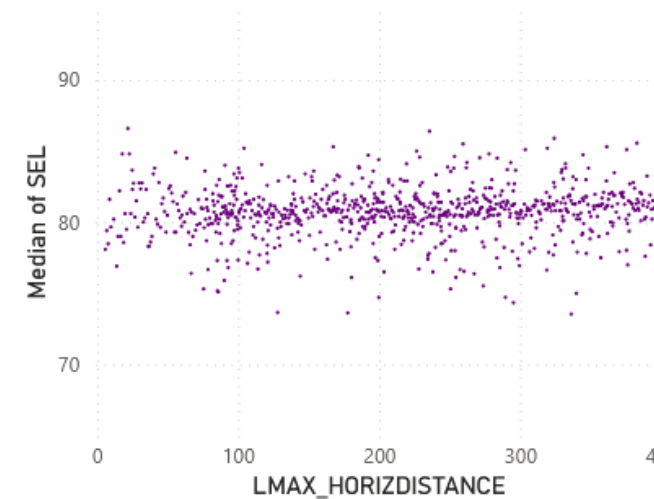
Median of SEL by RMTID and LMAX_HEIGHT

RMTID ● 6



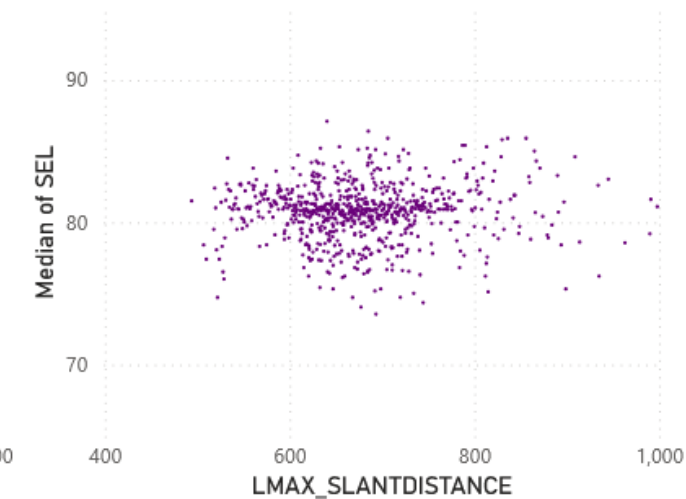
Median of SEL by RMTID and LMAX_HORIZDISTANCE

RMTID ● 6



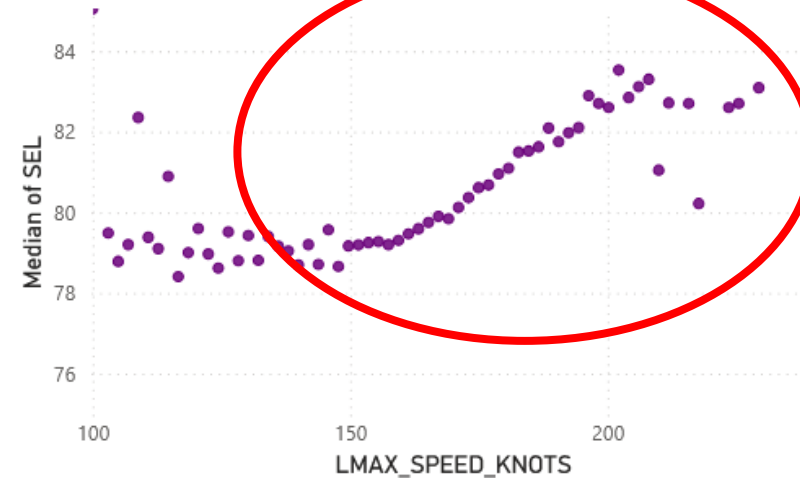
Median of SEL, Median of SEL and Median of MAXLEVEL by RMTID and LMAX_SLANTDISTANCE

RMTID ● 6



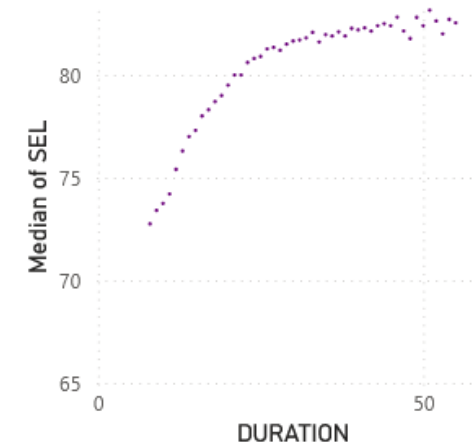
Median of SEL by RMTID and LMAX_SPEED_KNOTS

RMTID ● 6



Median of SEL by RMTID and DURATION

RMTID ● 6



- ☐ 1.00
- ☐ 5.00
- ☒ 6.00
- ☐ 9.00
- ☐ 68.00
- ☐ 69.00
- ☐ 70.00
- ☐ 201.00

RUNW... ▾

- ☐ 04L
- ☐ 15
- ☒ 22L

ADFL...

A

70.80 80.75
Average of MAXLEVEL Average of SEL

AIRCRAF.

- ☐ A306
- ☐ A308
- ☐ A310
- ☐ A318
- ☐ A319
- ☒ A320
- ☐ A321
- ☐ A332
- ☐ A333
- ☐ A339
- ☐ A340

70.78 80.90
Median of MAXLEVEL Median of SEL

2.57 17.18K
Standard devi... Count of OPNUM

ACTUALTIME

1/1/2017

9/18/2025

RMTID, MAXLEVEL and SEL

RMTID ● 6



STAGELENGTH, MAXLEVEL and SEL

STAGELENGTH ● 1



Sel-Lmax

5.00 15.00

LMAX_SLANTDISTANCE

56.00 3,500.00

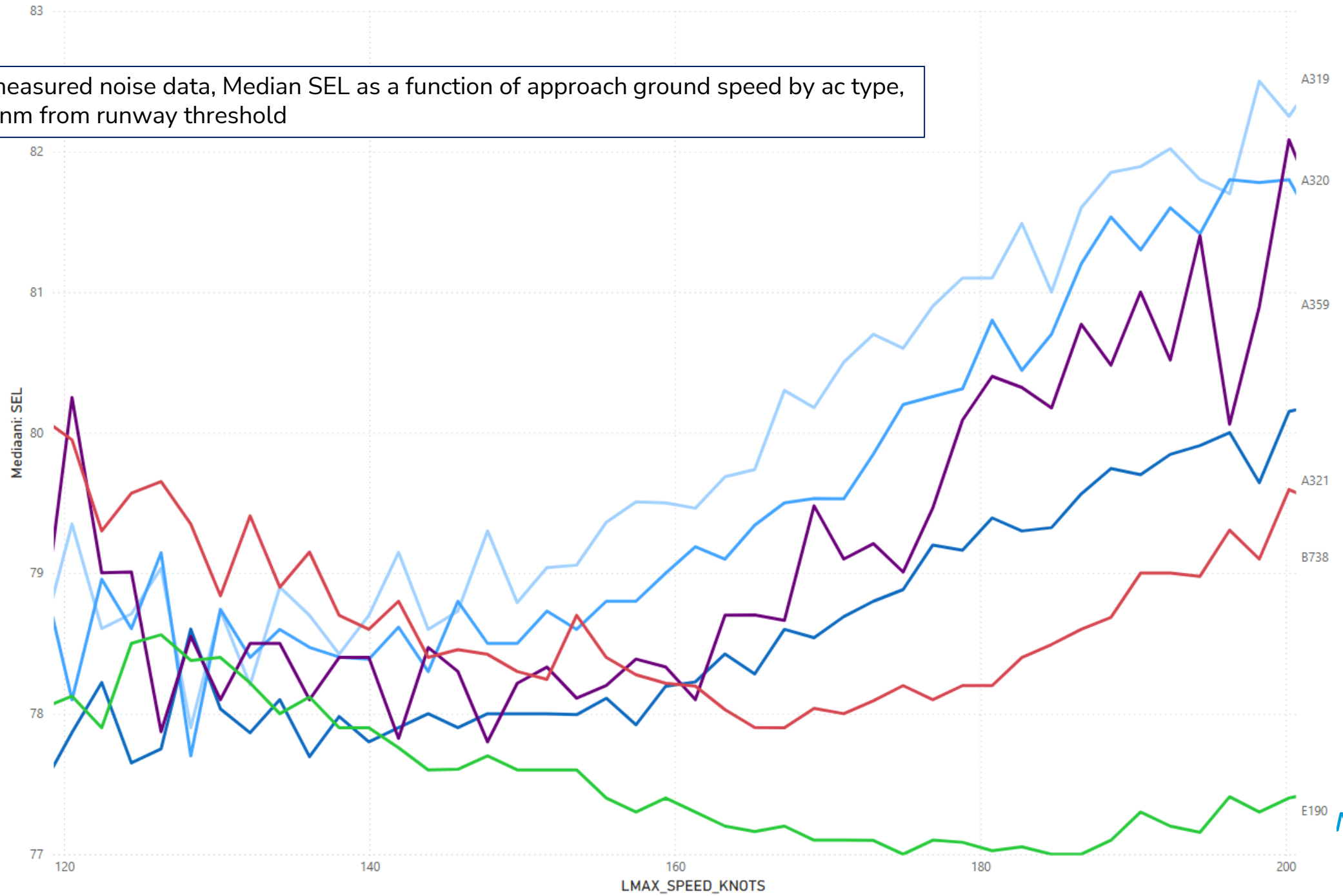
STAGELENGTH

1.00

VIA

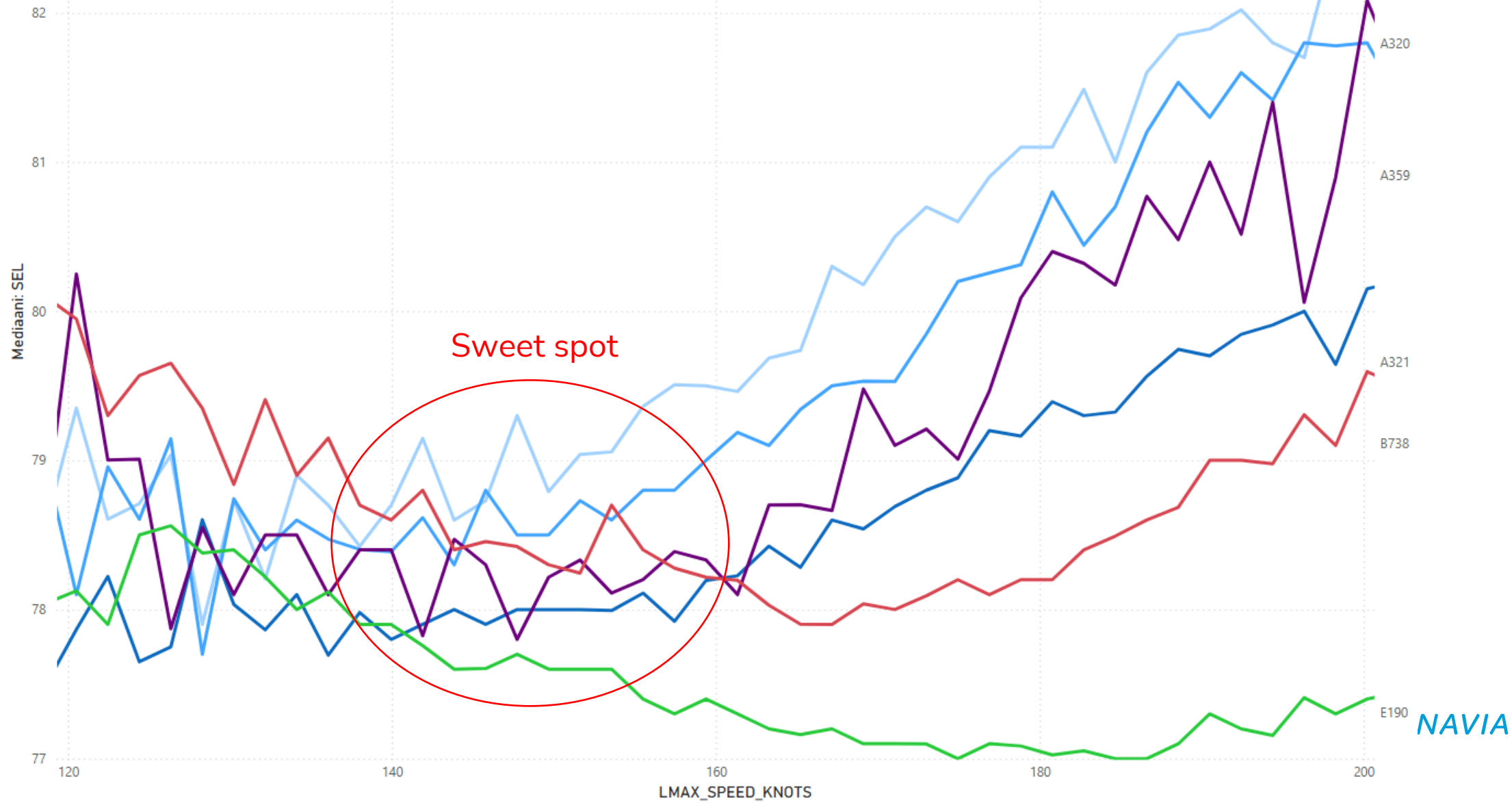
AIRCRAFTTYPE A319 A320 A321 A359 B738 E190

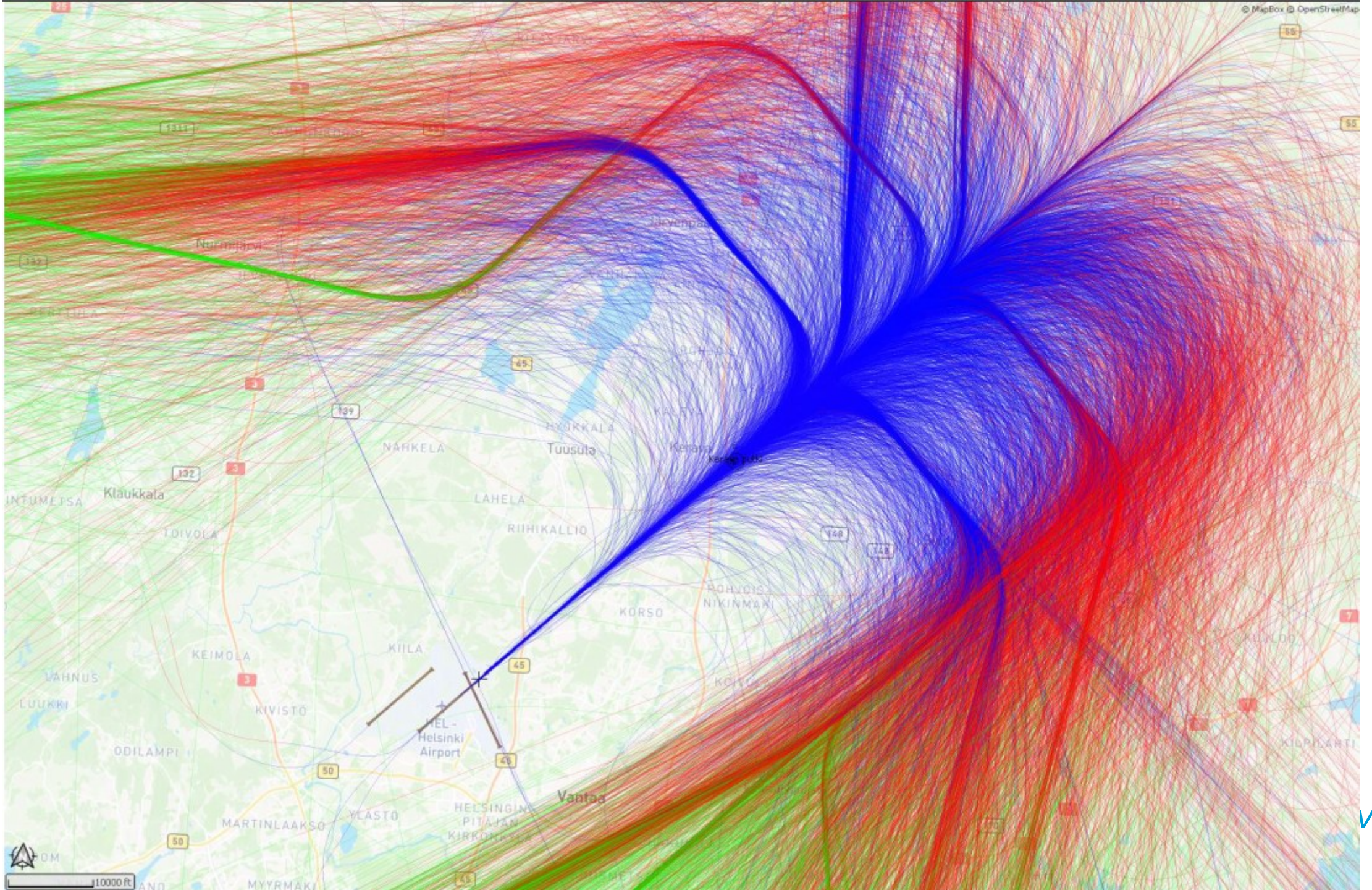
EFHK measured noise data, Median SEL as a function of approach ground speed by ac type, 6 – 6,2 nm from runway threshold



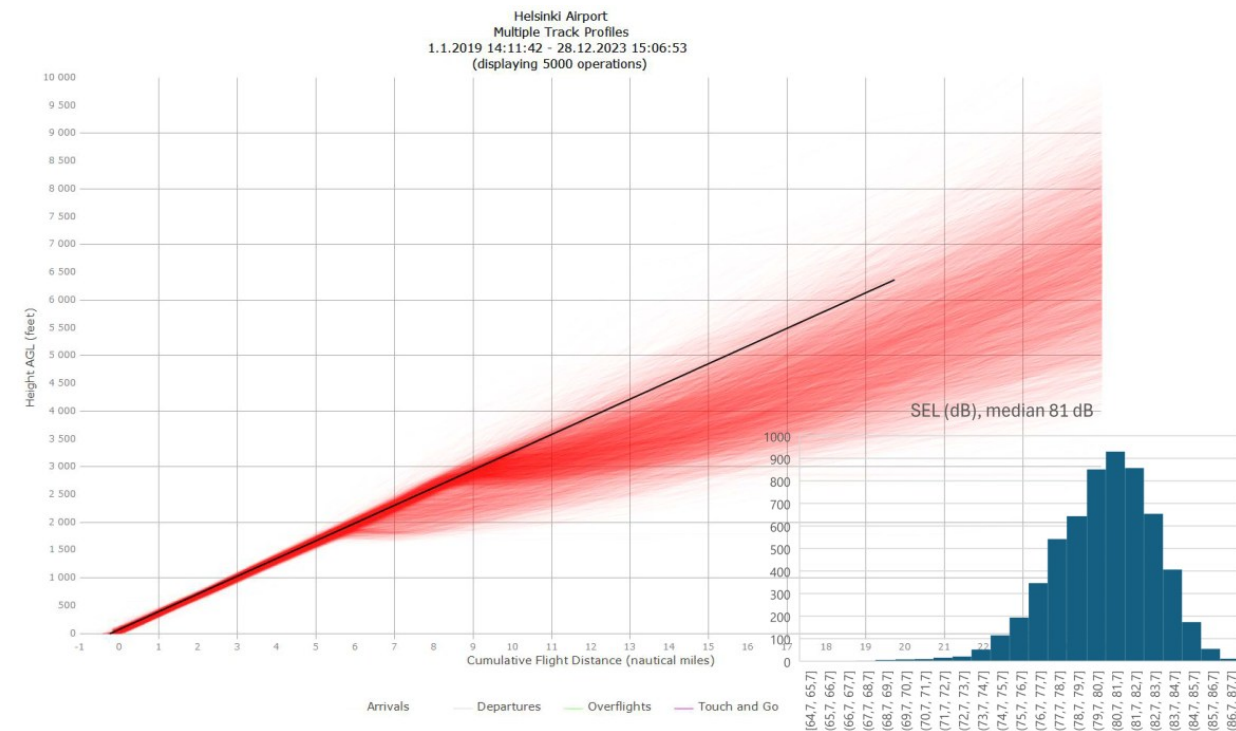
AIRCRAFTTYPE A319 A320 A321 A359 B738 E190

EFHK measured noise data, Median SEL as a function of approach ground speed by ac type, 6 – 6,2 nm from runway threshold

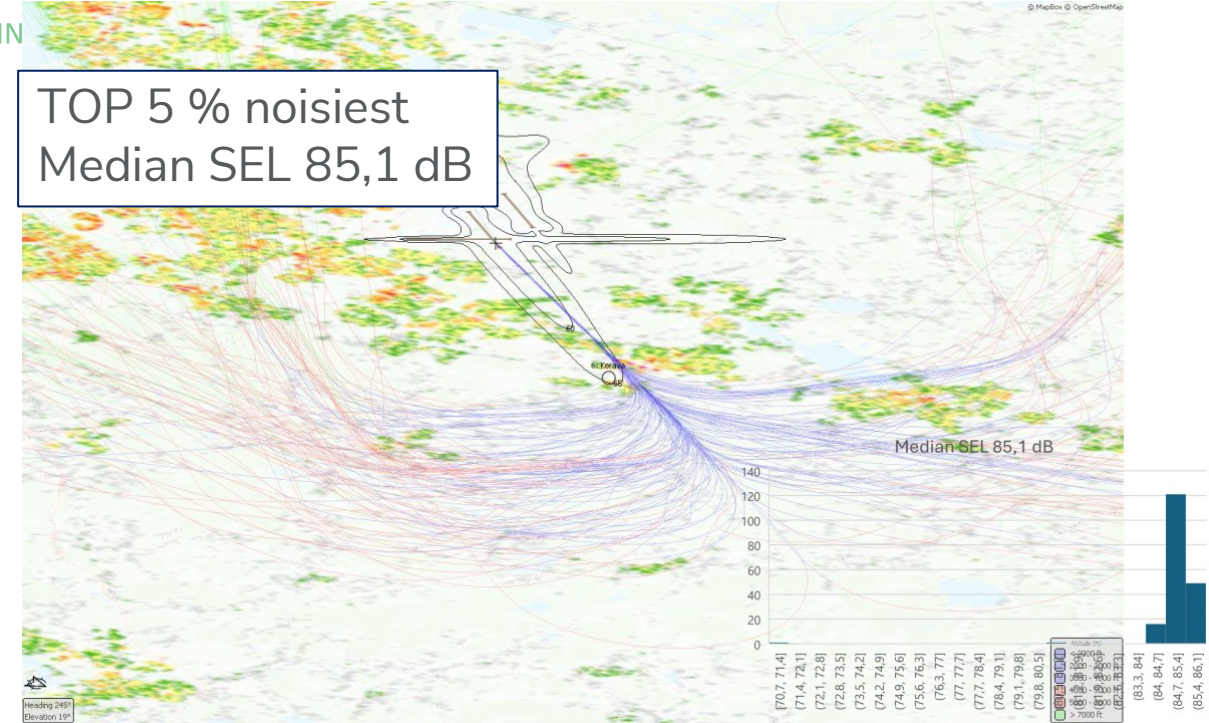




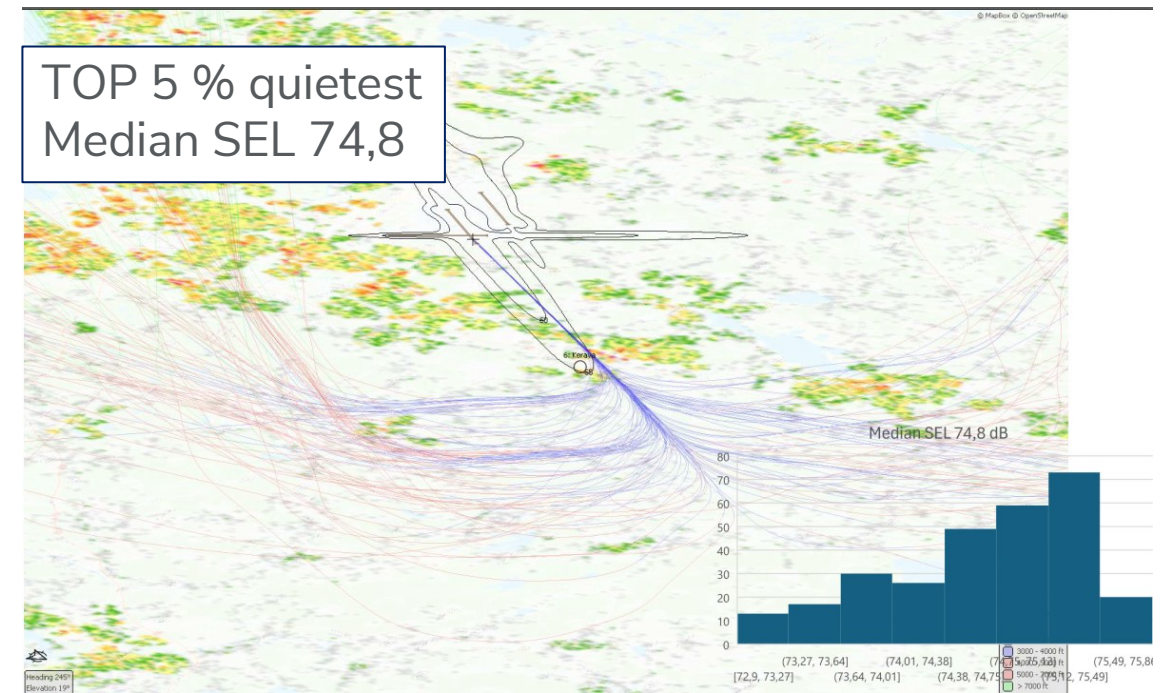
1.1.2019 – 31.12.2023



TOP 5 % noisiest
Median SEL 85,1 dB



TOP 5 % quietest
Median SEL 74,8

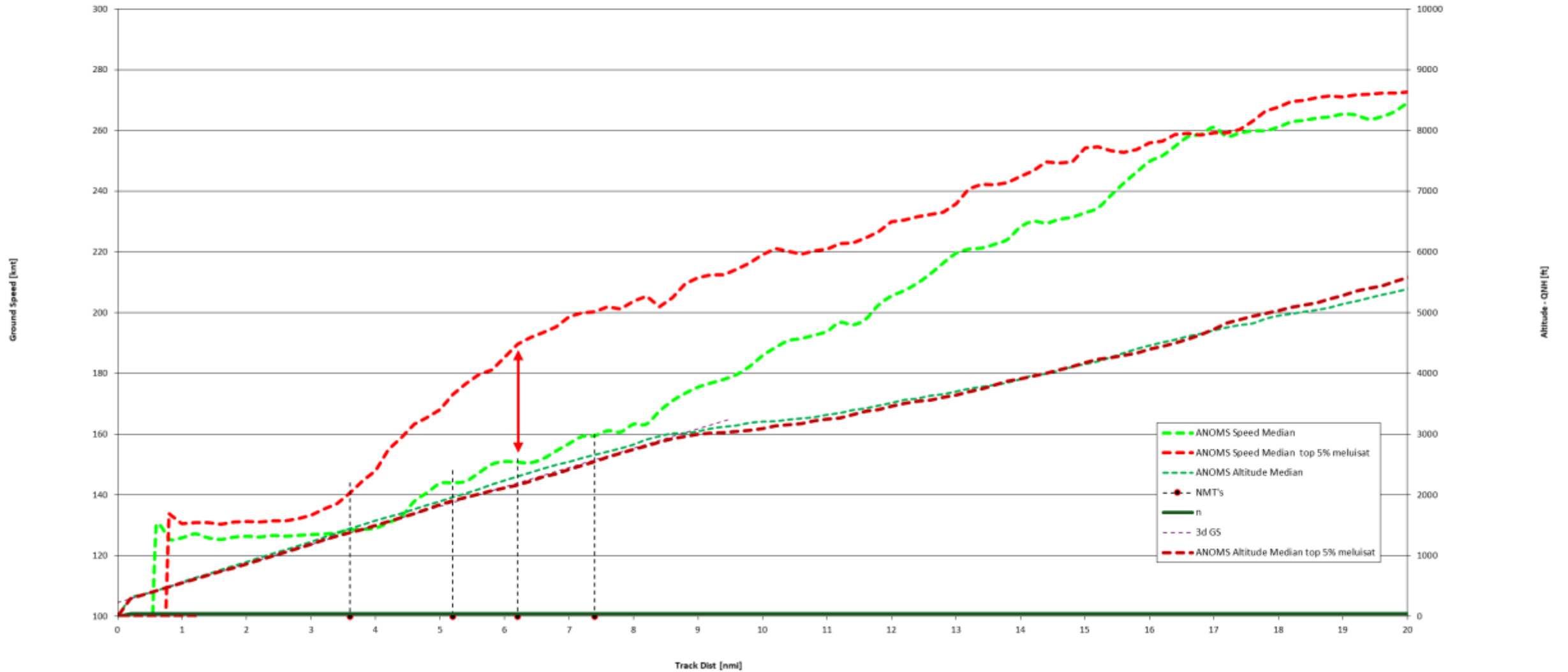


A320 arrivals, one runway, 2019 - 2023

Quiet TOP 5 %

Loudest TOP 5 %

t0_meluisat_vs_meluisat

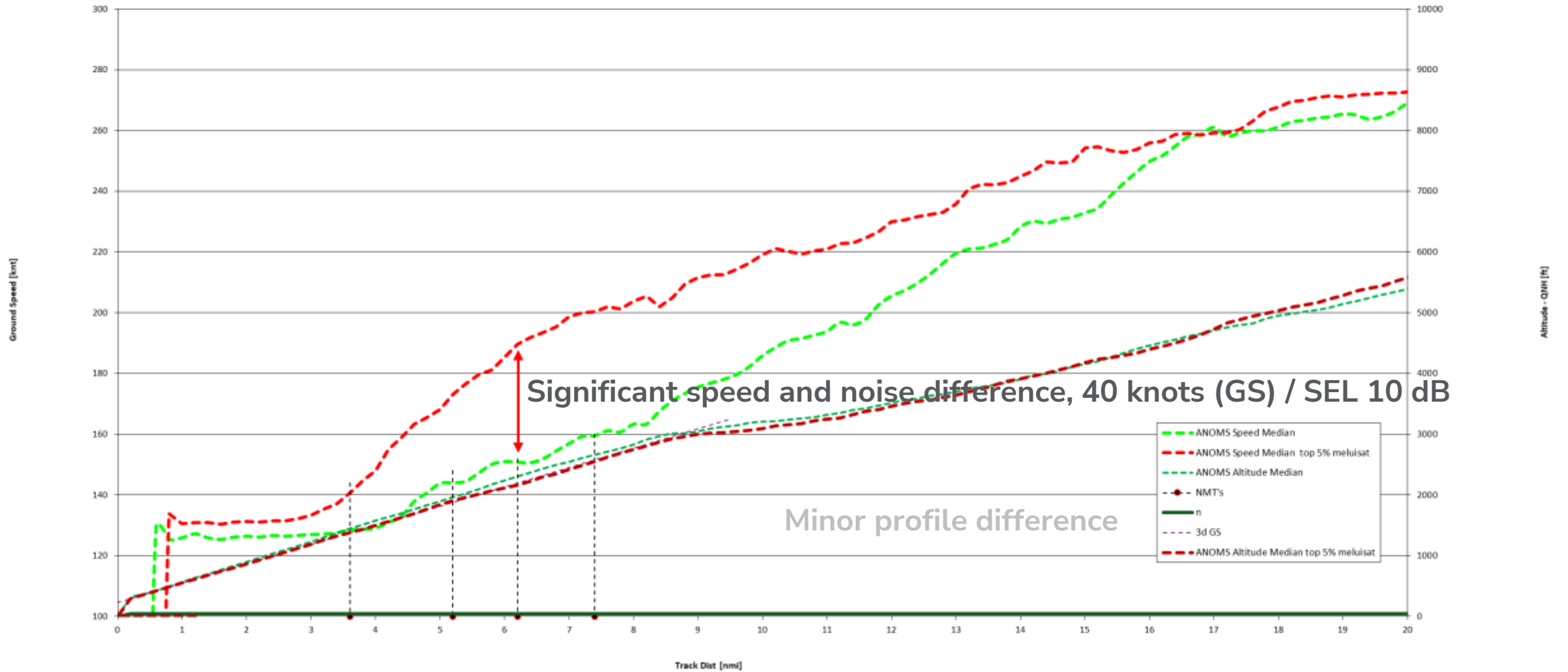


A320 arrivals, one runway, 2019 - 2023

Quiet TOP 5 %

Loudest TOP 5 %

t0_meluisat_vs_meluisat

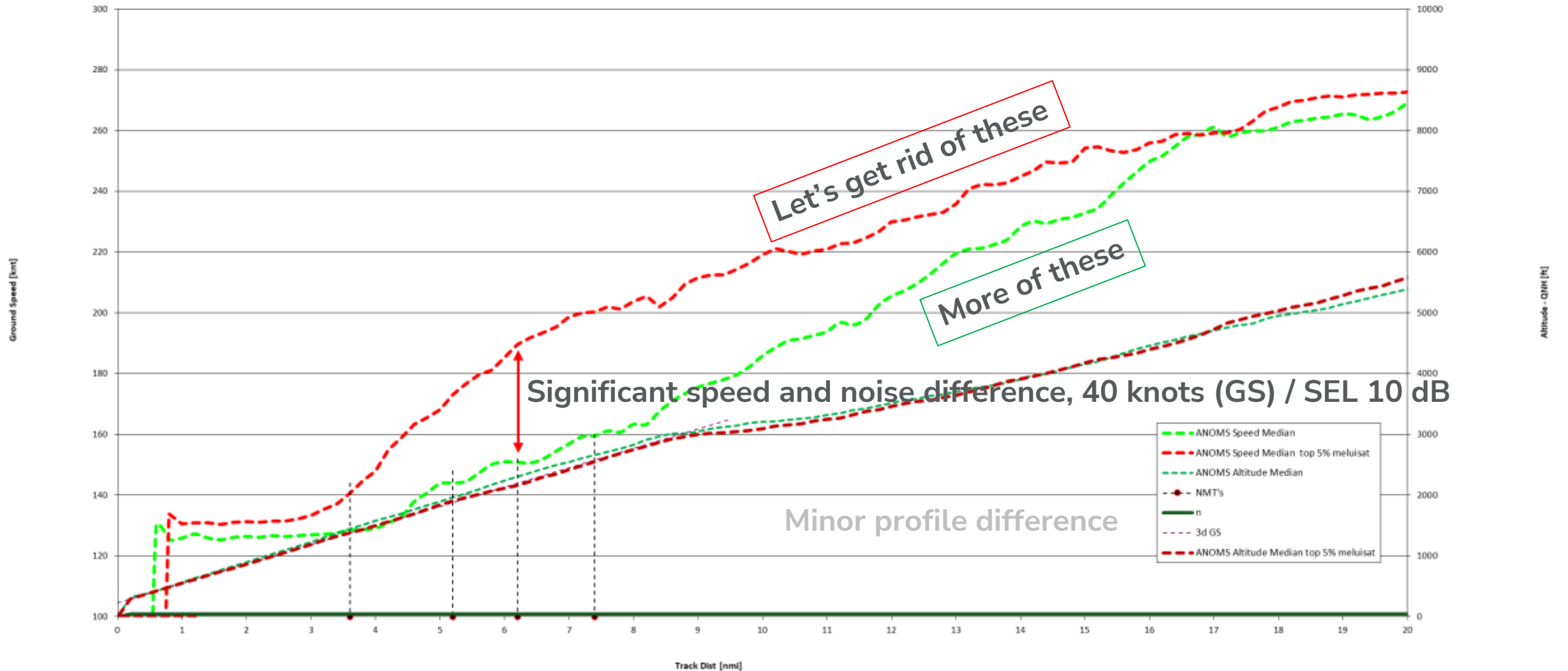


A320 arrivals, one runway, 2019 - 2023

Quiet TOP 5 %

Loudest TOP 5 %

t0_meluisat_vs_meluisat



Solution

Solution = Speed restriction

- Project within Collaboration Environmental Management (CEM) group work (Airport, Airlines, Air Navigation Services)
- Test campaign 2.12. – 20.12.2024 for speed constraint (TAS) **190 knots @ 9 nautical miles**
 - all runways
 - 24/7
- **190 knots @ 9nm** enables Low Power / Low Drag approaches (with A320-family configuration 2, delayed landing gear extension)
- After the test flight campaign and positive comments from ATC, Airlines and preliminary noise results decision was made to continue with the speed restriction in 2025

Effects

Speed restriction analysis and classification

- Analysis using a classification: **complied / did not comply with the speed limit**
- >190 knots (GS) @ <8 nautical miles (1 nm tolerance due to wind and use of ground speed)
- Analysis from the year 2025 onwards, most significant aircraft types for EFHK annual noise, mainly on runways 22L/04L
- The analysis includes aircraft landings that have correlated with a noise event

1.1.2025 – 25.8.2025

FINAVIAN AINEISTOA

Nopeusrajoitus noudattaminen ● Did comply ● Overspeed

AIRCRAFTTYPE

A20N

A319

A320

A321

A333

A359

B38M

B738

CRJ9

E190



Nopeusrajoitus noudattaminen ● Did comply ● Overspeed

AIRCRAFTTYPE
A20N
A319
A320
A321
A333
A359
B38M
B738
CRJ9
E190

Count of OPNUM

2 000

1 000

0

January

February

March

April

May

June

July

August

September

October

November

December

January

February

March

April

May

June

July

August

September

October

November

December

January

February

March

April

May

June

July

August

September

October

November

2022

2023

2024

Month

Nopeusrajoitus noudattaminen ● Did comply ● Overspeed

AIRCRAFTTYPE
A20N
A319
A320
A321
A333
A359
B38M
B738
CRJ9
E190

Count of OPNUM

2 000

1 000

0

Month

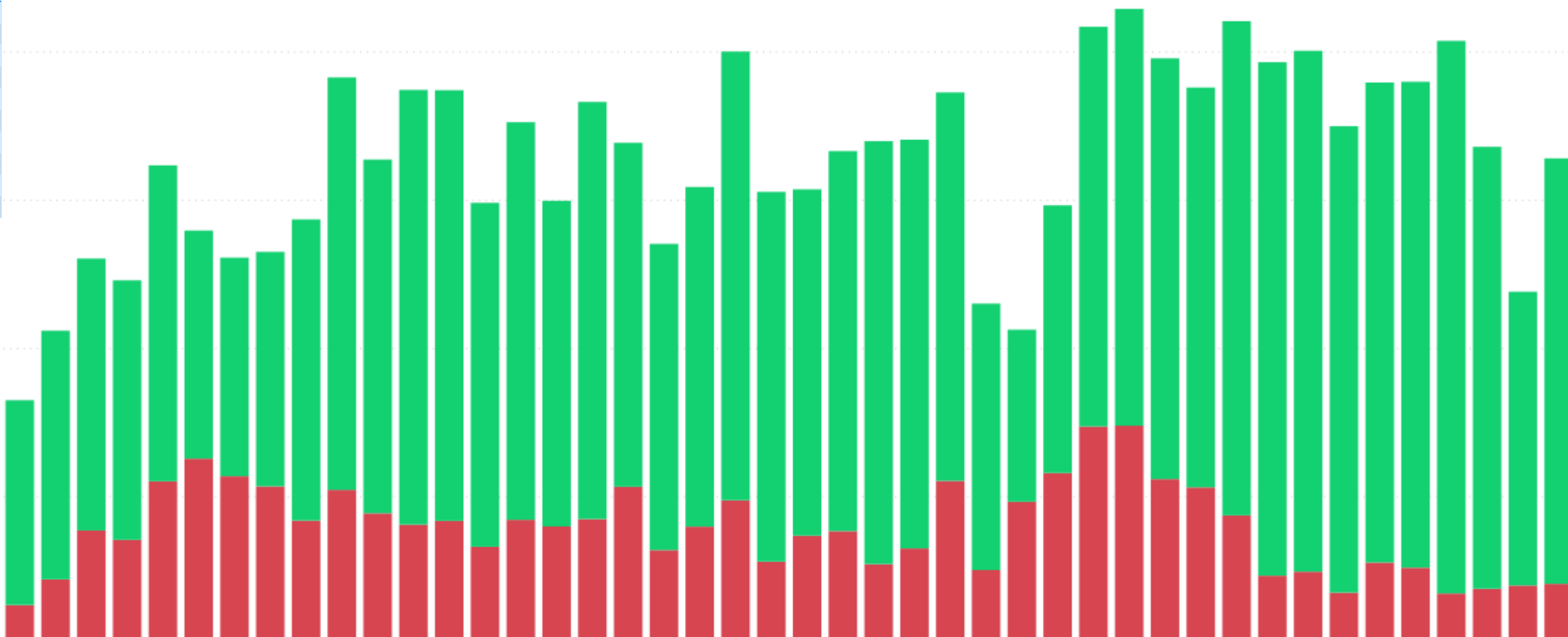
2022

2023

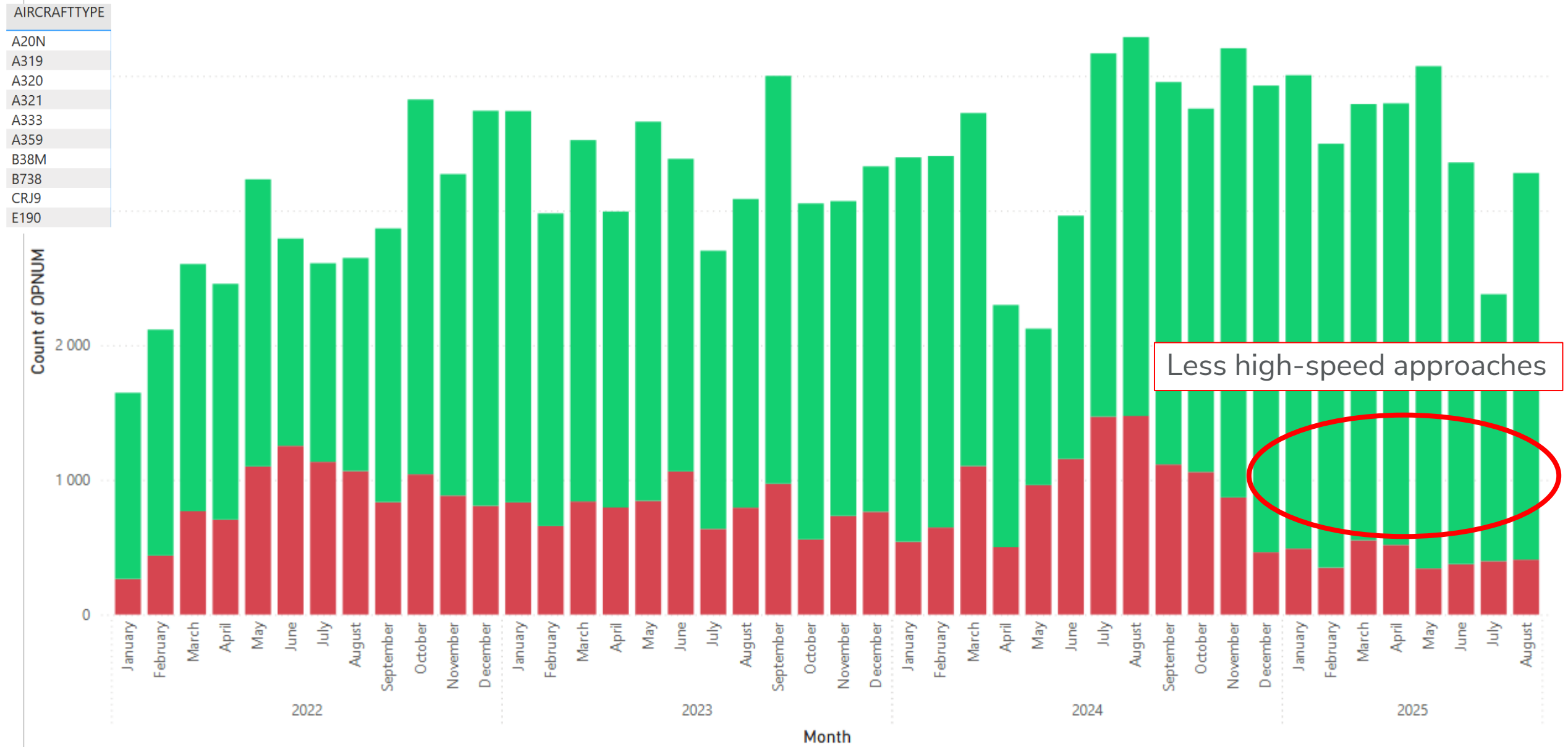
2024

2025

January
February
March
April
May
June
July
August
September
October
November
December
January
February
March
April
May
June
July
August
September
October
November
December
January
February
March
April
May
June
July
August



Nopeusrajoitus noudattaminen ● Did comply ● Overspeed

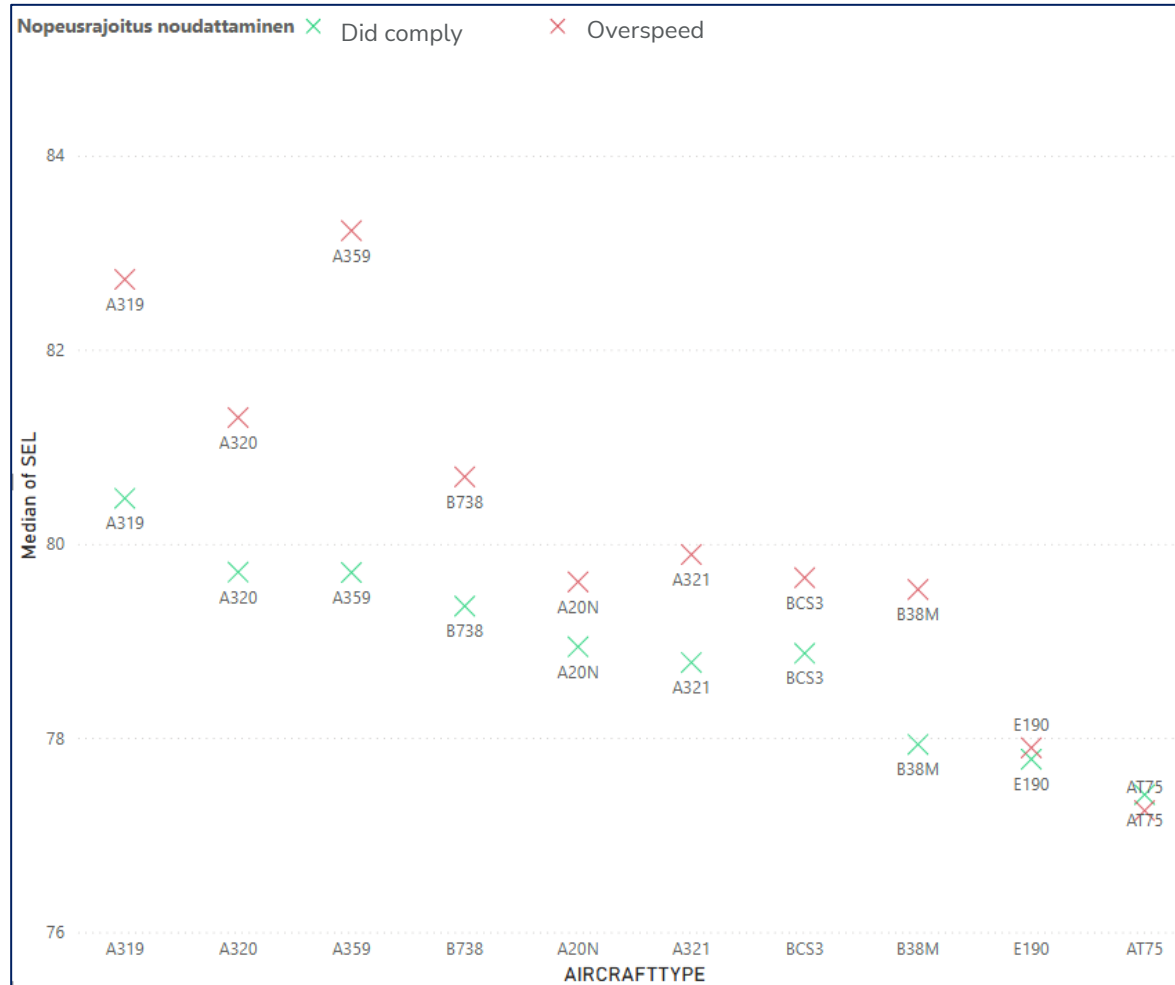


● Did comply ● Overspeed

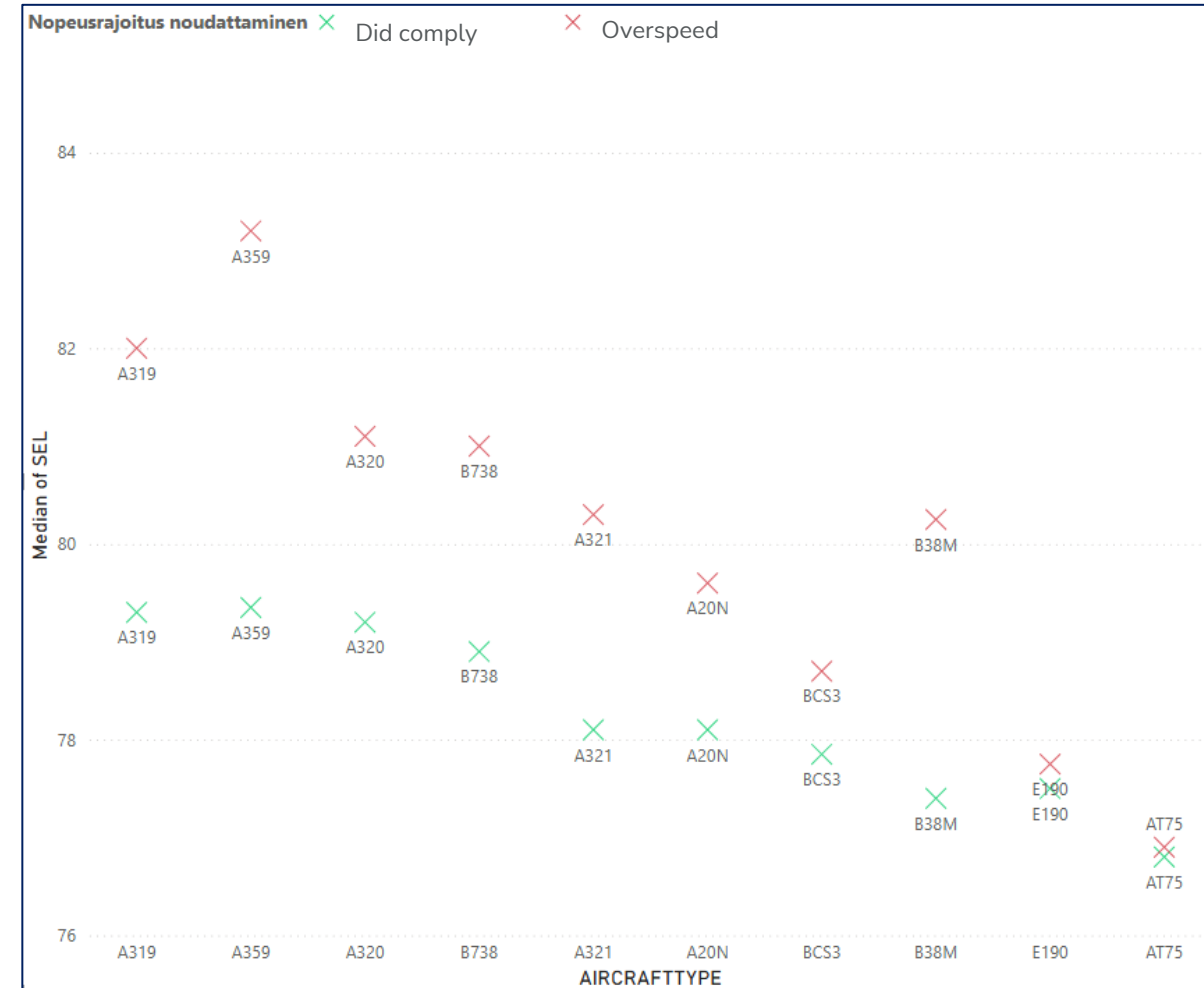


Effect on SEL values by aircraft type

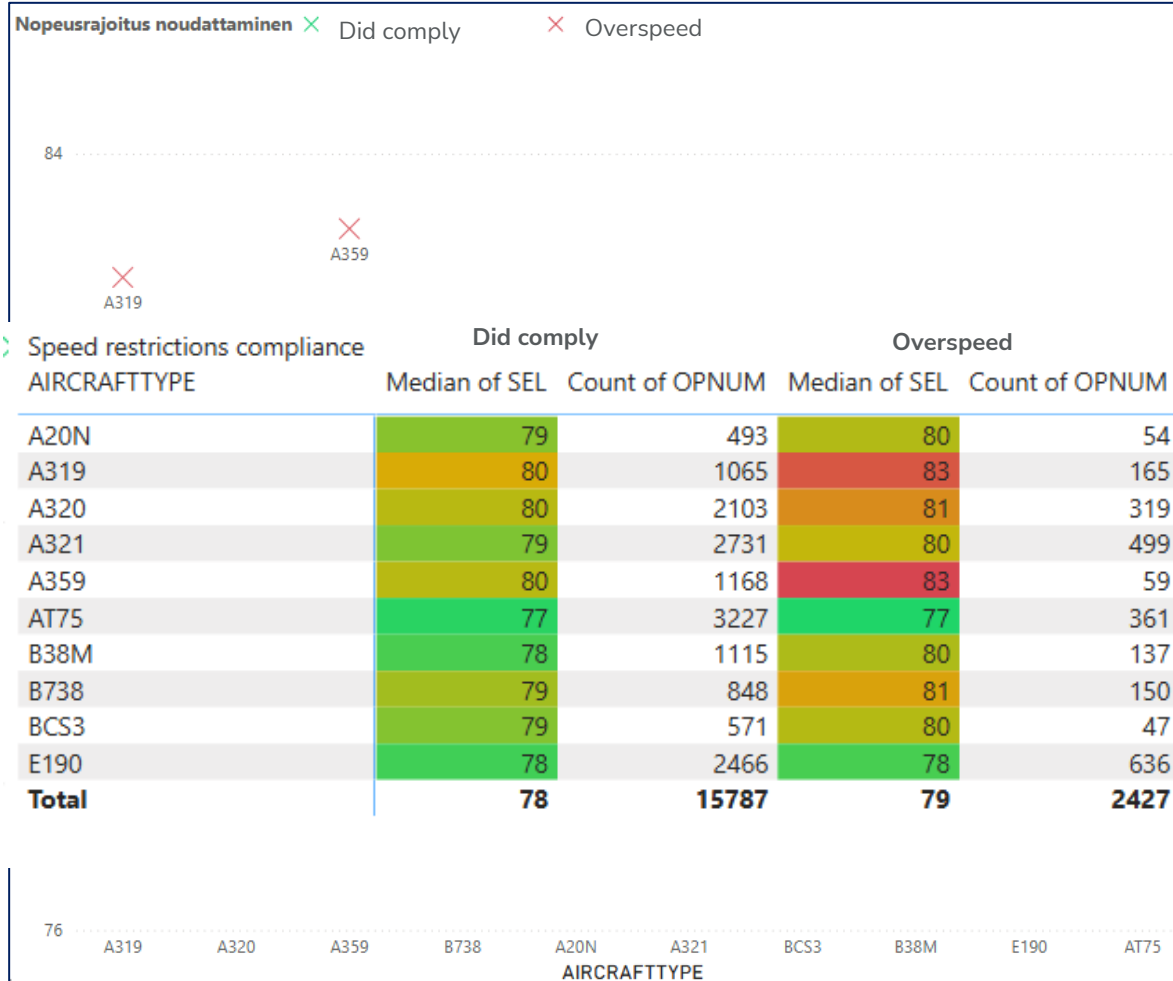
22L



04L



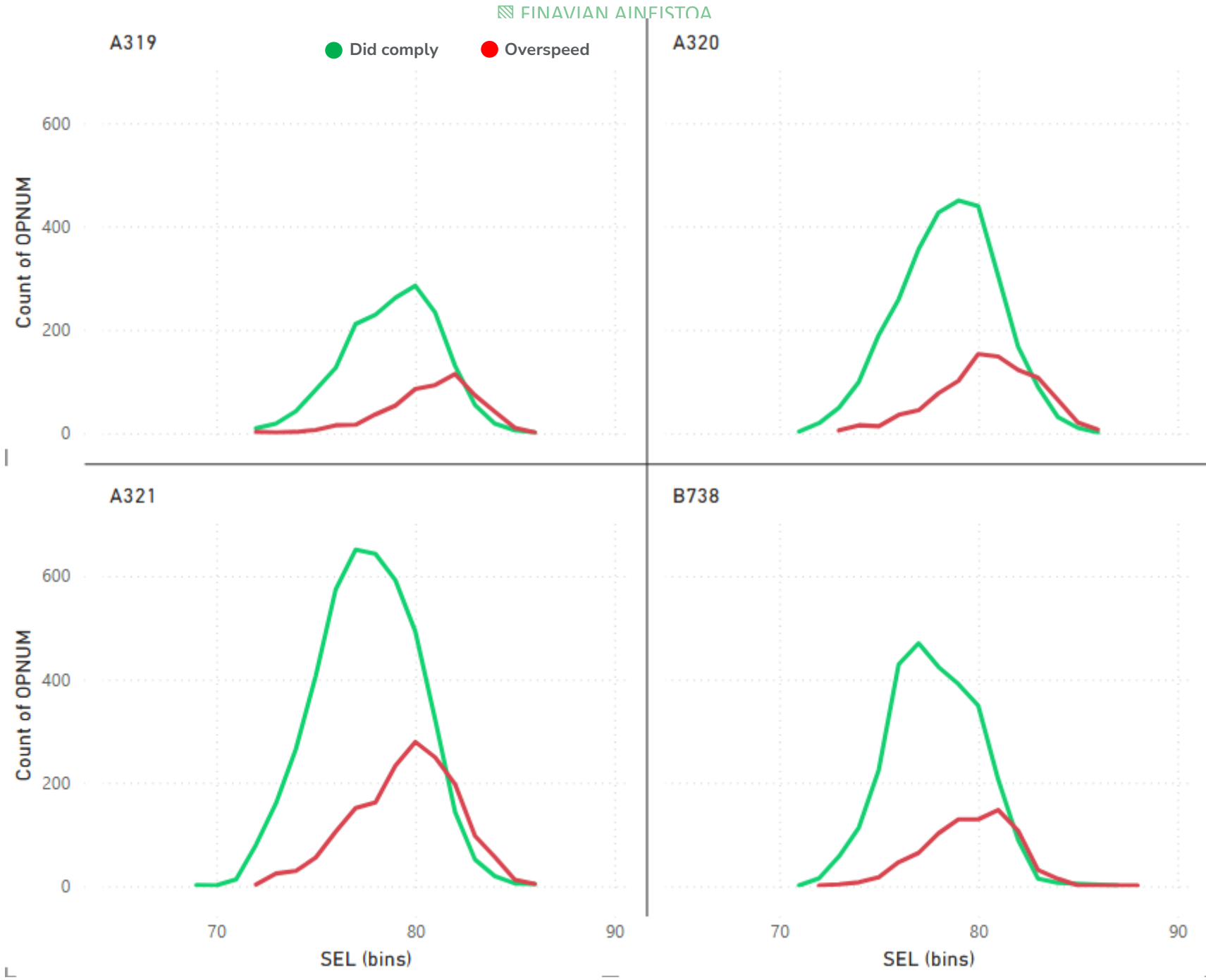
22L



04L



2025



Discussion and conclusions

Speed restrictions benefits for the stakeholders

- **Communities:** less high-noise events, lower noise levels
- **Airlines:** More predictable approaches, more CDO-approaches, less unstabilized approaches
- **ANSP/ATC:** No negative effects to runway capacity or sequencing, more uniform traffic management
- **Airport operator:** We can communicate with the authorities (EPA, CAA) that approach noise can be reduced with the speed restriction, that helps the airport staying within the Helsinki-Vantaa BAR 598/2014 noise objective

Further development

- Using TAS (true air speed) instead of GS (ground speed) (work in progress for using ADS-B speed data)
- FDR data from airlines would be useful for further analysis
- Creating key performance indicators for speed restriction violation, monitoring and reporting to airlines and ATC
- Is the speed restriction 190kn@9nm ultimate answer, or do we need to iterate that -> another measurement campaign, noise analysis, repeating the process

Conclusions

- Speed restrictions was published on eAIP 7th August 2025:
- The speed restriction has a concrete effect on approach speeds for most significant aircraft types analysed
- The speed restriction is mostly complied (on runways 22L/04L), but about 15% of approaches still fly overspeed
- The speed restriction has potential to reduce the median SEL noise levels of approaches up to 2 dB for the aircraft types most significant to the Helsinki-Vantaa noise situation.

SPEED (IAS)
MAX 190 KT at 9 NM and
MNM 150 KT until 4 NM
FM RWY TDZ.
Otherwise advise ATC

FINAVIA

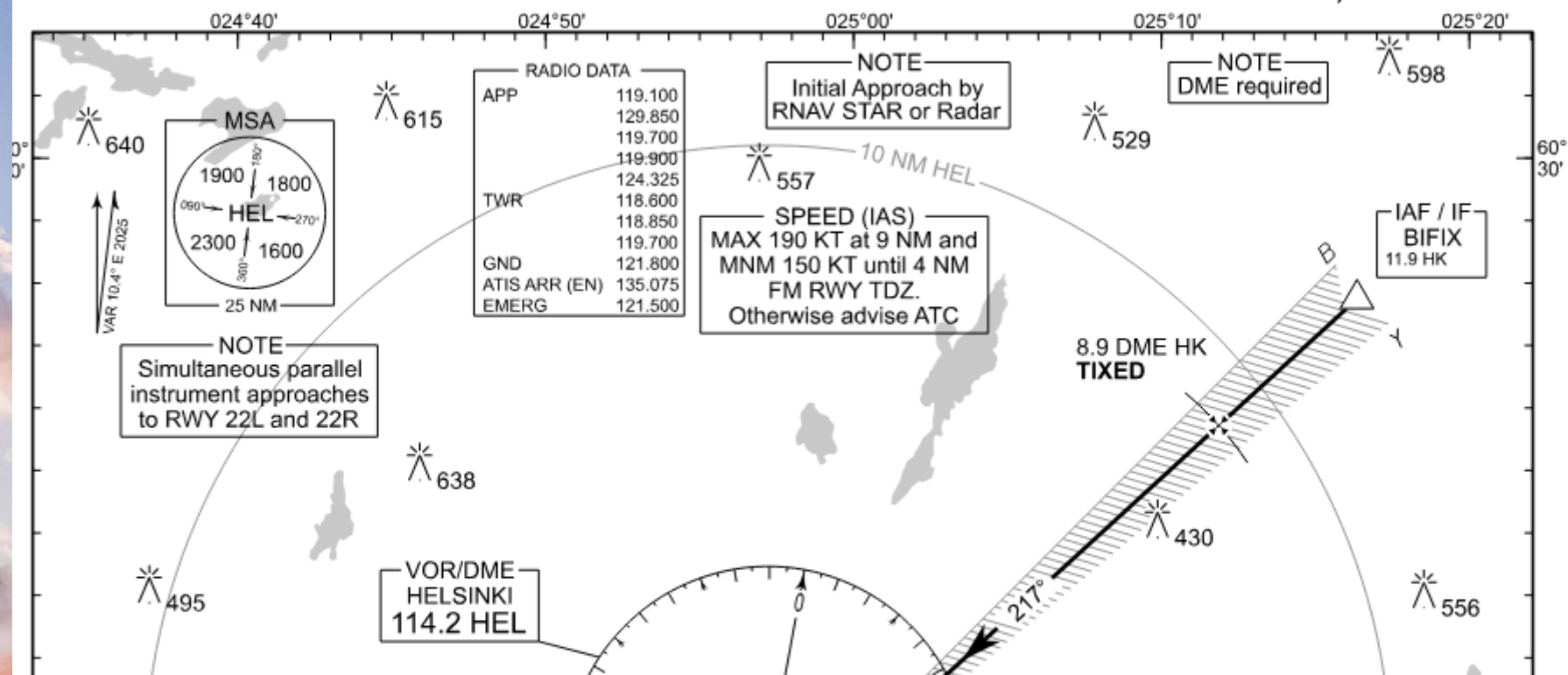
FOR SMOOTH TRAVELLING

Thank you

INSTRUMENT
APPROACH CHART - ICAO

ELEV 180 FT
HEIGHTS RELATED TO
THR RWY 22L ELEV 149 FT

ILS CAT II or LOC RWY 22L
HELSINKI-VANTAA AERODROME
HELSINKI, FINLAND



FINAVIA

FOR SMOOTH TRAVELLING