

Supplementary Materials

Comparison of the Aircraft Noise Calculation Programs sonAIR, FLULA2 and AEDT with Noise Measurements of Single Flights

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Table S1. List of aircraft types simulated with AEDT, their emission models and corresponding level corrections.

Type	Engine Type	AEDT Emission Model	Correction Departure	Correction Approach
A319	CFM56-5A	A319-131 \ IAE V2522-A5	1.9	0.3
A319	CFM56-5B	A319-131 \ IAE V2522-A5	0.75	−0.6
A319	V2500	A319-131 \ IAE V2522-A5	−0.15	0.1
A320	V2500	A320-232 \ V2527-A5	0.15	0.2
A320	CFM56-5A	A320-211 \ CFM56-5A1	0.05	−0.1
A320	CFM56-5B	A320-211 \ CFM56-5A1	−1.0	−0.7
A321	CFM56-5B	A321-232 \ V2530-A5	1.8	1.3
A321	V2500	A321-232 \ V2530-A5	0.1	0.0
A333	TRENT7	A330-343 \ RR TRENT 772B	−0.3	0.1
A343	CFM56-5C	A340-211 \ CFM56-5C2	0.7	−0.2
A388	GP7270	A380-861 \ EA GP7270	0.0	0.0
A388	TRENT9	A380-841 \ RR trent970	−0.05	0.0
B733	CFM56-3	BOEING 737-300/CFM56-3B-1	0.45	−0.3
B734	CFM56-3	BOEING 737-400/CFM56-3C-1	−0.05	0.0
B735	CFM56-3	BOEING 737-500/CFM56-3C-1	0.0	0.4
B736	CFM56-7B	BOEING 737-700/CFM56-7B24	−2.1	−0.3
B737	CFM56-7B	BOEING 737-700/CFM56-7B24	0.2	0.0
B738	CFM56-7B	BOEING 737-800/CFM56-7B26	0.05	0.1
B739	CFM56-7B	BOEING 737-800/CFM56-7B26	0.95	0.0
B762	CF6-80C2	BOEING 767-200/CF6-80A	−0.85	−5.1
B763	CF6-80C2	BOEING 767-300/CF6-80A	−0.05	−3.1
B763	PW4060	BOEING 767-300/CF6-80A	0.0	−3.1
B764	CF6-80C2	BOEING 767-300/CF6-80A	0.35	−3.0
B77W	GE90-115B	Boeing 777-300ER/GE90-115B-EIS	−0.25	−0.2
CRJ7	CF34-80C5	CL-600-2D15/CL-600-2D24/CF34-8C5	0.0	0.0
CRJ9	CF34-80C5	CL-600-2D15/CL-600-2D24/CF34-8C5	5.0	0.0
CRJX	CF34-80C5	CL-600-2D15/CL-600-2D24/CF34-8C5	0.7	0.7
E170	CF34-8E	ERJ170-100	−0.1	0.5
E190	E190_CF34-10E	ERJ190-100	0.0	0.0
E195	E190_CF34-10E	ERJ190-200	0.0	0.0
F100	TAY650-15	F100/TAY 650-15	0.0	0.0
FA7X	PW307	GULFSTREAM GIV-SP/TAY 611-8	1.8	−2.2
B788	Genx-1B	Boeing 787-8/T1000-C/01 Family Plan Cert	1.05	2.0
B789	Genx-1B	Boeing 787-8/T1000-C/01 Family Plan Cert	2.35	1.4

Table S2. Aircraft and engine specific differences and standard deviations to measurements with FDR data in the close range (ZRH and GVA combined), separated for departures (D) and approaches (A). N: number of noise events, SD: standard deviation.

Type (ICAO)	sonAIR	FLULA2	AEDT	Procedure	N	sonAIR Mean	sonAIR SD	FLULA2 Mean	FLULA2 SD	AEDT Mean	AEDT SD	
A319	A319 CFM56-5B	RCLAPA319	A319-131\IAE V2522-A5	A	245	-0.2	1.9	-0.1	2.1	-2.4	2.5	
A319	A319 CFM56-5B	RCSVGA319	A319-131\IAE V2522-A5	D	258	-1.0	1.3	-0.5	1.4	-1.5	1.7	
A320	A320 CFM56-5B	RCLAPA320	A320-211\CFM56-5A1	A	251	-0.3	1.5	-0.3	1.9	-0.8	1.8	
A320	A320 CFM56-5B	RCSVGA320	A320-211\CFM56-5A1	D	255	-0.6	1.3	-0.5	1.4	-1.7	1.7	
A321	A321 CFM56-5B	RCLAPA321	A321-232\V2530-A5	A	276	0.3	1.3	0.4	1.7	1.2	1.8	
A321	A321 CFM56-5B	RCSVGA321	A321-232\V2530-A5	D	279	-0.7	1.5	-0.2	1.7	0.0	2.2	
A333	A333 TRENT7	RCLAPA3303	A330-343\RR TRENT 772B	A	195	-0.2	1.7	-0.4	1.7	0.8	1.9	
A333	A333 TRENT7	RCSVGA3303	A330-343\RR TRENT 772B	D	181	-1.1	1.3	-2.3	1.8	-3.0	2.0	
A343	A343 CFM56-5C	RCLAPA3403	A340-211\CFM56-5C2	A	197	0.3	1.3	0.4	1.7	1.4	1.6	
A343	A343 CFM56-5C	RCSVGA3403	A340-211\CFM56-5C2	D	249	-0.5	1.9	-0.1	1.7	-2.5	2.2	
B77W	B77W GE90-115B	RCLAPB7773	Boeing 777-300ER/GE90-115B-EIS	A	272	-0.6	1.3	-0.9	1.8	1.4	1.9	
B77W	B77W GE90-115B	RCSVGB7773	Boeing 777-300ER/GE90-115B-EIS	D	320	0.4	1.4	0.8	2.4	-1.5	2.6	
BCS1	BCS1 PW1500G	RCLAPBCS1	Boeing 737-700/CFM56-7B24	A	229	-0.4	1.6	-1.4	2.0	0.4	1.8	
BCS1	BCS1 PW1500G	RCSVGBCS1	Boeing 737-700/CFM56-7B24	D	312	0.1	1.5	0.0	1.9	0.2	2.0	
BCS3	BCS3 PW1500G	RCLAPBCS3	Boeing 737-700/CFM56-7B24	A	225	-0.2	1.8	-1.0	1.9	0.8	1.7	
BCS3	BCS3 PW1500G	RCSVGBCS3	Boeing 737-700/CFM56-7B24	D	292	-0.6	1.5	-0.3	1.8	1.1	2.1	
					A	1890	-0.2	1.6	-0.4	1.9	0.3	2.3
					D	2146	-0.4	1.5	-0.3	2.0	-1.0	2.5
					Total	4036	-0.3	1.6	-0.3	2.0	-0.4	2.5

Table S3. Aircraft and engine specific differences and standard deviations to measurements without FDR data in the close range (ZRH and GVA combined), separated for departures (D) and approaches (A). N: number of noise events, SD: standard deviation.

Type	sonAIR	FLULA2	AEDT	Procedure	N	sonAIR Mean	sonAIR SD	FLULA2 Mean	FLULA2 SD	AEDT Mean	AEDT SD	
A319	A319 CFM56-5B	RCLAPA319	A319-131\IAE V2522-A5	A	365	1.7	1.5	1.7	1.8	0.1	1.9	
A319	A319 CFM56-5B	RCSVGA319	A319-131\IAE V2522-A5	D	526	0.5	1.7	0.7	1.7	-0.9	2.0	
A319	A32X_CFM56-5A	RCLAPA319	A319-131\IAE V2522-A5	A	141	-0.6	1.4	2.1	1.8	0.4	2.1	
A319	A32X_CFM56-5A	RCSVGA319	A319-131\IAE V2522-A5	D	226	-0.1	1.4	-0.2	1.6	0.0	1.6	
A319	A32X_V2500	RCLAPA319	A319-131\IAE V2522-A5	A	344	1.3	1.9	3.4	2.0	2.7	1.9	
A319	A32X_V2500	RCSVGA319	A319-131\IAE V2522-A5	D	321	0.2	1.3	1.3	1.5	-1.0	1.7	
A320	A320 CFM56-5B	RCLAPA320	A320-211\CFM56-5A1	A	378	0.7	1.8	0.7	1.9	0.3	1.7	
A320	A320 CFM56-5B	RCSVGA320	A320-211\CFM56-5A1	D	576	0.1	1.8	0.1	1.9	-1.5	2.1	
A320	A32X_CFM56-5A	RCLAPA320	A320-211\CFM56-5A1	A	243	-0.8	1.6	0.9	1.6	0.6	1.6	
A320	A32X_CFM56-5A	RCSVGA320	A320-211\CFM56-5A1	D	300	-0.8	1.3	-0.5	1.6	-0.9	1.7	
A320	A32X_V2500	RCLAPA320	A320-232\V2527-A5	A	355	0.7	1.7	2.0	1.8	2.6	1.9	
A320	A32X_V2500	RCSVGA320	A320-232\V2527-A5	D	320	-0.7	1.8	0.4	1.8	0.2	1.8	
A321	A321 CFM56-5B	RCLAPA321	A321-232\V2530-A5	A	314	0.3	1.9	0.6	1.9	1.4	2.2	
A321	A321 CFM56-5B	RCSVGA321	A321-232\V2530-A5	D	424	-0.7	1.6	-0.4	2.0	-0.5	2.2	
A321	A32X_V2500	RCLAPA321	A321-232\V2530-A5	A	305	0.7	1.9	2.0	2.0	1.4	2.0	
A321	A32X_V2500	RCSVGA321	A321-232\V2530-A5	D	330	-3.0	1.5	-0.7	1.7	-1.8	2.1	
A333	A333 TRENT7	RCLAPA3303	A330-343\RR TRENT 772B	A	191	-0.4	2.1	-0.5	1.6	0.9	1.6	
A333	A333 TRENT7	RCSVGA3303	A330-343\RR TRENT 772B	D	290	-1.5	2.2	-1.6	2.3	-2.8	2.3	
A343	A343 CFM56-5C	RCLAPA3403	A340-211\CFM56-5C2	A	119	0.3	1.9	0.5	1.8	1.1	1.9	
A343	A343 CFM56-5C	RCSVGA3403	A340-211\CFM56-5C2	D	201	-0.1	1.6	0.1	1.6	-1.7	2.0	
A388	A388_GP7270	RCLAPA380	A380-861\EA GP7270	A	168	3.7	2.8	2.0	2.0	0.3	2.3	
A388	A388_GP7270	RCSVGA380	A380-861\EA GP7270	D	157	-1.0	1.9	1.2	1.8	-0.1	2.3	
A388	A388_TRENT9	RCLAPA380	A380-841\RR trent970	A	127	-0.4	2.9	-1.2	2.9	-2.2	2.3	
A388	A388_TRENT9	RCSVGA380	A380-841\RR trent970	D	58	-0.6	1.1	0.1	1.0	-0.7	1.1	
B733	B737_CFM56-3	RCLAPB7373	BOEING 737-300/CFM56-3B-1	A	134	-1.2	1.5	-1.0	1.5	-1.3	1.6	
B733	B737_CFM56-3	RCSVGB7373	BOEING 737-300/CFM56-3B-1	D	267	-0.2	1.9	0.0	2.0	0.1	2.2	
B734	B737_CFM56-3	RCLAPB7374	BOEING 737-400/CFM56-3C-1	A	259	-1.5	1.4	-2.3	1.3	-2.1	1.6	
B734	B737_CFM56-3	RCSVGB7374	BOEING 737-400/CFM56-3C-1	D	190	-0.6	1.9	0.2	1.8	-0.5	1.8	
B735	B737_CFM56-3	RCLAPB7375	BOEING 737-500/CFM56-3C-1	A	210	-1.4	1.4	-1.7	1.2	-0.9	1.6	
B735	B737_CFM56-3	RCSVGB7375	BOEING 737-500/CFM56-3C-1	D	332	-0.9	1.4	-0.9	1.7	-0.8	1.5	
B736	B737_CFM56-7B	RCLAPB7376	BOEING 737-700/CFM56-7B24	A	224	-1.2	2.0	-0.7	2.3	1.0	2.5	
B736	B737_CFM56-7B	RCSVGB7376	BOEING 737-700/CFM56-7B24	D	246	1.1	2.0	0.1	1.8	-0.7	1.6	
B737	B737_CFM56-7B	RCLAPB7377	BOEING 737-700/CFM56-7B24	A	254	-0.9	1.6	-0.4	1.4	1.4	1.6	
B737	B737_CFM56-7B	RCSVGB7377	BOEING 737-700/CFM56-7B24	D	263	-0.4	1.9	-0.6	2.0	0.3	2.1	
B738	B737_CFM56-7B	RCLAPB7378	BOEING 737-800/CFM56-7B26	A	246	-1.5	1.8	-1.0	1.6	-0.2	1.7	
B738	B737_CFM56-7B	RCSVGB7378	BOEING 737-800/CFM56-7B26	D	312	-1.2	2.1	0.2	2.1	1.0	2.7	
B739	B737_CFM56-7B	RCLAPB7378	BOEING 737-800/CFM56-7B26	A	210	-2.2	1.6	-1.6	1.4	-1.1	1.6	
B739	B737_CFM56-7B	RCSVGB7378	BOEING 737-800/CFM56-7B26	D	209	-2.2	2.0	-0.8	2.3	0.2	2.7	
B762	B76X_CF6-80C2	RCLAPB7672	BOEING 767-200/CF6-80A	A	18	4.4	1.7	5.1	1.2	-2.6	1.3	
B762	B76X_CF6-80C2	RCSVGB7672	BOEING 767-200/CF6-80A	D	10	2.6	1.3	2.5	2.4	0.6	1.7	
B763	B763_PW4060	RCLAPB7673	BOEING 767-300/CF6-80A	A	147	-0.7	2.0	-0.1	1.7	-2.1	1.8	
B763	B763_PW4060	RCSVGB7673	BOEING 767-300/CF6-80A	D	252	-1.0	2.5	1.1	2.5	-0.1	3.2	
B763	B76X_CF6-80C2	RCLAPB7673	BOEING 767-300/CF6-80A	A	266	2.0	2.3	-0.8	1.5	-1.9	1.9	
B763	B76X_CF6-80C2	RCSVGB7673	BOEING 767-300/CF6-80A	D	229	-0.8	2.2	2.0	2.5	1.1	2.7	
B764	B76X_CF6-80C2	RCLAPB7674	BOEING 767-300/CF6-80A	A	241	2.0	2.7	1.2	1.9	-3.5	1.9	
B764	B76X_CF6-80C2	RCSVGB7674	BOEING 767-300/CF6-80A	D	215	-1.3	2.3	0.4	2.8	-1.7	3.5	
CRJ7	CRJ9_CF34-8C5	RCLAPCL90	CL-600-2D15/CL-600-2D24/CF34-8C5	A	189	-0.5	1.4	0.0	1.6	0.9	1.6	
CRJ7	CRJ9_CF34-8C5	RCSVGCL90	CL-600-2D15/CL-600-2D24/CF34-8C5	D	338	0.3	1.7	1.5	2.0	-2.8	1.8	
CRJ9	CRJ9_CF34-8C5	RCLAPCL90	CL-600-2D15/CL-600-2D24/CF34-8C5	A	301	-0.8	1.7	-0.5	2.0	0.6	2.2	
CRJ9	CRJ9_CF34-8C5	RCSVGCL90	CL-600-2D15/CL-600-2D24/CF34-8C5	D	236	0.1	1.9	1.5	2.3	0.4	3.6	
CRJX	CRJ9_CF34-8C5	RCLAPCL90	CL-600-2D15/CL-600-2D24/CF34-8C5	A	41	-1.9	1.2	-0.9	1.3	0.4	1.0	
CRJX	CRJ9_CF34-8C5	RCSVGCL90	CL-600-2D15/CL-600-2D24/CF34-8C5	D	68	-0.5	1.3	1.3	1.9	-2.0	1.9	
E170	E170_CF34-8E	RCLAPE170	ERJ170-100	A	181	-0.1	2.1	-0.1	2.2	1.8	2.3	
E170	E170_CF34-8E	RCSVGE170	ERJ170-100	D	186	-0.1	1.7	-0.5	1.8	-1.8	1.7	
E190	E190_CF34-10E	RCLAPE190	ERJ190-100	A	362	-0.5	1.5	-0.4	1.7	0.5	1.7	
E190	E190_CF34-10E	RCSVGE190	ERJ190-100	D	476	-1.0	1.6	-0.4	1.8	-1.4	1.8	
E195	E190_CF34-10E	RCLAPE190	ERJ190-200	A	102	-1.2	1.1	-0.7	1.2	-0.2	1.4	
E195	E190_CF34-10E	RCSVGE190	ERJ190-200	D	102	-0.9	1.4	-0.6	1.8	-2.0	1.5	
F100	F100_TAY650-15	RCLAPFK10	F100/TAY 650-15	A	311	0.3	2.4	0.1	2.6	0.2	3.0	
F100	F100_TAY650-15	RCSVGFK10	F100/TAY 650-15	D	449	-1.5	1.7	0.9	2.0	-1.8	2.4	
FA7X	FA7X_PW307	RCLAPFA7X	GULFSTREAM GIV-SP/TAY 611-8	A	179	0.3	1.9	0.7	1.8	-3.5	2.3	
FA7X	FA7X_PW307	RCSVGFA7X	GULFSTREAM GIV-SP/TAY 611-8	D	213	0.3	2.8	0.0	3.3	-3.7	3.2	
					A	6925	0.1	2.3	0.3	2.3	0.2	2.5
					D	8322	-0.6	2.0	0.2	2.2	-0.9	2.5
Total					15247	-0.3	2.2	0.2	2.2	-0.4	2.5	

Table S4. Aircraft and engine specific differences and standard deviations to measurements **with** FDR data in the **far range** (ZRH only), separated into departures (D) and approaches (A). N: number of noise events, SD: standard deviation.

Type	sonAIR	FLULA2	AEDT	Procedure	N	sonAIR Mean	sonAIR SD	FLULA2 Mean	FLULA2 SD	AEDT Mean	AEDT SD
A319	A319 CFM56-5B	RCLAPA319	A319-131\IAE V2522-A5	A	97	0.1	1.3	0.0	1.7	-2.7	1.6
A320	A320 CFM56-5B	RCLAPA320	A320-211\CFM56-5A1	A	176	0.5	1.3	0.4	2.3	-0.1	2.1
A321	A321 CFM56-5B	RCLAPA321	A321-232\V2530-A5	A	170	0.6	1.2	0.9	1.8	0.5	1.7
A333	A333 TRENT7	RCLAPA3303	A330-343\RR TRENT 772B	A	86	-0.1	1.3	-4.3	2.0	-1.0	2.1
A343	A343 CFM56-5C	RCLAPA3403	A340-211\CFM56-5C2	A	21	0.5	0.6	-1.3	2.1	0.9	2.0
				A	550	0.4	1.3	-0.3	2.7	-0.5	2.2
				Total	550	0.4	1.3	-0.3	2.7	-0.5	2.2