

Supporting Information for "O₃ formation sensitivity to precursors and lightning in the tropical troposphere based on airborne observations"

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Contents of this file

1. Figures S1 to S5
2. Tables S1 to S5

Introduction

The supporting information provides additional information on the comparison between in situ observations and model simulations. Figures S1–S5 provide the vertical profiles of NO, O₃ and HO₂ for the individual research aircraft campaigns. Tables S1–S5 show the number of available data points for each altitude bin used to create Figures S1–S5.

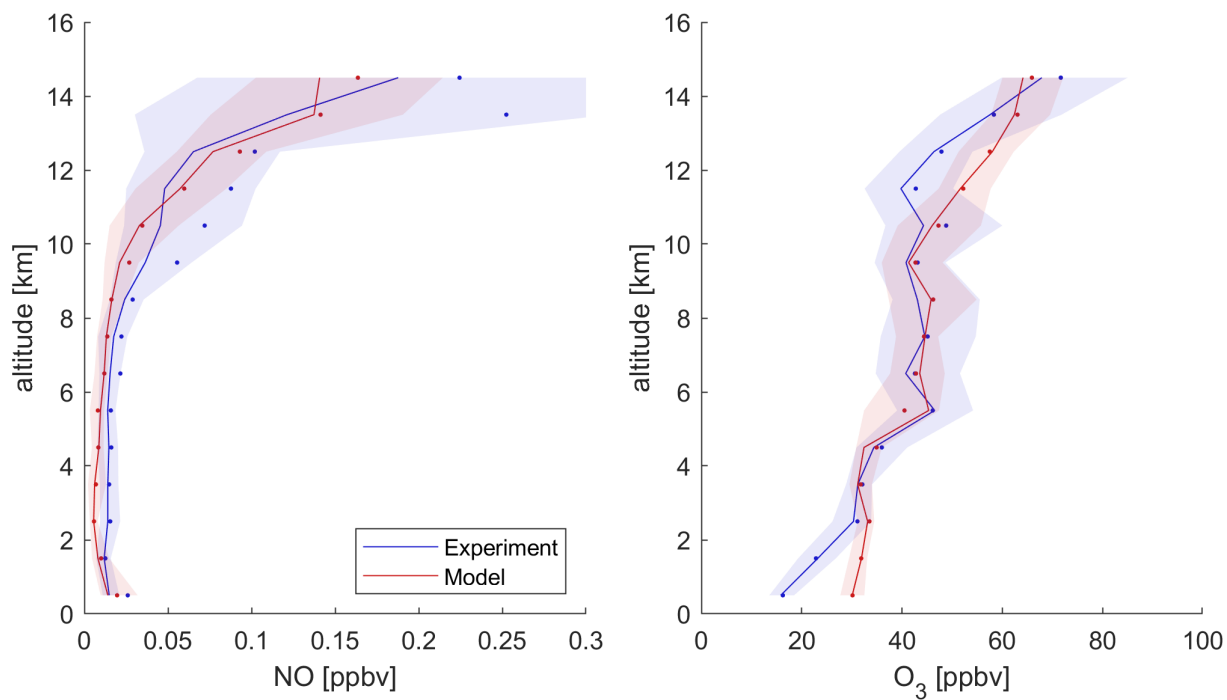


Figure S1. Vertical profiles of modeled (red) and experimental (blue) data of NO and O₃ for the research aircraft campaign CAFE Brazil. Lines and shades represent the median values and the 25th/75th percentiles, respectively. Dots show the mean values in the center of each 1km altitude bin.

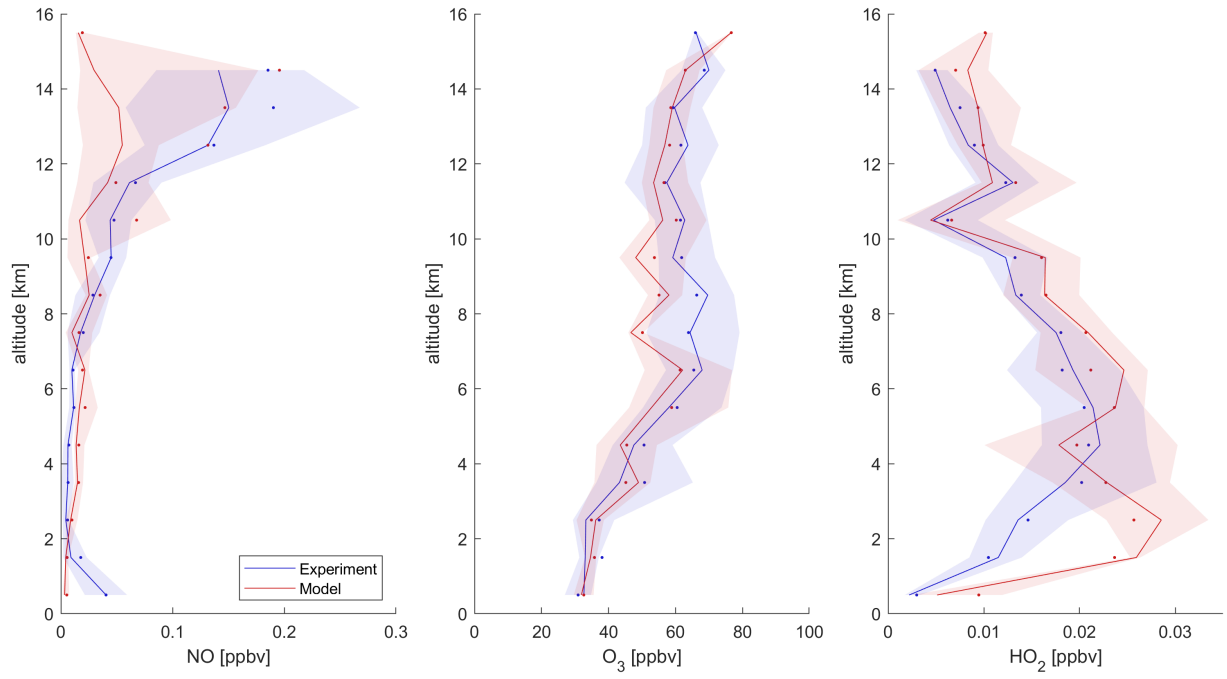


Figure S2. Vertical profiles of modeled (red) and experimental (blue) data of NO, O₃ and HO₂ for the research aircraft campaign CAFE Africa. Lines and shades represent the median values and the 25th/75th percentiles, respectively. Dots show the mean values in the center of each 1km altitude bin.

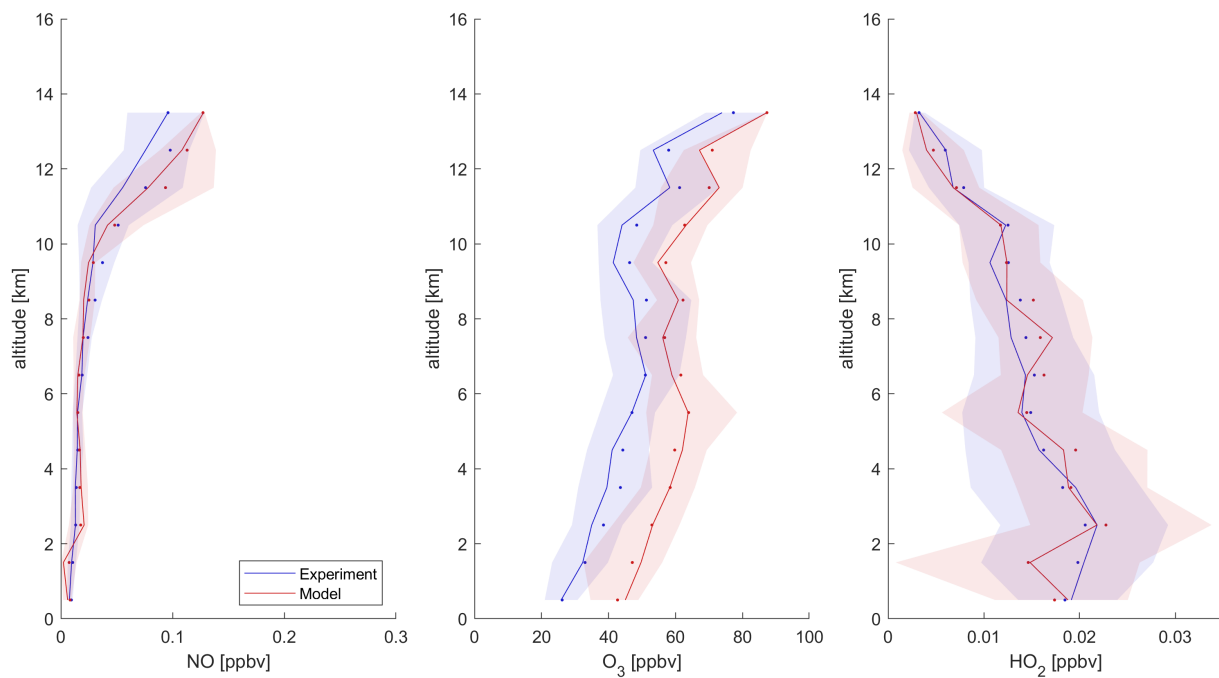


Figure S3. Vertical profiles of modeled (red) and experimental (blue) data of NO, O₃ and HO₂ for the research aircraft campaign ATom (Atlantic Ocean). Lines and shades represent the median values and the 25th/75th percentiles, respectively. Dots show the mean values in the center of each 1km altitude bin.

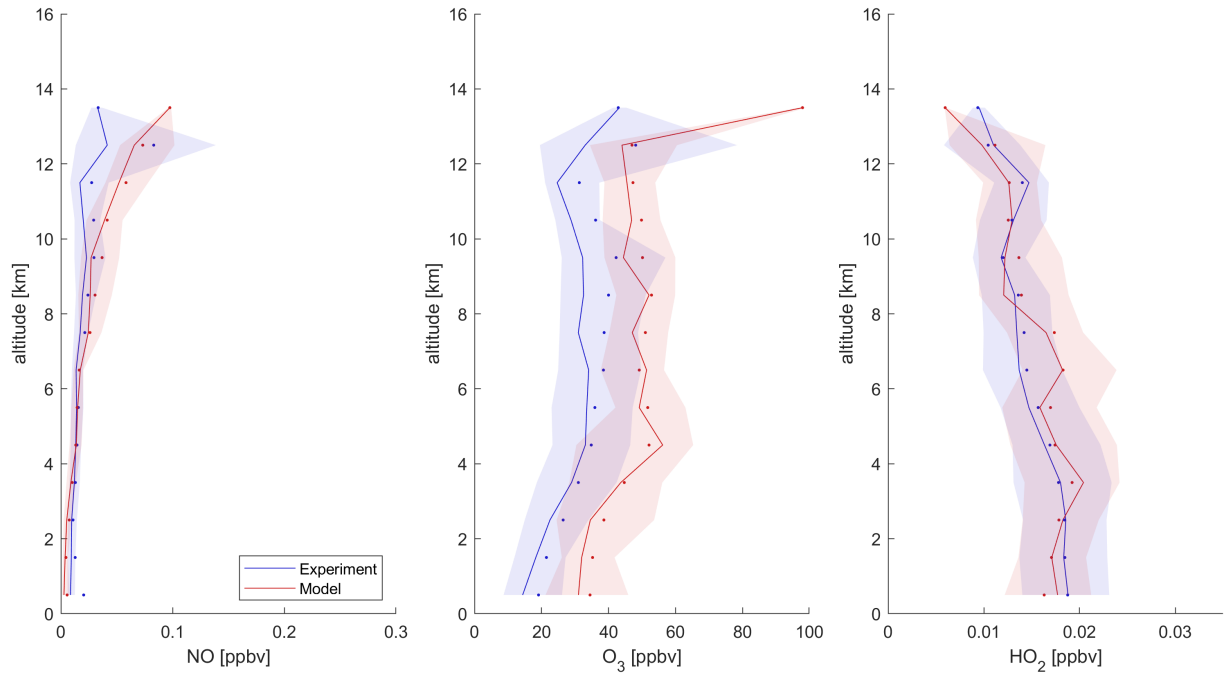


Figure S4. Vertical profiles of modeled (red) and experimental (blue) data of NO, O₃ and HO₂ for the research aircraft campaign ATom (Pacific Ocean). Lines and shades represent the median values and the 25th/75th percentiles, respectively. Dots show the mean values in the center of each 1km altitude bin.

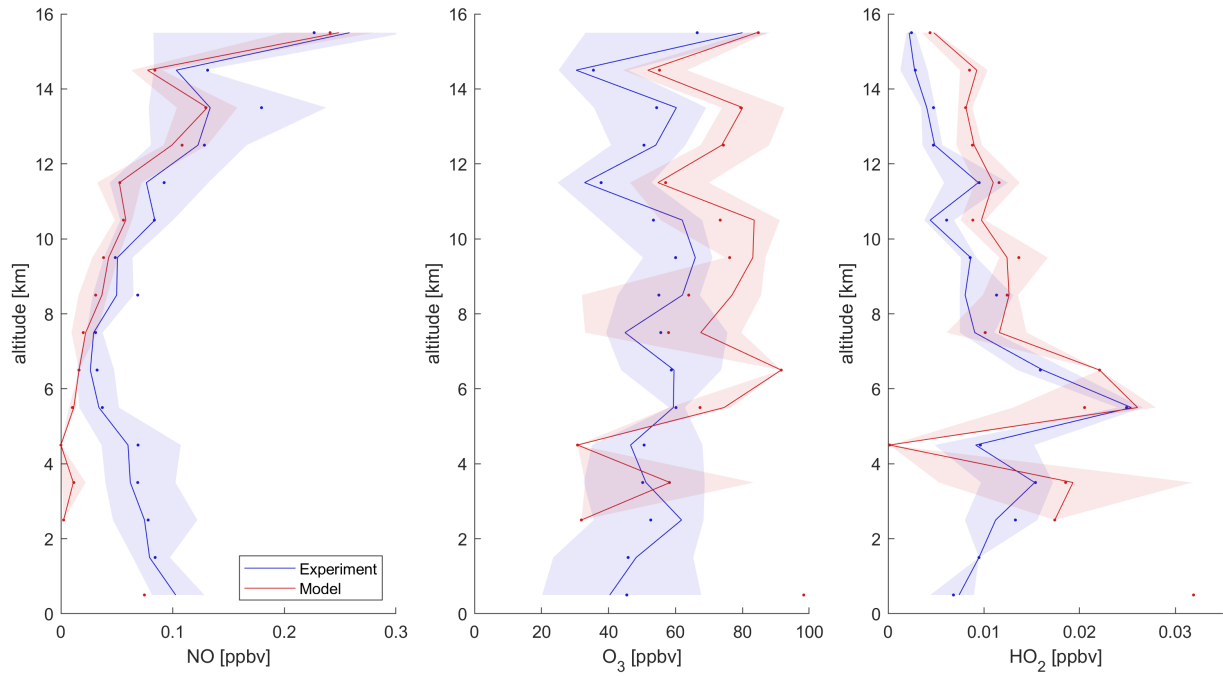


Figure S5. Vertical profiles of modeled (red) and experimental (blue) data of NO, O₃ and HO₂ for the research aircraft campaign OMO. Lines and shades represent the median values and the 25th/75th percentiles, respectively. Dots show the mean values in the center of each 1km altitude bin. Please note that the measurements in the lower troposphere were performed in the vicinity of the airport and may be locally influenced by aircraft NO_x emissions that are not well captured by the model with grid cells of about 180km in the horizontal direction.

Table S1. Number of data points per altitude bin for the research aircraft campaign CAFE Brazil for creating the vertical profiles in Figure S1.

Altitude [m]	NO Exp	NO Model	O ₃ Exp	O ₃ Model
500	687	96	690	96
1500	359	51	367	51
2500	327	42	337	42
3500	154	26	187	26
4500	617	84	712	84
5500	264	38	286	38
6500	137	21	138	21
7500	144	14	144	14
8500	154	17	154	17
9500	305	44	317	44
10500	407	55	437	55
11500	1431	183	1504	183
12500	1813	241	1904	241
13500	491	63	513	63
14500	209	25	214	25
15500	0	0	0	0

Table S2. Number of data points per altitude bin for the research aircraft campaign CAFE Africa for creating the vertical profiles in Figure S2.

Altitude [m]	NO Exp	NO Model	O ₃ Exp	O ₃ Model	HO ₂ Exp	HO ₂ Model
500	2	9	97	9	67	9
1500	86	22	151	22	110	22
2500	178	35	233	35	155	35
3500	229	61	397	61	220	61
4500	240	66	413	66	159	66
5500	67	12	95	12	76	12
6500	64	13	87	13	67	13
7500	237	46	298	46	215	46
8500	49	11	66	11	55	11
9500	139	28	191	28	153	28
10500	413	91	534	91	389	91
11500	147	47	286	47	173	47
12500	799	185	1136	185	792	185
13500	966	223	1344	223	835	223
14500	634	135	830	135	628	135
15500	0	9	49	9	0	9

Table S3. Number of data points per altitude bin for the research aircraft campaign ATom (Atlantic Ocean) for creating the vertical profiles in Figure S3.

Altitude [m]	NO Exp	NO Model	O ₃ Exp	O ₃ Model	HO ₂ Exp	HO ₂ Model
500	385	67	387	67	306	67
1500	158	25	158	25	142	25
2500	127	19	127	19	118	19
3500	154	31	154	31	140	31
4500	133	20	133	20	122	20
5500	159	23	159	23	147	23
6500	159	32	159	32	151	32
7500	168	20	168	20	161	20
8500	197	38	197	38	186	38
9500	285	50	293	50	275	50
10500	393	61	408	61	387	61
11500	327	51	335	51	319	51
12500	112	19	117	19	109	19
13500	35	6	38	6	38	6
14500	0	0	0	0	0	0
15500	0	0	0	0	0	0

Table S4. Number of data points per altitude bin for the research aircraft campaign ATom (Pacific Ocean) for creating the vertical profiles in Figure S4.

Altitude [m]	NO Exp	NO Model	O ₃ Exp	O ₃ Model	HO ₂ Exp	HO ₂ Model
500	614	102	630	102	439	102
1500	264	44	273	44	206	44
2500	229	42	235	42	184	42
3500	253	40	263	40	212	40
4500	225	38	230	38	186	38
5500	242	49	251	49	201	49
6500	259	44	267	44	225	44
7500	265	43	275	43	217	43
8500	320	52	327	52	260	52
9500	474	79	513	79	398	79
10500	738	128	784	128	617	128
11500	583	98	623	98	499	98
12500	268	37	295	37	256	37
13500	21	3	21	3	21	3
14500	0	0	0	0	0	0
15500	0	0	0	0	0	0

Table S5. Number of data points per altitude bin for the research aircraft campaign OMO for creating the vertical profiles in Figure S5.

Altitude [m]	NO Exp	NO Model	O ₃ Exp	O ₃ Model	HO ₂ Exp	HO ₂ Model
500	47	1	53	1	12	1
1500	13	0	14	0	1	0
2500	19	1	21	1	6	1
3500	17	4	19	4	6	4
4500	19	1	24	1	6	1
5500	53	4	61	4	35	4
6500	20	1	28	1	15	1
7500	94	9	115	9	51	9
8500	71	8	81	8	52	8
9500	68	8	75	8	52	8
10500	35	4	42	4	16	4
11500	608	62	735	62	456	62
12500	764	68	888	68	499	68
13500	477	46	541	46	315	46
14500	303	27	360	27	130	27
15500	40	5	58	5	45	5