

Supplementary materials for

Improved catalog of NO_x point source emissions (version 2)

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Abstract. This Supplement provides regional results of the NO_x point source catalog v2.

Maps of A^* and tables of the corresponding top ten regional emitters are shown for the "regions of interest" that were defined in Beirle et al., 2021. In addition, we provide a table of those point sources listed in v2 of the catalog at locations not covered by those "regions of interest".

1 North America

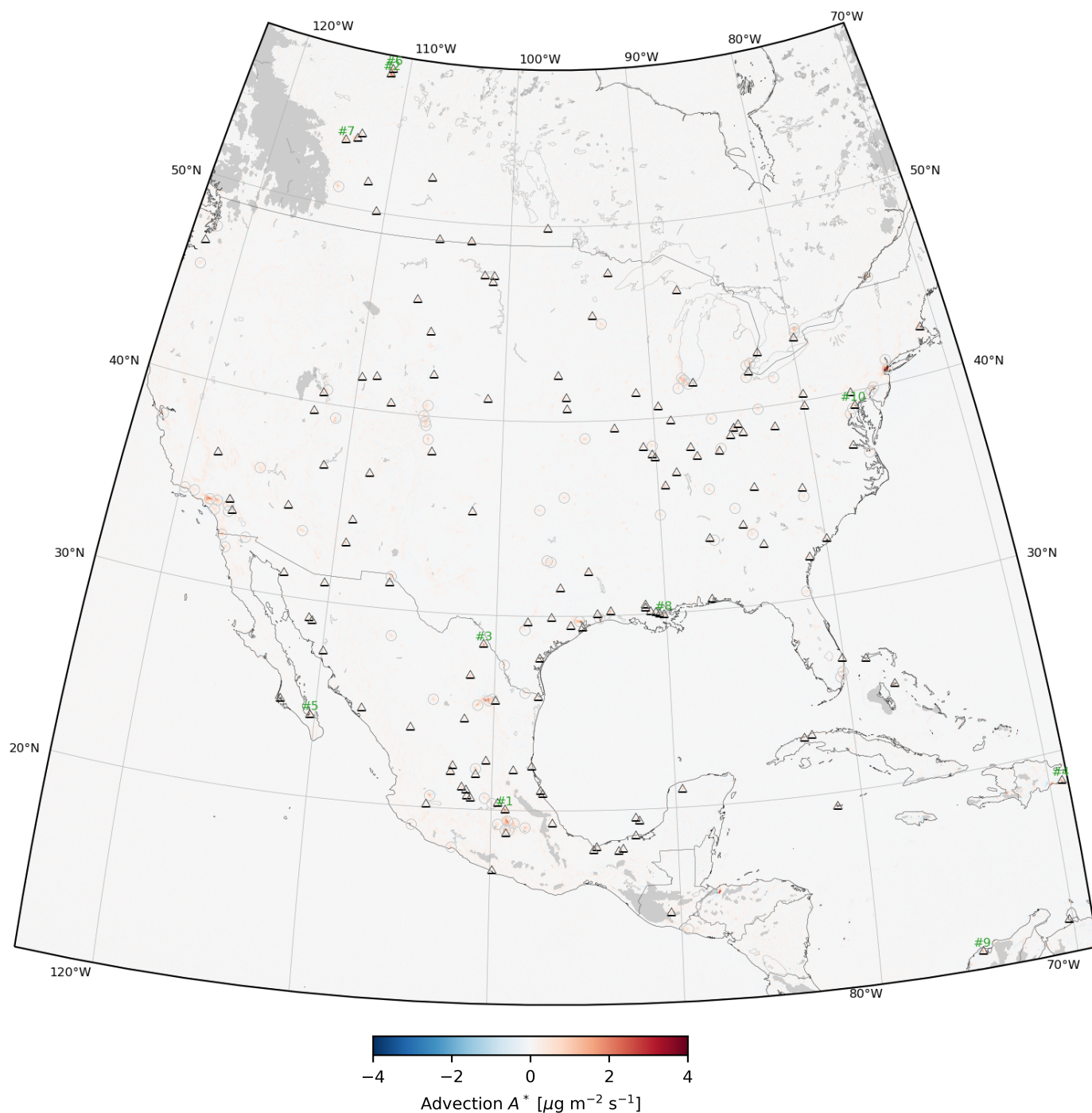


Figure S1. Map of A^* for North America. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S1. Catalog v2 extract of ten largest point sources detected in North America.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	33	20.0375	-99.2625	1.10	0.75	Francisco Pérez Ríos (Tula)	
2	85	57.0625	-111.6875	0.65	0.11	Poplar Creek	
3	148	28.4875	-100.7125	0.51	0.09	Carbón II	
4	175	18.5375	-69.3375	0.47	0.11	Quisqueya 2	San Pedro de Macorís
5	185	24.1875	-110.2875	0.46	0.12	Punta Prieta II	La Paz
6	187	57.3125	-111.5625	0.45	0.08	Muskeg River	
7	193	53.3625	-114.3125	0.44	0.04	Genesee	
8	210	29.9375	-90.1375	0.42	0.10	Nine Mile Point	Metairie
9	213	10.9125	-74.7625	0.41	0.18	Termobarranquilla	Barranquilla
10	220	39.2875	-76.6625	0.40	0.05	Westport	Baltimore

¹First match only.

2 South America

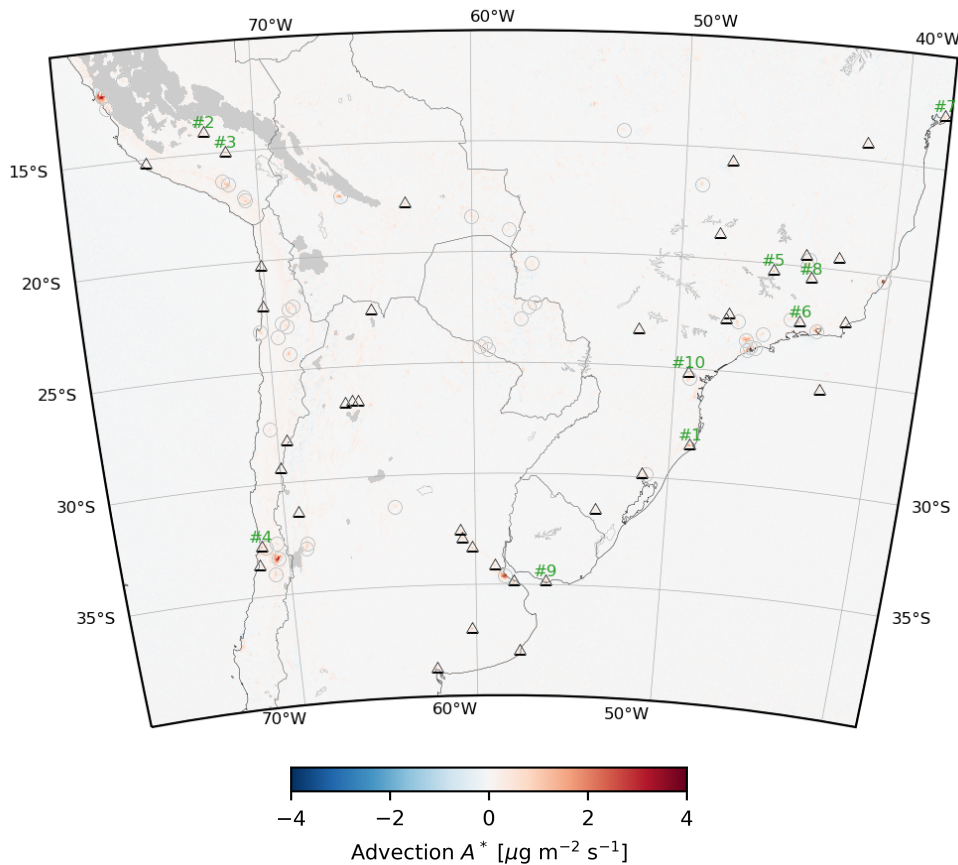


Figure S2. Map of A^* for South America. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S2. Catalog v2 extract of ten largest point sources detected in South America.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	176	-28.4375	-49.0125	0.47	0.12	Jorge Lacerda IV	
2	290	-14.0625	-72.3125	0.33	0.13		
3	300	-15.0125	-71.3875	0.32	0.11		
4	321	-32.7875	-71.3875	0.30	0.12	VENTANAS	
5	333	-20.3125	-45.5875	0.30	0.09		
6	334	-22.5125	-44.1125	0.30	0.08		Volta Redonda
7	389	-12.6625	-38.3125	0.27	0.07	Camaçari	Camaçari
8	390	-20.5375	-43.7625	0.27	0.10	Açominas	Conselheiro Lafaiete
9	398	-34.8625	-56.2125	0.27	0.07	CTR	Montevideo
10	404	-25.2125	-49.3125	0.26	0.06		Colombo

¹First match only.

3 Europe

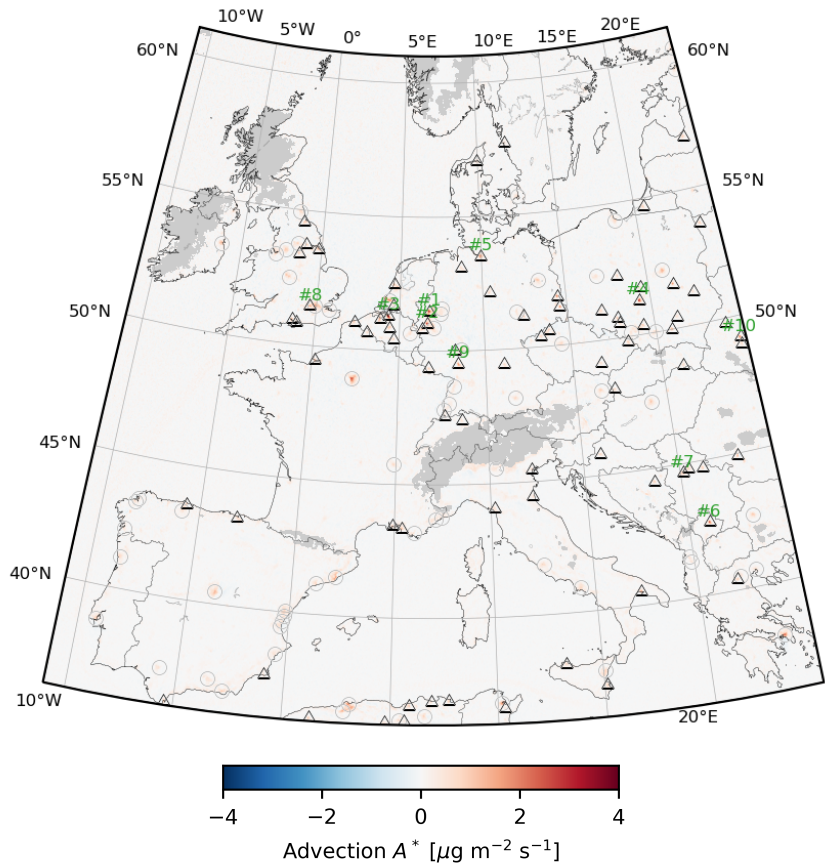


Figure S3. Map of A^* for Europe. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S3. Catalog v2 extract of ten largest point sources detected in Europe.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	65	51.4875	6.7375	0.73	0.09	KW Walsum	Duisburg
2	71	51.0125	6.6375	0.71	0.10	Niederaussem	
3	79	51.2875	4.3125	0.66	0.08	INESCO WKK	Antwerp
4	140	51.2625	19.3125	0.53	0.08	Bełchatów	
5	168	53.5125	9.9375	0.49	0.05	Hamburg-Moorburg	Hamburg
6	173	42.6875	21.0625	0.48	0.09	Kosovo A Coal Power Plant	
7	186	44.6625	20.1625	0.45	0.07	TENT A	
8	191	51.4625	-0.4125	0.44	0.05	Taylor's Lane GT	Slough
9	270	49.5125	8.4375	0.34	0.05	GKM (Mannheim)	Mannheim
10	298	49.2125	24.6625	0.32	0.06	Burshtyn	

¹First match only.

4 West Africa

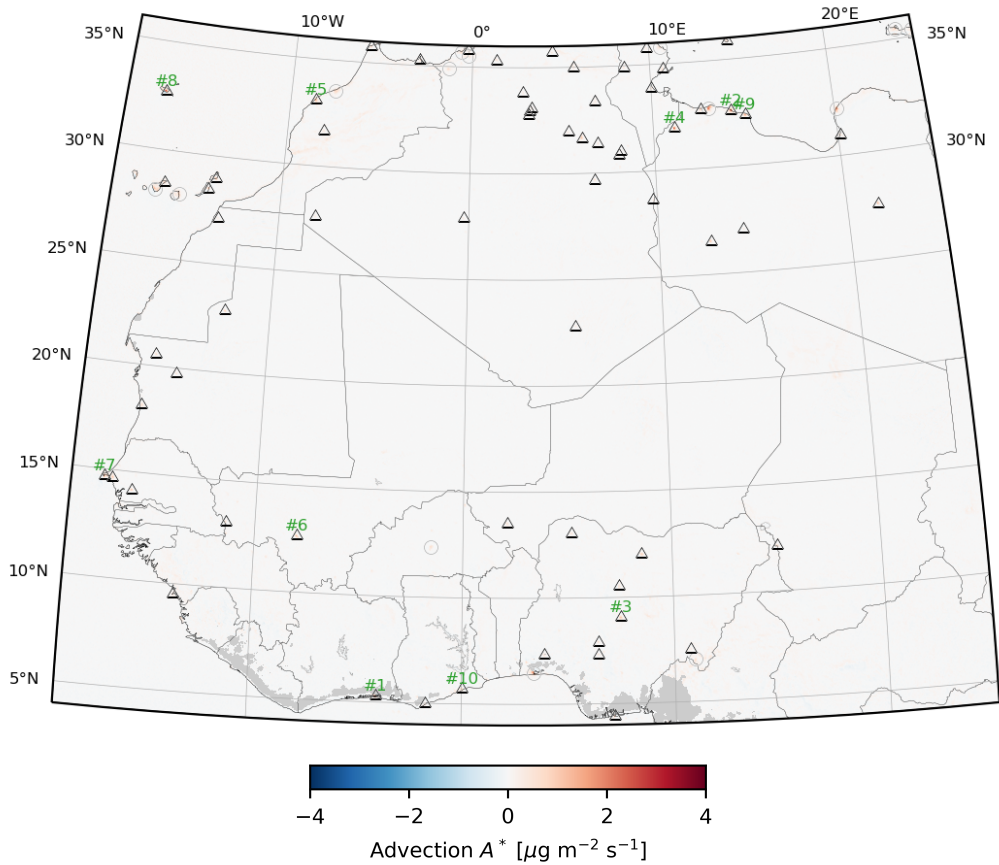


Figure S4. Map of A^* for West Africa. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S4. Catalog v2 extract of ten largest point sources detected in West Africa.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	76	5.2875	-4.0125	0.70	0.30	Azito OCGT	Abidjan
2	87	32.6125	14.3375	0.65	0.16	Al Khums	Al Khums
3	127	9.0625	7.4875	0.56	0.28		Abuja
4	157	31.9625	11.1625	0.50	0.08	Western Mountain Ruwais	
5	219	33.0875	-8.6375	0.41	0.10	Jorf Lasfar (JLEC)	
6	226	12.6375	-7.9875	0.39	0.12		Bamako
7	233	14.6875	-17.4125	0.39	0.12		Pikine
8	234	32.6875	-16.9125	0.38	0.10		Funchal
9	280	32.3625	15.0875	0.33	0.08	Misrata	Misratah
10	292	5.7125	0.0125	0.33	0.13	Tema	Tema

¹First match only.

5 South Africa

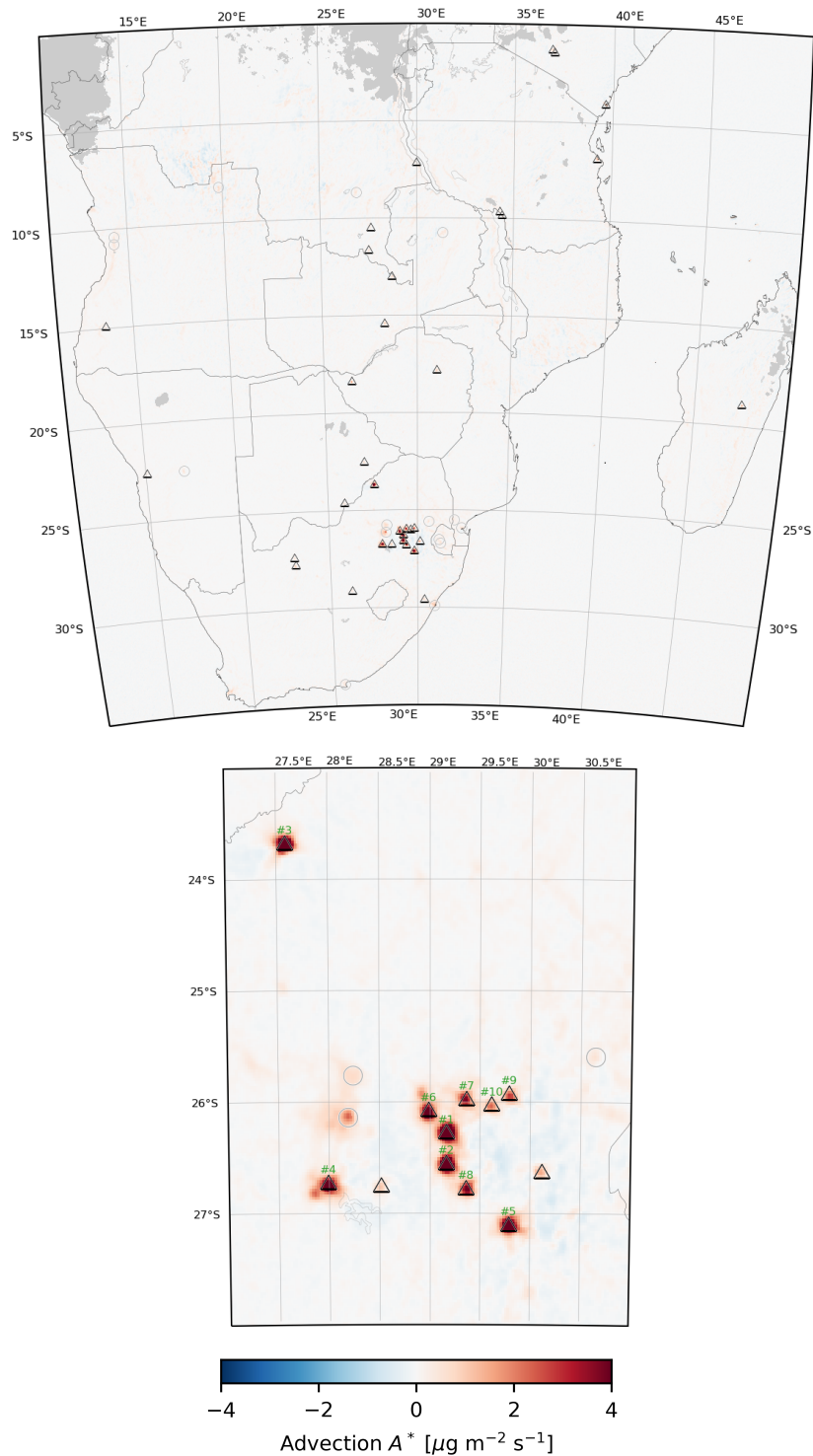


Figure S5. Map of A^* for South Africa. Point sources listed in the catalog v2 are displayed as triangle. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$. As regional top ten emitters are all located in the country South Africa, they are labeled in green in a separate zoom (lower panel).

Table S5. Catalog v2 extract of ten largest point sources detected in South Africa.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	1	-26.2875	29.1625	2.76	0.47	Matla	Vereeniging
2	2	-26.5625	29.1625	2.47	0.39		
3	3	-23.6875	27.5875	2.47	0.56	Matimba	
4	4	-26.7375	27.9875	2.03	0.44	Lethabo	
5	5	-27.1125	29.7875	2.03	0.31	Majuba	
6	9	-26.0875	28.9875	1.74	0.32	Kendal	
7	22	-25.9875	29.3625	1.21	0.23	Duvha	
8	29	-26.7875	29.3625	1.17	0.18	Tutuka	
9	75	-25.9375	29.7875	0.71	0.13	Arnot	
10	114	-26.0375	29.6125	0.61	0.11	Hendrina	

¹First match only.

6 West Russia/East Europe

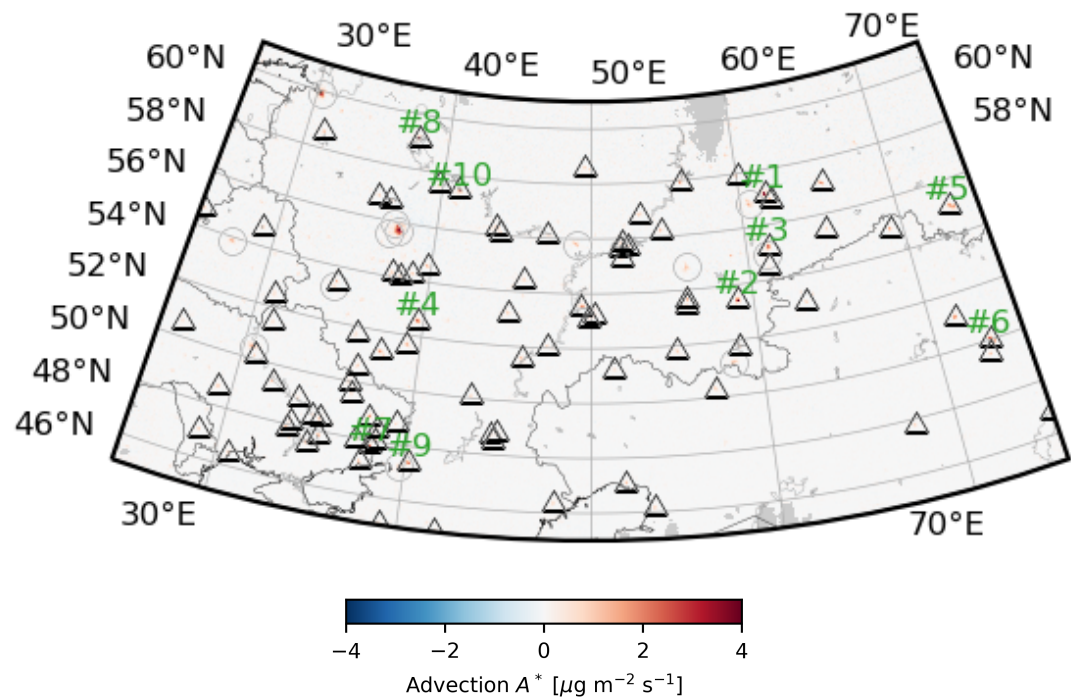


Figure S6. Map of A^* for West Russia/East Europe. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S6. Catalog v2 extract of ten largest point sources detected in West Russia/East Europe.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	19	57.1125	61.7125	1.23	0.12	Reftinskaya GRES	
2	49	53.4375	59.0375	0.91	0.11	CHP Plant of MMK	Magnitogorsk
3	61	55.1875	61.4125	0.78	0.07	Chelyabinsk CHP-1	Chelyabinsk
4	80	52.5625	39.6375	0.66	0.09	Lipetsk CHPP-2	Lipetsk
5	82	55.0625	73.2375	0.65	0.06	Omskaya-4	Omsk
6	88	50.0375	73.0375	0.65	0.12	Karaganda TPS-2	Temirtaū
7	90	47.8125	37.9875	0.64	0.08	Starobeshivska	
8	102	59.1375	37.8375	0.63	0.10	CHP-PVS	Cherepovets
9	128	47.4125	40.2125	0.56	0.06	Novocherkasskaya GRES	Novocherkassk
10	135	57.4625	41.1625	0.54	0.06	Krostromskaya	

¹First match only.

7 Siberia/Mongolia

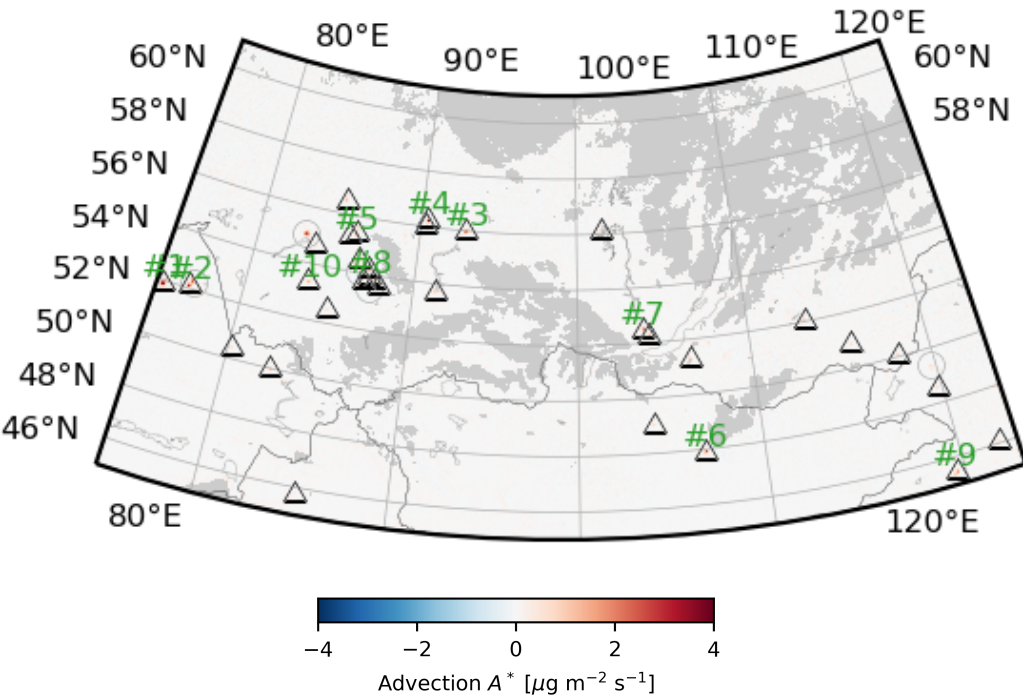


Figure S7. Map of A^* for Siberia/Mongolia. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S7. Catalog v2 extract of ten largest point sources detected in Siberia/Mongolia.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	21	51.8875	75.3875	1.21	0.13	Ekibastuz-1	
2	56	52.1125	76.8625	0.83	0.09	Aksu	
3	66	55.9875	92.9125	0.73	0.10		Krasnoyarsk
4	94	56.2375	90.4125	0.64	0.08	Achinsk Alumina Combine	Achinsk
5	101	55.3625	86.0125	0.63	0.08	NOVO-KEMEROVO CHP	Kemerovo
6	103	47.8875	106.8125	0.63	0.15	Ulaanbaatar-4	Ulaanbaatar
7	117	52.4875	103.9125	0.60	0.11	Thermal Power Station 10	Angarsk
8	118	53.8875	87.2375	0.60	0.12	West Siberian CHP	
9	144	45.4625	119.5625	0.53	0.08	Huolinhe Zhanute	Mositai
10	243	53.3375	83.6625	0.38	0.05	Barnaulskaya CHP Plant-3	Barnaul

¹First match only.

8 Middle East

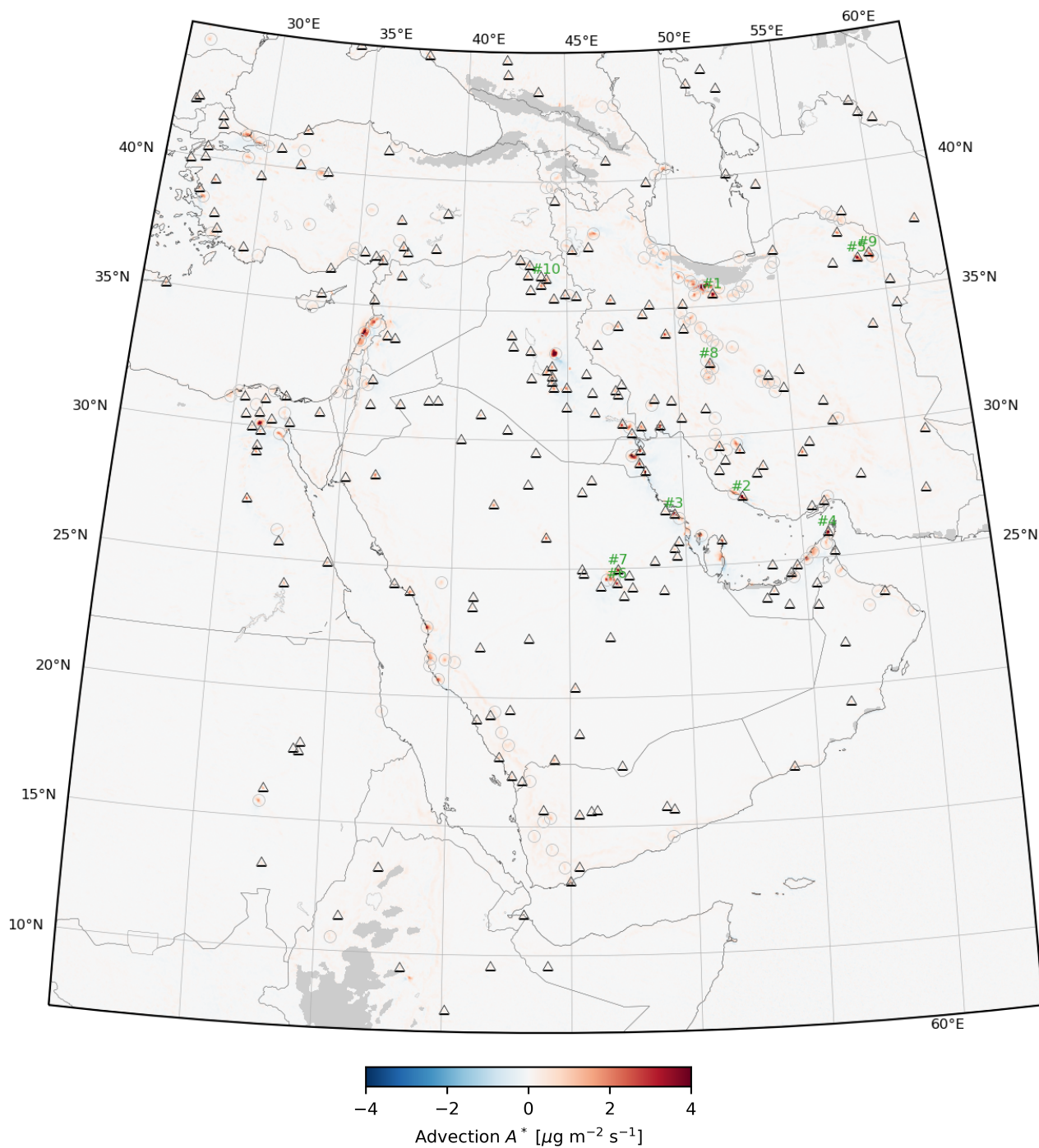


Figure S8. Map of A^* for Middle East. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S8. Catalog v2 extract of ten largest point sources detected in Middle East.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	11	35.4375	51.8625	1.70	0.50	Damavand C.C.	
2	13	27.5625	52.5375	1.66	0.41	Mobin Petroshimi	
3	15	27.0375	49.5625	1.46	0.38	BERI GP	Al Jubayl
4	18	25.9625	56.1125	1.34	0.49		
5	20	36.3125	58.8375	1.23	0.30	Neishabour	Neyshabūr
6	28	24.4125	47.0125	1.17	0.20	Riyadh 10	
7	37	24.9375	47.0625	1.03	0.16	Riyadh 9	
8	41	32.7875	51.4875	1.02	0.21	Shahid M. Montazeri	Khomeynī Shahr
9	42	36.4625	59.4125	0.99	0.25	Ferdosi C.C.	
10	57	36.2125	44.0125	0.83	0.19		Erbil

¹First match only.

9 India/Pakistan/West China

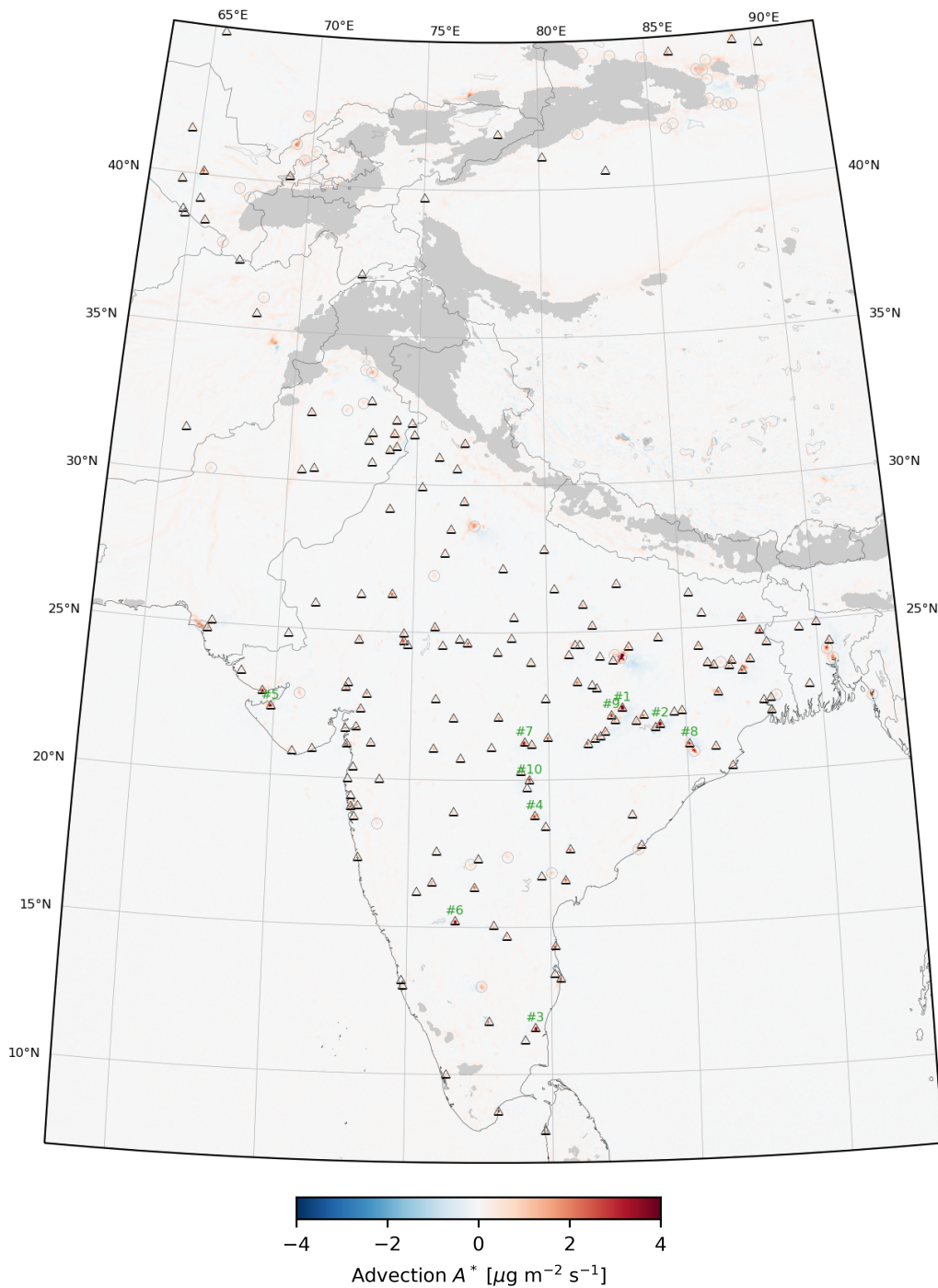


Figure S9. Map of A^* for India/Pakistan/West China. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S9. Catalog v2 extract of ten largest point sources detected in India/Pakistan/West China.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	6	22.3875	82.6875	2.01	0.59	KORBA STPS	
2	17	21.7875	84.0625	1.34	0.39	STERLITE	
3	24	11.5625	79.4375	1.19	0.39	NEYVELI ST II	
4	25	18.7625	79.4625	1.19	0.36	R_GUNDEM STPS	Ramgundam
5	26	22.3125	69.8625	1.18	0.21	SIKKA REP.	
6	31	15.1875	76.6625	1.13	0.33	BELLARY TPS	
7	32	21.2625	79.1125	1.12	0.33	KORADI	Nagpur
8	36	21.0875	85.0875	1.08	0.35	TALCHER STPS	
9	38	22.1375	82.2875	1.03	0.29	SIPAT STPS	
10	39	19.9875	79.2875	1.03	0.31	CHANDRAPUR_Coal	Chanda

¹First match only.

10 East China/South East Asia

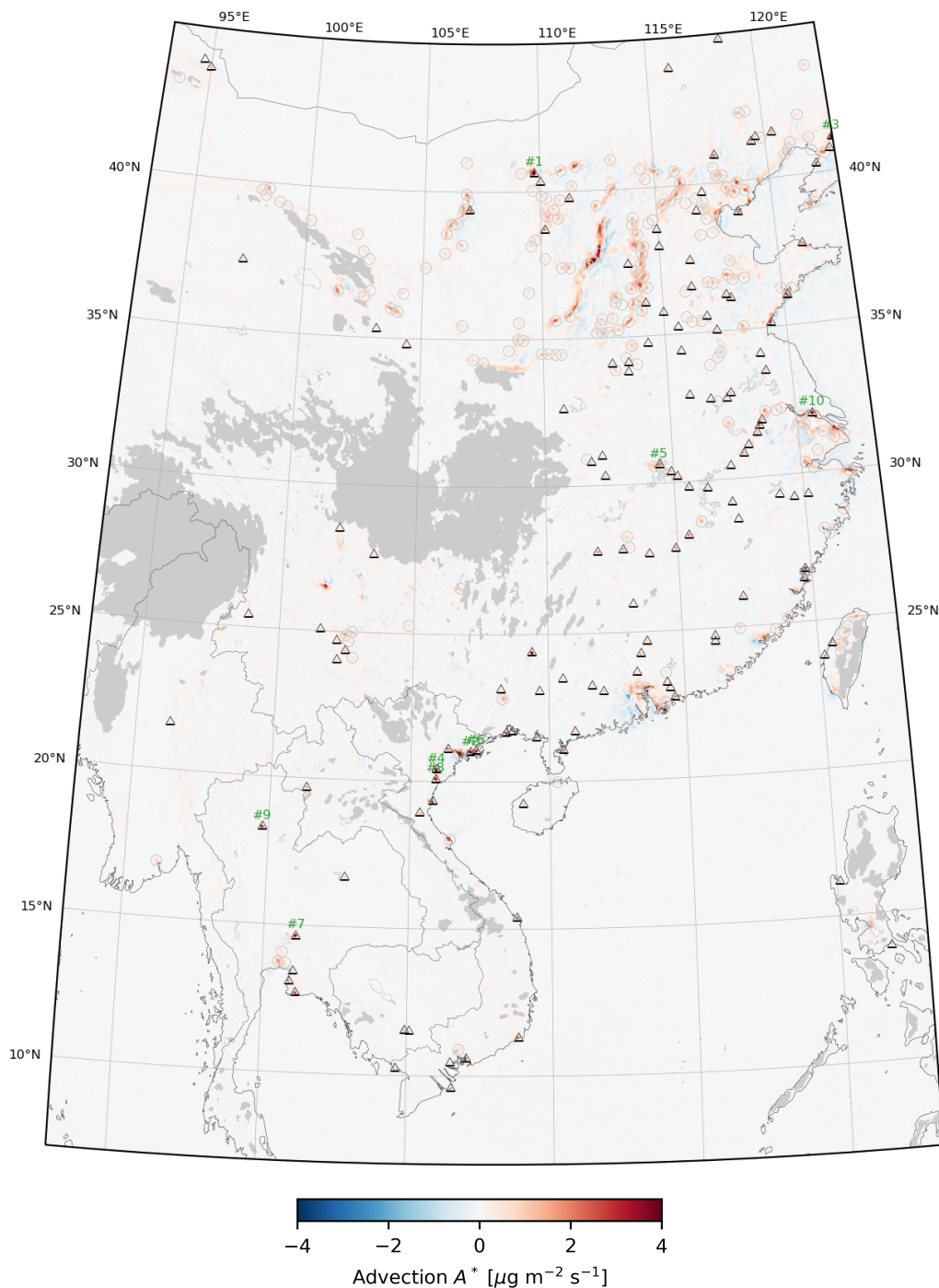


Figure S10. Map of A^* for East China/South East Asia. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S10. Catalog v2 extract of ten largest point sources detected in East China/South East Asia.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	7	40.6375	109.7375	1.81	0.57	Baotou East Hope	Baotou
2	8	21.0125	107.1375	1.80	0.42	Quang Ninh 1	Ha Long
3	14	41.1375	122.9625	1.54	0.15	Anshan Steel Company	Anshan
4	16	20.4125	105.9125	1.35	0.33		
5	23	30.6375	114.4625	1.20	0.24	Huaneng Yangluo	
6	27	21.0625	107.3375	1.18	0.29	Mong Duong 2	Cam Pha
7	34	14.6375	101.1125	1.10	0.31	Kaeng Khoi 2	
8	35	20.0875	105.8875	1.09	0.27		
9	43	18.2875	99.7625	0.99	0.35	Mae Mah	
10	45	31.9875	120.6375	0.97	0.15	Jiangsu Nantong	Yangshe

¹First match only.

11 East Asia

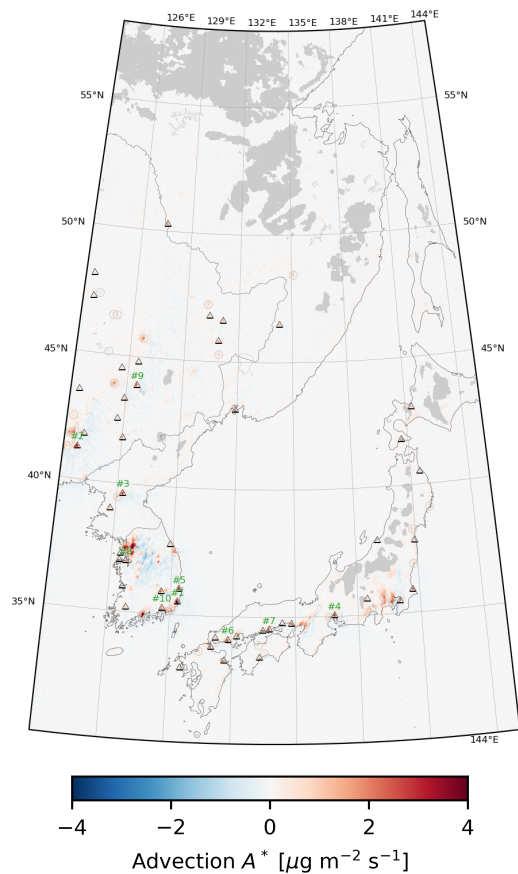


Figure S11. Map of A^* for East Asia. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S11. Catalog v2 extract of ten largest point sources detected in East Asia.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	30	35.5125	129.3375	1.13	0.20	Ulsan	Ulsan
2	40	41.2875	123.7125	1.03	0.16		Benxi
3	55	39.6125	126.2875	0.85	0.13	Pukchang	
4	70	35.0375	136.8625	0.72	0.10	Chita	Nagoya
5	100	36.0125	129.3875	0.63	0.08	Pohang Works	Pohang
6	116	34.0875	131.7875	0.60	0.14	Nanyo Complex	Shūnan
7	124	34.5125	133.7375	0.57	0.11	Tamashima	Kurashiki
8	145	36.9875	126.7125	0.52	0.08	Bugok	
9	162	43.8875	126.5125	0.50	0.08	Songhuajiang	Jilin
10	169	35.2375	128.6125	0.49	0.07		Changwon

¹First match only.

12 Indonesia/Malaysia

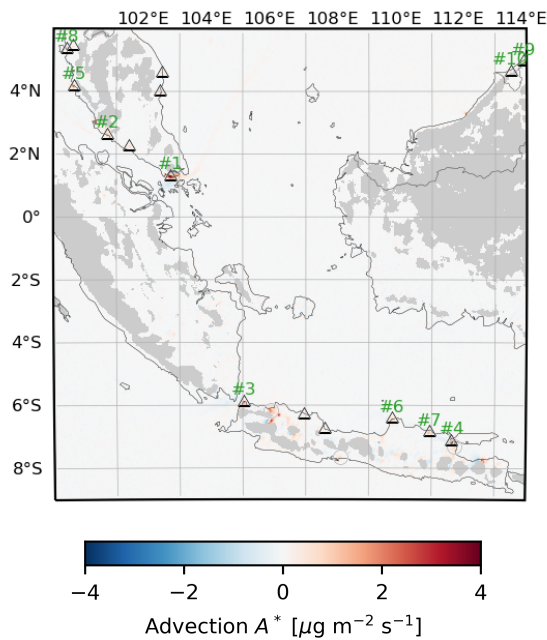


Figure S12. Map of A^* for Indonesia/Malaysia. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S12. Catalog v2 extract of ten largest point sources detected in Indonesia/Malaysia.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	12	1.2875	103.7125	1.70	0.61	Pulau Seraya	Singapore
2	72	2.6125	101.7125	0.71	0.35	Jimah	
3	73	-5.8875	106.0375	0.71	0.30	PLTU Suralaya	Cilegon
4	97	-7.1375	112.6375	0.64	0.25	PLTGU Gresik	
5	111	4.1625	100.6375	0.62	0.28	Manjung	
6	201	-6.4375	110.7375	0.43	0.16	PLTU Tanjung Jati B	
7	224	-6.8625	111.9125	0.40	0.14	Tanjung Awar-Awar	
8	284	5.3625	100.4125	0.33	0.16	TNB Prai	Butterworth
9	460	4.9375	114.9125	0.24	0.12	Gadong 2	
10	574	4.6375	114.4875	0.20	0.11	Lumut Cogen	

¹First match only.

13 Australia

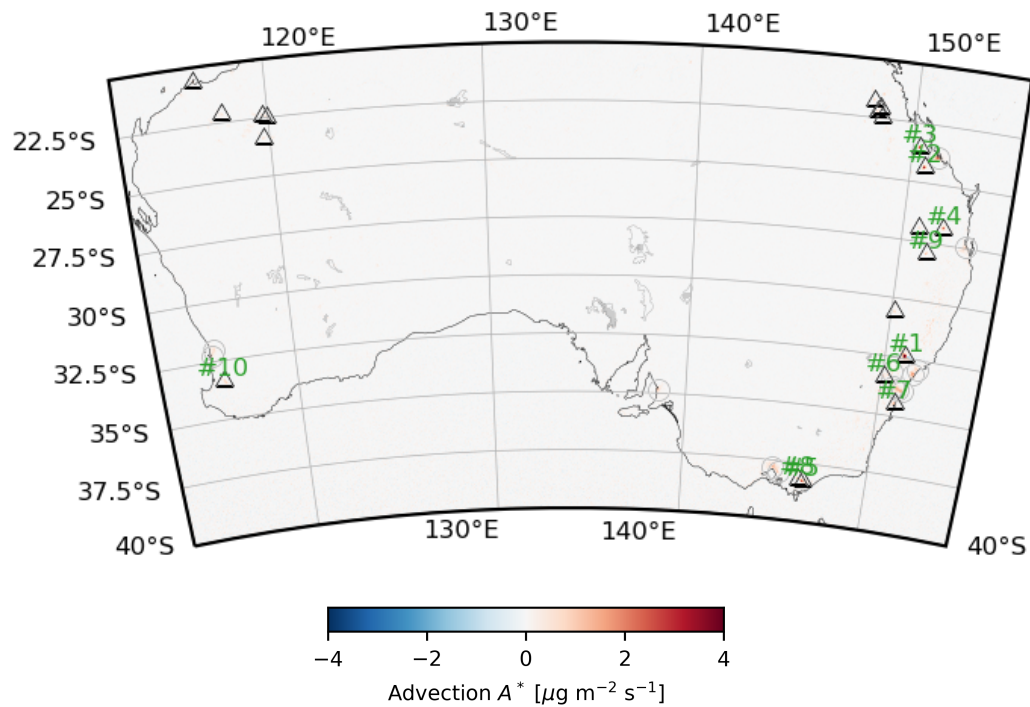


Figure S13. Map of A^* for Australia. Point sources listed in the catalog v2 are displayed as triangle. The regional top ten emitters are labeled in green. Candidates classified as area source are shown as circle if local advection is larger than $0.5 \mu\text{g s}^{-1} \text{m}^{-2}$.

Table S13. Catalog v2 extract of ten largest point sources detected in Australia.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	10	-32.4125	151.0125	1.73	0.30	Bayswater	
2	53	-24.3375	150.6375	0.87	0.17	Callide C	
3	86	-23.5125	150.3125	0.65	0.14	Stanwell	
4	112	-26.7875	151.9125	0.61	0.14	Tarong	
5	129	-38.2625	146.5875	0.56	0.13	Loy Yang A	
6	216	-33.3625	150.0625	0.41	0.08	Mt Piper	
7	273	-34.4375	150.8375	0.34	0.05	Tallawarra	Wollongong
8	379	-38.1875	146.3375	0.27	0.06	Hazelwood	
9	473	-27.9625	151.2875	0.24	0.06	Millmerran	
10	483	-33.3375	116.2375	0.23	0.04	Muja D	

¹First match only.

14 Further point sources

In contrast to v1, no pre-selection of “regions of interest” was made in v2. While most of the detected point sources in v2 are covered by the regions defined in v1 (1107 out of 1139), there are 32 further point sources in v2 outside these regions. Table S14 lists the 10 largest emitters.

Table S14. Catalog v2 extract of ten largest point sources detected outside the “regions of interest” considered in v1.

regional rank	global rank	lat [° N]	lon [° E]	Emissions [kg/s]	Error [kg/s]	Power plants (GPPD) ¹	Cities (WCD) ¹
1	54	6.9625	79.9375	0.86	0.32	CEB Kelantitissa	Colombo
2	78	61.2875	73.4875	0.68	0.07	Surgutskaya GRES-2	Surgut
3	133	-3.9375	122.4125	0.55	0.24		
4	134	10.4375	-61.4875	0.55	0.17	Point Lisas	
5	206	-20.1375	57.4625	0.42	0.14	Fort William Ceb	Port Louis
6	212	0.3125	32.5875	0.41	0.28		Kampala
7	248	-3.0875	-59.9625	0.37	0.16	Aparecida Parte I	Manaus
8	261	-2.6125	-44.3625	0.34	0.10	Porto do Itaqui	São Luís
9	364	0.1625	117.4875	0.28	0.13		Bontang
10	410	32.3125	-64.7875	0.26	0.07		

¹First match only.