Supplement of

Measurement Report: Tethered Balloon Observations of Vertically Resolved Aerosol Size Distributions during the ARM CoURAGE and BNF Campaigns

Yuhang Guo[1], Chongai Kuang[2], Darielle Dexheimer[3], Manish Shrivastava[4], Ogochukwu Enekwizu[2], Yang Wang[5], Jingbo Mao[1], Gan Luo[1], Fangqun Yu[1,*], Jie Zhang[1,*]

[1]Atmospheric Sciences Research Center, University at Albany, State University of New York, Albany, NY 12203, USA
[2]Environmental Science and Technologies Department, Brookhaven National Laboratory, Upton, New York
[3]Environmental Science Division, Sandia National Laboratories, Albuquerque, New Mexico, USA
[4]Pacific Northwest National Laboratory, Richland, Washington, USA
[5]Department of Chemical, Environmental and Materials Engineering, University of Miami, Coral Gables, Florida, 33146, United States

Correspondence to: Jie Zhang (jzhang35@albany.edu) and Fangqun Yu (fyu@albany.edu)

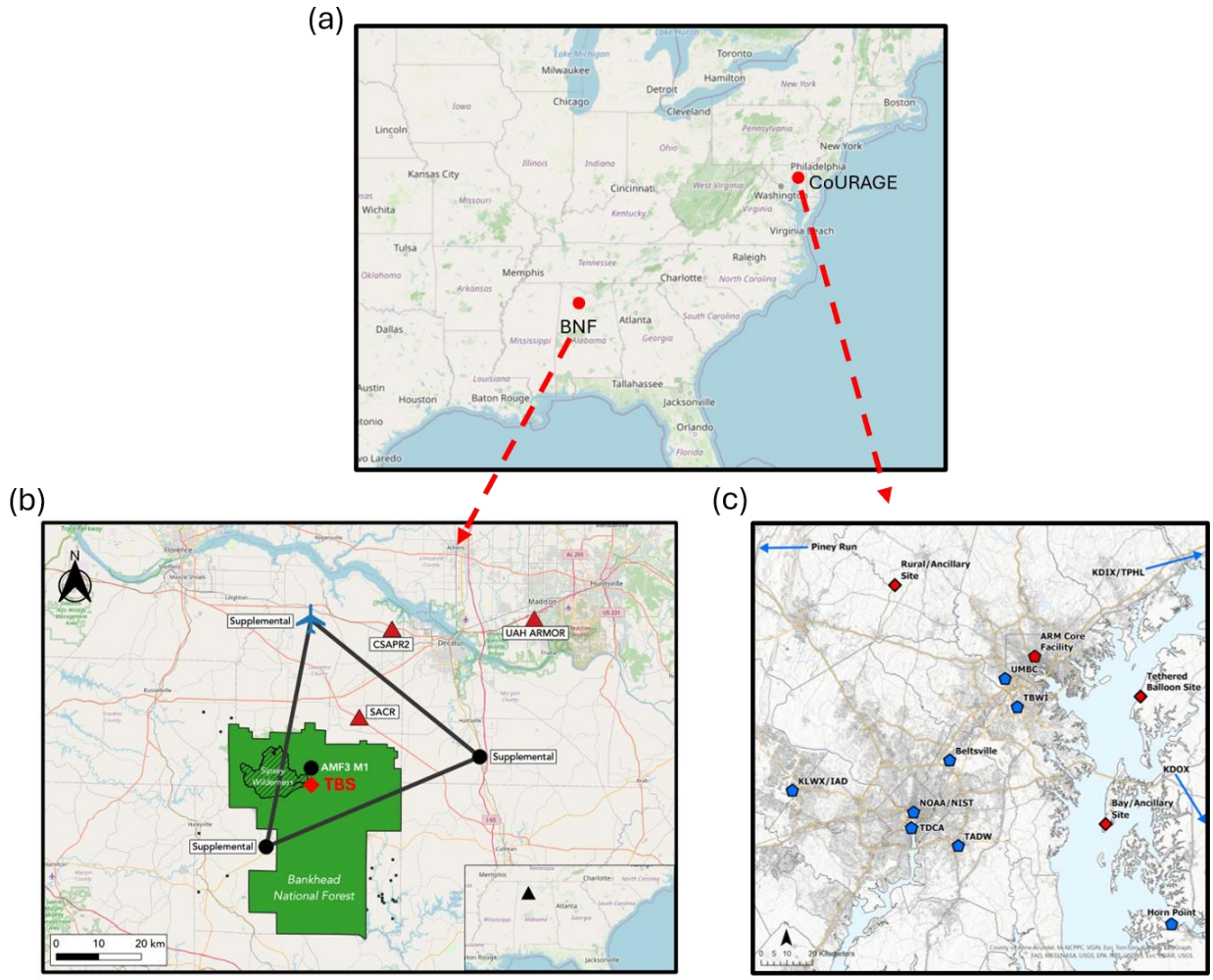

Figure S1. (a) The locations of AMF1-CoURAGE and AMF3-BNF for TBS deployments (Note: The map data is available under the Open Database License, https://www.openstreetmap.org/copyright), (b) The AMF3 BNF site layout, including the location of the main site, TBS site (at main site), Supplemental sites as well as partner sites (Source: AMF3 BNF Science Plan, Kuang et al., 2023), and (c) The AMF1 CoURAGE study domain and sites (marked in red), include a core site in the Baltimore urban region, a rural site in the rural mountain region, a Bay site, and the TBS site. The blue points represent the existing regional network of atmospheric profiling and scanning radar stations (Source: AMF1 CoURAGE Science Plan, Davis et al., 2024).

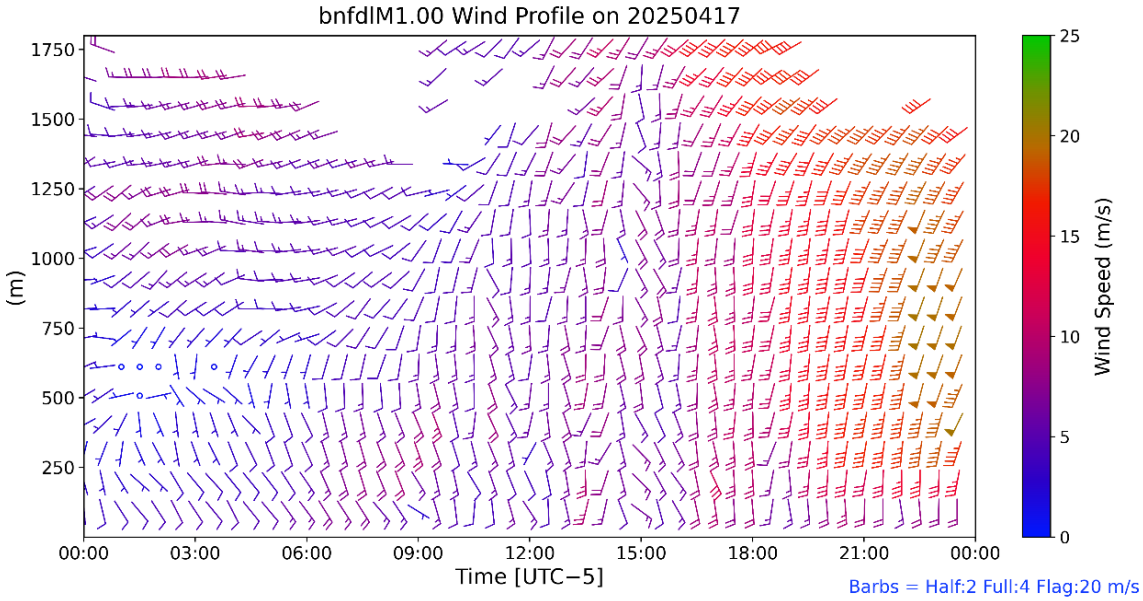

Figure S2. The BNF Doppler lidar measured wind profile on 04/17/2025

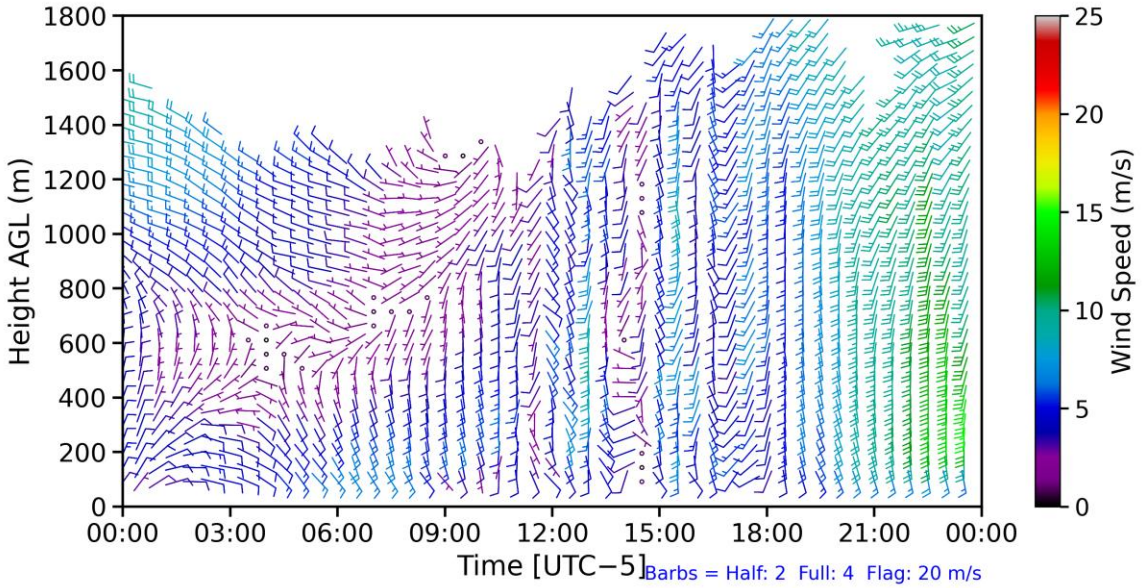

Figure S3. The BNF Doppler lidar measured wind profile on 03/27/2025

Table S1.

Camp.	#	Date	Local time	Time period[1]	Season	Max TBS altitude (m)	Appr. PBLH (m)	Mean aerosol number concentration (# cm^{-3}) [5% 95% range]	Profile type	Cross PBL (Y/N)
CoURAGE	1	02/19	14:30-17:15	Afternoon	Winter	735	1000*	3017 [1881 4201]	II.B	
	2	02/22	09:00-11:45	Morning	Winter	1000	700*	1593 [100 3506]	II.A	Y
	3		15:00-17:27	Afternoon	Winter	573	710*	2392 [1903 3197]	II.A	
	4	02/23	12:00-13:20	Afternoon	Winter	746	2730*	2301 [1541 4459]	I.A	
	5		14:30-16:47	Afternoon	Winter	902	2800*	3444 [2075 7726]	I.B	
	6	02/24	09:45-11:26	Morning	Winter	774	370*	2166 [1317 4109]	II.A	
	7	07/15	09:24-10:53	Morning	Summer	607	750*	1452 [1004 1811]	I.B	
	8		12:50-14:36	Afternoon	Summer	500	1100*	1403 [1196 1614]	I.B	
	9	07/16	09:00-10:35	Morning	Summer	388	750*	2161 [1770 2672]	I.A	
	10		12:40-14:27	Afternoon	Summer	504	950*	1950 [1758 2151]	I.B	
	11	07/18	12:00-14:47	Afternoon	Summer	849	1000*	3067 [2624 3260]	I.A	
	12		15:40-17:01	Afternoon	Summer	552	1600*	3793 [3348 4158]	I.A	
	13	07/19	13:30-14:32	Afternoon	Summer	420	660*	2211 [1913 2464]	I.B	
	14		15:30-17:21	Afternoon	Summer	960	950*	2094 [1547 2471]	I.B	
	15	07/20	10:20-11:19	Morning	Summer	360	650*	4715 [3044 6746]	I.A	
	16		12:00-12:48	Afternoon	Summer	350	1000*	3795 [2816 4809]	I.A	
	17	07/21	14:50-16:45	Afternoon	Summer	830	2700*	2563 [1959 3095]	I.B	
	18		17:40-18:25	Afternoon	Summer	279	2500*	2566 [2009 2926]	I.B	
	19	07/22	11:50-13:09	Afternoon	Summer	854	2000*	4895 [939 6939]	I.A	
	20	07/24	10:53-12:55	Morning	Summer	776	1300*	1738 [1428 2022]	I.B	
	21	07/26	10:40-12:03	Morning	Summer	704	1700*	3773 [2658 4694]	I.A	
	22		12:47-14:14	Afternoon	Summer	598	1500*	2856 [2517 3274]	I.A	
	23	07/27	10:25-12:34	Morning	Summer	702	1000*	2320 [1637 3620]	II.B	
	24	07/28	10:00-12:00	Morning	Summer	1051	2700*	2463 [1765 3142]	II.A	
	25		12:34-14:36	Afternoon	Summer	778	1600*	3150 [2488 4222]	II.A	
BNF	26	03/27	21:22-23:15	Night	Spring	702	110	3352 [2445 5714]	II.A	Y
	27		02:57-06:28	Night	Spring	801	110	2822 [1581 4580]	II.A	Y
	28		12:34-14:30	Afternoon	Spring	645	1200	2309 [1693 3166]	I.A	
	29	03/28	13:46-14:17	Afternoon	Spring	329	650	3479 [2853 7083]	I.A	
	30		18:20-18:58	Afternoon	Spring	320	1350	2561 [1693 9640]	I.A	
	31	04/09	21:50-22:35	Night	Spring	134	100	2449 [1610 3593]	I.A	
	32	04/10	13:30-15:15	Afternoon	Spring	404	1100	2168 [1762 2808]	I.A	
	33	04/12	10:46-12:52	Morning	Spring	1010	1100	950 [737 1256]	I.A	
	34		17:00-17:52	Afternoon	Spring	850	1300	1577 [1310 1828]	I.A	
	35	04/13	08:55-11:04	Morning	Spring	1143	920	1334 [222 2012]	I.A	Y
	36		14:20-15:38	Afternoon	Spring	445	1800	2587 [1700 4480]	II.A	
	37	04/17	22:25-00:22	Night	Spring	1201	100	4625 [3905 6020]	II.B	Y

	38		04:20-06:42	Night	Spring	852	450	2367 [1960 2534]	II.B	Y
	39	04/19	17:55-18:36	Afternoon	Spring	251	1300	2202 [1473 2916]	I.A	
	40	04/26	12:46-14:37	Afternoon	Spring	504	900	780 [585 922]	I.A	
	41	05/29	10:35-11:44	Morning	Summer	352	260	784 [590 1132]	I.A	
	42		15:00-15:45	Afternoon	Summer	501	1300	1339 [976 1937]	I.B	
	43	06/01	14:05-15:22	Afternoon	Summer	1138	1500	1123 [939 1393]	I.A	
	44		16:50-18:09	Afternoon	Summer	377	1600	1212 [1057 1482]	I.A	
	45	06/05	09:45-10:46	Morning	Summer	377	550	1129 [991 1261]	I.B	
	46		14:30-16:04	Afternoon	Summer	1010	1200	1091 [959 1289]	I.B	
	47		17:00-18:12	Afternoon	Summer	797	1450	1169 [1069 1287]	I.B	
	48	06/07	10:21-10:53	Morning	Summer	322	1500	2233 [2039 2386]	I.A	
	49	06/08	22:00-22:20	Night	Summer	106	380	1787 [1514 2186]	I.A	
	50	06/11	21:10-22:45	Night	Summer	653	2000	1701 [1455 2043]	I.A	
	51	06/12	11:25-11:58	Morning	Summer	224	800	1894 [1706 2103]	I.A	
	52		12:26-13:45	Afternoon	Summer	415	1000	1710 [1557 1927]	I.A	
	53		19:08-22:07	Night	Summer	456	950	2055 [1300 3134]	II.B	
	54	06/15	09:46-11:15	Morning	Summer	206	270	1173 [1067 1289]	I.B	
	55	06/15	12:50-13:38	Afternoon	Summer	273	800	1033 [928 1161]	I.B	
	56	08/09	10:30-11:22	Morning	Summer	429	600	865 [753 992]	I.B	
	57	08/09	12:13-14:12	Afternoon	Summer	613	1000	858 [755 973]	I.B	
	58	08/14	13:05-15:14	Afternoon	Summer	856	1400	2088 [1616 2384]	I.B	
	59	08/15	14:36-16:06	Afternoon	Summer	808	900	1141 [955 1392]	I.A	
	60	08/16	15:15-17:18	Afternoon	Summer	823	1300	1509 [1170 1834]	I.B	
	61	08/17	21:10-22:51	Night	Summer	355	400	1452 [1215 1665]	I.A	
	62	08/22	15:00-16:31	Afternoon	Summer	874	1300	1778 [1607 1982]	I.B	
	63	08/23	13:10-14:29	Afternoon	Summer	600	1400	1366 [1228 1508]	I.A	

Note: (1) Time period was classified according to the local flight start time as Morning (05:00–11:59 LT), Afternoon (12:00–18:59 LT), and Night (19:00–04:59 LT), (2) The PBLH for CoURAGE was based on the ceilometer in core site, which was about 36km away.

Reference:

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