## **Supporting Information:**

Wintertime spatial patterns of particulate matter in Fairbanks, AK

## during ALPACA 2022

Ellis S. Robinson,<sup>\*,†</sup> Meeta Cesler-Maloney,<sup>‡</sup> Xinxiu Tian,<sup>†</sup> William Simpson,<sup>‡</sup>

Jingqiu Mao,<sup>‡</sup> and Peter F. DeCarlo<sup>\*,†</sup>

†Dept. of Environmental Health & Engineering, Johns Hopkins University, Baltimore, MD
 ‡Dept. of Chemistry & Biochemistry, Geophysical Institute, University of Alaska
 Fairbanks, Fairbanks, AK

E-mail: shipleyrobinson@gmail.com; pdecarl1@jhu.edu

		lable	S1:									
Details for all mobile sampling drives												
Drive	Date	DOW	Inversion	Start	Er							
1	2022-01-17	Mon	Weak	10:42	12:							
2	2022-01-18	Tue	Weak	20:16	21:							
3	2022-01-20	Thu	Strong	14:48	16:							
4	2022-01-22	Sat	Strong	18:54	20:							
5	2022-01-23	Sun	Strong	18:33	19:							
6	2022-01-25	Tue	Weak	17:22	18:							
7	2022-01-26	Wed	Strong	9:49	11:							
8	2022-01-26	Wed	Strong	21:40	23:							
9	2022-01-27	Thu	Strong	6:48	7:5							
10	2022-01-28	Fri	Weak	22:30	23:							
11	2022-01-29	Sat	Strong	14:21	15:							
12	2022-01-30	Sun	Strong	8:25	9:3							
13	2022-01-31	Mon	Strong	10:21	11:							
14	2022-01-31	Mon	Strong	23:00	0:1							
15	2022-02-16	Wed	Weak	18:49	19:							
16	2022-02-17	Thu	Weak	12:28	13:							
17	2022-02-18	Fri	Weak	6:48	7:5							
18	2022-02-19	Sat	Weak	13:58	15:							
19	2022-02-19	Sat	Strong	19:53	21:							
20	2022-02-20	Sun	Weak	16:24	17:							
21	2022-02-21	Mon	Weak	6:53	8:0							
22	2022-02-21	Mon	Weak	19:17	20:							
23	2022-02-22	Tue	Weak	20:37	21:							
24	2022-02-23	Wed	Weak	12:57	14:							
25	2022-02-24	Thu	Strong	15:14	16:							
26	2022-02-25	Fri	Strong	8:36	9:4							
27	2022-02-25	Fri	Weak	18:42	20:							
28	2022-02-26	Sat	Strong	3:53	6:5							
29	2022-02-27	Sun	Weak	14:03	15:							



Figure S1: Time series of outdoor  $PM_{2.5}$  from the ALPACA house site measured with a QuantAQ MODULAIR-PM sensor. Highlighted portions correspond to driving periods. No driving was performed between Feb. 1 to Feb. 16, 2022.

Weak inversion         Full dataset         Strong inversion           Neighborhood         m         p.25         med         med         p.25         med         med         p.25         med         med         p.25         med         med         p.26         med         <		-						· · · ·						-						
Neighborhoot         min         p.2         max         max         max <thmax< th=""> <th< td=""><td></td><td colspan="6">Weak inversion</td><td colspan="6">Full dataset</td><td colspan="6">Strong inversion</td></th<></thmax<>		Weak inversion						Full dataset						Strong inversion						
Ph (m-:s)         State is a state state is a state is a state is a state state is a state is a stat	Neighborhood	min	p_25	med	mean	p_75	max	min	p_25	med	mean	p_75	max	min	p_25	med	mean	p_75	max	
Benteysiand         31.000         35.000         43.000         44.000         46.000         47.000         48.000         87	PN (cm-3)																			
Downtownersie         38,000         39,000         40,000         42,000         40,000	BentleyIsland	31,000	35,000	43,000	41,000	46,000	65,000	42,000	47,000	61,000	67,000	77,000	130,000	51,000	62,000	79,000	93,000	110,000	210,000	
DowntownWest         45,00         99,00         42,00         52,00         47,000         28,000         73,00         78,00         81,000         150,00           HamiltorAcces         64,00         55,00         57,000         62,000         75,000        75,000 </td <td>DowntownEast</td> <td>38,000</td> <td>39,000</td> <td>40,000</td> <td>42,000</td> <td>42,000</td> <td>60,000</td> <td>48,000</td> <td>58,000</td> <td>72,000</td> <td>74,000</td> <td>85,000</td> <td>120,000</td> <td>64,000</td> <td>78,000</td> <td>100,000</td> <td>110,000</td> <td>130,000</td> <td>210,000</td>	DowntownEast	38,000	39,000	40,000	42,000	42,000	60,000	48,000	58,000	72,000	74,000	85,000	120,000	64,000	78,000	100,000	110,000	130,000	210,000	
HamiltonArena16,00030,00040,00040,00040,00040,00040,00060,00010,000 <t< td=""><td>DowntownWest</td><td>35,000</td><td>39,000</td><td>42,000</td><td>52,000</td><td>47,000</td><td>420,000</td><td>50,000</td><td>55,000</td><td>57,000</td><td>66,000</td><td>64,000</td><td>290,000</td><td>68,000</td><td>71,000</td><td>73,000</td><td>79,000</td><td>81,000</td><td>150,000</td></t<>	DowntownWest	35,000	39,000	42,000	52,000	47,000	420,000	50,000	55,000	57,000	66,000	64,000	290,000	68,000	71,000	73,000	79,000	81,000	150,000	
Higheliev         6,400         8,500         10,000         12,000	HamiltonAcres	16,000	31,000	40,000	39,000	43,000	140,000	23,000	46,000	62,000	63,000	73,000	140,000	30,000	59,000	82,000	86,000	99,000	190,000	
Highway         19,000         37,000         51,000         58,000         69,000         27,000         10,000         27,000         27,000         10,000         27,000         27,000         10,000         27,000	HighElev	6,400	8,500	10,000	12,000	14,000	29,000	7,500	10,000	12,000	15,000	18,000	37,000	8,400	11,000	14,000	17,000	21,000	42,000	
Lemeta         31,000         36,000         96,000         170,000         26,000         47,000         26,000         47,000         26,000         47,000         26,000         47,000         26,000         47,000         26,000         47,000         26,000         47,000         26,000         47,000         26,000         47,000         26,000         47,000         26,000         47,000         26,000         47,000         47,000         26,000         47,000         47,000         27,000         17,00         17,01         11	Highway	19,000	37,000	51,000	58,000	66,000	160,000	23,000	36,000	57,000	69,000	100,000	160,000	23,000	35,000	56,000	78,000	100,000	270,000	
ShanonPark         17.000         28.000         48.	Lemeta	31,000	36,000	39,000	59,000	69,000	170,000	29,000	41,000	45,000	53,000	56,000	120,000	25,000	39,000	47,000	47,000	53,000	70,000	
Staterville         39,000         42,000         44,000         45,000         51,000         53,000         59,000         85,000         60,000         60,000         70,000         72,000         77,000         110,000           PM2.5 (ug m-3) <td>ShannonPark</td> <td>17,000</td> <td>28,000</td> <td>36,000</td> <td>36,000</td> <td>40,000</td> <td>110,000</td> <td>25,000</td> <td>36,000</td> <td>47,000</td> <td>48,000</td> <td>59,000</td> <td>96,000</td> <td>28,000</td> <td>43,000</td> <td>61,000</td> <td>61,000</td> <td>73,000</td> <td>120,000</td>	ShannonPark	17,000	28,000	36,000	36,000	40,000	110,000	25,000	36,000	47,000	48,000	59,000	96,000	28,000	43,000	61,000	61,000	73,000	120,000	
PM2.5 (ug m-3)           Bentley(sland         7.6         9.1         9.9         10         11         23         20         21         22         24         26         31         30         32         34         36         39         49           Downtow/Rest         6.6         7.8         8.4         8.2         8.7         9.5         20         21         21         22         22         26         31         33         33         34         35         44         29         49           HamiltoAcres         3.6         8.1         10         10         12         23         12         17         21         23         34         18         25         29         30         34         57           HighElev         3.6         8.5         9.3         9.8         11         28         8.3         13         14         16         17         28         13         17         18         29         17         18         19         14         17         18         20         12         20         20         22         24         25         26         27         27         29         32         33	Slaterville	39,000	42,000	44,000	45,000	46,000	61,000	51,000	53,000	57,000	58,000	59,000	85,000	60,000	64,000	70,000	72,000	77,000	110,000	
BentleyIsiand       7.6       9.1       9.9       10       11       23       20       21       22       24       26       31       30       32       34       36       39       49         DowntowRest       6.6       7.8       8.4       8.2       8.7       9.5       20       21       21       22       22       22       26       31       33       34       35       42         DowntowRest       6.6       8.6       1.0       10       12       23       12       17       21       23       34       18       25       29       30       34       57         Highrey       3.5       6.5       6.9       8.6       12       3.6       6.6       6.8       7.8       9.7       11         Lemeta       8.3       9.7       11       11       11       17       13       14       15       16       17       28       13       17       12       24       20       22       22       24       24       23       23       24       24       23       23       24       23       23       24       24       23       22       22       22 <td>PM2.5 (ug m-3)</td> <td></td>	PM2.5 (ug m-3)																			
DowntownEast         6.6         7.8         8.4         8.2         8.7         9.5         2.0         2.1         2.2         2.2         2.6         3.1         3.3         3.3         3.4         3.5         4.2         4.2           HamiltonAcres         3.6         8.1         10         10         12         2.3         1.7         2.1         2.1         2.3         3.4         1.8         2.5         2.9         3.0         3.4         5.7         6.6         6.7         3.6         6.6         6.7         3.6         6.6         6.7         3.6         6.6         6.7         3.6         6.6         6.7         3.6         6.6         6.7         3.6         6.6         6.7         3.6         6.6         6.7         1.8         2.7         1.1         1.1         1.7         1.3         1.4         1.5         1.6         1.7         2.8         3.7         1.1         1.1         1.7         1.8         1.9         4.4         2.0         2.2         2.4         2.6         2.7         2.6         2.7         2.9         3.2           ShannoPark         0.4         0.52         0.82         0.13         1.6         1.7 <td>BentleyIsland</td> <td>7.6</td> <td>9.1</td> <td>9.9</td> <td>10</td> <td>11</td> <td>23</td> <td>20</td> <td>21</td> <td>22</td> <td>24</td> <td>26</td> <td>31</td> <td>30</td> <td>32</td> <td>34</td> <td>36</td> <td>39</td> <td>49</td>	BentleyIsland	7.6	9.1	9.9	10	11	23	20	21	22	24	26	31	30	32	34	36	39	49	
DowntownWest         6.4         8.4         9.3         11         11         143         17         18         19         20         21         36         24         26         27         28         29         49           HamiltonAces         3.6         8.1         10         10         12         23         12         17         21         21         23         34         18         25         29         30         34         57           Hightay         3.6         8.5         9.3         9.8         11         28         8.3         13         14         16         17         28         13         17         18         21         22         24         24         24         25         323           Staterville         7.4         8.4         8.6         9.9         17         16         17         18         20         22         24         24         25         29         32         33         33         34         16         17         18         19         4.4         20         2.2         2.5         2.6         2.7         2.7         2.9         32         20         24         2.6	DowntownEast	6.6	7.8	8.4	8.2	8.7	9.5	20	21	21	22	22	26	31	33	33	34	35	42	
HamiltonAcres         3.6         8.1         10         10         12         23         12         17         21         21         23         34         18         25         29         30         34         57           HighElev         3.6         5.5         6.1         6.1         6.7         11         3.5         1.6         5.6         6.9         6.6         12         3.6         5.6         6.9         7.8         9.7         16           Lemeta         8.3         9.7         11         11         11         15         16         17         27         14         17         20         21         25         40           ShannonPark         4.4         6.6         7.7         8.4         9.9         9         17         16         16         17         17         18         20         22         22         24         26         27         7.5           ShannonPark         0.65         0.62         0.92         0.92         1.0         1.3         1.6         1.7         1.8         1.9         1.4         1.6         1.8         1.3         1.9         2.1         2.2         2.2         2.	DowntownWest	6.4	8.4	9.3	11	11	43	17	18	19	20	21	36	24	26	27	28	29	49	
HighElev       3.5       5.2       6.1       6.1       6.7       11       2.8       5.5       5.6       6.9       8.6       12       3.6       5.6       6.9       7.8       9.7       16         Highway       3.6       8.5       9.3       9.8       11       12       8.3       13       14       15       16       17       27       14       17       20       21       22       40         ShannonPark       4.4       6.7       7.8       8.4       9.4       18       7.1       11       15       16       17       27       14       17       20       21       25       40         Staterville       7.4       8.4       8.4       9.4       18       7.1       11       15       18       22       11       15       20       22       24       26       27       7.5         BartleyIsland       0.52       0.82       0.92       1.0       1.3       1.3       1.6       1.7       1.8       1.9       4.4       2.0       2.3       2.5       2.6       2.7       7.5         DowntownEast       0.65       1.0       0.11       1.1       1.3	HamiltonAcres	3.6	8.1	10	10	12	23	12	17	21	21	23	34	18	25	29	30	34	57	
Highway       3.6       8.5       9.3       9.8       11       128       8.3       13       14       16       17       28       13       17       18       21       22       45         Lemeta       8.3       9.7       11       11       11       17       13       14       15       16       17       27       14       17       20       21       25       40         SharnonPark       4.4       6.6       7.7       8.84       9.9       17       16       16       17       17       18       20       22       22       24       24       25       29         BC (ug m-3)       Sisterville       7.4       8.4       8.8       9.6       9.9       17       16       16       17       18       20       22       24       26       2.7       2.6       2.7       7.5       2.6       2.77       7.5       0.91       1.3       1.6       1.7       1.8       1.9       2.4       2.6       2.7       2.7       2.9       3.2       3.0       0.6       0.6       0.6       0.77       0.78       0.91       1.3       0.62       1.2       1.9       2.1	HighElev	3.5	5.2	6.1	6.1	6.7	11	3.5	5.1	6.5	6.9	8.6	12	3.6	5.6	6.9	7.8	9.7	16	
Lemeta       8.3       9.7       11       11       11       17       13       14       15       16       17       27       14       17       20       21       25       40         ShannonPark       4.4       6.7       7.8       8.4       9.4       18       7.1       11       15       18       22       11       15       20       24       25       20       24       25       22       24       24       25       22       24       24       25       29         Bc (ug m-3)       Bentleylsland       0.52       0.82       0.92       1.0       1.3       1.3       1.6       1.7       1.8       1.9       4.4       2.0       2.3       2.5       2.6       2.7       7.5         DowntownEast       0.65       1.0       1.1       1.1       1.5       1.7       1.8       1.9       4.4       2.0       2.3       2.5       2.6       2.7       2.7       2.9       3.2         DowntownEast       0.66       0.70       0.78       0.91       1.3       0.62       1.3       1.5       1.4       1.6       1.8       1.3       1.9       2.1       2.1       2.	Highway	3.6	8.5	9.3	9.8	11	28	8.3	13	14	16	17	28	13	17	18	21	22	45	
ShannonPark       4.4       6.7       7.8       8.4       9.4       18       7.1       11       15       18       22       11       15       20       20       24       23         Slaterville       7.4       8.4       8.8       9.6       9.9       17       16       16       17       17       18       20       22       22       24       24       25       29         BC (ug m-3)                      20       22       24       26       2.5       2.6       2.7       7.5              7.7       7.8        3.1       1.6       1.7       1.8       1.9       2.4       2.0       2.2       2.4       2.6       2.7       7.7       2.9       3.2       2.0       0.93       1.1       1.1       1.1       1.1       1.1       1.1       1.1       1.6       1.7       1.8       2.2       1.9       2.1       2.2       2.2       2.3       3.0       3.0       0.4       1.0       1.0       <	Lemeta	8.3	9.7	11	11	11	17	13	14	15	16	17	27	14	17	20	21	25	40	
Slaterville       7.4       8.4       8.8       9.6       9.9       17       16       16       17       17       18       20       22       22       24       24       25       29         BC (ug m-3)         Bentleyisland       0.52       0.82       0.92       0.92       1.0       1.3       1.3       1.6       1.7       1.8       1.9       4.4       2.0       2.3       2.5       2.6       2.7       7.5         DowntownEast       0.65       1.0       1.1       1.1       1.5       1.7       1.8       1.9       4.4       2.0       2.3       2.5       2.6       2.7       2.7       2.9       3.2         DowntownWest       0.70       0.93       1.1       1.2       1.3       0.82       1.3       1.6       1.7       1.8       2.2       2.4       2.6       0.27       2.7       2.9       3.2         Highlow       -0.0080       0.24       0.28       0.31       0.41       1.7       0.13       1.5       1.7       1.1       1.0       1.2       1.6       0.92       1.2       1.3       1.4       1.5       1.7       2.1       1.9       7.5       1.6<	ShannonPark	4.4	6.7	7.8	8.4	9.4	18	7.1	11	15	15	18	22	11	15	20	20	24	33	
BC (g m-3)           Bentleylsland         0.52         0.82         0.92         1.0         1.3         1.3         1.6         1.7         1.8         1.9         4.4         2.0         2.3         2.5         2.6         2.7         7.5           DowntowRest         0.65         1.0         1.1         1.1         1.5         1.7         1.8         1.9         1.0         2.2         2.4         2.6         2.7         2.7         2.9         3.2           DowntowRest         0.70         0.93         1.1         1.2         1.3         0.82         1.3         1.5         1.4         1.6         1.8         1.3         1.9         2.1         2.2         2.2         2.3         3.0           HamiltonAcres         -0.014         0.66         0.77         0.78         0.91         1.3         0.82         0.33         0.90         8.08         0.02         2.1         2.1         2.4         2.8           Highlew         -0.04         0.66         0.77         0.78         0.68         1.3         1.5         1.7         1.7         1.4         1.6         0.92         1.2         1.3         1.4         1.5         1.6 <td>Slaterville</td> <td>7.4</td> <td>8.4</td> <td>8.8</td> <td>9.6</td> <td>9.9</td> <td>17</td> <td>16</td> <td>16</td> <td>17</td> <td>17</td> <td>18</td> <td>20</td> <td>22</td> <td>22</td> <td>24</td> <td>24</td> <td>25</td> <td>29</td>	Slaterville	7.4	8.4	8.8	9.6	9.9	17	16	16	17	17	18	20	22	22	24	24	25	29	
BentleyIsland         0.52         0.82         0.92         0.92         1.0         1.3         1.3         1.6         1.7         1.8         1.9         4.4         2.0         2.3         2.5         2.6         2.7         7.5           DowntownEast         0.66         1.0         1.1         1.1         1.1         1.5         1.7         1.8         1.9         1.9         2.0         2.2         2.4         2.6         2.7         2.7         2.9         3.2           DowntownWest         0.70         0.93         1.1         1.2         1.3         2.4         1.3         1.6         1.7         1.8         2.2         2.1         2.2         2.2         2.3         3.0           HamitonAcres         -0.04         0.66         0.77         0.78         0.91         1.3         0.29         0.33         0.99         0.48         1.0         1.5         1.4         1.6         1.8         1.3         1.9         2.1         1.9         0.5         1.7         1.4         1.0         1.1         1.1         1.1         1.4         1.6         0.92         1.2         1.3         1.4         1.5         1.6         1.7	BC (ug m-3)																			
DowntownEast         0.65         1.0         1.1         1.1         1.1         1.5         1.7         1.8         1.9         1.9         2.0         2.2         2.4         2.6         2.7         2.7         2.9         3.2           DowntownWest         0.70         0.93         1.1         1.2         1.3         2.4         1.3         1.6         1.7         1.7         1.8         2.2         1.9         2.1         2.2         2.2         2.3         3.0           HamiltonAcces         -0.0080         0.24         0.28         0.31         0.41         0.70         0.13         0.29         0.33         0.39         0.48         1.0         0.12         0.30         0.36         0.46         0.57         1.2           Highway         0.34         0.96         1.2         1.4         2.2         0.49         1.3         1.5         1.7         1.4         1.0         1.5         1.7         2.1         2.1         2.1         2.4         2.8           ShannonPark         0.38         0.66         0.74         0.76         0.86         1.3         0.62         0.99         1.1         1.1         1.3         1.4         1.7 <td>BentleyIsland</td> <td>0.52</td> <td>0.82</td> <td>0.92</td> <td>0.92</td> <td>1.0</td> <td>1.3</td> <td>1.3</td> <td>1.6</td> <td>1.7</td> <td>1.8</td> <td>1.9</td> <td>4.4</td> <td>2.0</td> <td>2.3</td> <td>2.5</td> <td>2.6</td> <td>2.7</td> <td>7.5</td>	BentleyIsland	0.52	0.82	0.92	0.92	1.0	1.3	1.3	1.6	1.7	1.8	1.9	4.4	2.0	2.3	2.5	2.6	2.7	7.5	
DowntownWest         0.70         0.93         1.1         1.2         1.3         2.4         1.3         1.6         1.7         1.7         1.8         2.2         1.9         2.1         2.2         2.2         2.3         3.0           HamiltonAcres         -0.014         0.66         0.77         0.78         0.91         1.3         0.82         1.3         1.4         1.6         1.8         1.3         1.9         2.1         2.1         2.1         2.4         2.8           HighElev         -0.0080         0.24         0.28         0.31         0.41         0.70         0.13         0.29         0.30         0.48         1.0         0.15         1.7         1.7         1.4         1.0         0.5         1.7         2.1         2.4         1.3         1.5         1.7         1.7         4.4         1.0         1.5         1.7         1.5         1.7         1.7         1.4         1.0         0.39         0.48         1.0         0.15         1.7         1.7         1.4         1.5         1.7         1.3         1.4         1.5         1.7         1.3         1.4         1.5         1.6         1.7         1.7         1.8         1.	DowntownEast	0.65	1.0	1.1	1.1	1.1	1.5	1.7	1.8	1.9	1.9	2.0	2.2	2.4	2.6	2.7	2.7	2.9	3.2	
HamiltonAcces       -0.014       0.66       0.77       0.78       0.91       1.3       0.82       1.3       1.5       1.4       1.6       1.8       1.3       1.9       2.1       2.1       2.4       2.8         HighElev       -0.0080       0.24       0.28       0.31       0.41       0.70       0.13       0.29       0.30       0.39       0.48       1.0       0.12       0.30       0.36       0.44       1.0       1.5       1.7       1.4       1.0       1.2       1.4       2.2       0.49       1.3       1.5       1.7       1.7       1.4       1.0       1.5       1.7       1.6       0.92       1.2       1.3       1.4       1.5       2.2         ShannonPark       0.38       0.66       0.74       0.76       0.86       1.3       0.62       0.99       1.1       1.1       1.3       1.4       1.7       0.44       1.5       1.5       1.6       1.7       1.6       1.6       1.4       1.5       1.6       1.4       1.4       1.5       1.6       1.4       1.4       1.5       1.6       1.4       1.4       1.5       1.6       1.7       1.6       1.6       1.4       1.4 <td< td=""><td>DowntownWest</td><td>0.70</td><td>0.93</td><td>1.1</td><td>1.2</td><td>1.3</td><td>2.4</td><td>1.3</td><td>1.6</td><td>1.7</td><td>1.7</td><td>1.8</td><td>2.2</td><td>1.9</td><td>2.1</td><td>2.2</td><td>2.2</td><td>2.3</td><td>3.0</td></td<>	DowntownWest	0.70	0.93	1.1	1.2	1.3	2.4	1.3	1.6	1.7	1.7	1.8	2.2	1.9	2.1	2.2	2.2	2.3	3.0	
HighElev       -0.0080       0.24       0.28       0.31       0.41       0.70       0.13       0.29       0.33       0.39       0.48       1.0       0.12       0.30       0.36       0.46       0.57       1.2         Highway       0.34       0.96       1.2       1.4       2.2       0.49       1.3       1.7       1.7       4.4       1.0       1.5       1.7       2.1       1.9       7.5         Lemeta       0.49       0.79       0.88       0.36       0.76       0.86       1.3       0.62       0.99       1.1       1.1       1.3       1.5       0.94       1.3       1.5       1.5       1.7       2.1       1.4       1.5       2.2       ShannonPark       0.38       0.66       0.74       0.76       0.86       1.3       0.62       0.99       1.1       1.1       1.3       1.5       0.94       1.3       1.5       1.6       1.7       1.7       1.8       1.6       0.92       1.2       1.4       1.7       1.3       1.4       1.7       1.5       1.6       1.7       1.3       1.4       1.5       1.6       1.7       1.3       1.4       1.5       1.6       1.7       1.3 <t< td=""><td>HamiltonAcres</td><td>-0.014</td><td>0.66</td><td>0.77</td><td>0.78</td><td>0.91</td><td>1.3</td><td>0.82</td><td>1.3</td><td>1.5</td><td>1.4</td><td>1.6</td><td>1.8</td><td>1.3</td><td>1.9</td><td>2.1</td><td>2.1</td><td>2.4</td><td>2.8</td></t<>	HamiltonAcres	-0.014	0.66	0.77	0.78	0.91	1.3	0.82	1.3	1.5	1.4	1.6	1.8	1.3	1.9	2.1	2.1	2.4	2.8	
Highway       0.34       0.96       1.2       1.2       1.4       2.2       0.49       1.3       1.7       1.7       1.4       1.0       1.5       1.7       2.1       1.9       7.5         Lemeta       0.49       0.79       0.88       0.93       1.0       1.7       0.71       1.0       1.1       1.1       1.2       1.6       0.92       1.2       1.3       1.4       1.5       2.2         ShannonPark       0.38       0.66       0.74       0.62       0.99       1.1       1.1       1.1       1.3       1.5       0.94       1.3       1.5       1.5       1.7       2.2         ShannonPark       0.38       0.66       0.74       0.62       0.99       1.1       1.1       1.1       1.3       1.5       0.94       1.3       1.5       1.6       1.7       1.7       1.8       2.0         Staterville       0.59       0.77       0.93       0.94       1.0       1.9       1.1       1.3       1.4       1.4       1.5       1.6       1.7       1.7       1.8       1.4       1.5       1.6       1.7       1.7       1.3       1.4       1.4       1.4       1.5       1.	HighElev	-0.0080	0.24	0.28	0.31	0.41	0.70	0.13	0.29	0.33	0.39	0.48	1.0	0.12	0.30	0.36	0.46	0.57	1.2	
Lemeta       0.49       0.79       0.88       0.93       1.0       1.7       0.71       1.0       1.1       1.1       1.2       1.6       0.92       1.2       1.3       1.4       1.5       2.2         ShannonPark       0.38       0.66       0.74       0.76       0.86       1.3       0.62       0.99       1.1       1.1       1.3       1.5       0.94       1.5       1.5       1.5       1.7       2.0         Slaterville       0.59       0.77       0.93       0.94       1.0       1.9       1.1       1.3       1.3       1.4       1.7       1.6       1.7       1.7       1.8       2.0         Slaterville       0.59       0.77       0.93       0.94       1.0       1.9       1.1       1.3       1.3       1.4       1.7       1.5       1.6       1.7       1.7       1.8       2.0         Bentleylsland       0.45       1.0       1.2       1.4       0.98       1.2       1.4       1.4       1.5       1.6       1.4       1.4       1.5       1.5       1.5       1.6       1.7       1.3       1.4       1.4       1.5       1.6       1.4       1.4       1.5       <	Highway	0.34	0.96	1.2	1.2	1.4	2.2	0.49	1.3	1.5	1.7	1.7	4.4	1.0	1.5	1.7	2.1	1.9	7.5	
ShannonPark       0.38       0.66       0.74       0.76       0.86       1.3       0.62       0.99       1.1       1.1       1.3       1.5       0.94       1.3       1.5       1.5       1.7       2.0         Slaterville       0.59       0.77       0.93       0.94       1.0       1.9       1.1       1.3       1.3       1.4       1.7       1.5       1.6       1.7       1.7       1.8       2.0         AAE       Bentleyisland       0.45       1.0       1.2       1.4       1.8       0.98       1.2       1.4       1.4       1.5       1.7       1.3       1.4       1.5       1.6       1.7       1.8       1.5       1.6       1.7       1.8       1.5       1.6       1.7       1.8       1.5       1.6       1.7       1.3       1.4       1.5       1.6       1.7       1.3       1.4       1.5       1.6       1.7       1.3       1.4       1.4       1.5       1.6       1.4       1.5       1.6       1.4       1.5       1.6       1.7       1.3       1.4       1.4       1.5       1.6       1.6       1.6       1.7       1.3       1.4       1.4       1.5       1.6 <th< td=""><td>Lemeta</td><td>0.49</td><td>0.79</td><td>0.88</td><td>0.93</td><td>1.0</td><td>1.7</td><td>0.71</td><td>1.0</td><td>1.1</td><td>1.1</td><td>1.2</td><td>1.6</td><td>0.92</td><td>1.2</td><td>1.3</td><td>1.4</td><td>1.5</td><td>2.2</td></th<>	Lemeta	0.49	0.79	0.88	0.93	1.0	1.7	0.71	1.0	1.1	1.1	1.2	1.6	0.92	1.2	1.3	1.4	1.5	2.2	
Slaterville       0.59       0.77       0.93       0.94       1.0       1.9       1.1       1.3       1.3       1.4       1.7       1.5       1.6       1.7       1.7       1.8       2.0         AAE         Bentleyisland       0.45       1.0       1.2       1.4       1.8       0.98       1.2       1.4       1.4       1.5       1.7       1.5       1.6       1.7       1.7       1.8       2.0         DowntownEast       0.77       1.0       1.2       1.4       1.8       0.98       1.2       1.4       1.4       1.5       1.7       1.3       1.4       1.5       1.6       1.4       1.5       1.5       1.6       1.7       1.5       1.6       1.7       1.5       1.6       1.7       1.5       1.6       1.7       1.5       1.6       1.7       1.5       1.5       1.5       1.6       1.7       1.5       1.5       1.5       1.5       1.5       1.5       1.6       1.7       1.7       1.8       1.4       1.4       1.4       1.4       1.5       1.6       1.7       1.5       1.5       1.5       1.6       1.6       1.7       1.6       1.6       1.7       1.6<	ShannonPark	0.38	0.66	0.74	0.76	0.86	1.3	0.62	0.99	1.1	1.1	1.3	1.5	0.94	1.3	1.5	1.5	1.7	2.0	
AAE           BentleyIsland         0.45         1.0         1.2         1.4         1.8         0.98         1.2         1.4         1.4         1.5         1.7         1.3         1.4         1.5         1.6         1.7           DowntownEast         0.77         1.0         1.3         1.3         1.5         1.8         1.1         1.3         1.4         1.4         1.5         1.6         1.4         1.5         1.5         1.6         1.6           DowntownWest         0.70         1.0         1.2         1.4         2.0         1.1         1.3         1.4         1.4         1.5         1.6         1.4         1.4         1.5         1.5         1.5         1.6         1.7           HamiltonAcres         -0.47         1.0         1.2         1.4         2.0         1.1         1.3         1.4         1.4         1.5         1.8         1.4         1.5         1.5         1.5         1.6         1.7           HamiltonAcres         -0.47         1.0         1.2         1.4         1.2         1.3         1.3         1.5         1.8         1.4         1.5         1.5         1.5         1.6         1.7         1.0	Slaterville	0.59	0.77	0.93	0.94	1.0	1.9	1.1	1.3	1.3	1.3	1.4	1.7	1.5	1.6	1.7	1.7	1.8	2.0	
BentleyIsland         0.45         1.0         1.2         1.2         1.4         1.8         0.98         1.2         1.4         1.4         1.5         1.7         1.3         1.4         1.5         1.5         1.6         1.7           DowntownEast         0.77         1.0         1.3         1.3         1.5         1.8         1.1         1.3         1.4         1.4         1.5         1.6         1.4         1.4         1.5         1.5         1.5         1.6         1.7           DowntownWest         0.70         1.0         1.2         1.4         2.0         1.1         1.3         1.4         1.4         1.5         1.6         1.4         1.5         1.5         1.5         1.5         1.6         1.7           HamiltonAcces         -0.47         1.0         1.2         1.4         2.0         0.61         1.2         1.3         1.3         1.5         1.8         1.3         1.5         1.5         1.6         1.6         2.0           HighElev         0.023         0.58         0.76         0.76         0.98         1.7         0.16         0.62         0.86         1.1         1.9         0.11         0.66	AAE																			
DowntownEast         0.77         1.0         1.3         1.3         1.5         1.8         1.1         1.3         1.4         1.4         1.5         1.6         1.4         1.4         1.5         1.5         1.5         1.6         1.6           DowntownWest         0.70         1.0         1.2         1.2         1.4         2.0         1.1         1.3         1.4         1.4         1.5         1.6         1.4         1.5         1.5         1.5         1.6         1.7           HamiltonAcres         -0.47         1.0         1.2         1.1         1.4         2.0         0.61         1.2         1.3         1.5         1.8         1.3         1.5         1.5         1.5         1.6         1.7           HamiltonAcres         -0.47         1.0         1.2         1.4         2.0         0.61         1.2         1.3         1.3         1.5         1.8         1.5         1.5         1.5         1.6         2.1           HighPlev         0.023         0.58         0.75         0.76         0.98         1.7         1.6         0.62         0.86         1.1         1.9         0.11         0.66         0.97         0.95	BentleyIsland	0.45	1.0	1.2	1.2	1.4	1.8	0.98	1.2	1.4	1.4	1.5	1.7	1.3	1.4	1.5	1.5	1.6	1.7	
DowntownWest         0.70         1.0         1.2         1.2         1.4         2.0         1.1         1.3         1.4         1.4         1.5         1.8         1.4         1.5         1.5         1.5         1.6         1.7           HamiltonAcres         -0.47         1.0         1.2         1.1         1.4         2.0         0.61         1.2         1.3         1.3         1.5         1.6         1.5         1.5         1.5         1.6         1.7           HamiltonAcres         -0.47         1.0         1.2         1.1         1.4         2.0         0.61         1.2         1.3         1.3         1.5         1.8         1.4         1.5         1.5         1.5         1.6         1.7           HighElev         0.23         0.58         0.75         0.76         0.98         1.7         0.16         0.62         0.86         0.86         1.1         1.9         0.11         0.66         0.97         0.92         1.2         1.9           HighEway         0.52         1.1         1.2         1.4         1.4         1.5         1.6         1.6         1.7         1.4           Lemeta         0.54         1.1	DowntownEast	0.77	1.0	1.3	1.3	1.5	1.8	1.1	1.3	1.4	1.4	1.5	1.6	1.4	1.4	1.5	1.5	1.5	1.6	
HamiltonAcres       -0.47       1.0       1.2       1.1       1.4       2.0       0.61       1.2       1.3       1.5       1.8       1.3       1.5       1.5       1.5       1.6       2.0         HighElev       0.023       0.58       0.75       0.76       0.98       1.7       0.16       0.62       0.85       0.86       1.1       1.9       0.11       0.66       0.97       0.95       1.2       1.9         Higheway       0.52       1.1       1.2       1.4       2.0       0.47       1.2       1.3       1.4       3.5       0.82       1.3       1.4       1.4       1.4       1.5       4.9         Lemeta       0.54       1.1       1.3       1.4       1.4       1.5       2.2       1.4       1.6       1.6       1.7       2.0         ShannonPark       -0.093       0.80       1.1       1.3       1.8       0.52       1.2       1.3       1.4       1.8       1.2       1.4       1.5       1.6       1.6       1.7       2.0         ShannonPark       -0.093       0.80       1.1       1.3       1.8       1.2       1.4       1.4       1.4       1.5       1.6	DowntownWest	0.70	1.0	1.2	1.2	1.4	2.0	1.1	1.3	1.4	1.4	1.5	1.8	1.4	1.5	1.5	1.5	1.6	1.7	
HighElev         0.023         0.58         0.75         0.76         0.98         1.7         0.16         0.62         0.85         0.86         1.1         1.9         0.11         0.66         0.97         0.95         1.2         1.9           Highway         0.52         1.1         1.2         1.4         2.0         0.47         1.2         1.3         1.3         1.4         3.5         0.82         1.3         1.4         1.5         4.9           Lemeta         0.54         1.1         1.3         1.2         1.4         2.0         0.47         1.2         1.4         3.5         0.82         1.3         1.4         1.5         4.9           Lemeta         0.54         1.1         1.3         1.2         1.4         2.0         1.1         1.3         1.4         1.5         2.2         1.4         1.5         1.6         1.6         1.7         2.0           ShannonPark         -0.093         0.80         1.1         1.0         1.3         0.52         1.2         1.3         1.4         1.8         1.2         1.4         1.5         1.6         1.6         1.7           ShannonPark         -0.093 <td< td=""><td>HamiltonAcres</td><td>-0.47</td><td>1.0</td><td>1.2</td><td>1.1</td><td>1.4</td><td>2.0</td><td>0.61</td><td>1.2</td><td>1.3</td><td>1.3</td><td>1.5</td><td>1.8</td><td>1.3</td><td>1.5</td><td>1.5</td><td>1.5</td><td>1.6</td><td>2.0</td></td<>	HamiltonAcres	-0.47	1.0	1.2	1.1	1.4	2.0	0.61	1.2	1.3	1.3	1.5	1.8	1.3	1.5	1.5	1.5	1.6	2.0	
Highway       0.52       1.1       1.2       1.2       1.4       2.0       0.47       1.2       1.3       1.4       3.5       0.82       1.3       1.4       1.4       1.5       4.9         Lemeta       0.54       1.1       1.3       1.2       1.4       2.0       1.1       1.3       1.4       1.5       1.6       1.6       1.6       1.7       2.0         ShannonPark       -0.03       0.80       1.1       1.0       1.3       1.2       1.4       1.4       1.4       1.5       4.9         ShannonPark       -0.03       0.80       1.1       1.0       1.3       0.52       1.2       1.3       1.4       1.4       1.5       1.6       1.6       1.7       2.0         ShannonPark       -0.03       0.80       1.1       1.0       1.3       0.52       1.2       1.3       1.4       1.4       1.5       1.6       1.6       1.6       2.1         ShannonPark       -0.03       0.80       1.1       1.3       1.2       1.4       1.4       1.4       1.5       1.6       1.6       1.6       1.6       1.6       1.6       1.6       1.6       1.6       1.7	HighElev	0.023	0.58	0.75	0.76	0.98	1.7	0.16	0.62	0.85	0.86	1.1	1.9	0.11	0.66	0.97	0.95	1.2	1.9	
Lemeta         0.54         1.1         1.3         1.2         1.4         2.0         1.1         1.3         1.4         1.4         1.5         2.2         1.4         1.6         1.6         1.7         2.0           ShannonPark         -0.093         0.80         1.1         1.0         1.3         1.8         0.52         1.2         1.3         1.4         1.8         1.2         1.4         1.5         1.6         1.6         1.7         2.0           ShannonPark         -0.093         0.80         1.1         1.0         1.8         0.52         1.2         1.3         1.4         1.8         1.2         1.4         1.5         1.6         1.6         1.7         2.0           Shaterville         0.73         1.2         1.4         1.8         0.52         1.2         1.3         1.3         1.4         1.8         1.2         1.4         1.5         1.6         1.6         1.6         1.6         1.6         1.6         1.6         1.6         1.6         1.7	Highway	0.52	1.1	1.2	1.2	1.4	2.0	0.47	1.2	1.3	1.3	1.4	3.5	0.82	1.3	1.4	1.4	1.5	4.9	
ShannonPark         -0.093         0.80         1.1         1.0         1.3         1.8         0.52         1.2         1.3         1.4         1.8         1.2         1.4         1.5         1.5         1.6         2.1           Slaterville         0.73         1.2         1.4         1.8         1.2         1.4         1.4         1.5         1.6         1.6         1.6         1.7	Lemeta	0.54	1.1	1.3	1.2	1.4	2.0	1.1	1.3	1.4	1.4	1.5	2.2	1.4	1.5	1.6	1.6	1.7	2.0	
Slaterville         0.73         1.2         1.4         1.3         1.4         1.2         1.4         1.4         1.5         1.7         1.4         1.5         1.6         1.6         1.6         1.7	ShannonPark	-0.093	0.80	1.1	1.0	1.3	1.8	0.52	1.2	1.3	1.3	1.4	1.8	1.2	1.4	1.5	1.5	1.6	2.1	
	Slaterville	0.73	1.2	1.4	1.3	1.4	1.8	1.2	1.4	1.4	1.4	1.5	1.7	1.4	1.5	1.6	1.6	1.6	1.7	

 Table S2:

 Pollutant summary statistics for each pollutant (PM2.5, BC, PN) and AAE for each neighborhood



Figure S2: a.) Distribution of  $\Delta T$ , the difference in temperature measured between the top and bottom of a three-story building downtown, which serves as a measure of the presence and strength of surface-based inversion. The two inversion categories ("strong" and "weak") are created by splitting the drives into two  $\Delta T$  bins, with roughly equal numbers (n = 14 and n = 15). As expected, in January there are more drives with higher  $\Delta T$ , and in February there are more drives with lower  $\Delta T$ , but there are a mix of inversion conditions between January and February, and thus across the two portions of the mobile campaign. b.) Distribution of ground-level temperature between the two temperature inversion categories. These data indicate that it was warmer for the weak inversion drives, but still quite cold in the context of home heating needs. c.) Distribution of driving periods over time of day between the two temperature inversion categories, illustrating that the time of day coverage for each category is similar.



Figure S3: Correlation plot between  $PM_{2.5}$  and total suspended particles (TSP). The 1:1 line is dotted and black, and the linear regression line is blue and solid. Regression line slope of 0.969 indicates that roughly only 3% of the DustTrak-measured mass is in particles larger than 2.5  $\mu$ m.



Figure S4: Average SMPS volume distribution of outdoor air measured at the ALPACA House field site, filtered for mobile sampling periods. We use the analysis represented by this figure to estimate that 27% of the aerosol volume for the relevant timeframe is sub-100 nm. We fit the bi-modal aerosol distribution, and then integrate the area under the fitted curve to estimate the proportion of total volume below and above the 100 nm cut point. Extending the fit beyond the upper size cutoff of our SMPS is important, as illustrated, because it clearly misses aerosol volume above 600 nm, while the DustTrak does not.



Figure S5: Schematic of mobile sampling platform and sampling inlet. All lengths of the sampling line and instrument flow rates are shown.



Figure S6: Plots illustrating our analysis to assess our confidence in providing robust representative mean concentrations, illustrated for  $PM_{2.5}$ . a.) For an example grid cell, we calculate the cumulative mean for 100 different random orders of visits, and the associated spread (IQR) in the cumulative mean at each number of visits. b.) For all grid cells, we then calculate the IQR/mean as a function of number of visits. The same example grid cell from panel a.) is highlighted in blue, just for illustration. c.) Histogram showing the distribution of number of visits required for the IQR/mean to fall below 0.2 for all grid cells.



Figure S7: Plots illustrating our analysis to assess our confidence in distinguishing mean concentrations between the two inversion conditions at each location. a.) Calculating  $\Delta PM_{2.5}$ for a randomly chosen individual grid cell. Here we define  $\Delta PM_{2.5}$  as the difference between the lower bound of the spread of cumulative mean for the strong inversion condition and the upper bound of the spread of cumulative mean for the weak inversion condition, at 10 visits. b.) Histogram showing the distribution of  $\Delta PM_{2.5}$  values for all grid cells. Because almost all grid cells have large and positive  $\Delta PM_{2.5}$  values, we are confident in being able to distinguish between the two inversion conditions with 10 visits.



Figure S8: Maps of BC (a.) and PN (b.) for strong and weak inversion conditions. Concentration values outside of the colorscale range are given the end values of the range, for visualization purposes.