



Supplement of

Dynamics of gaseous oxidized mercury at Villum Research Station during the High Arctic summer

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Supplemental Information - Dynamics of gaseous oxidized mercury at Villum Research Station during the High Arctic summer

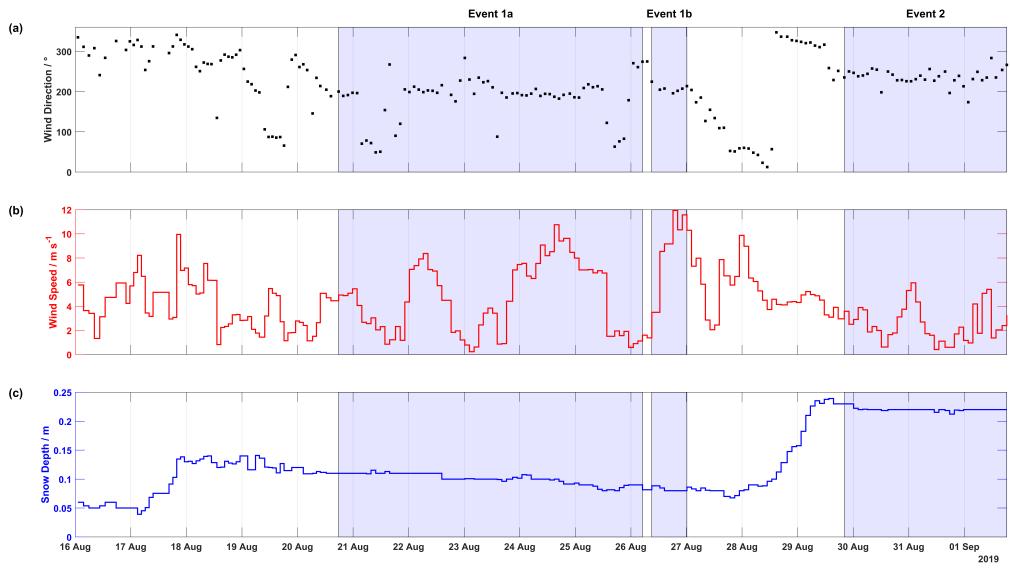


Figure. S1. Overview of meteorological parameters measured during the 2019 campaign including (a) wind direction (°) in black, (b) wind speed (m s⁻¹) in red, and (c) snow depth (m) in blue. The areas shaded in blue indicate Events 1a, 1b, and 2, respectively.

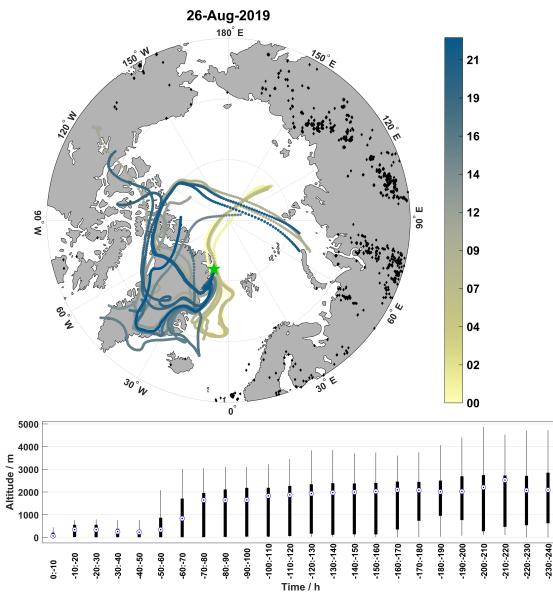


Figure. S2. Hourly air mass back-trajectories for August 26, 2019. The top panels show back-trajectories colored coded by arrival time. The bottom panels show the boxplots of the altitude (m) of each hourly back-trajectory binned in ten-hour increments. The whiskers represent the 5th and 95th percentiles, the filled boxes represent the 25th and 75th percentiles, and the circle represents the median.

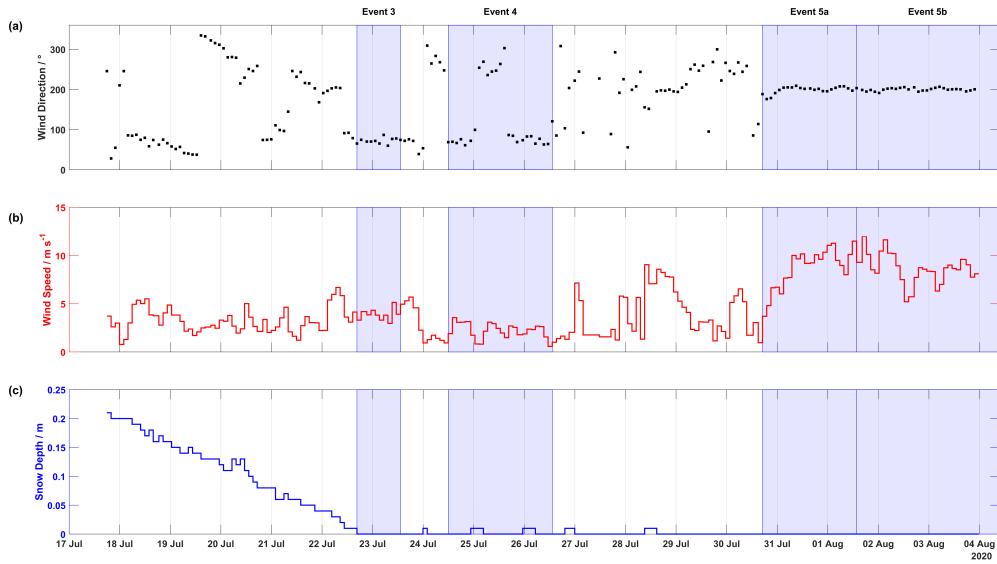


Figure. S3. Overview of meteorological parameters measured during the 2020 campaign including (a) wind direction ($^{\circ}$) in black, (b) wind speed (m s^{-1}) in red, and (c) snow depth (m) in blue. The areas shaded in blue indicate Events 3, 4, 5a, and 5b, respectively.

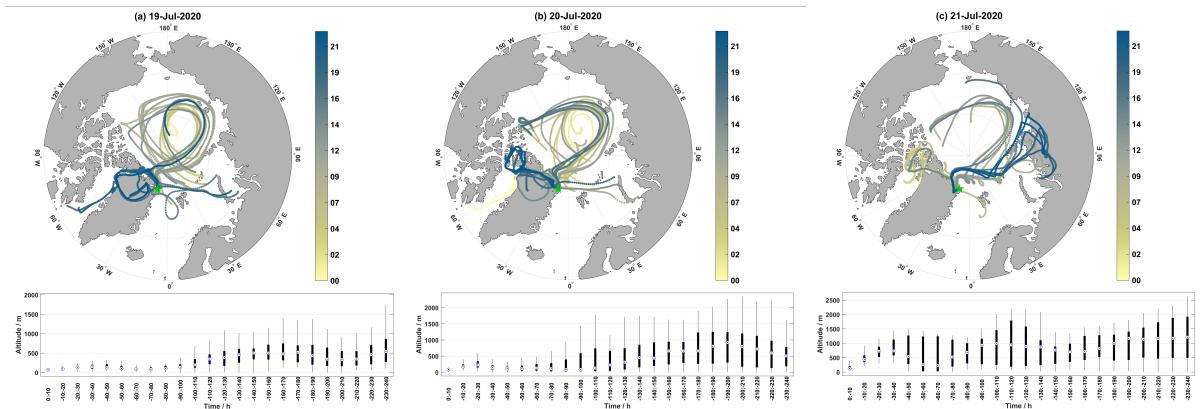


Figure. S4. Hourly air mass back-trajectories for July 19–21, 2020 (a–c). The top panels show back-trajectories colored coded by arrival time. The bottom panels show the boxplots of the altitude (m) of each hourly back-trajectory binned in ten-hour increments. The whiskers represent the 5th and 95th percentiles, the filled boxes represent the 25th and 75th percentiles, and the circle represents the median.

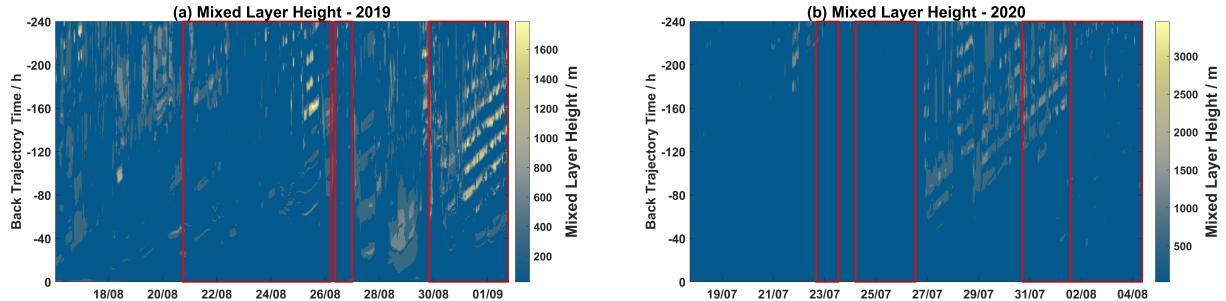


Figure. S5. Contour plots of trajectory derived meteorological parameters **(a)** H₂O mixing ratio for the 2019 campaign and **(b)** H₂O mixing ratio for the 2020 campaign. Event periods are outlined in red. The x-axis displays arrival time at Villum, the y-axis displays hours backward in time for each trajectory, and the color bar represents the meteorological parameter.

Table S1. Statistics for ground level meteorological parameters, mercury species, aerosol properties, and accumulated precipitation. The top number represents the median while the bottom number is the median absolute deviation.

	Event 1a	Event 1b	Event 2	Event 3	Event 4	Event 5a	Event 5b	2019 Non-Events	2019 Events	2020 Non-Events	2020 Events
GEM	1.49 0.09	1.38 0.04	1.47 0.02	1.71 0.13	1.76 0.09	1.54 0.02	1.51 0.05	1.56 0.08	1.48 0.04	1.95 0.32	1.56 0.06
GOM	2.69 1.24	3.97 1.59	1.65 0.62	35.13 13.98	8.78 2.38	9.10 2.43	11.33 2.21	0.00 0.00	2.18 0.87	2.02 0.83	10.28 2.89
PHg	N/A N/A	N/A N/A	N/A N/A	0.17 0.54	0.83 0.49	<LOD N/A	-1.07 0.33	N/A N/A	N/A N/A	1.43 0.49	1.14 0.34
Radiation	122.62 85.69	219.01 127.97	77.75 70.73	142.05 76.53	264.05 105.80	216.09 98.12	233.06 104.82	56.35 39.38	108.72 85.07	155.38 73.88	223.10 101.56
Ozone	35.85 4.97	42.70 0.60	31.89 2.62	26.69 0.79	25.30 1.63	30.01 1.65	31.38 0.94	30.10 2.58	34.31 4.50	24.37 2.11	29.05 2.64
H ₂ O Mixing Ratio	2.89 0.19	2.67 0.07	3.01 0.19	3.83 0.04	4.61 0.23	4.55 0.34	2.91 0.22	3.51 0.12	2.93 0.19	4.23 0.56	3.87 0.73
Acc. Precipitation	6.75 2.35	2.50 0.50	7.50 5.50	10.90 4.10	8.90 1.90	12.95 3.40	11.15 2.90	8.98 6.02	6.60 3.30	14.65 6.15	11.15 3.05
BC	7.30 4.94	16.44 1.32	3.80 0.59	9.43 0.87	10.12 1.20	4.07 0.63	2.00 0.47	1.22 1.06	4.73 2.79	2.58 2.33	4.23 2.54
N _{Coarse}	3.92 2.82	7.19 0.95	1.99 0.13	2.13 0.45	2.50 0.47	0.77 0.18	0.58 0.04	0.46 0.34	2.26 1.42	0.61 0.47	0.91 0.39
Temperature	2.16 0.83	2.19 0.13	0.34 1.11	3.61 0.62	8.26 1.50	10.81 1.27	10.45 1.16	-0.09 0.43	1.68 1.23	3.78 3.28	9.58 1.72
RH	62.96 5.33	62.98 4.73	76.91 7.82	80.10 2.20	71.35 4.28	52.35 3.79	37.30 4.65	95.70 1.82	67.83 8.53	85.55 9.20	52.87 14.59
Wind Speed	4.46 2.58	10.30 1.28	2.27 1.01	3.85 0.48	2.32 0.58	9.30 1.05	8.63 0.77	4.42 1.43	3.43 2.02	3.04 1.09	6.70 2.98

Table S2. Statistics for trajectory derived meteorological parameters and altitude. The top number represents the median while the bottom number is the median absolute deviation. For the percent above the mixed layer, and percent in cloud, the units are percentage of time.

	Event 1a	Event 1b	Event 2	Event 3	Event 4	Event 5a	Event 5b	2019 Non-Events	2019 Events	2020 Non-Events	2020 Events
Temperature	-1.85 3.00	-6.35 6.00	-1.05 4.70	1.05 2.50	0.15 3.10	4.15 4.00	-5.15 9.20	-1.75 2.30	-1.95 3.80	1.95 2.60	0.65 4.20
RH	82.00 14.00	70.60 17.30	74.60 15.50	95.60 3.50	89.60 9.00	84.40 10.50	71.90 20.50	89.20 7.90	78.80 15.50	87.70 10.20	83.50 13.80
Radiation	107.70 66.40	121.15 93.50	84.20 72.60	145.90 67.65	185.40 89.40	142.90 103.60	189.00 133.00	106.5 63.1	102 70.4	169.40 95.20	170.90 103.30
Altitude	941.70 523.50	1986.25 781.85	1162.80 734.70	831.20 355.15	1145.70 575.80	855.80 382.40	2098.25 1030.50	652.00 598.20	1048.30 635.80	539.80 418.40	1251.20 647.30
H ₂ O Mixing Ratio	3.00 0.80	1.90 0.70	3.00 0.80	3.90 0.70	3.30 0.40	4.90 0.90	2.00 1.40	3.20 0.50	2.90 0.80	4.00 0.70	3.40 1.00
% above Mixed Layer	90.72	93.80	89.47	96.70	98.71	83.59	97.00	70.49	90.54	79.59	94.32
% in cloud	22.67	11.67	14.28	52.58	38.32	20.37	14.68	29.61	19.15	32.59	27.37