

**Table S1.** Summary of the 21 Arctic aerosol layers observed by CALIOP during the October 20-27 export event. Refer to Table 1 for the legend.

Date	Location of endpoints (Latitude; Longitude)	CALIOP				GEOS-Chem		
		Length (km)	Mean Altitude (km)	IVDR	Color Ratio	AOD (plume   col. <sup>(b)</sup> )	AOD w/o TH (plume   col. <sup>(b)</sup> )	AOD w/ TH (plume   col. <sup>(b)</sup> )
10-20 14.51 N	59.4°N;174.9°E   64.2°N;178.5°E	560	3.0	0.030	0.29	0.07   0.07	0.03 0.06	0.00 0.00
10-20 16.30 N	64.5°N;154.0°E   66.9°N;156.3°E	280	2.9	0.021	0.24	-- <sup>(c)</sup>	-- <sup>(c)</sup>	-- <sup>(c)</sup>
10-20 18.09 N	70.9°N;136.8°E   76.0°N;147.9°E	660	5.1	0.031	0.28	0.09   0.09	0.05 0.07	0.02 0.02
10-20 23.52 D	62.0°N;179.2°W   69.1°N;173.9°E	840	3.5	0.029	0.34	0.07   0.07	0.02 0.05	0.00 0.00
10-21 17.13 N	70.6°N;150.2°E   73.8°N;155.9°E	400	5.1	0.032	0.28	0.03 0.03	0.02 0.05	0.00 0.00
10-21 18.52 N	72.1°N;127.8°E   78.6°N;147.6°E	900	5.2	0.026	0.26	0.08 0.08	0.05 0.06	0.01 0.01
10-22 00.35 D	67.0°N;165.5°E   74.1°N;154.4°E	880	4.7	0.029	0.34	0.05 0.05	0.02 0.04	0.00 0.00
10-22 02.14 D	72.9°N;132.3°E   75.3°N;126.6°E	320	3.8	0.029	0.30	0.02 0.02	0.02 0.05	0.00 0.00
10-22 16.17 N	64.1°N;156.7°E   69.6°N;162.7°E	660	2.7	0.023	0.23	0.02 0.02	0.02 0.03	0.00 0.00
10-22 17.56 N	74.8°N;147.5°E   77.7°N;156.9°E	400	5.2	0.028	0.23	0.03 0.03	0.02 0.04	0.00 0.00
10-22 19.35 N	73.5°N;119.9°E   79.2°N;139.8°E	800	4.3	0.030	0.25	0.03 0.03	0.03 0.05	0.00 0.00
10-22 21.14 N	80.8°N;129.1°E   81.6°N;172.5°E	720	4.7	0.031	0.27	0.06 0.06	0.03 0.05	0.00 0.00
10-23 01.18 D	76.1°N;138.2°E   78.6°N;128.2°E	360	4.2	0.025	0.31	0.02 0.02	0.01 0.06	0.00 0.01
10-23 20.18 N	78.5°N;125.2°E   81.8°N;169.4°E	880	4.2	0.028	0.25	0.01 0.01	0.04 0.05	0.00 0.00
10-23 21.57 N	81.4°N;164.6°E   81.7°N;134.7°E	480	4.6	0.030	0.24	0.02 0.03	0.03 0.05	0.00 0.00
10-25 13.30 N	79.4°N;127.2°W   81.2°N; 64.4°W	1120	2.9	0.036	0.25	0.04 0.04	0.01 0.03	0.00 0.00
10-26 10.56 N	74.2°N;109.0°W   81.7°N; 58.2°W	1360	2.7	0.027	0.19	0.01 0.01	0.01 0.02	0.00 0.00
10-26 12.34 N	77.7°N;122.7°W   81.8°N; 77.6°W	960	3.4	0.032	0.26	0.01 0.01	0.01 0.03	0.00 0.00
10-26 16.38 D	76.2°N; 92.1°W   80.2°N;112.9°W	640	2.9	0.030	0.34	0.02 0.02	0.01 0.03	0.00 0.00
10-27 17.22 D	61.4°N;81.4°W   73.4°N;95.8°W	1440	2.2	0.042	0.31	0.06 0.06	0.01 0.03	0.00 0.00
10-27 19.01 D	73.4°N;120.5°W   78.5°N;137.3°W	720	2.4	0.031	0.22	0.04 0.04	0.01 0.04	0.00 0.00
Mean <sup>(a)</sup>	--	730 <sup>(a)</sup>	3.8 <sup>(a)</sup>	0.030±0.004 <sup>(a)</sup>	0.27±0.04 <sup>(a)</sup>	0.041 0.041 <sup>(a)</sup>	0.022 0.042 <sup>(a)</sup>	0.002 0.002 <sup>(a)</sup>

- (a) All mean aerosol properties given in the chart are weighted by the length of the cross-section.  
(b) Column values are intended from 2-10 km, since low clouds obscure the surface during most scenes.  
(c) Values are not given because the aerosol layer is completely overcast by clouds.