

Supplementary of

A new method to determine the aerosol optical properties from multiple wavelength O₄ absorptions by MAX-DOAS observation

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30 **Table S1. Discussion of break points based on σ_{sca}**

Date	Breakpoint	v_{sca}	a_{sca}	a'_{sca}
2016/11/01	09:00	-113.22	-2076.08	-28172.69
	12:00	-45.88	841.84	36474.01
	14:00	251.89	2836.27	31514.06
	16:00	-200.00	-5648.61	-106060.96
2016/11/02	10:00	-3.25	2459.38	101349.83
	16:00	5.33	95.37	-26266.72
2016/11/03	12:00	11.67	-1012.04	-24508.74
	14:00	469.75	5841.20	73018.74
2016/11/04	11:00	35.89	-4820.68	-118465.30
	14:00	-12.88	-609.55	52639.13
	16:00	233.25	3003.13	37469.62
2016/11/05	10:00	-138.25	-4643.75	-95585.94
	12:00	16.33	1717.59	70681.58
2016/11/06	10:00	24.50	102.08	-20193.87
	12:00	27.00	-1148.61	-30649.40
	16:00	-224.50	-2718.75	-28671.88
2016/11/07	09:00	-65.33	1768.52	49858.54
2016/11/08	09:00	247.00	3015.63	26588.54
	11:00	60.67	-2070.37	-56511.06
	14:00	138.25	1753.13	21601.56
2016/11/09	10:00	-124.67	-2921.30	-51938.01
2016/11/10	11:00	-9.63	1438.02	54491.46
	14:00	-52.89	1333.18	22417.27
2016/11/11	12:00	166.75	2400.00	33650.17
	14:00	-189.33	-3956.48	-70627.57
	15:00	-34.38	1936.98	73668.26
2016/11/12	09:00	-9.25	314.06	-20286.46
	12:00	208.75	2770.31	35963.54
	14:00	-192.67	-4460.19	-80338.86
2016/11/13	09:00	-15.25	2217.71	83473.67
	10:00	-10.00	65.63	-26901.04
2016/11/14	09:00	338.38	4449.13	64797.21
	13:00	-31.25	-4620.31	-113368.06
	15:00	9.11	448.46	56319.66
2016/11/15	10:00	-944.22	-10617.75	-118634.69
	12:00	1064.38	25107.47	446565.15
	15:00	-6.88	-13390.63	-481226.13
2016/11/16	11:00	-6.22	7.25	148865.31
	13:00	-139.89	-2458.49	-38427.64
2016/11/17	13:00	-109.38	381.42	35498.89
	14:00	15.56	2127.01	32869.51
2016/11/18	10:00	53.75	477.43	-20619.70
2016/11/19	10:00	-121.50	-3965.97	-72686.15

	12:00	-69.00	687.50	20243.06
	13:00	-149.25	-2110.94	-40234.38
	15:00	-141.78	83.02	24377.36
2016/11/20	09:00	-4.50	1300.00	26883.68
2016/11/21	09:00	28.00	-1298.61	-25331.79
	11:00	-17.67	1073.15	20691.23
	12:00	-22.13	1034.55	24235.87
2016/11/23	10:00	157.50	1959.38	23697.92
	12:00	60.56	-1077.16	-33739.28
	15:00	39.50	1345.14	25406.06
	16:00	18.13	-267.19	-20154.08
2016/11/24	09:00	31.38	-1387.50	-33513.45
2016/11/25	10:00	244.38	2992.19	33999.57
	12:00	5.78	-2651.08	-62702.97
	13:00	7.25	18.40	33368.54
	15:00	84.56	3935.34	70635.72
2016/11/26	12:00	-23.25	-1347.57	-66036.36
	14:00	-170.50	-2007.81	-24943.58
2016/11/27	10:00	-6.22	1825.31	42590.23
	12:00	-23.00	788.89	20918.21
	16:00	-37.33	728.24	21754.76
2016/12/05	09:00	-53.25	-4481.25	-84058.16
	11:00	-57.44	-46.60	49273.83
	13:00	188.63	2240.63	28174.91
2016/12/06	10:00	35.67	-1699.54	-43779.58
	12:00	796.00	9351.39	108539.74
	15:00	204.88	-7389.06	-209255.64
2016/12/07	10:00	154.11	-564.04	75833.55
	15:00	50.63	1598.44	20852.86
2016/12/08	11:00	-15.89	-739.04	-25972.01
	12:00	5.63	-1411.63	-22097.56
	15:00	-6.00	-2081.94	-29608.41
2016/12/10	10:00	-5.50	6.25	26102.43
	13:00	48.89	-819.29	-25127.53
	15:00	54.44	-1581.17	-31700.53
2016/12/11	10:00	-33.13	1348.44	32706.16
	14:00	-142.25	604.69	29583.33
2016/12/17	11:00	812.88	10113.64	126417.88
	14:00	-30.56	-9371.45	-216501.02
	15:00	-26.00	56.94	117854.94
2016/12/18	12:00	21.33	1373.15	29146.09
	13:00	45.00	-931.25	-28819.44
	15:00	455.13	5102.95	58767.60
2016/12/19	11:00	-12.89	-33.49	26850.14

	14:00	25.00	1231.94	24191.74
	15:00	-9.38	-1620.31	-36994.36
2016/12/20	13:00	17.11	294.29	21273.36
	15:00	-39.78	741.36	22612.31
2016/12/21	11:00	8.88	1195.31	26499.57
2016/12/22	10:00	46.38	2667.19	41325.95
	12:00	48.75	29.69	-32968.75
	15:00	31.13	918.23	23104.02
2016/12/23	10:00	-74.38	-1942.19	-36048.18
	12:00	5.63	1000.00	36777.34
2016/12/24	10:00	171.38	2067.19	29572.48
	12:00	-17.25	-2357.81	-55312.50
2016/12/30	09:00	17.67	387.96	30508.62
	10:00	27.13	-1229.69	-26265.19
	16:00	-143.50	-1822.92	-21617.48
2016/12/31	12:00	19.75	2040.63	48294.27
2017/01/01	11:00	-35.67	-615.74	-29515.17
2017/01/02	09:00	-276.50	-3384.38	-46979.17
	10:00	102.22	4208.02	84360.00
	12:00	25.50	-959.03	-64588.16
	15:00	-31.50	-2521.88	-47673.61
2017/01/03	09:00	-8.11	259.88	30908.35
	13:00	27.50	-1125.69	-20762.92
	15:00	-263.13	-4725.17	-73129.10
2017/01/04	11:00	-66.00	2464.06	89865.45
	16:00	239.63	2785.59	34173.66
2017/01/05	11:00	59.50	-2251.56	-62964.41
	14:00	-794.56	-9489.51	-80421.60
2017/01/06	09:00	-3052.13	-28219.62	-234126.40
	11:00	1424.25	55954.69	1052178.82
	14:00	2286.56	9581.17	-515261.27
2017/01/07	11:00	-36.00	-29031.94	-482663.97
2017/01/08	10:00	-15.50	256.25	366102.43
	12:00	205.89	2154.32	27200.79
	13:00	75.25	-1632.99	-47341.34
	15:00	13.11	-1868.21	-35410.67
2017/01/09	13:00	3.38	-121.70	21831.36
	15:00	80.50	1760.94	27539.06
2017/01/11	09:00	31.56	-543.83	-25608.50
	10:00	-125.75	-3064.93	-54310.86
	12:00	-31.38	4570.31	67771.27
2017/01/12	10:00	105.63	1712.50	-35722.66
	12:00	-158.88	-1903.99	-21708.86
	15:00	-23.75	1689.06	44913.19

2017/01/14	09:00	-18.13	1330.38	31759.02
2017/01/15	09:00	-82.25	-1462.85	-23063.75
	11:00	-20.88	767.19	27875.43
	14:00	-12.50	-656.25	-26831.60
2017/01/16	09:00	42.13	1640.63	21516.93
	11:00	10.56	-350.77	-22126.63
	14:00	219.88	2616.49	37090.81
2017/01/17	09:00	-137.63	-4468.75	-88565.54
	14:00	-5.33	1469.91	65985.08
2017/01/18	11:00	52.13	723.44	24229.60
	14:00	6.13	-2284.38	-45305.99
	16:00	-529.89	-5955.71	-40792.61
2017/01/19	10:00	-349.25	2257.99	102671.20
	12:00	-277.89	-1073.77	-35264.06
	16:00	-86.00	2398.61	43404.71
2017/01/20	10:00	-85.00	12.50	-29826.39
	12:00	-292.56	-2306.17	-25763.03
	15:00	-98.50	2425.69	59148.34
2017/01/21	10:00	-41.13	717.19	-21356.34
	12:00	-220.75	-2500.00	-30056.42
	15:00	-139.78	899.69	37774.35
2017/01/22	11:00	-464.00	-4052.78	-61905.86
	16:00	-593.25	-1615.63	30464.41
2017/01/23	11:00	-333.11	2890.43	50067.30
	14:00	-870.63	-6718.92	-120116.95
	16:00	-716.63	1925.00	108049.05
2017/01/24	11:00	-117.56	6656.33	52570.30
	14:00	-50.13	842.88	-72668.07
2017/01/25	11:00	-173.75	-1806.25	-20629.34
2017/01/26	11:00	-83.33	1004.63	31232.00
	14:00	-135.25	-648.96	-20669.85
	16:00	-215.78	678.86	27213.01
2017/01/27	10:00	-63.88	571.01	20825.86
	13:00	-56.63	714.06	21161.02
	15:00	10.38	581.08	20386.53
	16:00	199.67	2154.63	24582.69
2017/01/28	11:00	2796.38	32458.85	378802.81
	13:00	1290.25	-18826.56	-641067.71
2017/01/29	09:00	506.44	-8708.95	112417.91
	11:00	159.13	-4341.49	54593.22
	14:00	149.00	-126.56	52686.63
2017/01/31	13:00	-930.38	-11457.81	-140588.11
	15:00	-2374.11	-16041.51	-50930.00
2017/02/01	16:00	-1244.63	14118.58	377001.11

2017/02/02	11:00	-1079.00	2070.31	-150603.30
	14:00	-471.78	6746.91	51962.23
2017/02/03	10:00	-239.63	2901.91	-48062.55
	11:00	-138.88	1259.38	-20531.68
	13:00	1431.00	17842.75	223004.05
	15:00	56.44	-15272.84	-367951.05
2017/02/04	10:00	88.38	399.13	195899.64
2017/02/07	10:00	25.67	-993.98	-24863.68
	12:00	-253.88	-2596.88	-21243.49
	13:00	-143.67	1224.54	42460.13
	15:00	202.50	2732.81	31436.63
2017/02/08	13:00	100.22	-1136.42	-42991.47
	15:00	-64.50	1193.75	34782.99
2017/02/11	10:00	-43.25	-2039.06	-37656.25
	12:00	-5.11	423.77	27364.75
	13:00	230.00	2148.61	21998.46
	15:00	252.38	279.69	-23361.55
2017/02/12	10:00	31.78	-3048.30	-41335.31
	12:00	26.75	-62.85	37318.19
	13:00	12.25	-2205.21	-47345.20
	15:00	53.38	514.06	33990.89
2017/02/13	11:00	115.88	-958.51	-31311.97
	14:00	203.50	2022.92	31426.50
2017/02/14	09:00	105.50	-1225.00	-40598.96
	14:00	390.25	4260.07	61036.36
2017/02/15	11:00	88.88	-3767.19	-100340.71
2017/02/16	09:00	206.44	1306.33	56372.39
	11:00	71.25	-1679.69	-20868.06
	14:00	185.00	1743.06	25356.87
2017/02/17	11:00	30.25	-1934.38	-45967.88
2017/02/18	10:00	20.78	-105.25	20323.65
	12:00	-76.44	1357.56	34806.24
	16:00	-232.00	-2292.19	-32999.13
2017/02/19	09:00	-100.38	2682.81	45062.93
	10:00	-37.50	785.94	-23710.94
	12:00	246.00	2719.44	35268.13
2017/02/21	09:00	164.75	-1015.63	32688.37
	12:00	-539.88	-6135.94	-85501.30
2017/02/22	09:00	39.88	0.00	-29199.22
	12:00	241.75	3262.15	29748.75
	16:00	-1115.38	-12094.97	-131513.07