Atmospheric
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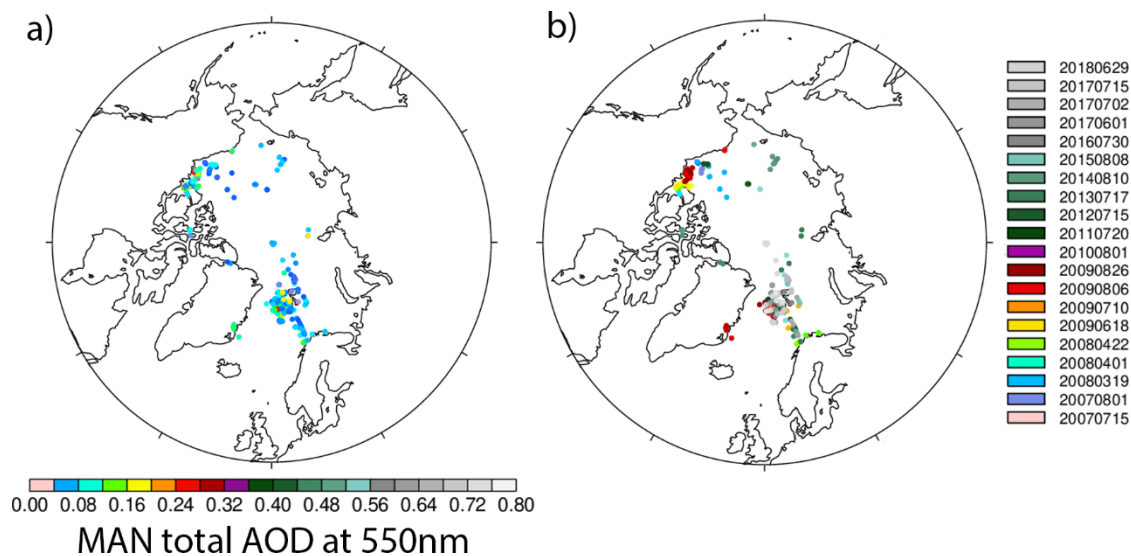
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EGU

Supplement of

Arctic spring and summertime aerosol optical depth baseline from long-term observations and model reanalyses – Part 2: Statistics of extreme AOD events, and implications for the impact of regional biomass burning processes

Peng Xian et al.

Correspondence to: Peng Xian (peng.xian@nrlmry.navy.mil)

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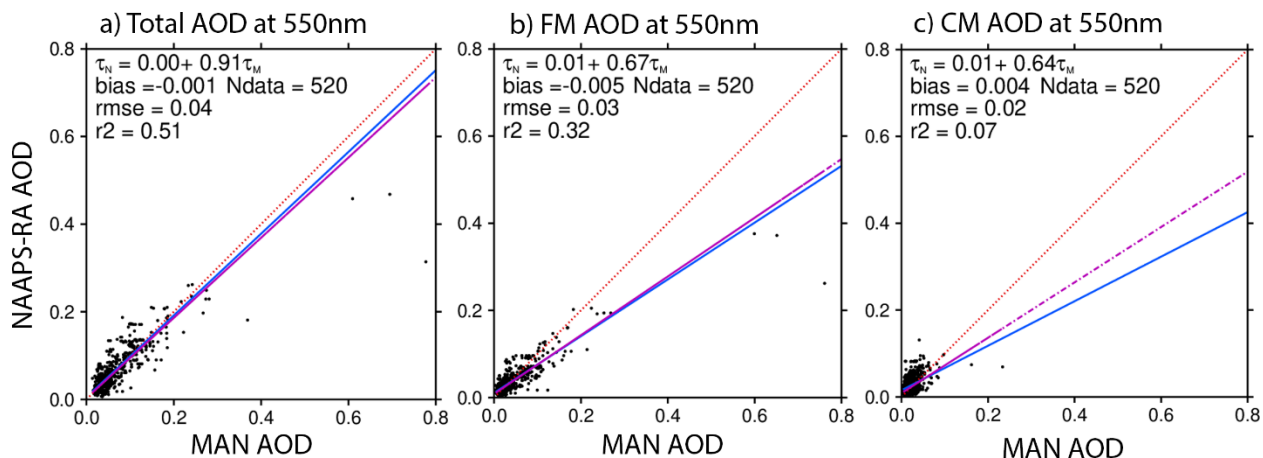0.00 0.08 0.16 0.24 0.32 0.40 0.48 0.56 0.64 0.72 0.80

2   MAN total AOD at 550nm

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4   **Figure S1.** MAN a) total AOD at 550nm for measurements collected north of 70°N and between
5   2003-2019, and b) measurement date in the format of year-month-date. 6-hrly AOD data is used.
6   The figure is the same as Fig. S1 in Part 1.

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10   **Figure S2.** Pairwise comparison of the NAAPS-RA 6-hrly AOD and MAN AOD with respect to
11   total (left), fine (middle) and coarse (right) modes at 550 nm for north of 70°N for 2003–2019.
12   The solid magenta line represents a Theil–Sen linear regression and the corresponding equation
13   is shown, where τ_N is the NAAPS-RA AOD and τ_M is the MAN AOD. The solid blue line is a
14   least-squares linear regression and the corresponding equation is not shown. Also shown are the
15   bias, root mean square error (rmse), coefficient of determination (r^2), total number of 6-hrly
16   MAN data (Ndata).

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Table S1. Occurrence statistics of high-Arctic daily area-mean (>70˚N) BB smoke AOD extreme event. These are defined as days with smoke AOD > smoke AOD_{95} (~0.06) based on 2003-2019 NAAPS-RA data. Years without an extreme smoke event are omitted but are counted in the period average calculation. Cumulative extreme AOD is calculated as the sum of extreme BB smoke AOD.

year	APR	MAY	JUN	JUL	AUG	Annual total	max smoke AOD	cumulative extreme AOD
	Extreme BB smoke days							
2003	0	9	16	0	0	25	0.14	2.4
2004	0	0	0	12	0	12	0.10	0.95
2006	0	0	0	4	0	4	0.16	0.49
2008	4	11	0	0	0	15	0.08	1.04
2009	0	0	0	0	5	5	0.07	0.32
2003-2009 ave	0.6	2.9	2.3	2.3	0.7	8.7	0.08	0.74
2010	0	0	1	0	2	3	0.09	0.22
2012	0	0	0	3	0	3	0.08	0.22
2014	0	0	0	1	2	3	0.07	0.2
2015	0	0	2	17	0	19	0.11	1.51
2016	0	4	0	0	0	4	0.08	0.29
2017	0	0	0	0	13	13	0.17	1.27
2019	0	0	0	7	25	32	0.31	3.75
2010-2019 ave	0	0.4	0.3	2.8	4.2	7.7	0.09	0.75