Atmospheric
Chemistry
and Physics

Supplement of

An emerging aerosol climatology via remote sensing over Metro Manila, the Philippines

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1　Table S1: Median aerosol properties associated with the AERONET volume size distribution (VSD) data for the total, fine, and coarse
2　fractions from January 2009 to October 2018. The time frames indicate the data included in the summary statistics, where ALL means
3　all the 1419 data points with VSD data. DJF, MAM, JJA, and SON indicate the summary statistics for specific consecutive months for
4　all the years (where DJF is December, January, and February). AM and PM are the summary statistics for data collected during the
5　morning (AM) or afternoon (PM) local times for the entire period. The volume concentration (C_v) has units of $\mu m^3\,\mu m^{-2}$. The
6　following parameters have units of μm: radius at peak volume concentration (r_{peak}), effective radius (r_{eff}), volume mean radius (r_v), and
7　standard deviation (σ).

| Time Frame	AOD	C_v	FMF	Fine						Coarse					
				AOD	C_v	r_{peak}	r_{eff}	r_v	σ	AOD	C_v	r_{peak}	r_{eff}	r_v	σ
ALL	0.1674	0.0610	0.6514	0.1086	0.0220	0.1482	0.1450	0.1630	0.4890	0.0524	0.0360	3.8575	1.9690	2.6410	0.7330
DJF	0.1507	0.0590	0.6215	0.0907	0.0190	0.1482	0.1475	0.1640	0.4960	0.0557	0.0390	3.8575	2.0410	2.7300	0.7335
MAM	0.1791	0.0630	0.6774	0.1240	0.0235	0.1482	0.1430	0.1600	0.4820	0.0522	0.0360	3.8575	1.9435	2.5995	0.7330
JJA	0.1708	0.0520	0.7700	0.1400	0.0310	0.1482	0.1460	0.1670	0.5080	0.0360	0.0220	2.9400	2.1680	2.7520	0.6670
SON	0.1479	0.0575	0.5733	0.0869	0.0170	0.1482	0.1480	0.1665	0.5035	0.0570	0.0370	2.9400	1.9290	2.5640	0.7505
AM	0.1654	0.0600	0.6443	0.1067	0.0210	0.1482	0.1460	0.1640	0.4950	0.0518	0.0350	3.8575	1.9494	2.5925	0.7360
PM	0.1850	0.0575	0.6847	0.1264	0.0260	0.1482	0.1410	0.1550	0.4590	0.0555	0.0390	3.8575	2.2070	2.8850	0.7190

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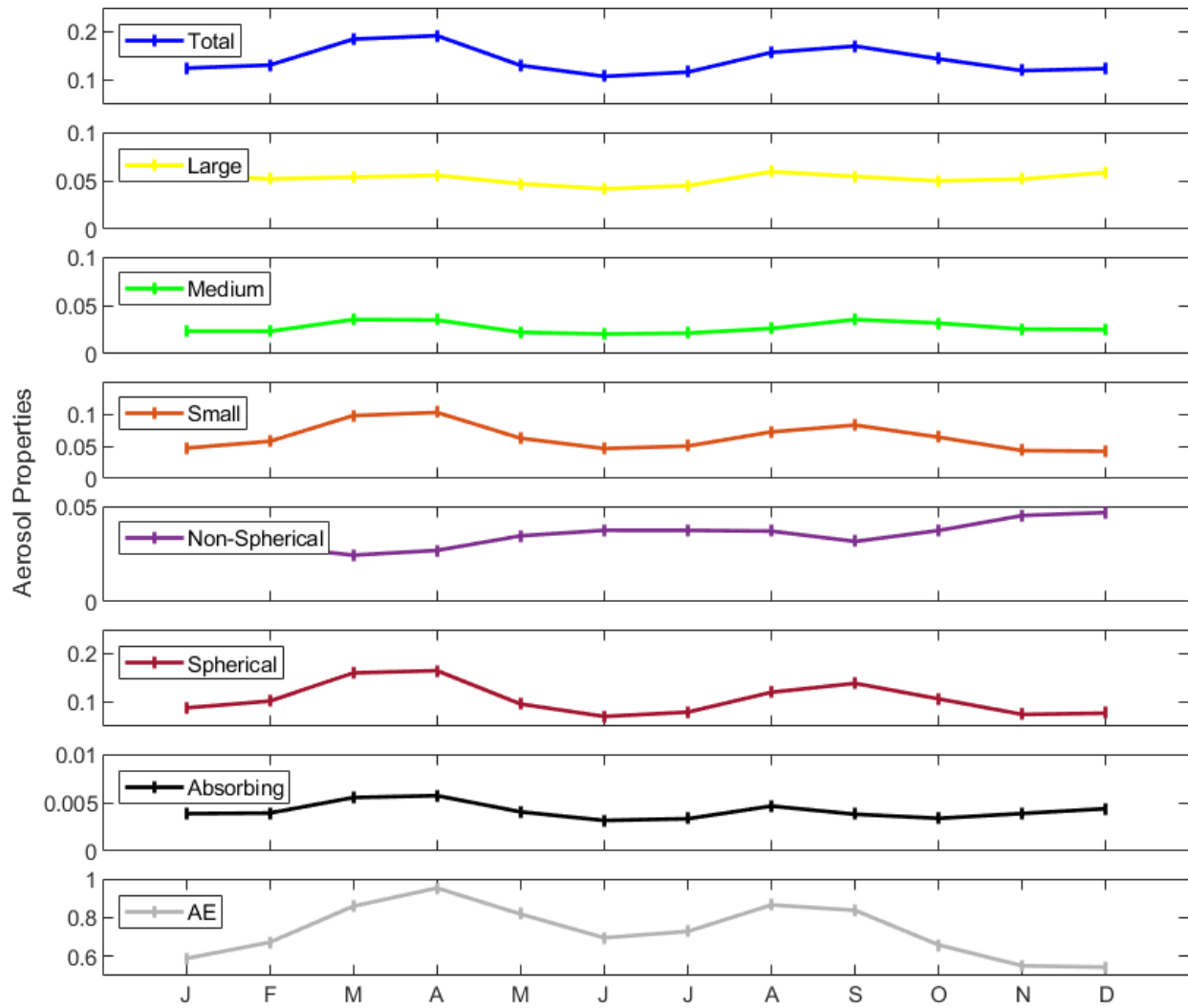
Figure S1: MISR monthly mean time series of 550 nm AOD (total, large (particle radii > 0.7 µm), medium (particle radii from 0.35 to 0.7 µm), small (particle radii < 0.35 µm), non-spherical spherical, and absorption optical depth) and angstrom exponent (AE) for March 2000 to December 2020 for 116.5°E - 128.5°E; 6.5°N - 22.5°N.

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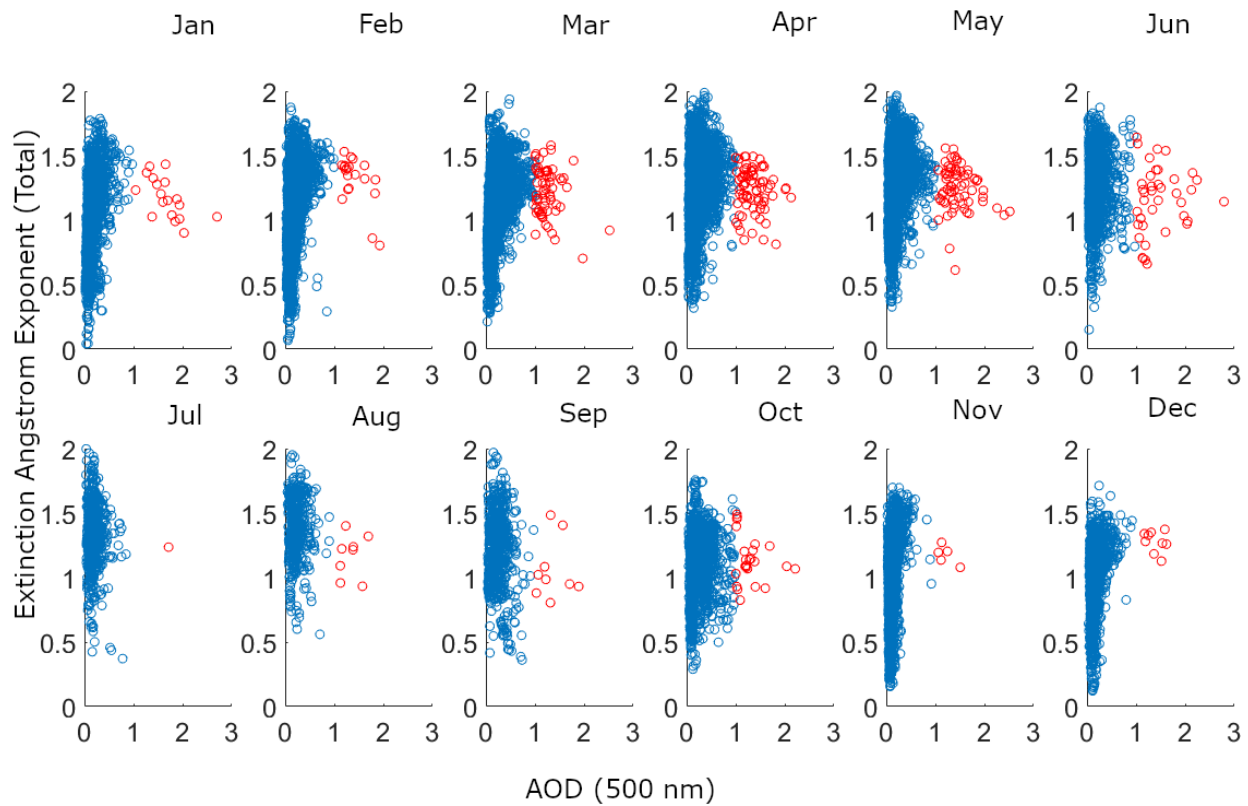
Figure S2: Scatterplots of total extinction angstrom exponent (EAE) versus AOD (500 nm). The red circles indicate when AOD exceeded 1.
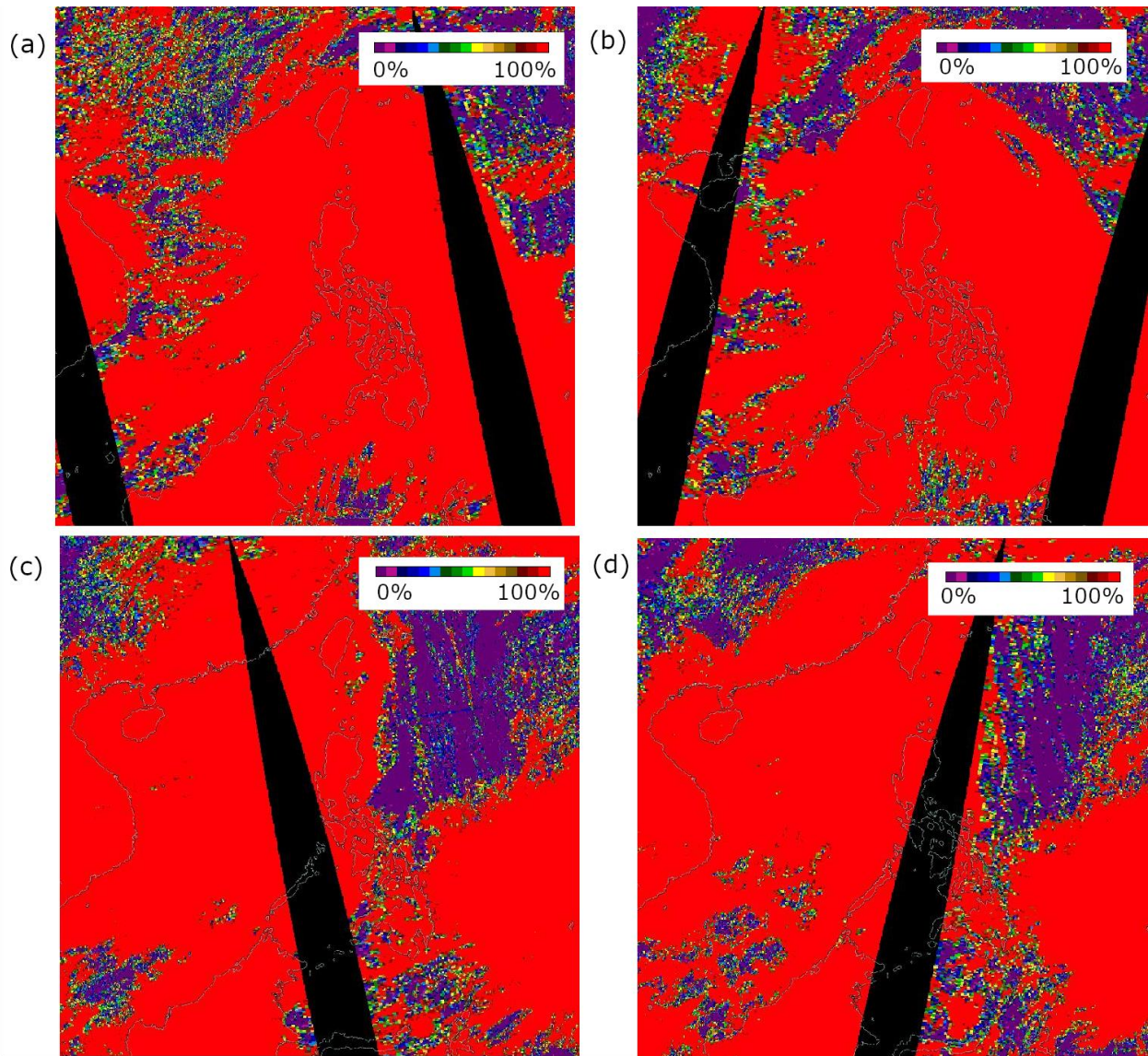
Figure S3: Cloud fraction images from (a/c) Aqua / MODIS and (b/d) Terra / MODIS satellite products. These are day-time snapshots during the back-trajectory periods: (a/b) 24 August 2009 at 00:00 UTC and (c/d) 25 August 2009 at 00:00 UTC. Red areas in panels show where there is 100% cloud fraction.
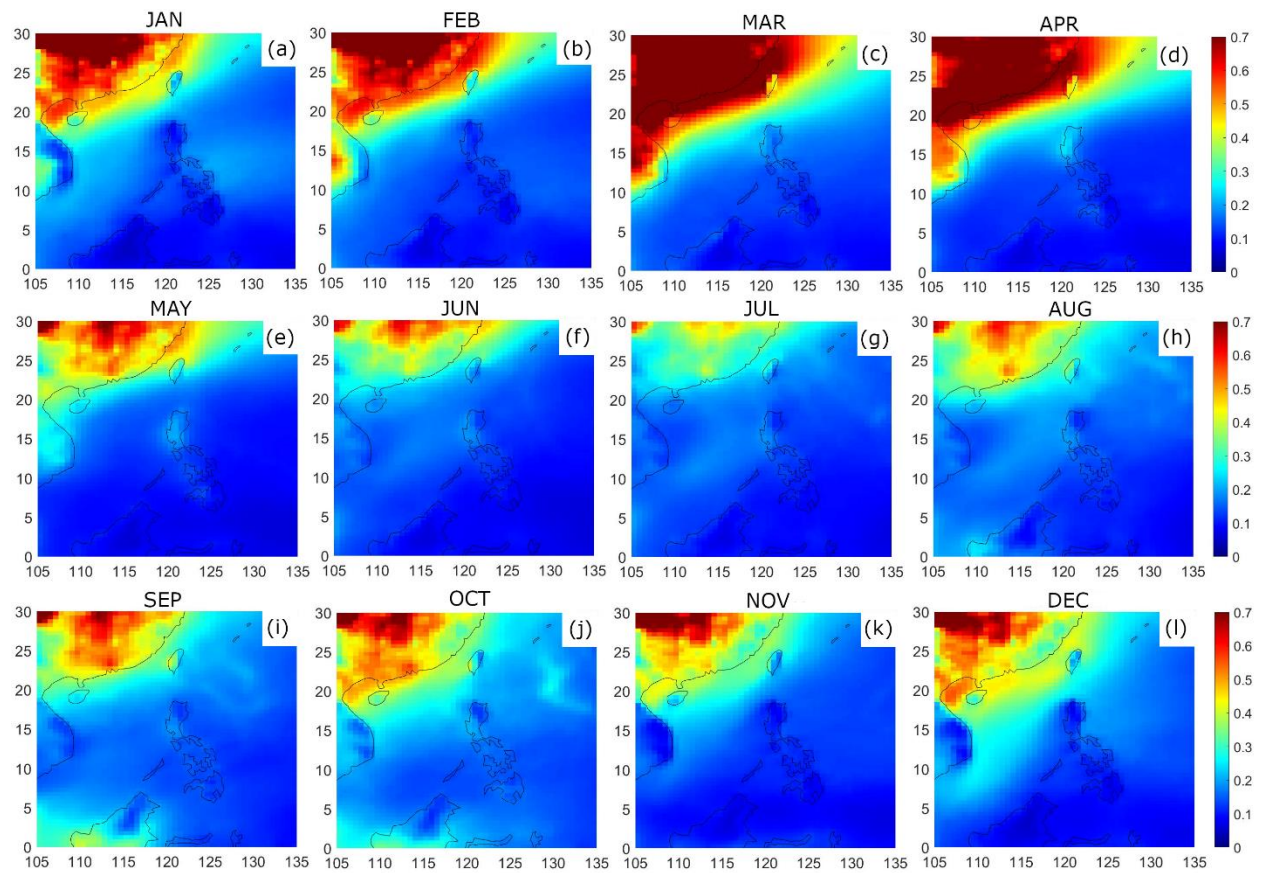
Figure S4: Monthly mean MERRA-2 AOD (extinction at 550 nm) from 2009 to 2018 in Southeast Asia.

Standardized PCs in U matrix
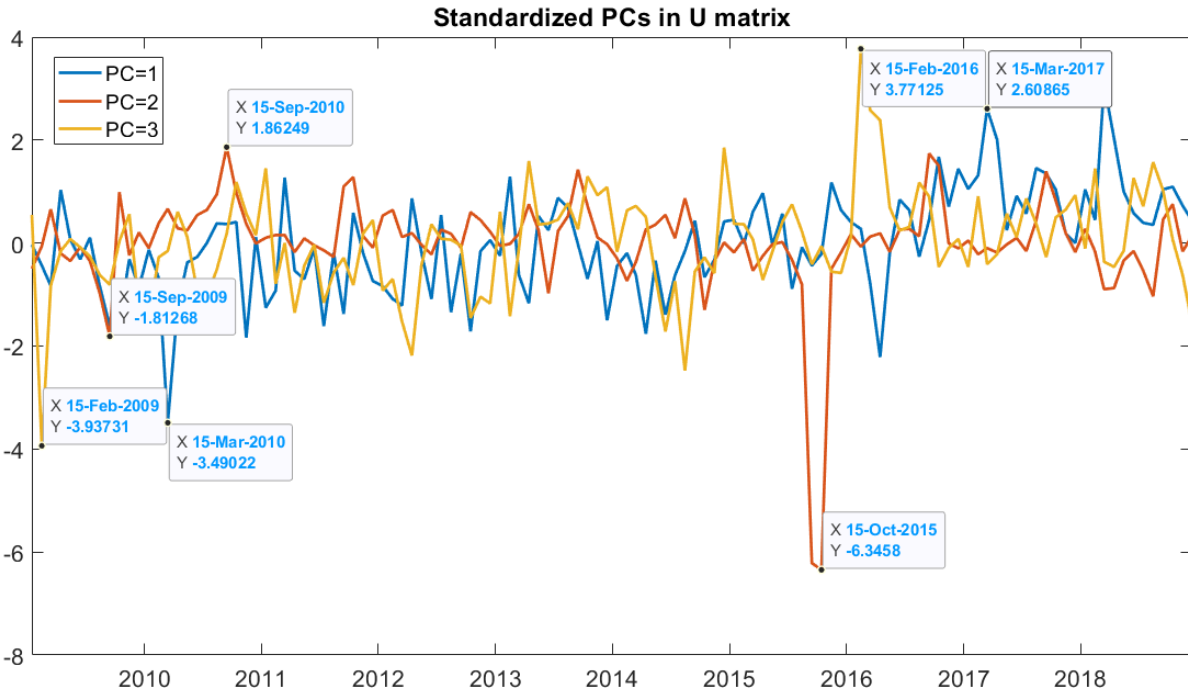
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27 **Figure S5:** Time series of standardized principal components. Maximum and minimum values
28 per principal component are annotated with the month of occurrence.