Table S1: (a) Aircraft, ground and satellite based instruments, the aerosol properties used from these instruments and their availability on the two case study days.

Instrument	Property	6-Mar	15-Mar
AATS-14	Aerosol Optical Depth (AOD)	Y	Y
HSRL	ADEP, ASR, BSC, EXT, SA, WVD**	Y	Y
Microtops	AOD	see Table 1 (b)	see Table 1 (b)
Sunphotometer	AOD, AE, SSA	see Table 1 (c)	see Table 1 (c)
MISR	AOD, AE, SSA	Y	Y

** **ADEP**: Aerosol Depolarization Ratio (532 nm); **ASR**: Aerosol Scattering Ration (532nm); **BSC**: Aerosol Backscatter Coefficient (532 nm); **EXT**: Aerosol Extinction Coefficient (532nm) ; **SA**: Extinction to Backscatter ratio (532 nnm); **WVD**: Wavelength Dependence (532 nm)

Table S1: (b) Ground-based Microtops Network in the INTEX-B field campaign region.

Site	Latitude	Longitude	Altitude (m)	Wavelength (nm)‡	Start/End	6-Mar+	15-Mar+
HIDALGO	19 26.316 N	99 8.854 W	2260	340;**440;675;870**; 936	13-29 Mar	N	Y
UNAM	19 19.484 N	99 10.805 W	2300	340;**440;675;870**; 936	6-29 Mar	Y	N
CORENA	19 16.390 N	99 12.277 W	2570	**440;870**;936;1640 ;2100	6-29 Mar	Y	Y
TEC*	19 35.703 N	99 13.654 W	2350	**440;870**;936;1640 ;2100	6-29 Mar	Y	N
UAM I	19 21.536 N	99 4.429 W	2250	380;**500;675;870**; 1640	6-29 Mar	Y	Y

* Technológico de Monterrey
+ Y/N=> Yes/No => AOD observation is/is not available
‡ Wavelengths in bold indicate the wavelengths at which AOD observation is available.

Table S1: (c) AERONET sites in the INTEX-B field campaign region.

Location	Latitude	Longitude	Altitude (m)	Wavelength (nm) ‡	Start/End	6-Mar	15-Mar
Mexico City	19 20.033 N	99 10.917 W	2268	**340;380;500;440;675;870;1020**;1640	1999-2000	N	N
T0-Max-Mex	19 29.280 N	99 8.820 W	2268	340;**380;500;440;675;870;1020**;1640	2 Mar-18 Apr	Y	Y
T1-Max-Mex	19 48.166 N	99 58.917 W	2272	**340;380;500;440;675;870;1020;1640**	6-31 Mar	Y	Y
Tampico-Max-Mex	22 16.667 N	97 51.833 W	15	**340;380;500;440;675;870;1020**;1640	1-30 Mar	Y	N

‡ Wavelengths in bold indicate the wavelengths at which AOD observation is available.

Table S2: Aerosol Component Particles

P#	Component Model	r_{eff} (μm)	$r_{pg,N}$ (μm)	σ_g (μm)	$\omega_{o,446}$	$\omega_{o,558}$	$\omega_{o,672}$	$\omega_{o,867}$	η_r (all λs)
p1	bioburn_VVS_A	0.06	0.04	1.6	0.861	0.838	0.816	0.777	1.5
p2	bioburn_VVS_LA	0.06	0.04	1.6	0.91	0.899	0.888	0.868	1.5
p3	bioburn_VVS_WA	0.06	0.04	1.6	0.95	0.939	0.928	0.908	1.5
p4	bioburn_VS_LA	0.12	0.07	1.6	0.91	0.899	0.888	0.868	1.5
p5	bioburn_VS_WA	0.12	0.07	1.6	0.95	0.939	0.928	0.908	1.5
p6	bioburn_S_A	0.22	0.13	1.6	0.861	0.838	0.816	0.777	1.5
p7	bioburn_S_LA	0.22	0.13	1.6	0.91	0.899	0.888	0.868	1.5
p8	bioburn_S_WA	0.22	0.13	1.6	0.95	0.939	0.928	0.908	1.5
p9	bioburn_S2_A	0.28	0.16	1.6	0.861	0.838	0.816	0.777	1.5
p10	bioburn_S2_LA	0.28	0.16	1.6	0.91	0.899	0.888	0.868	1.5
p11	sph_abs_flat_VVS_LA	0.06	0.03	1.65	0.9	0.9	0.9	0.9	1.45
p12	sph_abs_ flat _VVS_WA	0.06	0.03	1.65	0.95	0.95	0.95	0.95	1.45
p13	sph_abs_ flat _VS_VA	0.12	0.06	1.7	0.8	0.8	0.8	0.8	1.45
p14	sph_abs_ flat _VS_A	0.12	0.06	1.7	0.85	0.85	0.85	0.85	1.45
p15	sph_abs_ flat _VS_LA	0.12	0.06	1.7	0.9	0.9	0.9	0.9	1.45
p16	sph_abs_ flat _VS_WA	0.12	0.06	1.7	0.95	0.95	0.95	0.95	1.45
p17	sph_abs_ flat _S_VA	0.26	0.12	1.75	0.8	0.8	0.8	0.8	1.45
p18	sph_abs_ flat _S_A	0.26	0.12	1.75	0.85	0.85	0.85	0.85	1.45
p19	sph_abs_ flat _S_LA	0.26	0.12	1.75	0.9	0.9	0.9	0.9	1.45
p20	sph_abs_ flat _S_WA	0.26	0.12	1.75	0.95	0.95	0.95	0.95	1.45
p21	sph_abs_flat_M_VA	0.57	0.24	1.79	0.80	0.80	0.80	0.80	1.45
p22	sph_abs_flat_M_A	0.57	0.24	1.79	0.85	0.85	0.85	0.85	1.45
p23	sph_abs_ flat _M_LA	0.57	0.24	1.79	0.9	0.9	0.9	0.9	1.45
p24	sph_abs_ flat _M_WA	0.57	0.24	1.79	0.95	0.95	0.95	0.95	1.45
p25	sph_abs_steep_VVS_LA	0.06	0.03	1.65	0.928	0.90	0.863	0.748	1.45
p26	sph_abs_ steep _VVS_WA	0.06	0.03	1.65	0.965	0.95	0.93	0.884	1.45
p27	sph_abs_ steep _VS_VA	0.12	0.06	1.7	0.821	0.800	0.773	0.720	1.45
p28	sph_abs_ steep _VS_A	0.12	0.06	1.7	0.866	0.850	0.829	0.785	1.45

p29	sph_abs_ steep _VS_LA	0.12	0.06	1.7	0.911	0.9	0.885	0.853	1.45
p30	sph_abs_ steep _VS_WA	0.12	0.06	1.7	0.956	0.950	0.942	0.925	1.45
p31	sph_abs_ steep _S_VA	0.26	0.12	1.75	0.792	0.80	0.80	0.791	1.45
p32	sph_abs_ steep _S_A	0.26	0.12	1.75	0.842	0.85	0.85	0.844	1.45
p33	sph_abs_ steep _S_LA	0.26	0.12	1.75	0.894	0.9	0.901	0.897	1.45
p34	sph_abs_ steep _S_WA	0.26	0.12	1.75	0.946	0.950	0.951	0.949	1.45
p35	sph_abs_steep_M_VA	0.57	0.24	1.79	0.768	0.80	0.821	0.842	1.45
p36	sph_abs_steep_M_A	0.57	0.24	1.79	0.822	0.85	0.868	0.886	1.45
p37	sph_abs_steep_M_LA	0.57	0.24	1.79	0.879	0.9	0.914	0.926	1.45
p38	sph_non_abs_VVS	0.06	0.03	1.65	1.0	1.0	1.0	1.0	1.45
p39	sph_non_abs_VS	0.12	0.06	1.70	1.0	1.0	1.0	1.0	1.45
p40	sph_non_abs_S	0.26	0.12	1.75	1.0	1.0	1.0	1.0	1.45
p41	sph_non_abs_M	0.57	0.24	1.79	1.0	1.0	1.0	1.0	1.45
p42	sph_non_abs_L	1.28	0.5	1.85	1.0	1.0	1.0	1.0	1.45
p43	dust_grains_mode1_h1_0to10km_H2	0.75	0.5	1.5	0.919	0.977	0.994	0.997	1.51(green)
p44	dust_grains_mode1_h10_0to10km_H2	0.75	0.5	1.5	0.977	0.799	0.943	0.978	1.61(green)
p45	nonspherical_absorbing_1.18_lo (red dust)	1.18	0.47	2.59	0.805	0.88	0.914	0.98	1.53

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