



AMS

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Supplemental Material

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Supplemental Material

Table S1: Average±standard deviation of meteorological parameters for the two periods, 2000-2009 and 2010-2019, analyzed in this work during different seasons and all months. The values that exhibited a statistically significant change at 95% confidence interval are highlighted in green.

Parameter	Winter (DJF)		Spring (MAM)		Summer (JJA)		Fall (SON)		All	
	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019
GISTEMP (K)	0.52±0.63	0.84±1.25	0.43±0.43	0.77±0.94	0.33±0.41	0.73±0.65	0.36±0.61	0.84±0.88	0.41±0.53	0.79±0.94
Cloud Fraction	0.65±0.10	0.68±0.07	0.57±0.07	0.57±0.07	0.59±0.09	0.59±0.08	0.50±0.12	0.46±0.12	0.58±0.11	0.58±0.12
IWV (cm)	1.13±0.13	1.09±0.13	1.66±0.43	1.58±0.42	3.48±0.56	3.54±0.51	1.94±0.55	2.01±0.72	2.06±0.99	2.06±1.04
LWP (g m ⁻²)	196.00±4.105	204.64±4.080	155.04±2.747	153.73±3.332	115.72±2.317	111.98±1.602	171.42±4.914	165.42±48	159.24±4.654	158.94±4.899
RR (mm day ⁻¹)	4.60±1.47	4.98±1.73	4.16±1.73	4.39±1.44	3.85±1.45	3.82±1.03	3.75±1.82	2.99±1.65	4.08±1.64	4.05±1.64
t-adv at 900 hPa (K day ⁻¹)	0.44±0.92	0.36±1.26	0.62±0.61	0.56±0.51	0.07±0.18	0.07±0.21	0.14±0.52	0.11±0.47	0.32±0.65	0.27±0.74
q-adv at 900 hPa (g kg ⁻¹ day ⁻¹)	0.21±0.28	0.23±0.50	0.28±0.28	0.32±0.29	0.19±0.21	0.17±0.18	0.15±0.24	0.11±0.23	0.21±0.26	0.21±0.33

Table S2: Average±standard deviation of aerosol parameters for the two periods, 2000-2009 and 2010-2019, analyzed in this work during different seasons and all months. The values that exhibited a statistically significant change at 95% confidence interval are highlighted in green.

Parameter	Winter (DJF)		Spring (MAM)		Summer (JJA)		Fall (SON)		All	
	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019
Aerosol Dry Mass ($\mu\text{g m}^{-3}$)	7.23±2.19	4.76±1.17	10.31±2.87	6.96±1.76	14.84±2.72	8.40±1.84	10.18±3.30	6.11±1.54	10.64±3.89	6.56±2.06
Aerosol Water Path (mg m^{-2})	1.73±0.70	1.00±0.58	4.43±1.73	1.88±0.89	7.85±2.14	2.42±1.21	3.78±2.50	1.15±0.70	4.45±2.90	1.61±1.04
Aerosol Optical Depth	0.10±0.02	0.09±0.03	0.23±0.07	0.19±0.05	0.45±0.10	0.32±0.06	0.16±0.08	0.13±0.05	0.23±0.15	0.18±0.10
Single Scattering Albedo	0.96±0.00	0.96±0.00	0.95±0.00	0.95±0.00	0.94±0.00	0.94±0.00	0.95±0.00	0.95±0.00	0.95±0.01	0.95±0.01
Angstrom Exponent	1.51±0.01	1.51±0.01	1.51±0.03	1.51±0.03	1.58±0.07	1.58±0.05	1.55±0.04	1.53±0.03	1.54±0.05	1.53±0.04

Table S3: Average±standard deviation of land surface albedo parameters for the two periods, 2000-2009 and 2010-2019, analyzed in this work during different seasons and all months. The values that exhibited a statistically significant change at 95% confidence interval are highlighted in green.

Parameter	Winter (DJF)		Spring (MAM)		Summer (JJA)		Fall (SON)		All	
	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019
SW Black Sky Albedo	0.12	0.12	0.13±0.01	0.13±0.01	0.14±0.01	0.13	0.13	0.13	0.13±0.01	0.13±0.01
SW White Sky Albedo	0.13	0.12	0.14±0.01	0.14±0.01	0.15±0.01	0.15	0.14±0.01	0.13±0.01	0.14±0.01	0.14±0.01
Sensible Heat Flux (Wm ⁻²)	16.16±7.72	16.20±9.70	36.33±10.43	34.56±8.71	46.72±13.54	48.32±9.60	25.12±11.52	30.58±14.94	31.08±15.87	32.42±15.82
Latent Heat Flux (Wm ⁻²)	32.89±6.11	32.62±6.44	83.62±17.95	87.19±18.65	101.94±10.62	103.92±9.05	58.27±17.21	55.89±17.76	69.18±29.54	69.90±30.96

Table S4: Average±standard deviation of top of the atmosphere (TOA) radiation parameters for the two periods, 2000-2009 and 2010-2019, analyzed in this work during different seasons and all months. The values that exhibited a statistically significant change at 95% confidence interval are highlighted in green.

Parameter	Winter (DJF)		Spring (MAM)		Summer (JJA)		Fall (SON)		All	
	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019	2000-2009	2010-2019
TOA Clear sky SWU (Wm ⁻²)	40.26±4.83	39.64±4.87	66.76±7.47	65.34±7.41	72.60±3.25	70.28±3.54	49.53±7.74	48.22±7.08	57.57±14.30	55.87±13.81
TOA All sky SWU (Wm ⁻²)	84.55±15.57	87.00±13.92	126.81±15.23	126.13±10.60	126.89±14.47	124.13±11.95	90.84±18.25	84.48±14.68	107.66±25.24	105.44±23.55
TOA clear sky LWU (Wm ⁻²)	252.72±5.13	252.87±7.05	272.24±6.72	272.32±8.09	287.39±3.38	285.95±2.90	276.48±9.85	275.24±9.64	272.54±14.10	271.59±14.02
TOA all sky LWU (Wm ⁻²)	223.31±6.74	222.33±5.28	237.75±8.44	237.83±10.20	253.05±8.29	251.51±7.37	249.26±13.05	251.04±13.58	241.14±14.82	240.68±15.29

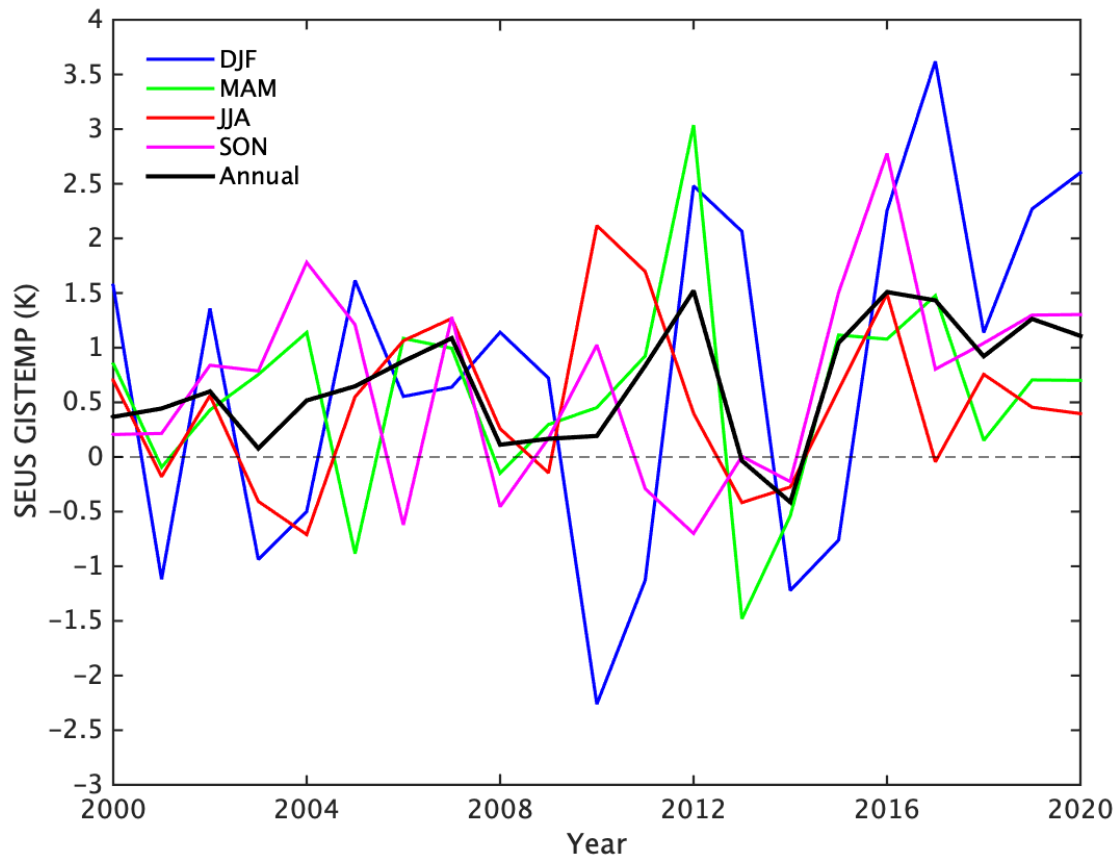


Figure S1: Annual and seasonal averaged monthly temperature anomaly as reported by GISTEMP averaged over the southeastern US (SEUS).

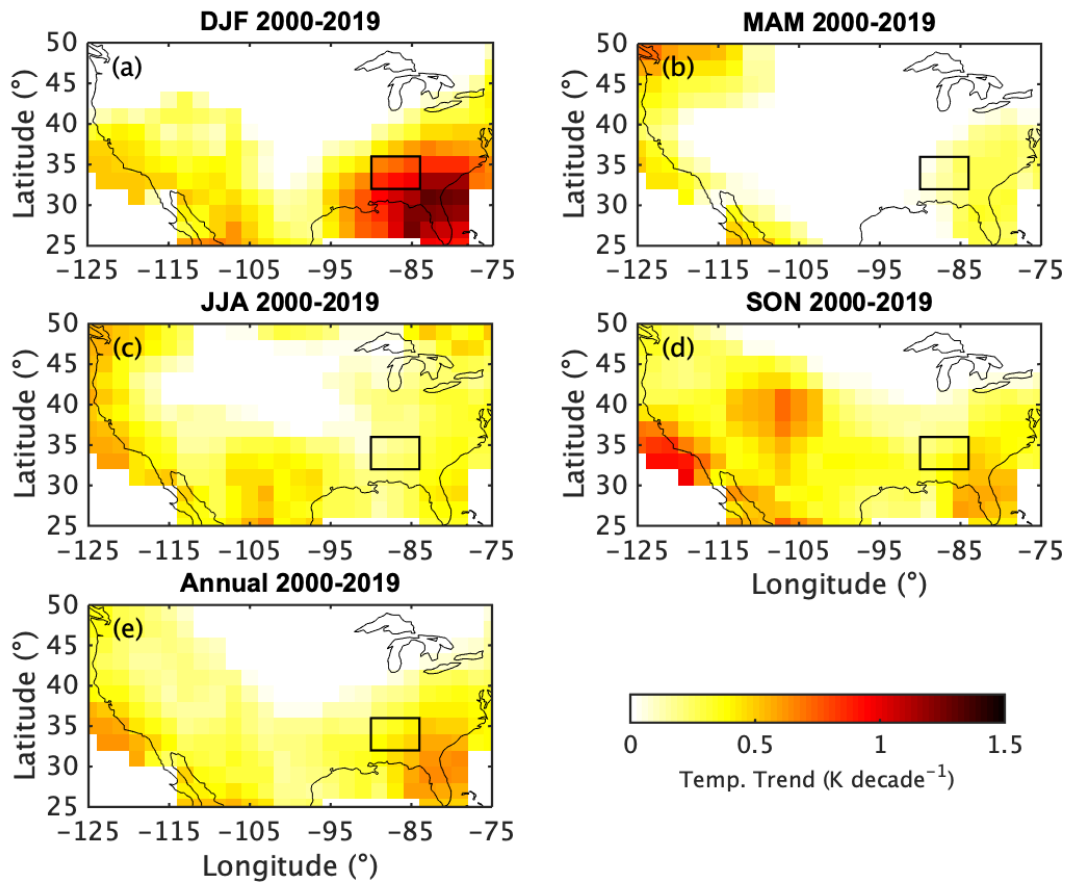


Figure S2: GISTEMP seasonal trends for 2000-2019 for different seasons and annual average. The study area is shown in black square in all panels.

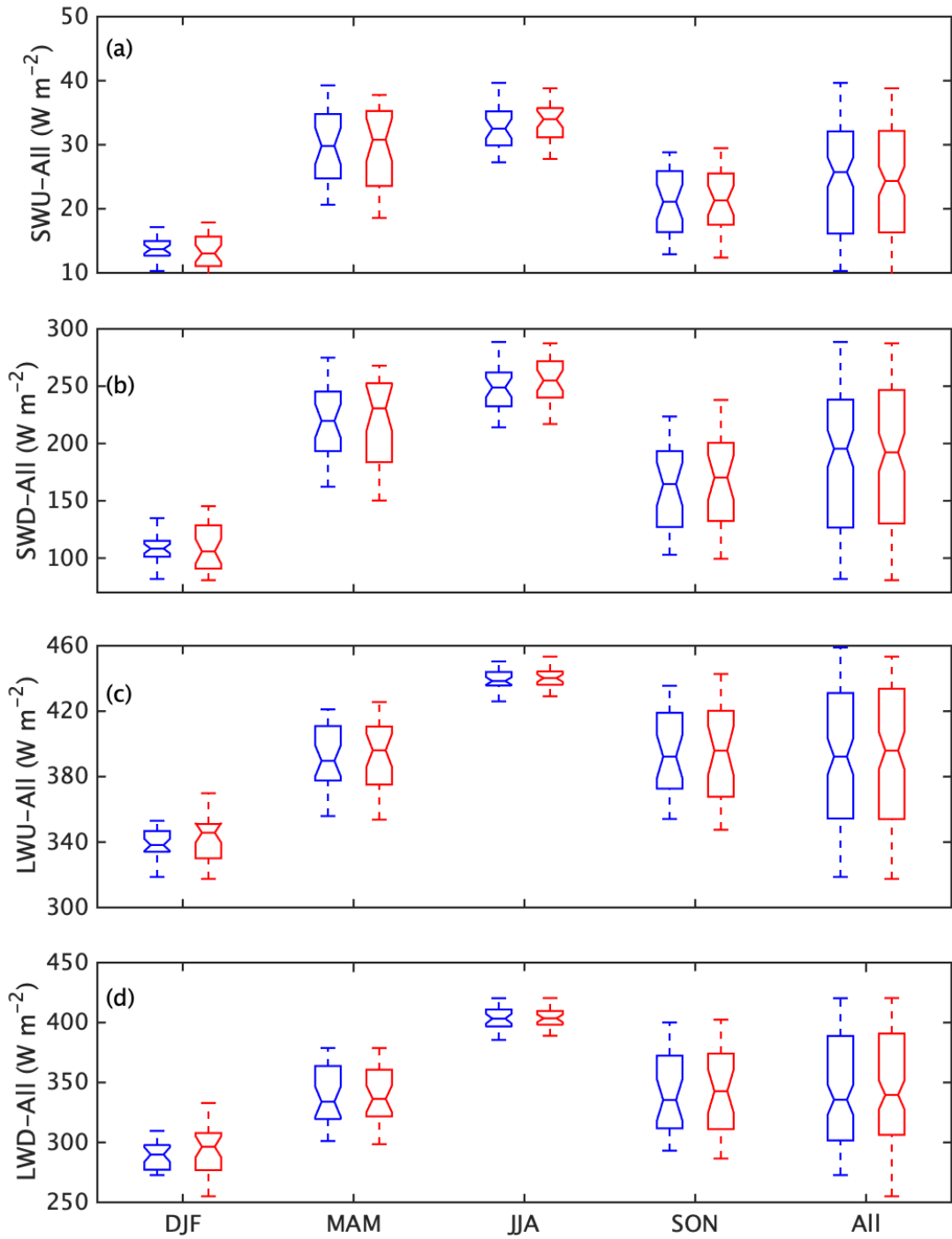


Figure S3: Box-whisker plot of monthly values of surface (a) upwelling shortwave radiation during clear-sky conditions, (b) upwelling shortwave radiation during all-sky conditions, (c) upwelling

longwave radiation during clear-sky conditions, and (d) upwelling longwave radiation during all-sky conditions during 2000-2009 (blue) and 2010-2019 (red). “X” below the box-whiskers denote if the averages of the two distributions are statistically different at a 95% confidence interval.

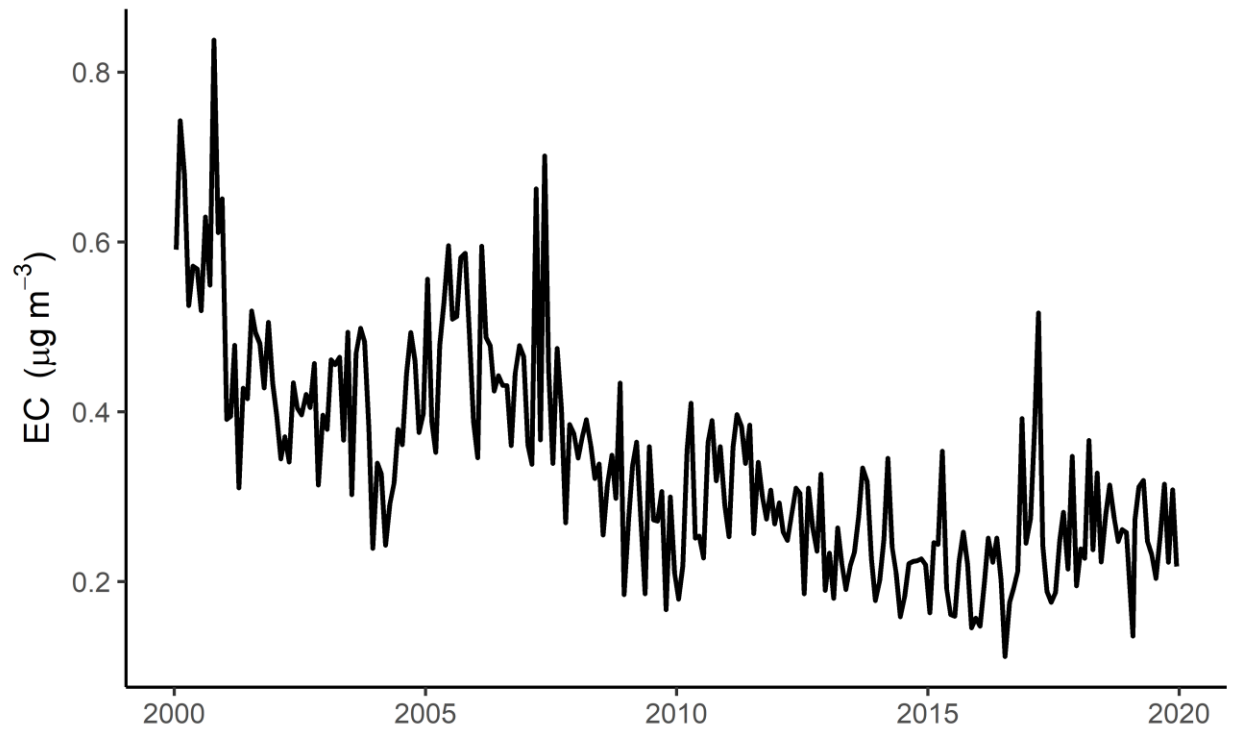


Figure S4: Mass concentrations of elemental carbon, the primary absorber of shortwave radiation, decreased in the region over the twenty-year period by approximately 50%