

Table S1. Names and numbers of the stations providing dust concentration data (monthly and annually).

No	Station Name	Latitude	Longitude	Measurement Period	
1	CapePoint	34.35°S	18.48°E	27-Feb-92	21-Nov-96
2	Cape Grim Tasmania	40.68°S	144.68°E	11-Jan-83	08-Nov-96
3	Marsh King George Isl	62.18°S	58.30°W	27-Mar-90	25-Sept-96
4	Mawson Antarctica	67.60°S	62.50°E	18-Feb-87	01-Jan-96
5	Palmer Stat. Antarctica	64.77°S	64.05°W	03-Apr-90	18-Oct-96
6	Yate New Caledonia	22.15°S	167.00°E	23-Aug-83	23-Oct-85
7	FunafutiTuvalu	8.50°S	179.20°W	08-Apr-83	31-Jul-87
8	Nauru	0.53°S	166.95°E	16-Mar-83	02-Oct-87
9	NorfolkIsland	29.08°S	167.98°E	27-May-83	21-Feb-97
10	Rarotonga CookIslands	21.25°S	159.75°W	23-Mar-83	23-Jun-94
11	AmericanSamoa	14.25°S	170.58°W	19-Mar-83	03-Jan-96
12	Midway Island	28.22°N	177.35°W	18-Jan-81	02-Jan-97
13	Oahu Hawaii	21.33°N	157.70°W	21-Jan-81	13-Jul-95
14	Jeju	33.52°N	126.48°E	10-Sep-91	27-Oct-95
15	Hedo	26.92°N	128.25°E	01-Sep-91	18-Mar-94
16	Fanning Island	3.92°N	159.33°W	02-Apr-81	14-Aug-86
17	Enewetak Atoll	11.33°N	162.33°E	27-Feb-81	10-Jun-87
18	Barbados	13.17°N	59.43°W	05-May-84	01-Jul-98
19	Izana Tenerife	28.30°N	16.50°W	25-Jul-87	01-Jul-98
20	Bermuda	32.27°N	64.87°W	29-Mar-89	01-Jan-98
21	Mace Head	53.32°N	9.85°W	11-Aug-88	15-Aug-94
22	Miami	25.75°N	80.25°W	02-Jan-89	07-Aug-98
23	Rukomechi	16.00°S	29.50°E	Not-Known	Not-Known
24	Jabirun	12.70°S	132.90°E	Not-Known	Not-Known

Table S2. Names and numbers of the stations providing dust deposition data.

No	Location	Latitude	Longitude	Deposition (g/m ² /year)	Region
1	FrenchAlps	45.50°N	6.50°E	2.1	Europe
2	Spain	41.80°N	2.30°E	5.3	Europe
3	Midway	28.20°N	177.35°W	0.6	WPacific
4	Miami	25.75°N	80.25°W	1.62	NAtlantic
5	Oahu	21.30°N	157.60°W	0.42	WPacific
6	Enewetak	11.30°N	162.30°E	0.44	EPacific
7	Fanning	3.90°N	159.30°W	0.09	WPacific
8	NewZealand	34.50°S	172.75°E	0.14	EPacific
9	Taklimakan	40.00°N	85.00°E	450	Asia
10	TelAviv	32.00°N	34.50°E	30	Europe
11	CampCentury	77.00°N	61.00°W	0.04	Greenland
12	Dye3	65.00°N	44.00°W	0.02	Greenland
13	Renland	71.00°N	27.00°W	0.06	Greenland
14	GRIP	73.00°N	38.00°W	0.008	Greenland
15	Byrd	75.00°S	120.00°W	0.003	Antartica
16	Huascaran	9.00°S	78.00°W	0.2	SAmerica
17	Corsica	42.00°N	9.00°E	15.43	Europe
18	RossSea1	69.52°S	170.60°E	0.002	SOcean
19	RossSea2	75.00°S	170.67°W	0.003	SOcean
20	RossSea3	76.45°S	175.52°W	0.003	SOcean
21	DumontAntartica1	64.60°S	140.33°E	0.0006	SOcean
22	DumontAntartica2	64.88°S	141.07°E	0.0009	SOcean
23	DumontAntartica3	64.97°S	141.45°E	0.0009	SOcean
24	DumontAntartica4	64.93°S	141.25°E	0.0009	SOcean
25	PrydzBay1	65.57°S	74.98°E	0.002	SOcean
26	PrydzBay2	64.90°S	75.00°E	0.003	SOcean
27	PrydzBay3	66.12°S	75.32°E	0.002	SOcean
28	PrinceElizabethLand1	66.30°S	75.72°E	0.002	SOcean
29	PrinceElizabethLand2	70.57°S	76.90°E	0.002	SOcean
30	PrinceElizabethLand3	73.43°S	76.52°E	0.002	SOcean
31	PrinceElizabethLand4	74.90°S	74.52°E	0.001	SOcean
32	PrinceElizabethLand5	75.85°S	71.50°E	0.0009	SOcean
33	Eilat	29.52°N	34.92°E	5.83	Europe
34	Sapporo	43.10°N	141.30°E	5.2	EPacific
35	DeadSea	31.50°N	35.30°E	44.57	MEast
36	LakeKinneret	32.70°N	35.50°E	285.71	Europe
37	Crete	35.20°N	24.80°E	21.26	Europe
38	SEFrance1	43.50°N	4.80°E	11.31	Europe
39	SEFrance2	43.60°N	7.30°E	1.8	Europe
40	Sspain	36.30°N	5.4°W	22.8	Europe
41	Nordsea	54.42°N	7.20°W	2.09	NAtlantic
42	Eiderstedt	54.30°N	8.60°W	1.57	NAtlantic
43	SEFrance3	43.60°N	7.30°E	32	Europe
44	WeddellSea	64.93°S	2.59°W	0.52	SOcean
45	Site13Shallow	35.52°S	161.0°E	1.24	EPacific
46	WR1	20.05°S	9.16°E	4.03	SAtlantic
47	Site12Shallow	17.76°S	154.83°E	0.4	EPacific
48	Site11Shallow	12.99°S	155.99°E	0.73	EPacific

49	GBZ4	2.18°S	9.90°W	1.2	EqAtlantic
50	CEPS03upper	0.00°N	175.00°E	0.825	EPacific
51	Site10	1.22°N	160.57°E	0.84	EPacific
52	GBN3upper	1.79°N	11.13°W	4.3	EqAtlantic
53	ECC-T	5.01°N	138.83°E	0.57	EPacific
54	PB2	5.37°N	85.58°W	4.8	WPacific
55	M5	10.00°N	65.00°E	1.5	IndianOc
56	CV1upper	11.48°N	21.02°W	22.62	EqAtlantic
57	NEC-T	12.02°N	134.29°E	0.11	EPacific
58	Cast	14.48°N	64.77°E	4.3	IndianOc
59	East	15.47°N	68.75°E	7.4	IndianOc
60	M4	15.98°N	61.50°E	4.5	IndianOc
61	Wast	16.25°N	60.47°E	6.1	IndianOc
62	M2M3	17.40°N	58.80°E	12.4	IndianOc
63	EumeliMesotropic	18.50°N	21.08°W	18.74	NAtlantic
64	BOSF1	19.00°N	20.17°W	21.55	NAtlantic
65	CB1-1	20.92°N	19.74°W	20.17	NAtlantic
66	EumeliOligotropic	21.05°N	31.17°W	3.73	NAtlantic
67	CB2-1	21.15°N	20.69°W	20.09	NAtlantic
68	22N25W	21.93°N	25.23°W	6.7	NAtlantic
69	25N23W	24.55°N	22.83°W	5.21	NAtlantic
70	28N22W	28.00°N	21.98°W	2.4	NAtlantic
71	CI1upper	29.11°N	15.45°W	4.15	NAtlantic
72	Site6	30.00°N	175.0°E	3	EPacific
73	ST	31.55°N	24.67°W	2.36	NAtlantic
74	Sargasso	32.08°N	64.25°W	1.9	NAtlantic
75	L1-93	33.15°N	21.98°W	1.76	NAtlantic
76	34N21W	33.82°N	21.02°W	4.75	NAtlantic
77	Site5upper	34.42°N	177.74°E	3.25	EPacific
78	Site7upper	37.40°N	174.95°E	8.77	EPacific
79	WP-3	40.00°N	145.43°E	7.32	EPacific
80	Site8	46.12°N	175.03°E	4.09	EPacific
81	NP-B	46.82°N	162.12°E	0.86	EPacific
82	48N21W-1	47.72°N	20.87°W	3.1	NAtlantic
83	48N21W-2	47.83°N	19.50°W	2.8	NAtlantic
84	P	50.00°N	144.98°W	0.3	WPacific

Table S3. AERONET stations used in this study.

Station Number	Station Name	Longitude	Latitude
1	Anmyon	126.33	36.54
2	Arica	-70.31	-18.47
3	Bahrain	50.61	26.21
4	Banizoumbou	2.66	13.54
5	Barbados	-59.62	13.15
6	Capo_Verde	-22.93	16.73
7	Dakar	-16.96	14.39
8	EI_Arenosillo	-6.73	37.11
9	Illorin	4.34	8.32
10	IMC_Oristano	8.50	39.91
11	IMS-METU-ERD	34.25	36.56
12	Kaashidhoo	73.47	4.96
13	Lampedusa	12.63	35.52
14	La_Parguera	-67.04	17.97
15	Nes_Ziona	34.79	31.92
16	Ouagadougou	-1.40	12.20
17	SEDE_BOKER	34.78	30.85
18	Solar_Village	46.39	24.91
19	Suriname	-55.20	5.80

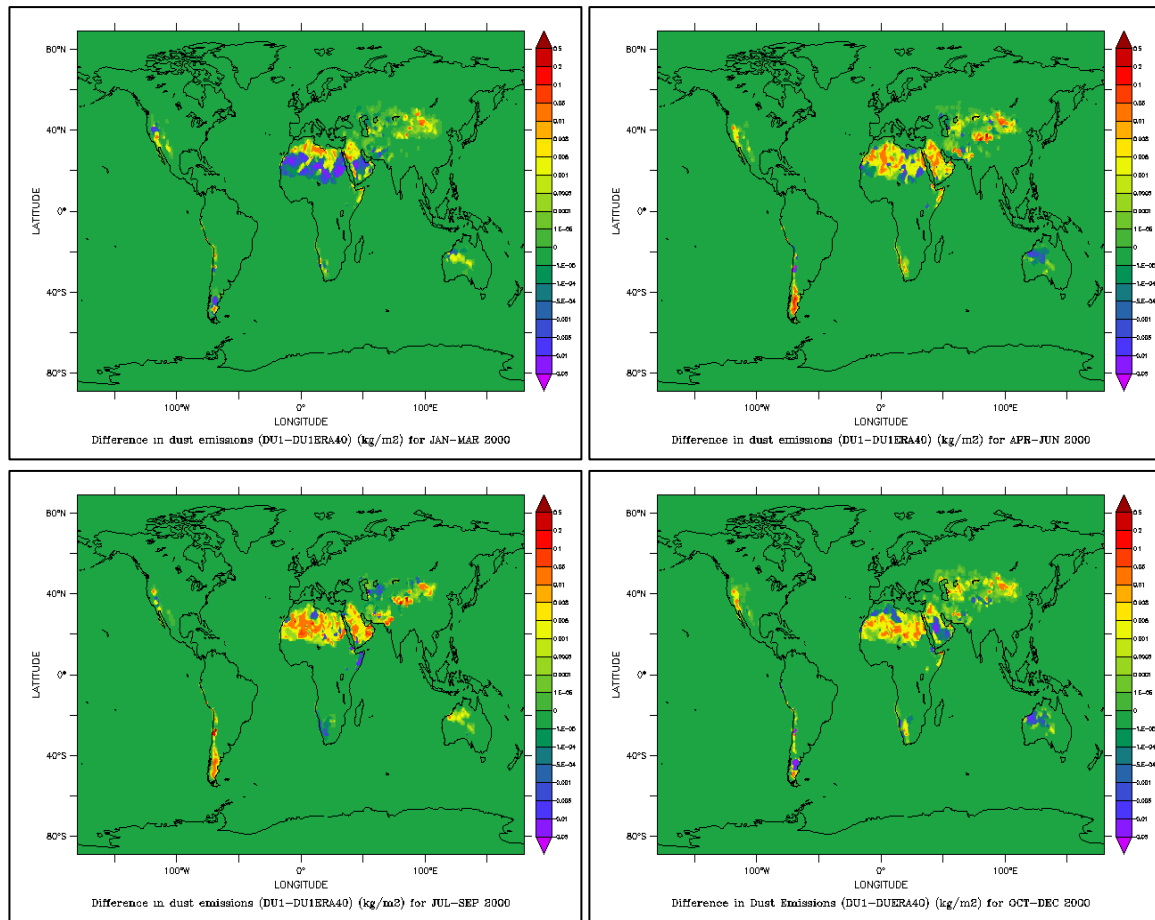


Fig S1. Difference in the seasonal dust emissions (kg/m^2) for the year 2000 for DU1 and DU1_ERA40: a) January to March, b) April to June, c) July to September and d) October to December

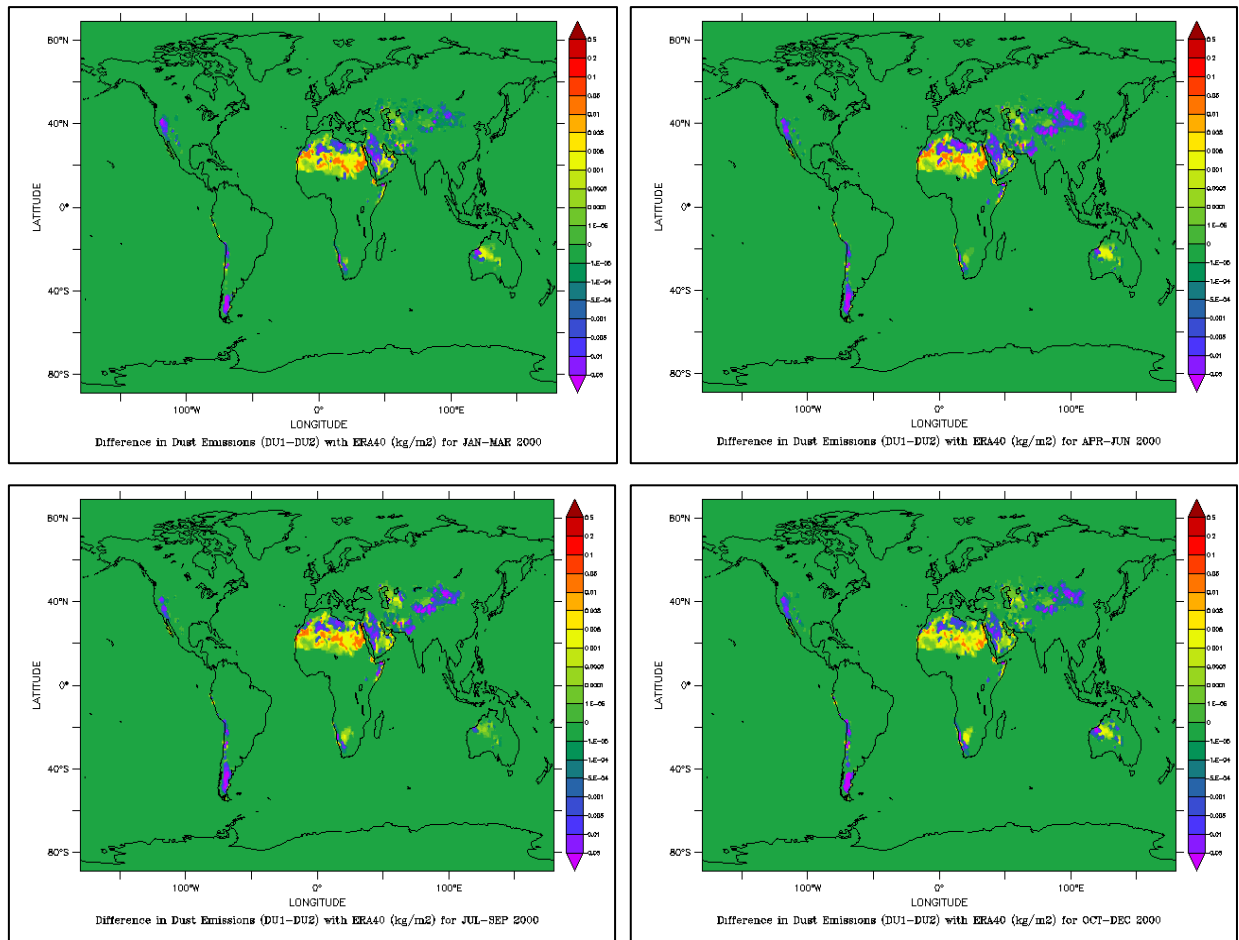


Fig. S2. Difference in the seasonal dust emissions (kg/m^2) between the nudged simulations for the year 2000 (DU1_ERA40-DU2_ERA40): a) January to March, b) April to June, c) July to September and d) October to December.

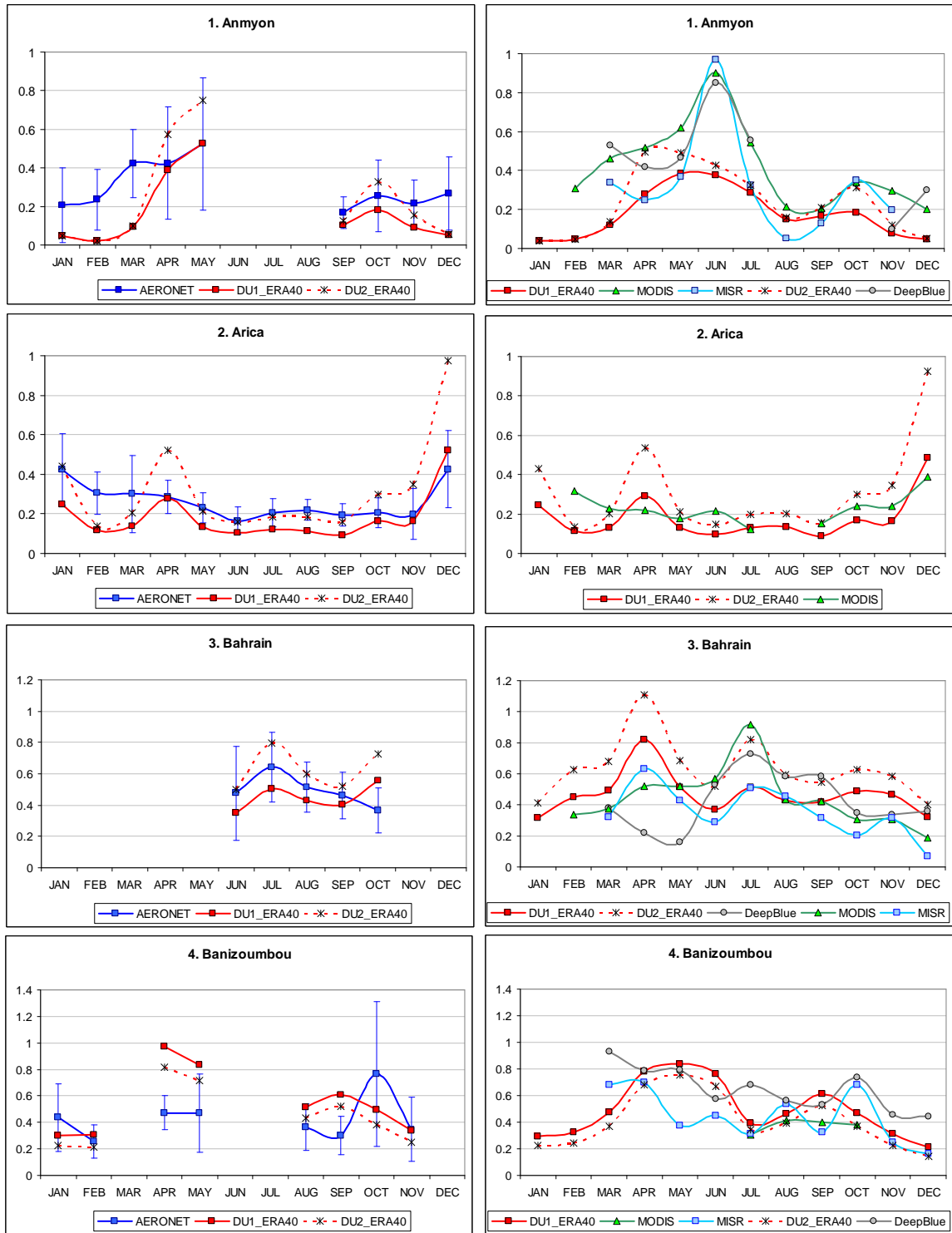


Fig. S3. Monthly AOD at the 19 AERONET stations (locations shown in Fig.3d). The left panels show the comparison between AERONET and modeled AOD for the specific dates available from AERONET. The right panels show the comparison between MODIS-Terra (for some stations additional MISR and Deep Blue AOD is included) and modeled AOD using the entire month from each simulation.

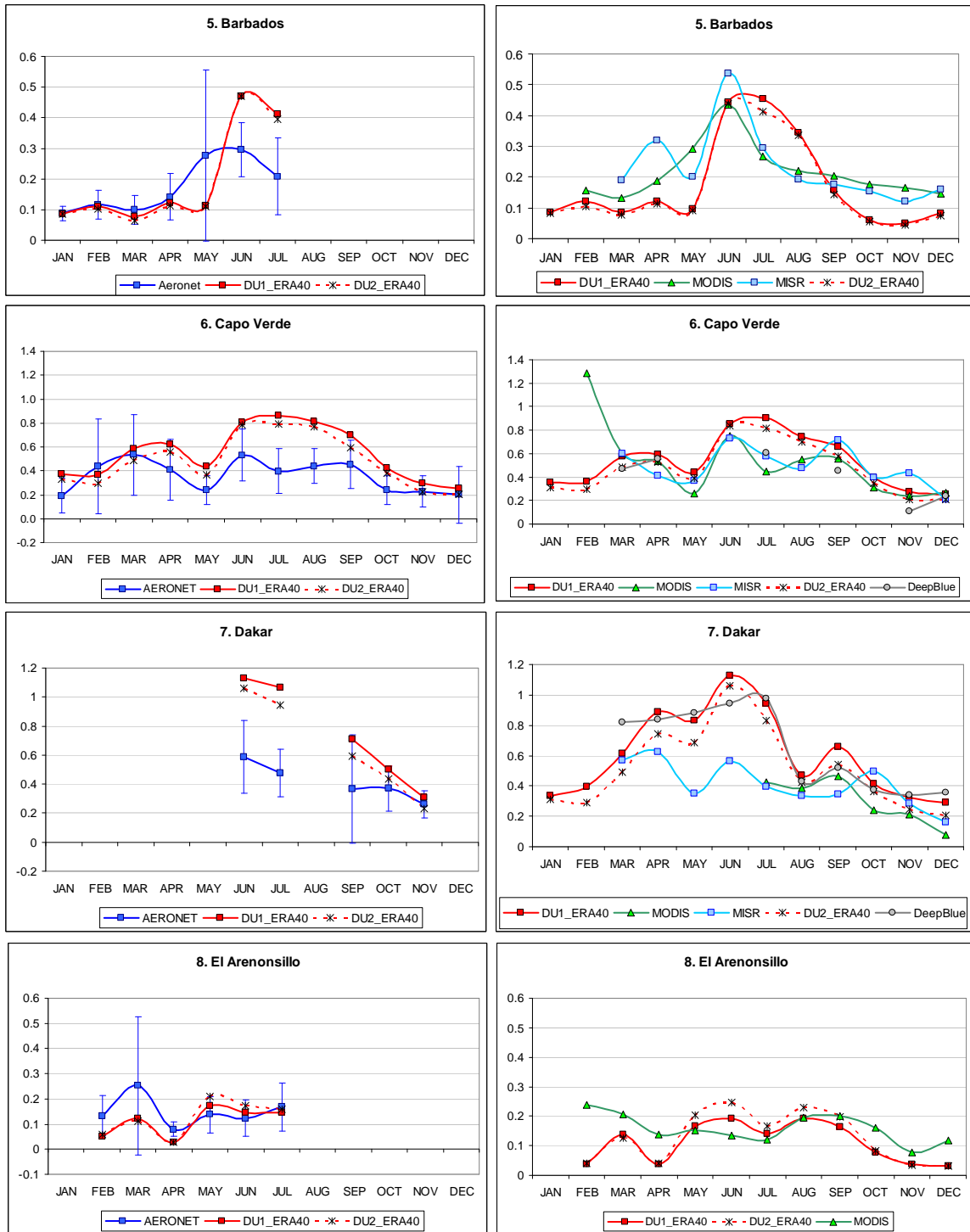


Fig. S3. continued.

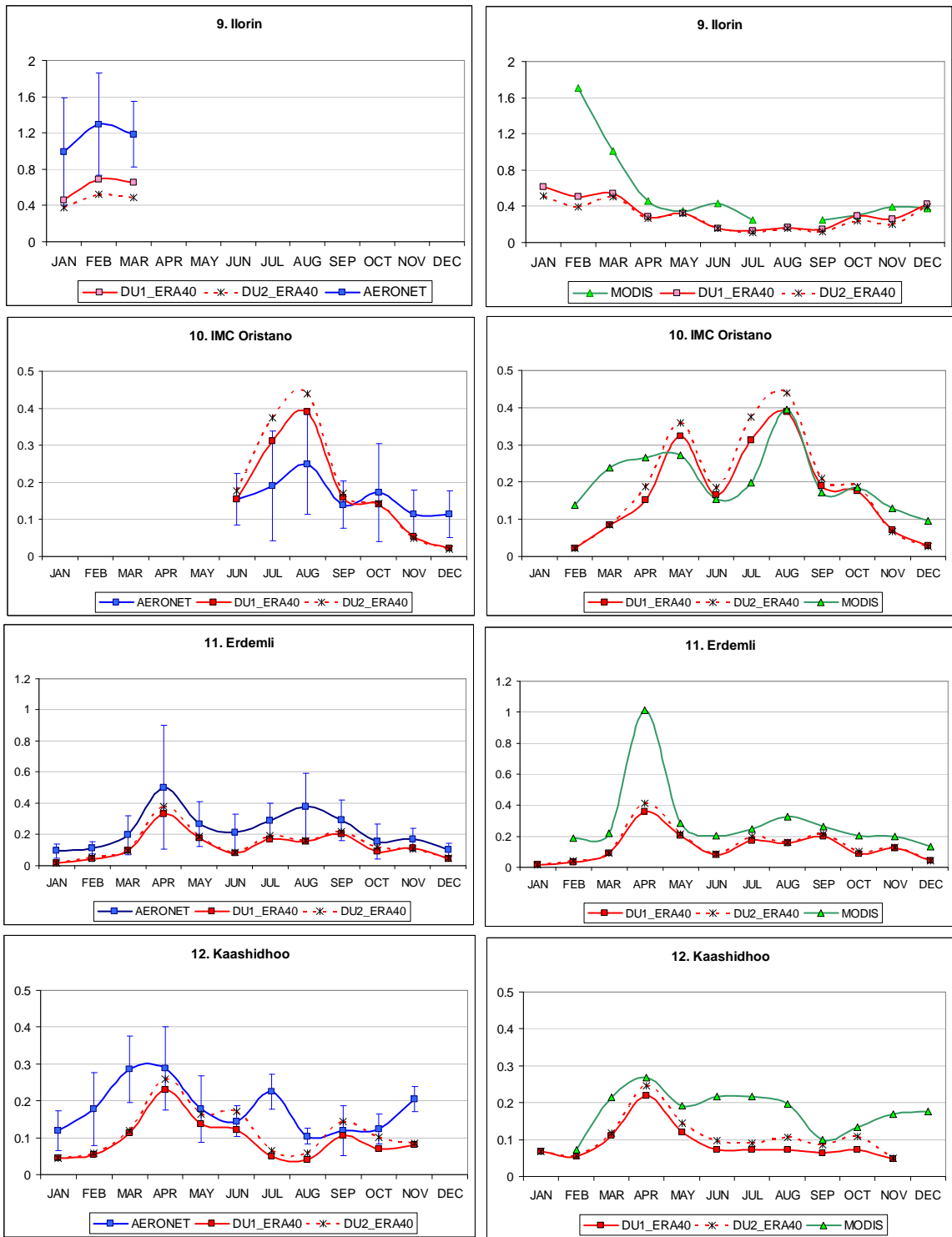


Fig. S3. continued.

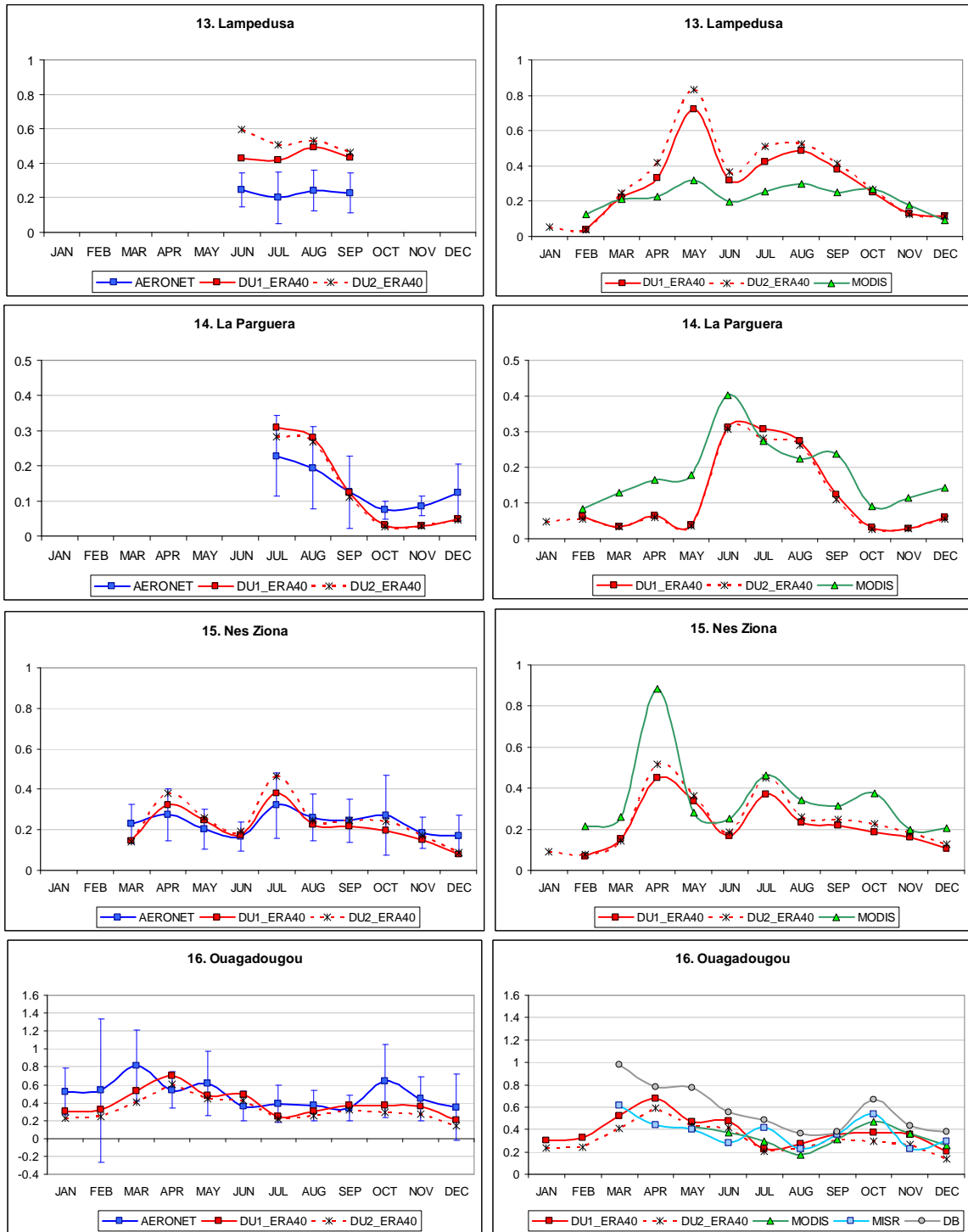


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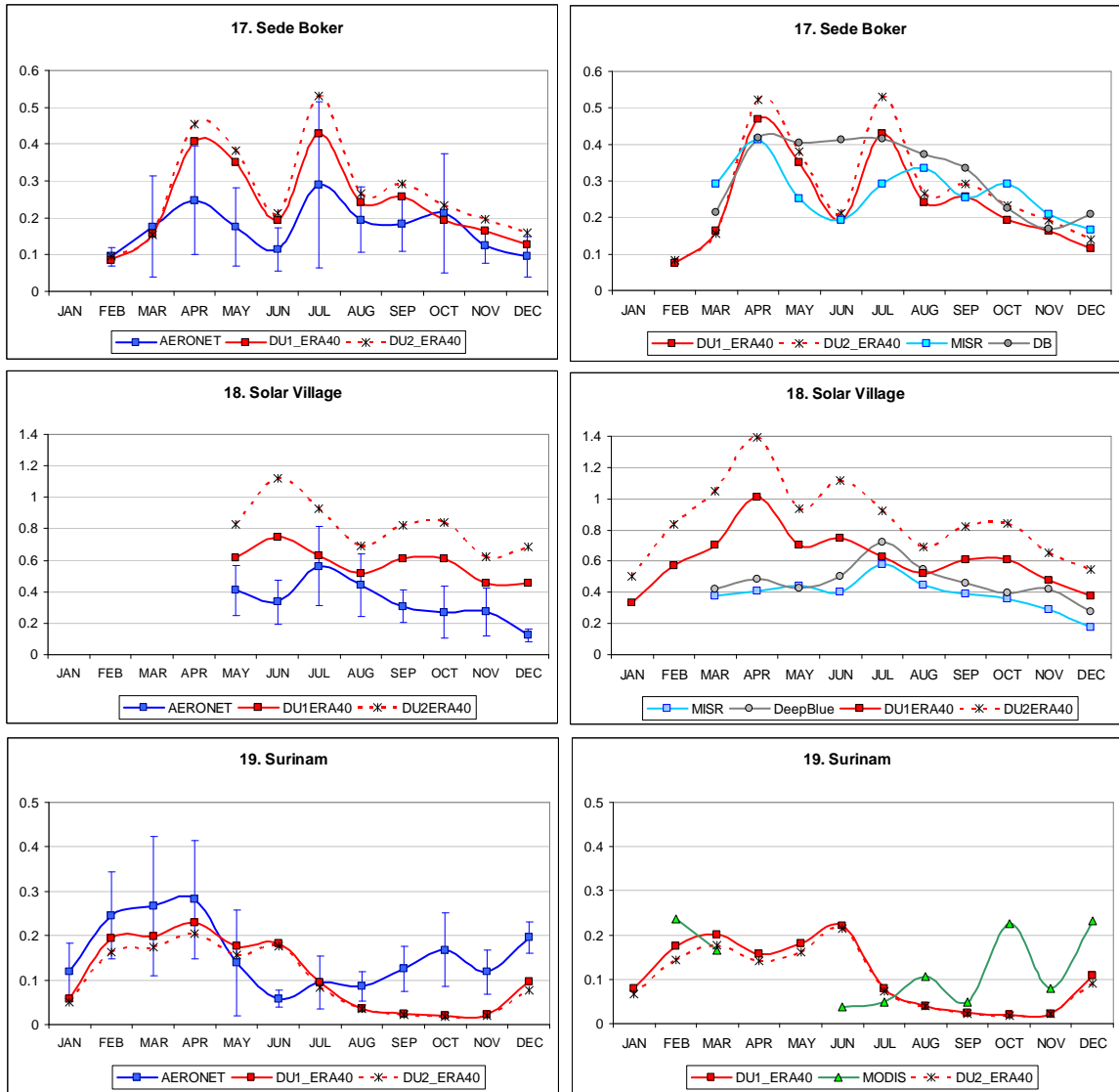


Fig. S3. continued.

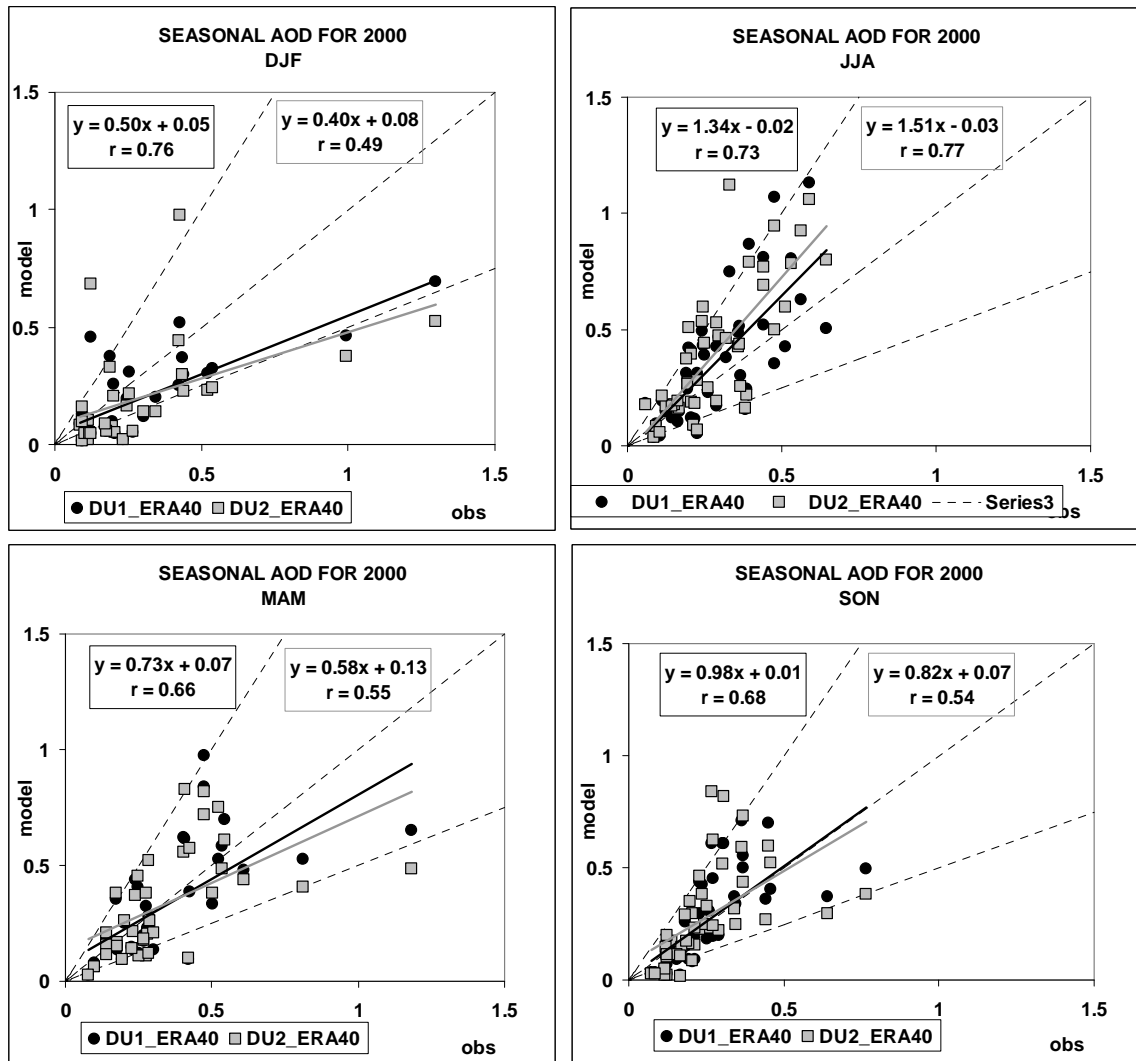


Fig. S4. Seasonal analysis of the monthly AOD at the 19 AERONET stations. DJF=December to February, MAM=March to May, JJA=June to August, SON=September to November. The 1:2 and 2:1 lines are shown in every scatter plot.

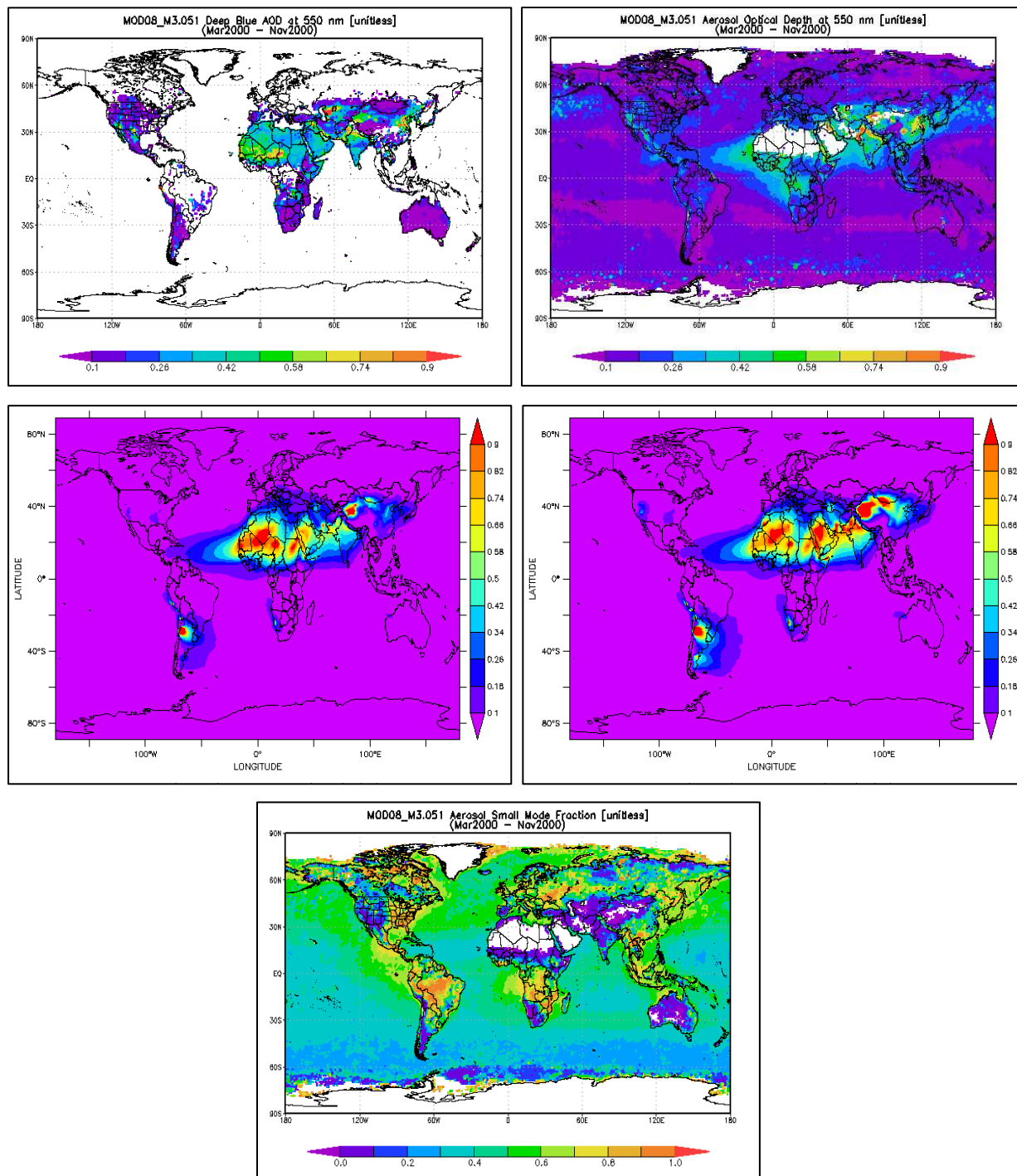


Fig. S5. Average Aerosol Optical Depth at 550nm from the MODIS-Terra (v5.1) satellite (upper panels) and from the EMAC simulation with the DU1_ERA40 formulation (middle left panel) and DU2_ERA40 simulation (middle right panel). The lower plot shows the aerosol small mode fraction produced by MODIS-Terra (v5.1) satellite. The period covered is March to November 2000.