ELECTRONIC SUPPLEMENT

Table S1. AERONET locations (presented as dots in Figure 1) for which MODIS and MISR AODs are compared, together with the slopes of the trend line of the AOD profile by MODIS and MISR between 2000 - 2009.

Europe Station name	Lon	Lat	Slope AOD trend MODIS 2000 - 2009	Change in AOD	Change in AOD %	Slope AOD trend MISR 2000 - 2009	Change in AOD	Change in AOD %
Forth Crete (GR)	25.28	35.33	-4.15E-04	-0.047	-20	-1.72E-04	-0.017	-9
Thessaloniki (GR)	22.96	22.96	-7.36E-04	-0.085	-31	-4.11E-04	-0.038	-16
Rome Tor Vergata (I)	12.64	41.84	-4.86E-04	-0.060	-28	-6.10E-05	-0.006	-3
Lecce (I)	18.11	18.11	-2.80E-04	-0.027	-13	-2.86E-04	-0.033	-15
SMHI (SE)	16.14	58.58	-3.39E-04	-0.039	-30	5.19E-05	0.007	8
Hamburg (D)	9.97	53.57	-9.37E-04	-0.109	-47	4.53E-06	-0.003	-2
Leipzig (D)	12.43	51.35	-1.36E-03	-0.162	-51	-4.38E-04	-0.057	-31
Clermont Ferrand (FR)	2.96	45.76	-3.59E-04	-0.041	-45	-2.06E-04	-0.023	-24
Valladolid (ES)	-4.71	41.65	-5.21E-04	-0.057	-30	-1.36E-04	-0.013	-10
Mace Head (Ir)	-9.90	53.33	2.18E-04	0.026	19	2.99E-05	0.010	10
Monks Wood (GB)	-0.23	52.40	-8.16E-04	-0.099	-41	1.11E-04	0.007	6
Chilbolton (GB)	-1.44	51.14	-6.16E-04	-0.075	-36	3.44E-04	0.040	32
Palaiseau (FR)	2.21	48.70	-4.21E-04	-0.050	-24	5.54E-07	0.001	0
Aire Adour (FR)	0.26	43.70	-4.07E-04	-0.049	-32	-2.03E-04	-0.023	-18
OHP obs (FR)	5.71	43.93	-2.47E-04	-0.029	-20	5.10E-05	0.006	5
Caceres (ES)	-6.34	39.47	-6.02E-04	-0.071	-55	-1.63E-04	-0.020	-16
Black Forest (D)	8.39	48.54	-3.35E-04	-0.040	-25	-2.28E-04	-0.024	-21
Munich Maisach (D)	11.26	48.21	-4.24E-04	-0.053	-27	-3.08E-04	-0.035	-27
Palgrunden (SE)	13.15	58.76	-1.74E-04	-0.021	-22	2.97E-04	0.033	47
Birkenes (NO)	8.25	58.38	-1.12E-04	-0.014	-14	-7.80E-05	-0.012	-8
Hyytiala (FI)	24.29	61.84	-3.09E-04	-0.038	-33	2.15E-05	0.002	3
Kuopio (FI)	27.65	62.89	-4.34E-04	-0.053	-42	-3.23E-04	-0.030	-27
Xanthi (GR)	24.91	41.14	-5.18E-04	-0.061	-34	-4.92E-04	-0.060	-23
Kanzelhohe (AT)	13.09	46.67	-6.45E-04	-0.076	-42	-5.30E-04	-0.050	-30
Barcelona (ES)	2.11	41.38	-3.54E-04	-0.045	-24	-2.25E-05	-0.003	-2
Evora (P)	-7.91	38.56	-5.35E-04	-0.057	-48	-2.45E-04	-0.027	-21
Granada (ES)	-3.60	37.16	-4.26E-04	-0.048	-19	-2.78E-04	-0.030	-17
Le Fauga (FR)	1.28	43.38	-3.92E-04	-0.046	-27	-2.42E-04	-0.023	-26
El Arenosillo (ES)	-6.73	37.10	-6.05E-04	-0.067	-45	-3.96E-04	-0.045	-24
Cabauw (NL)	4.92	51.97	-2.66E-04	-0.030	-13	-4.33E-04	-0.048	-24
Carpentras (FR)	5.06	44.08	-2.22E-04	-0.026	-20	-1.74E-06	0.000	0
Dunkerque (FR)	2.37	51.03	-1.25E-04	-0.021	-11	8.93E-05	0.010	7
Ispra (I)	8.63	45.81	-8.72E-04	-0.086	-28	-3.25E-04	-0.038	-16
Venice (I)	12.50	45.31	-9.96E-04	-0.107	-33	-2.39E-04	-0.027	-14
Laegeren (CH)	8.35	47.48	-3.11E-04	-0.041	-24	-2.94E-04	-0.034	-28
Lille (FR)	3.14	50.61	-5.50E-04	-0.065	-25	1.18E-05	0.001	1
Mainz (D)	8.30	50.00	-6.06E-04	-0.070	-35	2.94E-04	0.033	23
Modena (I)	10.94	44.63	-1.00E-03	-0.079	-33	6.09E-05	0.006	5
Belsk (PL)	20.80	51.82	-5.45E-04	-0.065	-28	-1.15E-04	-0.016	-10
Kiev (UA)	30.49	50.36	-3.31E-04	-0.041	-20	2.33E-04	0.025	17
Moldova	28.81	46.99	-4.90E-04	-0.058	-36	-1.58E-04	-0.017	-10
Bucarest (RO)	26.52	44.44	-5.71E-04	-0.067	-31	-3.36E-04	-0.044	-23
Tuz Golu (TR)	33.33	38.74	-3.71E-04	-0.044	-13	-1.86E-04	-0.027	-13
Minsk (Belarus)	27.60	53.90	-1.48E-04	-0.020	-11	-1.15E-04	-0.012	-8
IMS-METU-ER (TR)	34.25	36.56	-2.92E-04	-0.038	-14	-1.07E-05	-0.001	0

Australia Station name	Lon	Lat	Slope AOD trend MODIS 2000 - 2009	Change in AOD	Change in AOD %	Slope AOD trend MISR 2000 - 2009	Change in AOD	Change in AOD %
Canberra	149.11	-35.27	-2.18E-04	-0.020	-41	-3.38E-05	-0.002	-5
Adelaide	138.65	-34.73	-2.33E-04	-0.027	-36	7.08E-05	0.009	17
Coleambally	146.06	-34.81	-2.16E-04	-0.012	-27	1.49E-04	0.017	26
Merredin	118.23	-31.49	-3.55E-04	-0.041	-55	-3.78E-05	-0.004	-5
LakeArgyle	128.75	-16.11	-4.18E-04	-0.049	-27	-5.39E-04	-0.053	-35
Birdsville	139.35	-25.9	-4.43E-04	-0.043	-25	1.41E-04	0.022	21
Jabiru	132.89	-12.66	-3.82E-04	-0.045	-33	-1.36E-04	-0.002	-2
TingaTingana	139.99	-28.97	-8.00E-04	-0.038	-14	6.37E-04	0.079	91

Middle East Station name	Lon	Lat	Slope AOD trend MODIS 2000 - 2009	Change in AOD	Change in AOD %	Slope AOD trend MISR 2000 - 2009	Change in AOD	Change in AOD %
Nes Ziona (IL)	34.78	31.92	-5.67E-04	-0.072	-22	-2.76E-04	-0.037	-15
Sede Boker (IL)	34.78	30.85	-			9.55E-05	0.007	3
Dhabi (UAE)	54.38	24.48	1.77E-03	0.206	67	7.01E-04	0.073	20
Dhadnah (UAE)	56.32	25.51	1.18E-03	0.140	42	4.26E-04	0.042	12

South Americ Station name	lon	lat	Slope AOD trend MODIS 2000 - 2009	Change in AOD	Change in AOD %	Slope AOD trend MISR 2000 - 2009	Change in AOD	Change in AOD %
Balbina	-59.49	-1.86	-1.75E-04	-0.021	-12	3.49E-04	0.041	26
Tukurui	-49.68	-3.37	-1.17E-04*	-0.030	-15	-3.79E-04	-0.025	-11
PetrolinaS	-40.5	-9.38	-1.74E-04	-0.012	-18	2.12E-05	0.004	4
Uberlandia	-48.27	-18.9	7.85E-05	0.008	13	4.71E-04	0.061	77
Jamarai	-62.75	-8.63	-5.69E-05	-0.002	0	3.37E-04	0.050	20
ElRefugio	-61.82	-14.46	-5.23E-04	-0.031	-12	-1.76E-04	-0.007	-3
SaoMartino	-53.06	-29.42	-3.69E-04	-0.037	-53	8.50E-05	0.001	1
Cordoba	-64.46	-31.52	-3.89E-05	-0.005	-7	1.01E-04	0.014	16
Santiago	-70.72	-33.48	-4.07E-04	-0.048	-27	4.62E-04	0.027	54
AbracosHill	-62.36	-10.76	8.13E-04	0.089	37	1.08E-04	0.023	10
AltaForesta	-56.1	-9.87	5.10E-04	0.063	26	-4.24E-05	-0.002	-1
Arica	-70.31	-18.47	-4.37E-04	-0.045	-19	-3.20E-04	-0.037	-16
CuiabaMir	-56.02	-15.73	-5.06E-04	-0.062	-28	-9.48E-05	-0.010	-6
Belterra	-54.95	-2.64	-5.69E-04	-0.066	-22	5.75E-04	0.097	80
RioBranco	-67.87	-9.96	1.57E-04	0.022	11	4.62E-04	0.054	24

The outlier of AOD 1.65 on December 2009 is excluded, otherwise the slope of the trend line would be positieve (6.66E-04).

North America Station name	Lon	Lat	Slope AOD trend MODIS 2000 - 2009	Change in AOD	Change in AOD %	Slope AOD trend MISR 2000 - 2009	Change in AOD	Change in AOD %
Kelowna	-119.37	49.95	-2.91E-04	-0.040	-32	-1.45E-04	-0.018	-21
HJAndrews	-122.22	44.24	-2.00E-04	-0.023	-34	2.24E-04	0.022	29
Ukiah	-118.91	45.14	-3.55E-05	-0.004	-3	1.52E-04	0.015	25
Biggs	-121.73	39.45	-1.40E-04	-0.017	-18	5.96E-06	-0.001	-1
TableMountain	-117.67	34.37	-2.73E-04	-0.032	-14	-2.36E-04	-0.029	-20
Arizona	-110.77	32.42	-4.09E-04	-0.048	-21	-4.93E-05	-0.007	-9
LosAlamos	-106.31	35.86	-2.57E-04	-0.030	-16	-1.36E-04	-0.018	-18
Colorado	-105.55	40.45	-4.01E-04	-0.047	-29	-1.69E-04	-0.024	-30
Regina	-104.71	50.21	-4.76E-04	-0.061	-26	3.57E-04	0.035	36
PickleLake	-90.21	51.45	-3.12E-04	-0.042	-33	2.99E-04	0.032	39
OK_St_Univ	-97.91	35.04	-2.21E-04	-0.027	-27	-2.58E-04	-0.026	-19
SiouxFalls	-96.63	43.7	-1.51E-04	-0.019	-17	-9.48E-06	-0.005	-4
Kellogg_LTER	-85.37	42.41	-3.17E-04	-0.039	-24	1.21E-04	0.013	9
Walkerbranch	-84.28	35.96	-5.51E-04	-0.062	-34	-7.68E-05	-0.013	-10
JonesERC	-84.47	31.35	-3.82E-04	-0.047	-29	-4.67E-04	-0.058	-33
ColumbiaScienceC	-81.03	34.02	-6.67E-04	-0.082	-43	-2.04E-04	-0.026	-15
BigMeadows	-78.43	38.53	-7.93E-04	-0.094	-50	-8.61E-04	-0.101	-52
Burtonsvile	-76.94	39.09	-7.21E-04	-0.085	-37	-5.40E-04	-0.064	-35
CalipsoWilstonLK	-75.84	38.83	-6.92E-04	-0.082	-34	-1.98E-04	-0.026	-16
HavardForest	-72.19	42.55	-4.32E-04	-0.050	-39	-2.61E-08	0.000	0
Chapais	-74.98	49.87	-2.46E-04	-0.035	-26	-1.23E-04	-0.008	-7
Bondville	-88.37	40.05	-2.33E-04	-0.031	-22	2.05E-04	0.023	16
BrattsLake	-104.7	50.28	-4.76E-04	-0.061	-26	3.57E-04	0.040	42
BSRNBoulder	-105	40.04	-4.01E-04	-0.047	-29	1.44E-04	0.006	7
Cartel	-71.93	45.38	-2.33E-04	-0.031	-26	-1.06E-04	-0.012	-12
CARTEsite	-97.48	36.59	-3.06E-04	-0.039	-36	1.74E-05	0.002	2
CCNY	-73.94	40.82	-3.28E-04	-0.042	-19	-1.64E-04	-0.019	-10
Egbert	-79.75	44.22	-5.53E-04	-0.068	-38	-1.61E-04	-0.020	-13
Fresno	-119.77	36.78	-4.30E-04	-0.052	-27	-7.09E-05	-0.008	-5
GSFC	-76.84	39.99	-7.21E-04	-0.089	-38	-2.54E-04	-0.029	-19
Howland	-68.73	45.2	-2.35E-04	-0.029	-28	-1.03E-04	-0.012	-10
KonzaEDC	-96.61	36.1	-1.89E-04	-0.026	-25	-2.97E-04	-0.035	-27
LaJolla	-117.25	32.87	-1.52E-04	-0.018	-13	-3.13E-04	-0.036	-20
Maricopa	-111.97	33.06	-3.06E-04	-0.039	-17	-4.83E-05	-0.006	-5
MDScienceCentre	-76.62	39.28	-7.21E-04	-0.088	-38	-5.40E-04	-0.062	-34
Seviletta	-106.88	34.36	-3.08E-04	-0.038	-23	-2.71E-04	-0.031	-22
Tuscon	-110.95	32.23	-4.09E-04	-0.051	-22	-4.93E-05	-0.006	-7
RailroadValley	-115.96	38.5	-2.67E-04	-0.032	-10	1.72E-04	0.020	20
Rimrock	-116.99	46.87	5.16E-05	0.006	7	2.16E-04	0.023	26
Missoula	-114.08	46.92	-9.56E-05	-0.013	-9	2.76E-05	0.003	3

Africa Station name	Lon	Lat	Slope AOD trend MODIS 2000 - 2009	Change in AOD	Change in AOD %	Slope ADO trend MISR 2000 - 2009	Change in AOD	Change in AOD %
Djougou	1.59	9.76	-1.03E-03	-0.120	-24	-5.10E-04	-0.065	-13
Lamto	-5.03	6.21	-8.15E-04	-0.122	-25	7.63E-04	0.097	18
Ilorin	4.34	8.32	-8.56E-04	-0.102	-20	-5.66E-04	-0.065	-11
Kasama	31.18	-10.17	-3.48E-04	-0.041	-24	2.84E-04	0.041	29
Senanga	23.29	-16.11	-2.59E-04	-0.030	-15	-1.63E-04	-0.019	-10
Onagadogou	-1.4	12.2	-3.15E-04	-0.040	-12	-1.07E-05	-0.010	-3
Banizoumbou	2.66	13.54	5.30E-05	0.002	1	-2.56E-04	-0.029	-6
Blida	2.88	36.5	-5.36E-04	-0.063	-31	-2.06E-04	-0.028	-20

Asia Station name	Lon	Lat	Slope AOD trend MODIS 2000 - 2009	Change in AOD	Change in AOD %	Slope AOD trend MISR 2000 - 2009	Change in AOD	Change in AOD %
Dharwar (IN)	75	15.42	2.12E-04	0.027	15	2.57E-04	0.031	17
Vishkhapatnam (IN)	83.34	17.74	1.07E-03	0.127	37	6.47E-04	0.067	17
Chitkara (IN)	76.87	30.86	-8.48E-04	-0.100	-16	-3.75E-04	-0.043	-10
Kanpur (IN)	80.23	26.51	1.86E-04	0.014	2	7.89E-04	0.089	22
GandhiCollege (IN)	84.13	25.87	6.54E-05	0.007	1	3.21E-04	0.045	11
ChiangMai (TH)	98.97	18.79	-5.15E-04	-0.060	-21	-2.76E-04	-0.031	-12
Pimai (TH)	102.56	15.18	-4.57E-04	-0.053	-14	-2.20E-04	-0.033	-11
Asia1 (CN)	87.64	43.78	-4.66E-04	-0.006	-18	6.26E-05	0.006	6
Jingtai (CN)	104.1	37.32	-2.59E-05	-0.021	-6	-1.58E-04	-0.021	-7
Nuist (CN)	118.72	32	1.49E-04	0.018	3	3.14E-04	0.035	8
BackgardenGZ (CN)	113.02	23.29	1.06E-03	0.124	23	6.11E-04	0.071	14
Lhasa (CN)	91.03	29.64	-3.88E-04	-0.046	-30	4.44E-04	0.044	42
Dunhuang (CN)	94.79	40.34	*			7.02E-05	0.008	3
Liangning (CN)	102.7	41.51	*			-5.79E-05	-0.008	-4
Singapore	103.78	1.29	2.38E-04	0.027	10	1.84E-03	0.194	95
Dalanzadgad (MN)	104.42	43.57	-4.39E-04	-0.056	-23	-9.05E-05	-0.013	-9
Ulanangom (MN)	92.08	49.97	-8.60E-04	-0.106	-34	1.54E-04	0.015	11
Bandung (ID)	107.61	-6.88	2.08E-05	0.003	1	-1.90E-04	-0.021	-12
Yakutsk (RU)	129.36	61.66	-1.04E-04	-0.019	-14	2.03E-04	0.022	19
Tomsk (RU)	85.04	56.47	-1.47E-04	-0.024	-17	4.80E-05	0.004	3
Irkurtsk (RU)	103.08	51.8	-9.85E-04	-0.123	-58	4.38E-04	0.056	55
Yerkatarinaburg (RU)	59.54	57.03	-5.62E-04	-0.068	-37	6.29E-05	0.007	7
Barnaul (RU)	83.77	53.34	-1.89E-04	-0.027	-18	-7.74E-05	-0.012	-9
BacGiang (VN)	106.22	21.29	7.45E-04	0.087	19	8.94E-04	0.100	23
ChenKungUniv (TW)	120.21	23	-4.93E-04	-0.058	-14	1.60E-04	0.020	5
Silpakorn (TH)	100.06	13.76	-3.41E-04	-0.036	-8	7.79E-04	0.092	33
Hefei (CN)	117.16	31.9	-2.36E-04	-0.025	-3	7.61E-04	0.088	21
Beijing (CN)	116.38	39.97	5.90E-04	0.060	11	6.49E-04	0.076	19
Xianghe (CN)	116.96	39.75	5.90E-04	0.060	11	7.83E-04	0.092	24
Taihu (CN)	120.21	31.41	1.51E-03	0.171	-23	8.40E-04	0.096	21
Osaka (JP)	135.59	34.65	-6.13E-04	-0.072	-21	-6.27E-04	-0.066	-25
Anmyon (KR)	126.33	36.54	-1.17E-04	-0.019	-5	3.39E-04	0.044	12

* MODIS does not register AOD over these locations because these stations are characterised by bright surfaces.

Table S2 Overview of the AERONET locations for which we have more than 50 months Level 2 data available, together with the slopes of the AOD trend by MODIS and MISR during the same period. The stations are presented by red dots in Figure 1. In the last column the number of months for which AERONET data is available during the period indicated in the previous column.

Station name	Lon	Lat	Slope AOD trend MODIS	Slope AOD trend MISR	Slope AOD trend AERONET	Period	Number of months
EUROPE							
Palaiseau (FR)	2.21 E	48.70 N	-5.50E-04	-2.28E-04	-2.06E-04	2000 – 2009	81
Carpentras (FR)	5.06 E	44.08 N	-4.28 E-04	-1.00E-04	-7.22E-04	2003 – 2009	73
Dunkerque (FR)	2.37 E	51.03 N	-2.23E-04	-1.74E-04	-7.75E-04	2003 – 2009	55
La Fauga (FR)	1.28 E	43.38 N	-1.05E-04	-1.47E-04	-9.96E-04	2002 – 2008	59
Lille (FR)	3.14 E	50.61 N	-5.14E-04	-1.04E-04	-6.07E-05	2000 – 2009	103
Cabauw (NL)	4.92 E	51.97 N	-2.10E-04	-1.69E-03	-1.71E-03	2003 – 2009	54
Barcelona (ES)	2.11 E	41.38 N	-6.86E-06	-3.09E-04	-1.89E-05	2004 – 2009	55
El Arenosillo (ES)	6.73 W	37.10 N	-4.79E-04	-4.38E-04	-2.44E-04	2000 – 2008	88
Evora (P)	7.91 W	38.56 N	-5.54E-04	-9.60E-05	-5.30E-04	2003 – 2009	63
IFT Leipzig (D)	12.43 E	51.35 N	-1.73E-03	-5.42E-04	-8.23E-04	2001 – 2008	78
Mainz (D)	8.30 E	50.0 N	-2.28E-04	-2.80E-04	-4.04E-04	2003 – 2009	57
Forth Crete (GR)	25.28 E	35.33 N	-8.54E-04	-4.08E-04	-7.56E-04	2003 – 2008	63
Rome Tor Vergata (I)	12.64 E	41.84 N	-3.85E-04	-7.20E-05	-2.06E-04	2001 – 2009	92
Ispra (I)	8.63 E	45.81 N	-8.80E-04	-6.21E-04	-8.23E-04	2001 – 2008	78
Venice (I)	12.50 E	45.31 N	-1.17E-03	-1.18E-04	-2.72E-04	2000 – 2006	74
Lecce University (I)	18.11E	40.33 N	-3.46E-04	-2.08E-04	-2.18E-04	2003 – 2008	61
Laegeren (CH)	8.35 E	47.48 N	-3.31E-04	-5.98E-04	-8.75E-05	2003 - 2009	57

Station name	Lon	Lat	Slope AOD trend MODIS	Slope AOD trend MISR	Slope AOD trend AERONET	Period	Number of months
Eastern Europe							
Belsk (Pl)	20.80 E	51.82 N	-1.55E-03	-8.75E-04	-8.47E-04	2002 – 2008	66
Moldova	28.81 E	46.99 N	-5.76E-04	-1.85E-04	-4.16E-04	2000 – 2009	90
IMS-METU-ERDEMLI (TR)	34.25 E	36.56 N	-2.65E-04	-3.67E-05	8.82E-05	2000 – 2009	77
Minsk (Belarus)	27.60 E	53.90 N	-7.21E-04	-2.44E-04	-1.03E-03	2002 - 2009	73

Station name	Lon	Lat	Slope AOD trend MODIS	Slope AOD trend MISR	Slope AOD trend AERONET	Period	Number of months
North America							
Bratts Lake (CA)	104.70 W	50.28 N	-3.46E-04	-4.50E-04	2.41E-04	2000 – 2009	103
Walker Branch (US)	84.28 W	35.96 N	-5.77E-04	3.48E-05	-6.51E-04	2000 – 2009	73
Bondville (US)	88.37 W	40.05 N	-1.89E-04	4.72E-04	-5.27E-04	2000 – 2008	92
BSRN BAO Boulder (US)	105.00 W	40.04 N	-2.77E-04	-9.50E-06	-3.97E-05	2001 – 2009	99
CARTEL (US)	71.93 W	45.38 N	1.13E-04	-1.79E-04	-4.66E-05	2000 – 2008	75
CART-SITE (US)	97.48 W	36.59 N	-6.17E-04	-1.32E-04	-2.21E-04	2000 – 2007	70
CCNY (US)	73.94 W	40.82 N	-5.82E-04	-4.29E-04	-2.40E-04	2001 – 2009	77
Egbert (US)	79.75 W	44.22 N	-4.70E-04	-9.84E-05	-1.69E-04	2000 – 2009	87
Fresno (US)	119.77 W	36.78 N	-3.78E-04	1.53E-05	-1.04E-04	2002 – 2009	74
GSFC (US)	76.84 W	39.99 N	-6.83E-04	-2.54E-04	-2.93E-04	2000 – 2009	115
Howland (US)	68.73 W	45.20 N	-1.42E-04	-1.37E-04	-6.71E-05	2000 – 2009	92
Konza EDC (US)	96.61 W	36.10 N	-3.71E-04	-5.88E-04	-3.98E-04	2000 – 2007	75
La Jolla (US)	117.25 W	32.87 N	-2.47E-04	-3.10E-04	-2.89E-04	2000 – 2007	66
Maricopa (US)	111.97 W	33.06 N	-1.01E-03	-2.40E-04	-2.15E-04	2000 – 2005	61
MD Science Centre (US)	76.62 W	39.28 N	-6.28E-04	-5.41E-04	-3.65E-04	2000 – 2009	108
Seviletta (US)	106.88 W	34.36 N	-3.24E-04	-2.71E-04	-1.64E-04	2000 – 2009	87
Railroad Valley (US)	115.96 W	38.50 N	2.87E-04	3.77E-04	1.96E-04	2001 – 2008	57
Rimrock (US)	116.99 W	46.87 N	-6.43E-05	2.16E-04	-2.40E-04	2000 – 2009	108
Missoula (US)	114.08 W	46.92 N	1.14E-04	4.17E-05	-1.62E-04	2000 – 2009	84

Station name	Lon	Lat	Slope AOD trend MODIS	Slope AOD trend MISR	Slope AOD trend AERONET	Period	Number of months
Australia							
Lake Argyle	128.75 E	16.11 S	-5.97E-04	-5.59E-04	6.90E-05	2002 – 2007	54
Jabiru	132.89 E	12.66 S	-2.69E-04	-1.07E-04	-3.86E-04	2001 - 2007	61

Station name	Lon	Lat	Slope AOD trend MODIS	Slope AOD trend MISR	Slope AOD trend AERONET	Period	Number of months
Middle East							
Nes Ziona (IL)	34.78	31.92	-3.99E-04	-1.33E-04	3.08E-04	2000 - 2008	85
Sede Boker (IL)	34.78	30.85	-	1.51E-04	3.01E-05	2000 - 2009	108

Station name	Lon	Lat	Slope AOD trend MODIS	Slope AOD trend MISR	Slope AOD trend AERONET	Period	Number of months
South America							
Cuiaba-Miranda (BR)	56.02 E	15.73 S	-6.41E-04	-2.66E-04	-2.04E-04	2001 – 2009	69
Belterra (BR)	54.95 E	2.64 S	-5.79E-04	5.75E-04	1.59E-03	2000 – 2005	55
Abracos Hill (BR)	62.36 E	10.76 S	5.10E-03	3.38E-03	2.04E-03	2000 – 2005	55
Alta Floresta (BR)	56.10 E	9.87 S	4.51E-04	2.36E-04	2.61E-05	2000 - 2009	99
Rio Branco (BR)	67.87 E	9.96 S	3.37E-04	7.21E-04	6.48E-05	2000 – 2009	72
Arica (CL)	70.31 E	18.47 S	-1.60E-04	-1.92E-04	-3.35E-04	2000 - 2008	55
Cordoba CETT (AR)	64.46 E	31.52 S	-1.43E-04	9.41E-05	5.72E05	2000 - 2007	68

Station name	Lon	Lat	Slope AOD trend MODIS	Slope AOD trend MISR	Slope AOD trend AERONET	Period	Number of months
Africa							
Ilorin (Nigeria)	4.34 E	8.32 N	-5.13E-04	7.29E-05	-1.20E-03	2001 - 2009	80
Onagadogou (Burkina Faso)	1.40 W	12.20 N	-3.71E-04	4.04E04	1.90E-03	2000 – 2007	70
Banizoumbou (Niger)	2.66 E	13.54 N	4.94E-05	-5.84E-05	1.09E-03	2000 – 2009	98
Blida (Algiers)	2.88 E	36.50 N	1.24E-04	3.28E-04	8.66E-05	2003 - 2008	56

Station name	Lon	Lat	Slope AOD trend MODIS	Slope AOD trend MISR	Slope AOD trend AERONET	Period	Number of months
Asia							
Kanpur (IN)	80.23 E	26.51 N	-5.23E-07	2.52E-04	1.66E-04	2001 – 2008	84
Beijing (CN)	116.38 E	39.97 N	4.94E-04	3.90E-04	-1.03E-03	2001 - 2009	89
Xianghe (CN)	116.96 E	39.75 N	2.65E-03	2.50E-03	8.19E-05	2001 – 2009	60
Dalanzadgad (MN)	104.42 E	43.57 N	-1.13E-03	-3.85E-04	-1.40E-07	2000 - 2007	78
Tomsk (RU)	85.04 E	56.47 N	-7.87E-04	-3.98E-04	-1.85E-05	2002 – 2009	64
Osaka (JP)	135.59 E	34.65 N	-2.74E-04	-6.23E-04	6.16E-04	2001 – 2008	59
Anmyon (KR)	126.33 E	36.54 N	2.23E-04	2.60E-03	1.07E-03	2000 - 2007	61

TABLE S3 Average monthly mean Level 3 AODs for MODIS, MISR and AERONET (Level 2) between 2000 and 2009, together with the standard deviation and the temporal correlation coefficient with AERONET and the number of months for which AOD data is available for each station.

Europe											
Station name	**MISR**	**stdev**	**r**	**#**	**MODIS**	**stdev**	**r**	**#**	**AERONET**	**stdev**	**#**
Forth Crete	0.18	0.056	0.49	63	0.21	0.054	0.84	63	0.17	0.045	63
Blida	0.12	0.083	0.83	57	0.16	0.082	0.94	57	0.22	0.110	56
Rome	0.19	0.063	0.70	105	0.19	0.066	0.91	106	0.18	0.049	92
Palaiseau	0.13	0.069	0.61	83	0.18	0.090	0.72	106	0.16	0.057	81
Barcelona	0.19	0.091	0.41	59	0.16	0.056	0.92	60	0.17	0.058	55
Evora	0.08	0.057	0.55	74	0.12	0.053	0.77	74	0.17	0.047	63
La Fauga	0.08	0.048	0.61	18	0.15	0.073	0.80	63	0.15	0.049	59
El Arenosillo	0.17	0.060	0.58	104	0.12	0.054	0.77	104	0.14	0.054	88
Cabauw	0.18	0.117	0.37	62	0.23	0.089	0.51	61	0.21	0.091	54
Carpentras	0.12	0.054	0.70	74	0.12	0.054	0.79	76	0.14	0.048	73
Dunkerque	0.14	0.094	0.49	60	0.18	0.052	0.63	59	0.17	0.056	55
IFT Leipzig	0.16	0.113	0.37	74	0.24	0.113	0.71	69	0.18	0.079	78
Ispra	0.22	0.113	0.26	84	0.27	0.124	0.26	90	0.18	0.079	78
Venice	0.19	0.081	0.58	70	0.29	0.113	0.78	74	0.23	0.078	74
Laegeren	0.09	0.050	0.31	24	0.14	0.056	0.64	57	0.13	0.044	57
Lille	0.15	0.091	0.61	89	0.23	0.095	0.76	86	0.18	0.064	103
Mainz	0.16	0.093	0.60	61	0.16	0.061	0.58	54	0.18	0.061	57
Lecce Univ	0.20	0.067	0.59	70	0.18	0.052	0.66	70	0.19	0.051	61
Average	*0.153*	*0.078*	0.54		*0.185*	*0.074*	0.72		*0.175*	*0.062*	

Eastern Europe											
Station name	**MISR**	**stdev**	**r**	**#**	**MODIS**	**stdev**	**r**	**#**	**AERONET**	**stdev**	**#**
Moldova	0.16	0.078	0.64	101	0.13	0.075	0.84	105	0.18	0.070	90
Minsk	0.14	0.081	0.49	59	0.18	0.140	0.93	60	0.17	0.105	73
IMS-METU-ERDEMLI	0.23	0.079	0.53	105	0.25	0.110	0.72	107	0.24	0.091	77
Belsk	0.15	0.096	0.71	65	0.21	0.107	0.81	64	0.20	0.077	66
Average	*0.171*	*0.084*	0.59		*0.194*	*0.108*	0.83		*0.197*	*0.086*	

Asia											
Station name	**MISR**	**stdev**	**r**	**#**	**MODIS**	**stdev**	**r**	**#**	**AERONET**	**stdev**	**#**
Kanpur	0.45	0.151	0.72	83	0.69	0.296	0.61	90	0.54	0.171	84
Dalanzadgad	0.13	0.073	0.76	82	0.22	0.073	0.60	30	0.10	0.060	78
Tomsk	0.13	0.066	0.66	50	0.14	0.110	0.71	47	0.15	0.620	64
Beijing	0.45	0.277	0.60	98	0.60	0.323	0.78	104	0.68	0.254	89
Xianghe	0.44	0.286	0.65	97	0.60	0.328	0.78	101	0.70	0.268	60
Osaka	0.22	0.123	0.40	29	0.31	0.128	0.74	76	0.32	0.140	59
Anmyon	0.42	0.295	0.43	40	0.43	0.219	0.76	93	0.38	0.180	61
Average	*0.320*	*0.182*	0.60		*0.426*	*0.211*	0.71		*0.410*	*0.242*	

Africa											
Station name	**MISR**	**stdev**	**r**	**#**	**MODIS**	**stdev**	**r**	**#**	**AERONET**	**stdev**	**#**
Ilorin	0.57	0.279	0.65	48	0.46	0.253	0.84	99	0.62	0.311	80
Ouagadogou	0.37	0.164	0.58	80	0.32	0.122	0.55	69	0.53	0.253	70
Banizoumbou	0.45	0.184	0.69	108	0.36	0.115	0.34	33	0.52	0.221	98
Blida	0.12	0.083	0.83	57	0.16	0.082	0.94	57	0.22	0.110	56
Average	*0.376*	*0.178*	0.69		*0.325*	*0.143*	0.67		*0.474*	*0.224*	

North America											
Station name	**MISR**	**stdev**	**r**	**#**	**MODIS**	**stdev**	**r**	**#**	**AERONET**	**stdev**	**#**
Walker Branch	0.12	0.109	0.67	96	0.16	0.132	0.94	110	0.18	0.114	73
Bondville	0.16	0.097	0.52	98	0.13	0.076	0.73	103	0.17	0.100	92
Bratts Lake	0.12	0.061	0.71	89	0.20	0.097	0.70	81	0.09	0.044	103
BSRN BAO Boulder	0.05	0.045	0.77	94	0.05	0.054	0.44	101	0.04	0.043	99
Cartel	0.10	0.078	0.50	71	0.11	0.071	0.22	65	0.11	0.047	75
CARTE- SITE	0.12	0.066	0.85	85	0.09	0.055	0.78	86	0.13	0.061	70
CCNY	0.19	0.099	0.71	84	0.21	0.113	0.94	87	0.17	0.096	77
Egbert	0.15	0.088	0.44	97	0.15	0.092	0.51	91	0.12	0.052	87
Fresno	0.16	0.050	0.22	86	0.17	0.055	0.40	89	0.15	0.045	74
GSFC	0.14	0.110	0.74	111	0.19	0.119	0.88	115	0.18	0.113	115
Howland	0.11	0.068	0.30	103	0.09	0.065	0.33	73	0.10	0.075	92
Konza EDC	0.12	0.094	0.48	78	0.09	0.059	0.79	81	0.12	0.061	75
La Jolla	0.16	0.059	0.65	83	0.14	0.048	0.70	84	0.11	0.037	66
Maricopa	0.12	0.047	0.79	69	0.21	0.068	0.77	69	0.08	0.030	61
MD Science Centre	0.15	0.123	0.76	106	0.19	0.121	0.75	111	0.19	0.116	108
Seviletta	0.13	0.064	0.83	117	0.14	0.048	0.67	117	0.07	0.037	87
Railroad Valley	0.11	0.058	0.73	87	0.30	0.080	0.73	85	0.06	0.035	57
Rimrock	0.10	0.061	0.56	95	0.09	0.040	0.62	102	0.12	0.055	108
Missoula	0.08	0.052	0.61	82	0.14	0.070	0.56	90	0.11	0.068	84

Average	*0.125*	*0.075*	0.62		*0.150*	*0.077*	0.66		*0.120*	*0.065*	

South America											
Station name	**MISR**	**stdev**	**r**	**#**	**MODIS**	**stdev**	**r**	**#**	**AERONET**	**stdev**	**#**
Cordoba_CETT	0.09	0.051	0.63	82	0.07	0.034	0.80	84	0.09	0.039	68
Abracos Hill	0.26	0.240	0.82	48	0.29	0.345	0.93	67	0.30	0.256	55
Alta Foresta	0.24	0.272	0.85	82	0.28	0.376	0.96	100	0.28	0.324	99
Arica	0.21	0.074	0.57	106	0.23	0.063	0.63	96	0.26	0.069	55
Cuiaba-Miranda	0.16	0.163	0.84	88	0.20	0.256	0.91	91	0.23	0.229	69
Belterra	0.17	0.181	0.79	19	0.28	0.155	0.66	54	0.21	0.140	55
Rio Branco	0.26	0.270	0.74	59	0.23	0.292	0.88	102	0.20	0.202	72
Average	*0.199*	*0.179*	0.75		*0.225*	*0.217*	0.82		*0.224*	*0.180*	

Australia											
Station name	**MISR**	**stdev**	**r**	**#**	**MODIS**	**stdev**	**r**	**#**	**AERONET**	**stdev**	**#**
Lake Argyle	0.11	0.069	0.82	62	0.14	0.061	0.75	65	0.11	0.077	54
Jaribu	0.12	0.089	0.72	63	0.11	0.085	0.51	68	0.14	0.080	61
Average	0.12	0.079	0.77		0.12	0.073	0.63		0.13	0.079	

Middle East											
Station name	**MISR**	**stdev**	**r**	**#**	**MODIS**	**stdev**	**r**	**#**	**AERONET**	**stdev**	**#**
Nes Ziona	0.24	0.101	0.25	104	0.29	0.113	0.71	104	0.23	0.067	85
Sede Boker	0.25	0.073	0.42	118	-	-	-	-	0.18	0.057	108
Average	0.24	0.087	0.34						0.20	0.062	96.5

Table S4 Overview of the mean AOD, the slope of the AOD trend line and the difference in AOD of the regression line for the AERONET stations (presented by red dots in Fig. 2), based on daily average Level 2 data, together with the number of days for which AOD data is available.

Station name	Lon	Lat	Mean AOD	Slope AOD trend AERONET	Change in AOD	Change in AOD %	Period	Number of days
EUROPE								
Palaiseau (FR)	2.21 E	48.70 N	0.175	-9.01E-06	-0.016	-9	2000 – 2009	1337
Carpentras (FR)	5.06 E	44.08 N	0.145	-2.73E-05	-0.050	-29	2003 – 2009	1716
Dunkerque (FR)	2.37 E	51.03 N	0.181	-1.96E-05	-0.022	-11	2003 – 2009	685
La Fauga (FR)	1.28 E	43.38 N	0.153	-5.92E-05	-0.068	-36	2002 – 2008	1060
Lille (FR)	3.14 E	50.61 N	0.186	-2.97E-06	-0.008	-4	2000 – 2009	1313
Cabauw (NL)	4.92 E	51.97 N	0.222	-9.97E-05	-0.088	-33	2003 – 2009	788
Barcelona (ES)	2.11 E	41.38 N	0.175	6.03E-06	0.003	2	2004 – 2009	1189
El Arenosillo (ES)	6.73 W	37.10 N	0.140	-7.31E-06	-0.018	-12	2000 – 2008	2112
Evora (P)	7.91 W	38.56 N	0.121	-3.22E-05	-0.047	-32	2003 – 2009	188
IFT Leipzig (D)	12.43 E	51.35 N	0.191	-6.09E-05	-0.064	-29	2001 – 2008	943
Mainz (D)	8.30 E	50.0 N	0.182	5.83E-06	0.003	2	2003 – 2009	718
Forth Crete (GR)	25.28 E	35.33 N	0.181	-7.60E-06	-0.016	-9	2003 – 2008	1741
Rome Tor Vergata (I)	12.64 E	41.84 N	0.182	-6.43E-06	-0.015	-9	2001 – 2009	1951
Ispra (I)	8.63 E	45.81 N	0.253	-3.87E-05	-0.084	-29	2001 – 2008	2077
Venice (I)	12.50 E	45.31 N	0.145	-1.47E-04	-0.040	-16	2000 – 2006	1460
Lecce University (I)	18.11E	40.33 N	0.190	-8.28E-06	-0.016	-8	2003 – 2008	1363
Laegeren (CH)	8.35 E	47.48 N	0.142	-9.05E-06	-0.013	-9	2003 - 2009	814

Station name	Lon	Lat	Mean AOD	Slope AOD trend AERONET	Change in AOD	Change in AOD %	Period	Number of days
Eastern Europe								
Belsk (Pl)	20.80 E	51.82 N	0.199	-8.80E-05	-0.092	-37	2002 – 2008	957
Moldova	28.81 E	46.99 N	0.194	-2.00E-05	-0.037	-17	2000 – 2009	1643
IMS-METU-ERDEMLI (TR)	34.25 E	36.56 N	0.237	5.88E-06	0.006	2	2000 – 2009	1682
Minsk (Belarus)	27.60 E	53.90 N	0.181	-8.42E-05	-0.085	-38	2002 - 2009	929

Station name	Lon	Lat	Mean AOD	Slope AOD trend AERONET	Change in AOD	Change in AOD %	Period	Number of days
North America								
Bratts Lake (CA)	104.70 W	50.28 N	0.095	1.64E-05	0.027	33	2000 – 2009	1758
Walker Branch (US)	84.28 W	35.96 N	0.196	-5.45E-05	-0.078	-33	2000 – 2009	1340
Bondville (US)	88.37 W	40.05 N	0.177	-3.75E-05	-0.066	-31	2000 – 2008	1650
BSRN BAO Boulder (US)	105.00 W	40.04 N	0.088	-1.84E-07	-0.002	-2	2001 – 2009	2175
CARTEL (US)	71.93 W	45.38 N	0.119	-8.05E-06	-0.012	-10	2000 – 2008	1131
CCNY (US)	73.94 W	40.82 N	0.176	-2.13E-05	-0.030	-16	2001 – 2009	1208
Egbert (US)	79.75 W	44.22 N	0.129	-1.21E-05	-0.018	-13	2000 – 2009	1250
Fresno (US)	119.77 W	36.78 N	0.144	-3.48E-06	-0.008	-6	2002 – 2009	1674
GSFC (US)	76.84 W	39.99 N	0.184	-7.98E-06	-0.022	-11	2000 – 2009	2398
Howland (US)	68.73 W	45.20 N	0.102	-6.22E-6	-0.010	-9	2000 – 2009	1199
Konza EDC (US)	96.61 W	36.10 N	0.130	-1.32E-05	-0.024	-17	2000 – 2007	1635
La Jolla (US)	117.25 W	32.87 N	0.109	-1.34E-05	-0.019	16	2000 – 2007	1261
Maricopa (US)	111.97 W	33.06 N	0.073	-3.65E-05	-0.016	-17	2000 – 2005	1476
MD Science Centre (US)	76.62 W	39.28 N	0.192	-1.22E-05	-0.029	-14	2000 – 2009	2113
Seviletta (US)	106.88 W	34.36 N	0.071	-5.99E-06	-0.012	16	2000 – 2009	1856
Railroad Valley (US)	115.96 W	38.50 N	0.061	4.91E-06	0.006	10	2001 – 2008	1445
Rimrock (US)	116.99 W	46.87 N	0.096	8.80E-06	0.013	14	2000 – 2009	1625
Missoula (US)	114.08 W	46.92 N	0.118	-3.56E-06	-0.008	-6	2000 – 2009	1412

Station name	Lon	Lat	Mean AOD	Slope AOD trend AERONET	Change in AOD	Change in AOD %	Period	Number of days
Australia								
Lake Argyle	128.75 E	16.11 S	0.116	6.95E-06	0.018	17	2002 – 2007	1332
Jabiru	132.89 E	12.66 S	0.139	1.06E-05	0.012	9	2001 - 2007	1391

Station name	Lon	Lat	Mean AOD	Slope AOD trend AERONET	Change in AOD	Change in AOD %	Period	Number of days
Middle East								
Nes Ziona (IL)	34.78 E	31.92 N	0.228	-1.06E-04	-0.003	-1	2000 - 2008	1817
Sede Boker (IL)	34.78 E	30.85 N	0.178	-1.62E-07	-0.002	1	2000 - 2009	2726

Station name	Lon	Lat	Mean AOD	Slope AOD trend AERONET	Change in AOD	Change in AOD %	Period	Number of days
South America								
Cuiaba-Miranda (BR)	56.02 W	15.73 S	0.247	-4.47E-05	-0.059	-21	2001 – 2009	1157
Belterra (BR)	54.95 W	2.64 S	0.220	1.45E-04	0.108	65	2000 – 2005	783
Abracos Hill (BR)	62.36 W	10.76 S	0.320	1.68E-04	0.143	57	2000 – 2005	902
Alta Floresta (BR)	56.10 W	9.87 S	0.309	4.61E-05	0.074	27	2000 - 2009	1721
Rio Branco (BR)	67.87 W	9.96 S	0.249	8.72E-05	0.081	38	2000 – 2009	997
Arica (CL)	70.31 W	18.47 S	0.262	-5.05E-05	-0.070	-24	2000 - 2008	1249
Cordoba CETT (AR)	64.46 W	31.52 S	0.094	5.32E-06	0.004	4	2000 - 2007	1178

Station name	Lon	Lat	Mean AOD	Slope AOD trend AERONET	Change in AOD	Change in AOD %	Period	Number of days
Africa								
Ilorin (Nigeria)	4.34 E	8.32 N	0.687	-9.64E-05	-0.182	-23	2001 - 2009	1750
Onagadogou (Burkina Faso)	1.40 W	12.20 N	0.519	9.52E-05	0.164	37	2000 – 2007	1802
Banizoumbou (Niger)	2.66 E	13.54 N	0.527	4.71E-05	0.119	26	2000 – 2009	2656
Blida (Algiers)	2.88 E	36.50 N	0.222	-2.78E-05	-0.045	-18	2003 - 2008	1445

Station name	Lon	Lat	Mean AOD	Slope AOD trend AERONET	Change in AOD	Change in AOD %	Period	Number of days
Asia								
Kanpur (IN)	80.23 E	26.51 N	0.561	2.72E-05	0.041	8	2001 – 2008	1849
Beijing (CN)	116.38 E	39.97 N	0.658	-3.52E-05	-0.076	-11	2001 - 2009	1854
Xianghe (CN)	116.96 E	39.75 N	0.662	1.11E-05	0.030	4	2001 – 2009	1260
Dalanzadgad (MN)	104.42 E	43.57 N	0.102	4.80E-06	0.006	6	2000 - 2007	1656
Tomsk (RU)	85.04 E	56.47 N	0.154	-2.37E-05	-0.027	-16	2002 – 2009	912
Osaka (JP)	135.59 E	34.65 N	0.308	4.08E-6	0.005	2	2001 – 2008	1009
Anmyon (KR)	126.33 E	36.54 N	0.351	1.61E-04	0.119	40	2000 - 2007	811