

Supplement of Atmos. Chem. Phys., 19, 7183–7207, 2019
<https://doi.org/10.5194/acp-19-7183-2019-supplement>
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Atmospheric
Chemistry
and Physics
Open Access


Supplement of

Intercomparison in spatial distributions and temporal trends derived from multi-source satellite aerosol products

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Table S1. Comparison between satellite-derived (AOD_S) and ground-based monthly AOD_A values during 2006-2010 over land and ocean

Products		Land				Ocean					
Metrics		N	R	MAE	RMSE	RMB	N	R	MAE	RMSE	RMB
AATSR-ADV		6979	0.734	0.086	0.153	0.868	959	0.712	0.068	0.100	1.149
AATSR-EN		7739	0.745	0.082	0.140	0.941	1023	0.711	0.061	0.093	1.063
AATSR-ORAC		8401	0.713	0.081	0.143	0.896	1066	0.696	0.069	0.100	1.204
AATSR-SU		7503	0.766	0.081	0.140	0.997	1026	0.693	0.058	0.098	0.988
AVHRR		7331	0.743	0.082	0.152	0.970	1051	0.783	0.047	0.078	1.004
MISR		7464	0.795	0.074	0.128	0.869	954	0.587	0.070	0.118	0.977
MOD08		8108	0.875	0.074	0.113	1.162	1088	0.814	0.069	0.093	1.309
MYD08		7945	0.870	0.068	0.110	1.090	1088	0.812	0.056	0.082	1.191
POLDER		7956	0.733	0.108	0.162	1.292	1027	0.694	0.071	0.110	1.247
SeaWiFS		4516	0.819	0.072	0.117	0.920	775	0.746	0.057	0.088	1.053

Table S2. Statistics of continent-scale performance between monthly AODs and AOD_A from 2006 to 2010

N	AATSR- ADV	AATSR- EN	AATSR- ORAC	AATSR- SU	AVHRR	MISR	MOD08	MYD08	POLDER	SeaWiFS
ENAM	1013	1071	1276	1034	1137	1083	1191	1167	1143	672
WNAM	1026	1089	1231	1072	1010	1116	1150	1127	1103	599
SAM	504	551	542	562	469	509	569	553	568	304
EUR	1856	1945	2163	1804	1960	1879	1972	1884	1954	1165
AFR	716	869	878	865	769	832	878	879	874	567
ME	115	286	286	285	213	286	286	286	286	248
SAA	303	312	302	313	277	268	318	316	315	183
EAA	696	726	805	689	767	703	804	805	812	341
SEA	241	291	257	277	212	204	314	320	305	78
OCE	244	307	308	313	235	304	318	310	312	223
MAE										
ENAM	0.049	0.047	0.056	0.045	0.044	0.048	0.056	0.047	0.133	0.047
WNAM	0.046	0.057	0.048	0.046	0.053	0.046	0.056	0.051	0.098	0.051
SAM	0.085	0.078	0.086	0.097	0.075	0.066	0.056	0.057	0.111	0.087
EUR	0.049	0.046	0.043	0.044	0.046	0.048	0.056	0.045	0.074	0.043
AFR	0.142	0.110	0.135	0.112	0.143	0.091	0.086	0.085	0.113	0.091
ME	0.101	0.095	0.099	0.113	0.200	0.075	0.094	0.080	0.091	0.094
SAA	0.200	0.183	0.170	0.173	0.129	0.148	0.155	0.136	0.145	0.174
EAA	0.182	0.205	0.187	0.184	0.164	0.186	0.136	0.131	0.152	0.149
SEA	0.150	0.120	0.123	0.114	0.137	0.127	0.113	0.115	0.158	0.130
OCE	0.055	0.043	0.040	0.069	0.042	0.038	0.041	0.041	0.057	0.045
RMSE										
ENAM	0.071	0.066	0.078	0.065	0.064	0.072	0.078	0.067	0.189	0.069
WNAM	0.069	0.089	0.079	0.076	0.072	0.068	0.076	0.073	0.129	0.076
SAM	0.151	0.147	0.165	0.153	0.115	0.135	0.091	0.091	0.169	0.139
EUR	0.068	0.065	0.062	0.066	0.070	0.071	0.075	0.062	0.117	0.059
AFR	0.239	0.162	0.198	0.171	0.264	0.138	0.123	0.125	0.175	0.137
ME	0.193	0.127	0.154	0.153	0.364	0.100	0.110	0.097	0.121	0.137
SAA	0.267	0.236	0.226	0.226	0.166	0.191	0.212	0.187	0.198	0.226
EAA	0.253	0.289	0.278	0.274	0.235	0.268	0.196	0.201	0.212	0.209
SEA	0.269	0.180	0.191	0.180	0.202	0.191	0.156	0.163	0.225	0.184
OCE	0.075	0.058	0.050	0.109	0.056	0.054	0.055	0.055	0.080	0.063
RMB										
ENAM	0.995	1.066	1.261	1.046	0.930	0.920	1.302	1.159	1.870	0.937
WNAM	0.786	1.162	1.100	1.039	1.230	1.145	1.325	1.227	1.918	1.044
SAM	0.992	0.902	0.790	1.218	0.998	0.851	0.941	0.915	1.467	0.877
EUR	0.833	0.942	1.044	0.920	0.928	0.887	1.243	1.097	1.381	0.934
AFR	0.846	0.985	0.706	1.103	1.062	0.893	1.032	1.000	1.084	0.971
ME	0.846	1.206	0.862	1.243	1.329	1.005	1.271	1.210	1.024	1.120
SAA	0.849	0.956	0.783	1.002	0.948	0.820	1.183	1.111	1.017	0.760
EAA	0.793	0.705	0.723	0.765	0.824	0.658	1.113	1.098	1.068	0.755
SEA	0.938	0.829	0.871	0.908	0.893	0.830	1.105	1.035	1.224	0.883
OCE	1.457	1.405	1.307	1.776	1.148	1.252	1.188	1.151	1.548	1.395

Table S3. Statistics of missing monthly data records for the eleven satellite-derived global aerosol products

Product	Count	Missing data records
AATSR-ADV	1	200706
AATSR-EN	0	-
AATSR-ORAC	6	200301; 200302; 200303; 200410; 200411; 201111
AATSR-SU	0	-
AVHRR	1	200902
MISR	0	-
MOD08	0	-
MYD08	0	-
POLDER	0	-
SeaWiFS	7	200801; 200802; 200803; 200807; 200905; 200908; 200909
VIIRS	0	-

Table S4. Statistics of seasonal performance for satellite-derived AODs against AERONET AOD_A measurements from 2006 to 2010

DJF	AATSR-ADV	AATSR-EN	AATSR-ORAC	AATSR-SU	AVHRR	MISR	MOD08	MYD08	POLDER	SeaWiFS
N	735	811	995	787	885	919	911	867	955	639
MAE	0.079	0.075	0.063	0.063	0.066	0.065	0.061	0.061	0.109	0.067
RMSE	0.135	0.124	0.106	0.109	0.107	0.111	0.097	0.102	0.147	0.109
RMB	0.845	0.919	0.952	0.966	1.026	0.815	1.105	1.051	1.500	0.867
MAM	AATSR-ADV	AATSR-EN	AATSR-ORAC	AATSR-SU	AVHRR	MISR	MOD08	MYD08	POLDER	SeaWiFS
N	909	956	971	952	920	946	965	959	923	791
MAE	0.079	0.072	0.071	0.071	0.070	0.066	0.074	0.063	0.108	0.073
RMSE	0.135	0.114	0.113	0.110	0.123	0.102	0.105	0.095	0.149	0.120
RMB	0.906	0.950	0.929	1.022	0.979	0.920	1.206	1.118	1.309	0.994
JJA	AATSR-ADV	AATSR-EN	AATSR-ORAC	AATSR-SU	AVHRR	MISR	MOD08	MYD08	POLDER	SeaWiFS
N	971	1009	1003	1009	957	977	1012	1011	944	741
MAE	0.081	0.078	0.095	0.077	0.087	0.076	0.085	0.074	0.103	0.078
RMSE	0.137	0.143	0.164	0.132	0.193	0.139	0.121	0.114	0.153	0.137
RMB	0.900	0.939	0.863	0.972	0.943	0.894	1.213	1.144	1.177	0.895
SON	AATSR-ADV	AATSR-EN	AATSR-ORAC	AATSR-SU	AVHRR	MISR	MOD08	MYD08	POLDER	SeaWiFS
N	951	999	1006	987	964	972	995	993	949	739
MAE	0.07	0.066	0.062	0.060	0.061	0.060	0.060	0.053	0.081	0.067
RMSE	0.12	0.114	0.105	0.106	0.105	0.108	0.097	0.094	0.112	0.118
RMB	0.895	0.945	0.976	0.979	0.941	0.859	1.130	1.039	1.292	0.928

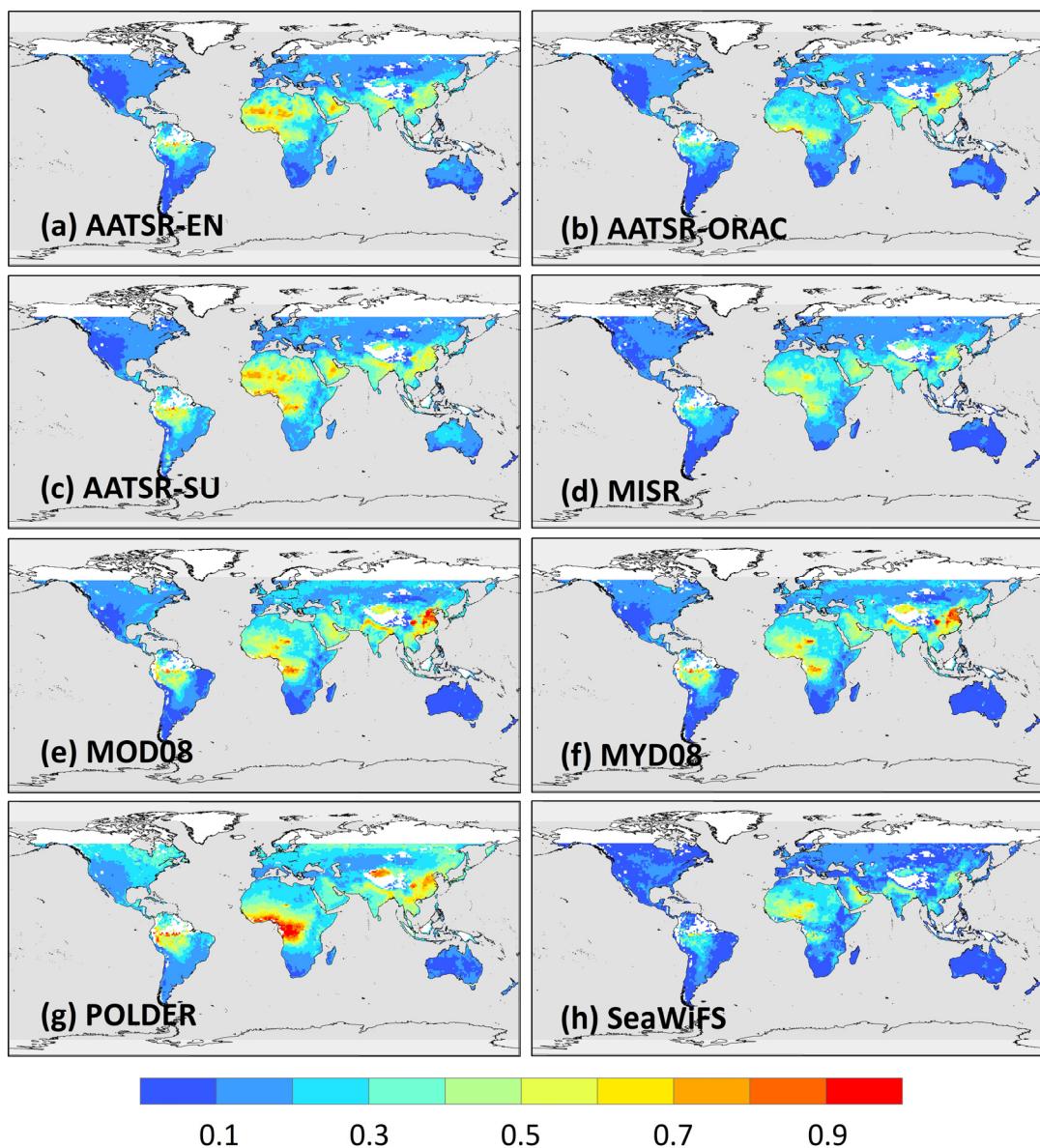


Figure S1. Satellite-derived global annual averaged AOD_s maps at 550 nm from 2006 to 2010 with common points in all datasets over land (exclude AATSR-ADV and AVHRR due to lack of observations over Sahara and the Middle East)

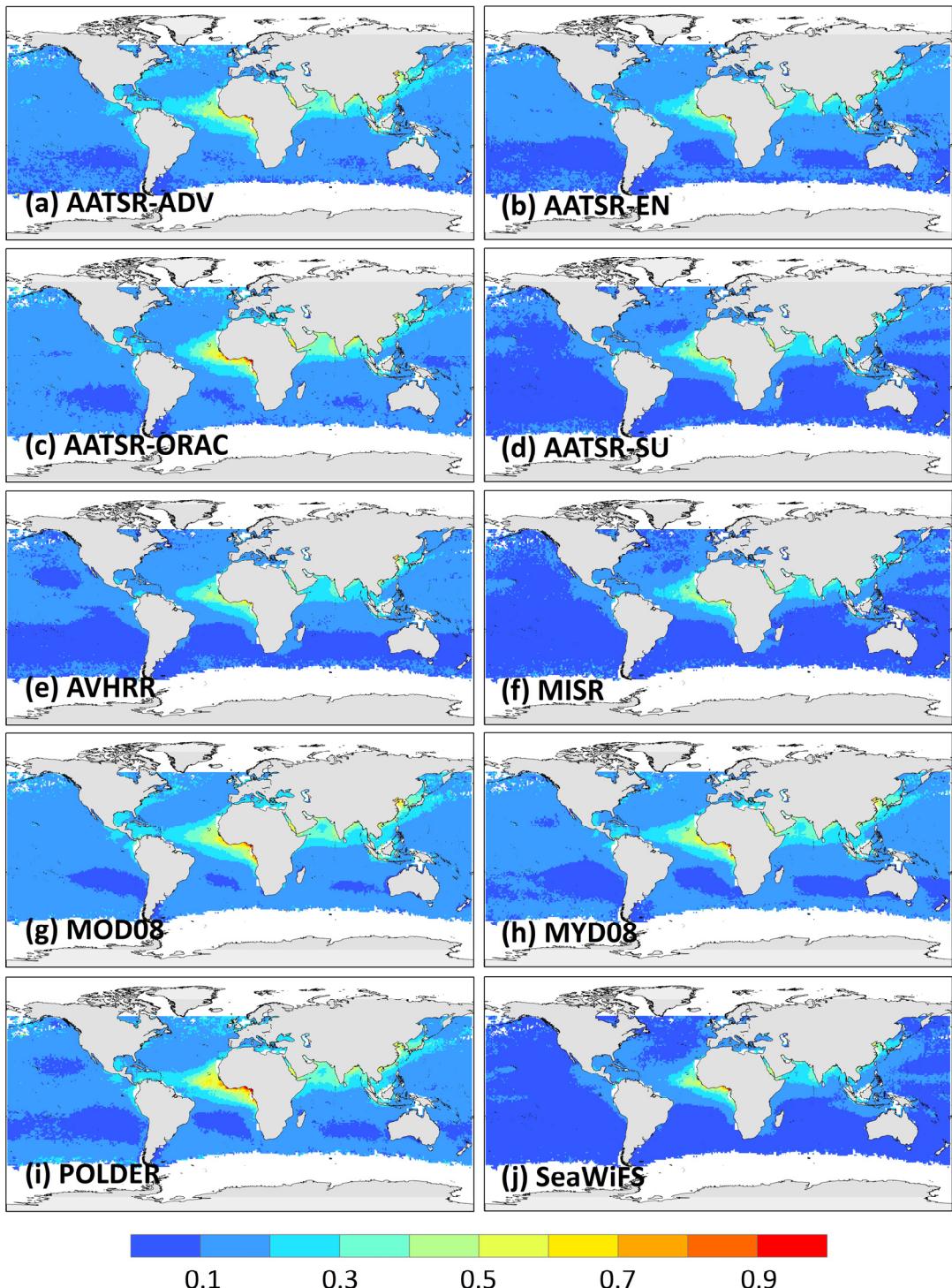


Figure S2. Satellite-derived global annual averaged AODs maps at 550 nm from 2006 to 2010 with common points in all datasets over ocean

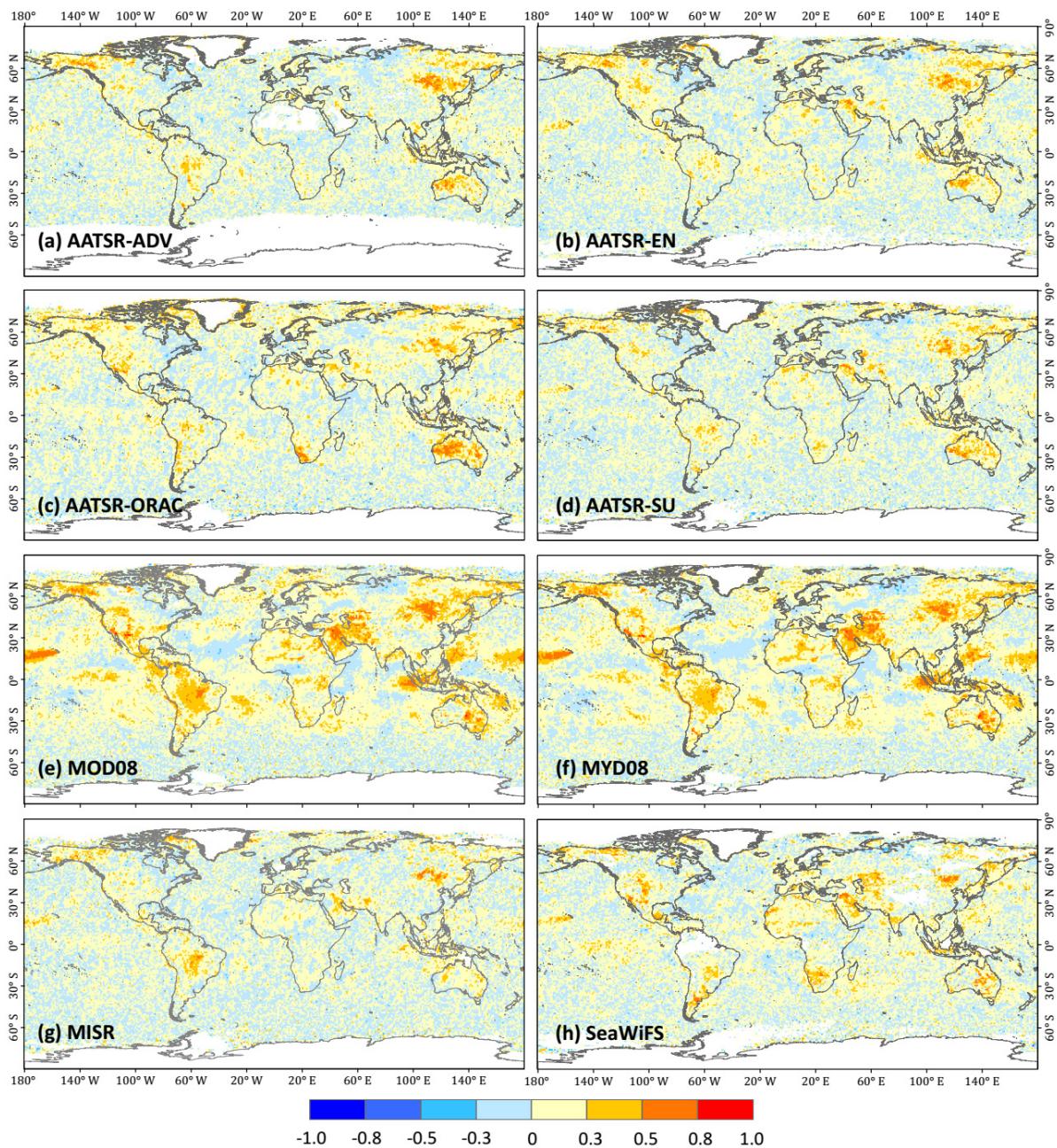


Figure S3. Spatial distribution of autocorrelation coefficient with a lag of one month based on de-seasonalized monthly AOD_s anomalies at 550 nm from 2003 to 2010.

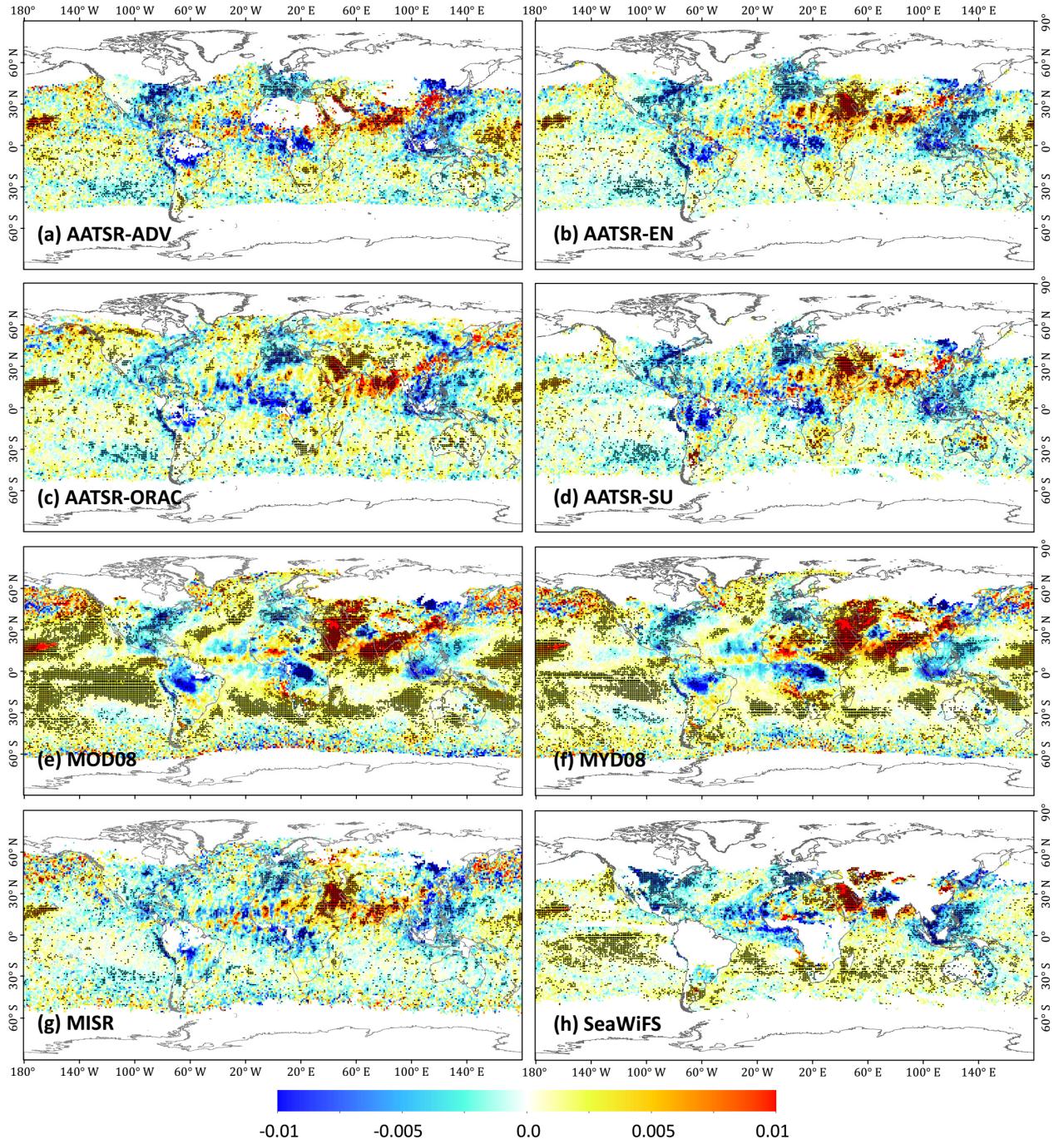


Figure S4. Linear trend based upon de-seasonalized monthly anomaly of AODs for the period 2003–2010. Units are AOD yr^{-1} . Black dots indicate that trend is significant at the 95% confidence level ($p < 0.05$) without the FDR correction.