Table S1. Regions defintion used in this study

	[Min Lat ; Max Lat]	[Min Lon ; Max Lon]
EUROPE	[40 ; 72]	[-10 ; 40]
NAMERICA	[20 ; 80]	[-150 ; -45]
SAMERICA	[-60 ; 20]	[-105 ; -30]
NAFRICA	[0 ; 40]	[-17 ; 50]
SAFRICA	[-35 ; 0]	[10 ; 40]
ASIA	[0 ; 72]	[50 ; 150]
AUSTRALIA	[-50 ; 10]	[110 ; 155]

EUROPE	Andenes(955); Arcachon(1193); Aubiere_LAMP(1746); Autilla(1695); Avignon(3036); BORDEAUX(393); Barcelona(3637); Bari_University(432); Bayfordbury(795); Belsk(2329); Birkenes(1162); Brussels(1925); Bucharest_Inoe(1317); Bure_OPE(978); CENER(1135); CLUJ_UBB(1466); Cabauw(2027); Camborne_MO(329); Carpentras(4190); Chilbolton(2013); Coruna(1353); Creteil(353); Dunkerque(2467); EastMalling_MO(314); Edinburgh(647); Eforie(1271); Ersa(2429); FZJ-JOYCE(1298); Fontainebleau(1001); Frioul(1358); Gotland(493); Hamburg(2209); Helgoland(1109); Helsinki(1405); HohenpeissenbergDWD(1173); Hyytiala(1259); IMAA_Potenza(2259); ISDGM_CNR(931); Iasi_LOASL(1484); Ispra(2788); Karlsruhe(1715); Kuopio(1418); Kyiv(2170); LAQUILA_Coppito(907); Laegeren(1505); Le_Fauga(1244); Lecce_University(3712); Leipzig(3128); Lille(3565); Loftus_MO(559); Madrid(2031); Magurele_Inoe(893); Mainz(2390); MetObs_Lindenberg(844); Minsk(2637); Modena(2572); Moldova(3725); Moscow_MSU_MO(2949); Munich_University(2264); Napoli_CeSMA(897); OHP_OBSERVATOIRE(3190); Oostende(1799); Oxford(474); Palaiseau(3160); Palencia(3283); Paris(2468); Poprad-Ganovce(899); Porquerolles(701); Portglenone_MO(372); Raciborz(681); Rame_Head(812); Rhyl_MO(376); Rome_La_Sapienza(386); Rome_Tor_Vergata(3500); SMHI(367); Sevastopol(1514); Seysses(729); Sirmione_Museo_GC(885); Sodankyla(885); Stornoway_MO(318); Strzyzow(1176); The_Hague(508); Thessaloniki(3170); Timisoara(556); Toravere(2900); Toulon(2578); Toulouse_MF(1070); Valladolid(1668); Venise(1736); Vienna_BOKU(560); Vienna_UNIVIE(476); Villefranche(2230); Watnall_MO(511); Wytham_Woods(632); Xanthi(678); Zaragoza(1183); Zvenigorod(1642)
ASIA	Anmyon(2166); Bac_Giang(831); Bac_Lieu(1475); Baengnyeong(895); Bahrain(1125); Beijing(3844); Beijing-CAMS(1382); Bhola(1027); Chen-Kung_Univ(2491); Chiang_Mai_Met_Sta(2486); Chiayi(928); Chiba_University(1077); Dhabi(803); Dhadnah(1532); Dhaka_University(1300); Dibrugarh_Univ(318); Dongsha_Island(940); Dushanbe(1627); EPA-NCU(1804); Fukuoka(1433); Gandhi_College(1997); Gangneung_WNU(1391); Gosan_SNU(1244); Gual_Pahari(390); Gwangju_GIST(2350); Hamim(863); Hankuk_UFS(1143); Hokkaido_University(916); Hong_Kong_PolyU(1377); Hong_Kong_Sheung(501); Irkutsk(1616); Jaipur(1880); Kaashidhoo(473); Kanpur(4301); Kaohsiung(324); Karachi(2080); Karunya_University(418); Kuching(617); Lahore(1965); Luang_Namtha(1115); Lumbini(483); MCO-Hanimaadhoo(1956); Manila_Observatory(1633); Masdar_Institute(1552); Mezaira(2235); Mukdahan(1331); Mussafa(886); NCU_Taiwan(1235); ND_Marbel_Univ(1252); NGHIA_DO(895); NhaTrang(877); Niigata(492); Nong_Khai(809); Noto(1436); Osaka(3417); Pantnagar(365); Pimai(733); Pokhara(2048); Pontianak(1078); Pune(1630); Pusan_NU(519); Seoul_SNU(1460); Shirahama(3176); Silpakorn_Univ(2481); Singapore(2564); Son_La(509); Songkhla_Met_Sta(1592); Tai_Ping(467); Taihu(1329); Taipei_CWB(1892); Tiksi(313); Tomsk(1544); Tomsk_22(973); USM_Penang(1453); Ubon_Ratchathani(1139); Ussuriysk(2084); Vientiane(328); XiangHe(3227); Xinglong(1276); Xitun(386); Yakutsk(2079); Yekaterinburg(1834); Yonsei_University(2073)
NAMERICA	ARM_Oliktok_AK(323); ARM_SGP(548); Ames(1917); Appledore_Island(388); BONDVILLE(3824); Bakersfield(578); Bermuda(765); Billerica(3103); Bonanza_Creek(2118); Bratts_Lake(2987); Brookhaven(1106); CARTEL(3280); CCNY(3014); COVE(1710); CalTech(1502); Camaguey(1669); Cart_Site(4568); Chapais(1542); Chequamegon(460); Churchill(1300); Columbia_SC(486); Dayton(1064); Dry_Tortugas(1135); EPA-Res_Triangle_Pk(1415); Easton-MDE(865); Easton_Airport(702); Egbert(3795); El_Segundo(1276); Fort_McKay(1020); Fort_McMurray(2221); Frenchman_Flat(1718); Fresno(1990); Fresno_2(1767); GISS(428); GSFC(6300); Georgia_Tech(1622); Grand_Forks(891); HJAndrews(1802); Halifax(2872); Hampton_University(613); Harvard_Forest(1486); Hermosillo(724); Howland(1608); IMPROVE-MammothCave(1334); Iqaluit(549); KONZA_EDC(2335); Kangerlussuaq(1149); Kellogg_LTER(1396); Kelowna_UAS(2356); Key_Biscayne(1837); Key_Biscayne2(1246); Kuujjuarapik(615); MD_Science_Center(4714); Maricopa(1924); Mingo(626); Missoula(3160); Modesto(858); Monterey(2511); NASA_KSC(685); NASA_LaRC(1595); NEON-Disney(827); NEON_Bartlett(378); NEON_CLBJ(824); NEON_GRSM(486); NEON_HEAL(492); NEON_Harvard(1073); NEON_KONZ(721); NEON_OAES(1142); NEON_ORNL(898); NEON_OSBS(1074); NEON_SCBI(1010); NEON_SERC(665); NEON_SJER(359); NEON_SRER(505); NEON_TALL(1152); NEON_UKFS(702); NEON_UNDE(926); NEON_WOOD(488); Narsarsuaq(402); OPAL(925); Oyster(303); PNNL(396); Pickle_Lake(2184); Resolute_Bay(805); Rimrock(3593); Rogers_Dry_Lake(1529); SDSU_IPLab(326); SEARCH-Centreville(749); SEARCH-OLF(845); SEARCH-Yorkville(603); SERC(3096); SP_Bayboro(1453); Sable_Island(490); San_Nicolas(838); Santa_Monica_Colg(1456); Saturn_Island(2790); Sigma_Space_Corp(865); Sioux_Falls(2679); St_Louis_University(1150); Tallahassee(1262); Thompson(550); Thompson_Farm(2303); Thule(1217); Toronto(2771); Trinidad_Head(1870); Tucson(2572); Tudor_Hill(1350); UAHuntsville(852); UCLA(663); UCSB(2040); UH_Coastal_Center(624); UMBC(1585); U_of_Wisconsin_SSEC(1044); Univ_of_Houston(2533); Univ_of_Lethbridge(1388); Walker_Branch(1854); Wallops(4120); Waskesiu(1575); Yellowknife_Aurora(1108); Yuma(1098)
SAMERICA	Abracos_Hill(1051); Alta_Floresta(3812); Amazon_ATTO_Tower(551); Arica(3937); Balbina(495); Barbados(525); Belterra(855); CEILAP-BA(4146); CEILAP-Bariloche(754); CEILAP-Comodoro(993); CEILAP-Neuquen(966); CEILAP-RG(2397); CUIABA-MIRANDA(3122); Campo_Grande_SONDA(2148); Cape_San_Juan(1795); Cordoba-CETT(1929); Guadeloup(2277); Itajuba(482); Ji_Parana_SE(2182); La_Parguera(3846); Manaus_EMBRAPA(1012); NEON_GUAN(420); Petrolina_SONDA(1783); Pilar_Cordoba(460); Puerto_Madryn(408); Ragged_Point(2235); Rio_Branco(2819); SANTA_CRUZ(686); SANTA_CRUZ_UTEPSA(1445); San_Cristobal_USFQ(428); Santiago_Beauchef(628); Sao_Martinho_SONDA(853); Sao_Paulo(2468); Surinam(352); Trelew(2851); Tuxtla_Gutierrez(1051); UPC-GEAB-Valledupar(444); UPRM_Lidar_Lab(614); UdeConcepcion-CEFOP(398)
NAFRICA	ATHENS-NOA(1945); AgiaMarina_Xyliatou(1046); Agoufou(2000); Badajoz(690); Banizoumbou(5621); Ben_Salem(1027); Bidi_Bahn(354); Blida(1638); Burjassot(3035); CUT-TEPAK(1611); Cabo_da_Roca(2262); Caceres(1592); Cairo_EMA_2(2996); DMN_Maine_Soroa(1011); Dahkla(629); Dakar(4674); Djougou(652); ETNA(1203); Eilat(2139); El_Arenosillo(2630); El_Farafra(1274); Evora(3900); FORTH_CRETE(2763); Finokalia-FKL(438); Gozo(685); Granada(2997); Hada_El-Sham(385); Huelva(1444); IER_Cinzana(3808); IMC_Oristano(887); IMS-METU-ERDEMLI(3515); Ilorin(3410); KAUST_Campus(868); Koforidua_ANUC(639); Kuwait_University(422); LAMTO-STATION(644); La_Laguna(1776); Lamezia_Terme(849); Lampedusa(2237); Malaga(1710); Medenine-IRA(1501); Messina(1944); Migal(413); Murcia(1964); Nes_Ziona(3145); Nicosia(355); Ouagadougou(1882); Oujda(1025); Palma_de_Mallorca(1955); Ras_El_Ain(414); SEDE_BOKER(5978); Saada(3260); Santa_Cruz_Tenerife(3647); Solar_Village(3927); TUBITAK_UZAY_Ankara(468); Tabernas_PSA-DLR(1492); Technion_Haifa_IL(574); Tizi_Ouzou(869); Tunis_Carthage(1053); Weizmann_Institute(930); Zinder_Airport(1858)
AUSTRALIA	ARM_Darwin(966); Birdsville(2344); Brisbane-Uni_of_QLD(510); Canberra(3123); Darwin(695); Fowlers_Gap(1043); Jabiru(3247); Lake_Argyle(3465); Lake_Lefroy(1434); Rottnest_Island(351); Tinga_Tingana(1556)

Table S2. List of observation stations (and number of measurements) used for the computation of AOD and AE regional time series.

Region	Sites
EUROPE	AAOT(428); Andenes(920); Arcachon(431); Aubiere_LAMP(1163); Autilla(1687); Bari_University(431); Bayfordbury(784); Belsk(2327); Birkenes(1159); Brussels(1872); Bucharest_Inoe(1315); Bure_OPE(978); CENER(1121); CLUJ_UBB(1401); Camborne_MO(327); Carpentras(3774); Chilbolton(2008); Coruna(1350); Dunkerque(2283); EastMalling_MO(312); Edinburgh(639); Eforie(1270); Ersa(1202); FZJ-JOYCE(1294); Fontainebleau(997); Frioul(1054); Galata_Platform(1253); Gloria(1998); Gotland(491); Gustav_Dalen_Tower(1555); Hamburg(2105); Helgoland(1073); Helsinki(1405); Helsinki_Lighthouse(1207); HohenpeissenbergDWD(1166); Hyytiala(1247); IMAA_Potenza(2193); ISDGM_CNR(919); Iasi_LOASL(1392); Ispra(3845); Karlsruhe(1636); Kuopio(1413); Kyiv(1191); LAQUILA_Coppito(904); Laegeren(1449); Lecce_University(3709); Leipzig(3107); Lille(2570); Loftus_MO(556); Madrid(2024); Magurele_Inoe(893); Mainz(2382); MetObs_Lindenberg(839); Minsk(1218); Modena(1273); Moldova(3720); Moscow_MSU_MO(2852); Munich_University(2242); Napoli_CeSMA(897); OHP_OBSERVATOIRE(2153); Oostende(1736); Oxford(471); Palaiseau(2054); Palencia(2124); Palgrunden(1152); Paris(2251); Poprad-Ganovce(897); Portglenone_MO(370); Raciborz(680); Rame_Head(750); Rhyl_MO(370); Rome_La_Sapienza(376); Rome_Tor_Vergata(1594); SMHI(353); Sevastopol(1431); Sirmione_Museo_GC(883); Sodankyla(883); Stornoway_MO(318); Strzyzow(1172); Thessaloniki(2361); Thornton_C-power(576); Timisoara(555); Toravere(2891); Toulon(632); Toulouse_MF(1069); Valladolid(1663); Venise(4772); Vienna_BOKU(560); Vienna_UNIVIE(476); Watnall_MO(510); Wytham_Woods(632); Xanthi(667); Zaragoza(1183); Zeebrugge-MOW1(305); Zvenigorod(1621)
ASIA	ARIAKE_TOWER(319); Abu_Al_Bukhoosh(599); Anmyon(2146); Bac_Giang(814); Bac_Lieu(1471); Baengnyeong(894); Bahrain(1119); Beijing(810); Beijing-CAMS(1345); Bhola(1011); Chen-Kung_Univ(2378); Chiang_Mai_Met_Sta(2456); Chiayi(925); Chiba_University(1074); Dhabi(752); Dhadnah(1523); Dhaka_University(1293); Dibrugarh_Univ(315); Dongsha_Island(927); Dushanbe(1607); EPA-NCU(1764); Fukuoka(1431); GOT_Seaprism(603); Gandhi_College(1978); Gangneung_WNU(1385); Gosan_SNU(945); Gual_Pahari(389); Gwangju_GIST(1938); Hamim(849); Hankuk_UFS(1138); Hokkaido_University(913); Hong_Kong_PolyU(1357); Hong_Kong_Sheung(488); Ieodo_Station(375); Irkutsk(1584); Jaipur(1875); Kaashidhoo(439); Kanpur(4108); Kaohsiung(322); Karachi(1952); Karunya_University(417); Kuching(603); Lahore(1941); Luang_Namtha(1104); Lumbini(476); MCO-Hanimaadhoo(1869); Manila_Observatory(1613); Masdar_Institute(1545); Mezaira(2098); Mukdahan(1277); Mussafa(883); NCU_Taiwan(559); ND_Marbel_Univ(1232); NGHIA_DO(880); NhaTrang(875); Niigata(490); Nong_Khai(804); Noto(999); Osaka(2318); Pantnagar(365); Pimai(730); Pokhara(1877); Pontianak(1073); Pusan_NU(516); Seoul_SNU(1286); Shirahama(3056); Silpakorn_Univ(2459); Singapore(2507); Socheongcho(548); Son_La(491); Songkhla_Met_Sta(1589); Tai_Ping(374); Taihu(1292); Taipei_CWB(1800); Tiksi(312); Tomsk(1527); Tomsk_22(969); USM_Penang(1378); Ubon_Ratchathani(833); Ussuriysk(1919); Vientiane(328); XiangHe(3162); Xitun(378); Yakutsk(2056); Yekaterinburg(1795); Yonsei_University(2051)
NAMERICA	ARM_Oliktok_AK(321); ARM_SGP(548); Ames(1907); Appledore_Island(388); BONDVILLE(3775); Bakersfield(574); Bermuda(623); Billerica(1681); Bonanza_Creek(2077); Bratts_Lake(2875); Brookhaven(1000); CARTEL(3202); CCNY(2786); COVE(1693); COVE_SEAPRISM(1336); CalTech(1489); Camaguey(1668); Cart_Site(4523); Chapais(1512); Chequamegon(397); Churchill(1287); Columbia_SC(468); Dayton(1060); Dry_Tortugas(1044); EPA-Res_Triangle_Pk(1160); Easton-MDE(836); Easton_Airport(702); Egbert(3540); El_Segundo(1228); Fort_McKay(1000); Fort_McMurray(2148); Frenchman_Flat(1658); Fresno(1904); Fresno_2(1761); GSFC(6181); Georgia_Tech(1620); Grand_Forks(889); HJAndrews(1719); Halifax(2819); Hampton_University(612); Harvard_Forest(1483); Hermosillo(592); Howland(1581); IMPROVE-MammothCave(1300); Iqaluit(536); KONZA_EDC(2291); Kangerlussuaq(1145); Kellogg_LTER(1357); Kelowna_UAS(2171); Key_Biscayne(1783); Key_Biscayne2(1245); Kuujjuarapik(609); LISCO(1657); Lake_Okeechobee(300); MD_Science_Center(4643); MVCO(1742); Maricopa(1880); Mingo(625); Missoula(2940); Modesto(857); Monterey(2429); NASA_KSC(683); NASA_LaRC(1585); NEON-Disney(826); NEON_Bartlett(375); NEON_CLBJ(823); NEON_GRSM(486); NEON_HEAL(489); NEON_Harvard(1068); NEON_KONZ(721); NEON_OAES(1138); NEON_ORNL(897); NEON_OSBS(1072); NEON_SCBI(1006); NEON_SERC(665); NEON_SJER(357); NEON_SRER(502); NEON_TALL(1150); NEON_UKFS(700); NEON_UNDE(920); NEON_WOOD(487); Narsarsuaq(396); OPAL(897); PNNL(392); Pickle_Lake(2170); Resolute_Bay(803); Rimrock(3567); Rogers_Dry_Lake(1513); SDSU_IPLab(326); SEARCH-Centreville(729); SEARCH-OLF(843); SEARCH-Yorkville(603); SERC(3050); SP_Bayboro(1447); Sable_Island(488); San_Nicolas(826); Santa_Monica_Colg(1454); Saturn_Island(2706); Sigma_Space_Corp(840); Sioux_Falls(2354); St_Louis_University(1140); Tallahassee(1181); Thompson(505); Thompson_Farm(2291); Thule(1213); Toronto(2584); Trinidad_Head(1796); Tucson(2536); Tudor_Hill(1327); UAHuntsville(848); UCLA(662); UCSB(2018); UH_Coastal_Center(624); UMBC(1582); USC_SEAPRISM(1207); USC_SEAPRISM_2(666); U_of_Wisconsin_SSEC(1037); Univ_of_Houston(2530); Univ_of_Lethbridge(1370); Walker_Branch(1819); Wallops(3590); Waskesiu(1552); WaveCIS_Site_CSI_6(1857); Yellowknife_Aurora(1101); Yuma(1094)
SAMERICA	Abracos_Hill(1021); Alta_Floresta(3523); Amazon_ATTO_Tower(538); Arica(3899); Balbina(468); Belterra(817); CEILAP-BA(3952); CEILAP-Bariloche(629); CEILAP-Comodoro(990); CEILAP-Neuquen(966); CEILAP-RG(2269); CUIABA-MIRANDA(3013); Campo_Grande_SONDA(2135); Cape_San_Juan(1591); Cordoba-CETT(1899); Guadeloup(1448); Itajuba(478); Ji_Parana_SE(2007); La_Parguera(3101); Manaus_EMBRAPA(990); NEON_GUAN(420); Petrolina_SONDA(1769); Pilar_Cordoba(451); Puerto_Madryn(370); Ragged_Point(2220); Rio_Branco(2746); SANTA_CRUZ(646); SANTA_CRUZ_UTEPSA(1280); San_Cristobal_USFQ(425); Santiago_Beauchef(627); Sao_Martinho_SONDA(682); Sao_Paulo(2439); Trelew(2670); Tuxtla_Gutierrez(988); UPC-GEAB-Valledupar(444); UPRM_Lidar_Lab(564); UdeConcepcion-CEFOP(390)
NAFRICA	ATHENS-NOA(1603); AgiaMarina_Xyliatou(439); Badajoz(690); Ben_Salem(608); Blida(1636); Burjassot(2704); CUT-TEPAK(1519); Cabo_da_Roca(1592); Caceres(1568); Cairo_EMA_2(2993); Dahkla(626); Dakar(2555); ETNA(1203); Eilat(2089); El_Arenosillo(1084); El_Farafra(318); Evora(2297); FORTH_CRETE(2681); Finokalia-FKL(437); Gozo(680); Granada(2993); Hada_El-Sham(373); IMS-METU-ERDEMLI(2820); Ilorin(3384); KAUST_Campus(1694); Koforidua_ANUC(636); Kuwait_University(421); La_Laguna(1763); Lamezia_Terme(849); Lampedusa(1441); Malaga(1709); Medenine-IRA(568); Migal(413); Murcia(1961); Nes_Ziona(3059); Nicosia(355); Oujda(1019); Palma_de_Mallorca(1952); SAGRES(450); SEDE_BOKER(5922); Santa_Cruz_Tenerife(3511); Solar_Village(3854); TUBITAK_UZAY_Ankara(466); Tabernas_PSA-DLR(1490); Technion_Haifa_IL(572); Tizi_Ouzou(869); Tunis_Carthage(1053); Weizmann_Institute(927)
AUSTRALIA	ARM_Darwin(953); Birdsville(2304); Brisbane-Uni_of_QLD(502); Canberra(3045); Darwin(680); Fowlers_Gap(1024); Jabiru(2927); Lake_Argyle(3360); Lake_Lefroy(1189); Lucinda(1015); Rottnest_Island(342); Tinga_Tingana(1083)

Table S3. Same as Table S2 for AOD<1μm and AOD>1μm.

Region	Sites
EUROPE	Aspvreten(6389); Auchencorth Moss(4604); Bilthoven(360); Birkenes II(927); Bredkälen(2751); Cabauw Wielsekade(2024); Cabauw Zijdeweg(786); Cabo de Creus(5390); Chilbolton Observatory(1046); De Zilk(3116); Deuselbach(1390); Diabla Gora(3514); Els Torms(5532); Farkasfa(764); Guipry(1366); Harwell(6402); Hurdal(431); Hyytiälä(856); Illmitz(6289); Iskrba(4979); Ispra(5397); K-puszta(1994); Kollumerwaard(3120); Kosetice (NOAK)(723); Kårvatn(438); La Coulonche(2243); La Tardière(3093); Lahemaa(3379); Lecce (ECO)(1287); Lille Valby(673); Lista(146); Mace Head(1149); Melpitz(4265); Montelibretti(973); Montseny(1263); Morvan(1351); Neuglobsow(3070); Niembro(5912); Norunda Stenen(322); O Saviñao(4984); Pallas (Matorova)(1707); Payerne(4898); Penausende(5624); Peyrusse Vieille(2478); Puntijarka(339); Revin(3292); Rucava(3262); Råö(3835); Saint-Nazaire-le-Désert(1445); Schmücke(3029); Utö(2128); Vavihill(4115); Verneuil(1430); Vilsandi(3375); Vindeln(501); Virolahti II(3545); Virolahti III(1090); Vredepeel(3267); Waldhof(7026); Zielonka(1032); Zoebelboden(689); Zoseni(844)
NAMERICA	Acadia National Park-McFarland Hill (ME98)(1537); Addison Pinnacle(478); Agua Tibia(825); Arendtsville (PA00)(504); Atlanta(76); Badlands NP(1525); Baltimore(129); Birmingham(693); Blue Mounds(660); Bondville(866); Boundary Waters Canoe Area(1225); Breton(217); Breton Island(473); Bridgton (ME02)(754); Brigantine NWR(1321); Cadiz(487); Caney Creek(882); Cape Cod(835); Cape Romain National Wildlife Refuge(1170); Casco Bay-Wolfe's Neck Farm (ME96)(849); Cedar Bluff(798); Chassahowitzka National Wildlife Refuge (FL05)(1160); Cherokee Nation(391); Chicago(92); Cohutta(818); Columbia Gorge 1(647); Columbia River Gorge(1213); Connecticut Hill(271); Death Valley NP(995); Denali National Park-Mt. McKinley (AK03)(1519); Detroit(89); Dome Lands Wilderness(830); Dome Lands Wilderness - code reserved pre 2014(74); Egbert(636); El Dorado Springs(682); Ellis(674); Everglades National Park-Research Center (FL11)(1358); Forest County Potawatomi Community(59); Fort Peck (IMPROVE)(752); Fresno(680); Frostberg Reservoir (Big Piney Run)(677); Glacier National Park-Fire Weather Station (MT05)(1516); Great Gulf Wilderness(953); Great River Bluffs(789); Great Smoky Mountains NP(1526); Hells Canyon(881); Hercules-Glades(853); Houston(69); Isle Royale NP(915); Isle Royale NP - code reserved pre 2014(92); James River Face Wilderness(904); Jefferson NF(274); Kalmiopsis(910); Lake Sugema 1(127); Lake Sugema 2(660); Linville Gorge(897); Livonia(504); Londonderry(359); Lostwood(878); Lye Brook Wilderness (IMPROVE)(303); Lynden(33); M.K. Goddard(506); Makah Tribe Site 2(352); Mammoth Cave National Park-Houchin Meadow(1349); Martha's Vineyard(759); Meadview(766); Medicine Lake(915); Mingo(868); Mohawk Mt.(840); Moosehorn NWR(1161); Mount Rainier National Park-Tahoma Woods (WA99)(1503); Nebraska NF(718); New York City(299); North Cascades(900); Okefenokee National Wildlife Refuge (GA09)(1343); Old Town(240); Olympic(844); Omaha(245); Organ Pipe Cactus National Monument(772); Pack Monadnock Summit(527); Penobscot(605); Petersburg(260); Phoenix(807); Phoenix Colocated Sampler(637); Pinnacles National Monument-Bear Valley (CA66)(1523); Pittsburgh(66); Point Reyes National Seashore(1428); Presque Isle(871); Proctor Maple R. F.(945); Puget Sound(1028); Quabbin Summit(754); Quaker City(825); Queen Valley(747); Redwood NP(1505); Rubidoux(47); Sac and Fox(465); Saguaro NM(1125); Saguaro West(819); San Rafael(873); Seney(927); Sequoia NP(1315); Sikes(494); Sipsy Wilderness(1251); Spokane Res.(186); St. Marks(865); Stilwell (IMPROVE)(397); Swanquarter(806); Tallgrass(788); Theodore Roosevelt National Park-Painted Canyon(896); Three Sisters Wilderness(1247); Tonto NM(1458); UL Bend(895); Upper Buffalo Wilderness(1305); Viking Lake(800); Voyageurs NP 1(281); Voyageurs NP 2(898); Washington D.C.(1264); Wichita Mountains(862)
NAFRICA	Agia Marina Xyliatou ; Cyprus Atmospheric Observatory(3677); Aliartos(737); Barcarrota(5483); Mahón(1498); San Pablo de los Montes(3072); Zarra(5881)

Table S4. Same as Table S2 for PM2.5

Region	Sites
EUROPE	Aspvreten(1254); Auchencorth Moss(4303); Beromünster(900); Birkenes II(967); Braganca(49); Bredkälen(3149); CEH Edingburgh(49); Cabauw Wielsekade(2050); Cabo de Creus(5507); Chilbolton Observatory(1047); De Zilk(3994); Deuselbach(1947); Diabla Gora(4912); Eibergen(4715); Els Torms(5364); Farkasfa(732); Guipry(1433); Harwell(6278); Hohenpeissenberg(3701); Hurdal(434); Hyytiälä(856); ISAC Bologna(50); Illmitz(1021); Iskrba(5051); Ispra(261); K-puszta(2666); Kamenicki vis(1149); Karpdalen(39); Keldsnor(2465); Kollumerwaard(729); Kosetice (NOAK)(819); Kårvatn(438); La Coulonche(2345); La Tardière(3390); Lahemaa(465); Lecce (ECO)(1265); Leova II(2071); Liesek(193); Lille Valby(372); Lough Navar(7587); Mace Head(59); Melpitz(5480); Montandon(2340); Montelibretti(4890); Montseny(820); Morvan(2020); Narberth(6880); Neuglobsow(7225); Niembro(5955); Noia(2616); Norunda Stenen(326); O Saviñao(5464); Pallas (Sammaltunturi)(364); Payerne(7926); Penausende(5548); Peyrusse Vieille(3264); Poiana Stampei(1439); Puntijarka(319); Revin(3844); Risoe(699); Rucava(3250); Råö(3815); Saint-Nazaire-le-Désert(1447); Schmücke(7243); St. Koloman(1238); Starina(522); Stará Lesná(603); Svanvik(48); Svratouch(576); Topolniky(350); Tänikon(7965); University of Gent(52); Vavihill(5079); Vindeln(2265); Virolahti II(232); Virolahti III(1079); Vredepeel(4722); Waldhof(7192); Westerland(7048); Zielonka(1380); Zingst(7202); Zoebelboden(3636); Zoseni(807)
NAMERICA	Acadia National Park-McFarland Hill (ME98)(1490); Addison Pinnacle(474); Agua Tibia(816); Arendtsville (PA00)(506); Atlanta(76); Badlands NP(1526); Baltimore(129); Birmingham(694); Blue Mounds(675); Bondville(873); Boundary Waters Canoe Area(1227); Breton(206); Breton Island(479); Bridgton (ME02)(696); Brigantine NWR(1276); Cadiz(477); Caney Creek(873); Cape Cod(820); Cape Romain National Wildlife Refuge(1174); Casco Bay-Wolfe's Neck Farm (ME96)(823); Cedar Bluff(790); Chassahowitzka National Wildlife Refuge (FL05)(1258); Cherokee Nation(393); Chicago(44); Cohutta(804); Columbia Gorge 1(533); Columbia River Gorge(1214); Connecticut Hill(269); Death Valley NP(988); Denali National Park-Mt. McKinley (AK03)(1535); Detroit(61); Dome Lands Wilderness(821); Egbert(634); El Dorado Springs(676); Ellis(672); Everglades National Park-Research Center (FL11)(998); Forest County Potawatomi Community(59); Fort Peck (IMPROVE)(737); Fresno(677); Frostberg Reservoir (Big Piney Run)(693); Glacier National Park-Fire Weather Station (MT05)(1504); Great Gulf Wilderness(939); Great River Bluffs(699); Great Smoky Mountains NP(1499); Hells Canyon(881); Hercules-Glades(868); Houston(69); Isle Royale NP(926); Isle Royale NP - code reserved pre 2014(91); James River Face Wilderness(905); Jefferson NF(271); Kalmiopsis(911); Lake Sugema 1(128); Lake Sugema 2(645); Linville Gorge(842); Livonia(504); Londonderry(358); Lostwood(892); Lye Brook Wilderness (IMPROVE)(303); M.K. Goddard(504); Makah Tribe Site 2(336); Mammoth Cave National Park-Houchin Meadow(1338); Martha's Vineyard(719); Meadview(759); Medicine Lake(912); Mingo(865); Mohawk Mt.(791); Moosehorn NWR(1146); Mount Rainier National Park-Tahoma Woods (WA99)(1489); Nebraska NF(771); New York City(299); North Cascades(867); Okefenokee National Wildlife Refuge (GA09)(1337); Old Town(239); Olympic(841); Omaha(243); Organ Pipe Cactus National Monument(777); Pack Monadnock Summit(526); Penobscot(607); Petersburg(259); Phoenix(838); Phoenix Colocated Sampler(646); Pinnacles National Monument-Bear Valley (CA66)(1502); Pittsburgh(66); Point Reyes National Seashore(1430); Presque Isle(868); Proctor Maple R. F.(857); Puget Sound(819); Quabbin Summit(754); Quaker City(820); Queen Valley(742); Redwood NP(1499); Rubidoux(45); Sac and Fox(466); Saguaro NM(1067); Saguaro West(818); San Rafael(875); Seney(928); Sequoia NP(1234); Sikes(493); Sipsy Wilderness(1241); Spokane Res.(186); St. Marks(843); Stilwell (IMPROVE)(389); Swanquarter(884); Tallgrass(785); Theodore Roosevelt National Park-Painted Canyon(902); Three Sisters Wilderness(1207); Tonto NM(1441); UL Bend(903); Upper Buffalo Wilderness(1280); Viking Lake(801); Voyageurs NP 1(248); Voyageurs NP 2(897); Washington D.C.(1293); Wichita Mountains(858)
NAFRICA	Agia Marina Xyliatou ; Cyprus Atmospheric Observatory(5332); Aliartos(248); Barcarrota(5334); Cairo(1717); Can Llompart(17); Doñana(2902); Finokalia(1471); Hurghada(779); Lamezia Terme(625); Mahón(2600); San Pablo de los Montes(2860); Zarra(5616)

Table S5. Same as Table S2 for PM10

Region	Sites
EUROPE	Anholt(323); Barcombe Mills(275); Birkenes I and II(432); Bredkälen(428); Cabo de Creus(204); Chopok(416); Danki(196); Diabla Gora(273); Donon(216); Els Torms(171); Eskdalemuir(338); Glen Dye(176); High Muffles(225); Hoburgen(336); Iraty(213); Iskrba(234); Ispra(238); Janiskoski(279); Jarczew(358); K-puszta(419); Kollumerwaard(216); Kosetice(258); Kårvatn(432); La Crouzille(228); Leba(269); Logroño(156); Lough Navar(286); Melpitz(184); Montelibretti(313); Morvan(214); Niembro(198); O Saviñao(166); Osen(196); Oulanka(305); Pallas (Matorova)(240); Payerne(425); Penausende(173); Peyrusse Vieille(180); Preila(404); Rucava(308); Rörvik-Råö(432); Sniezka(297); Strath Vaich Dam(174); Svratouch(218); Tange(423); Tustervatn(430); Utö(418); Vavihill(369); Virolahti(296); Virolahti II(12); Vredepeel(252); Yarner Wood(241); Åhtäri I-II(432)
ASIA	Baengnyeong_Island(32); Cheju(148); Chiang Mai (Mae Hia)(153); Hoa Binh(188); Imsil(147); Kanghwa(148); Khanchanaburi (Vachiralongkorn Dam)(31); Listvyanka(191); Mondy(177); Oki(162); Primorskaya(169); Rishiri(152); Tanah Rata(188); Terelj(138)
NAMERICA	Abington(251); Acadia NP(203); Acadia_NP(312); Addison_Pinnacle(111); Agua_Tibia(175); Algoma(335); Alhambra(318); Ann Arbor(305); Arches_NP(27); Arendtsville(327); Ashland(309); Badlands_NP(311); Bandelier_NM(302); Barrier_Lake(58); Beaufort(254); Beltsville(288); Big Bend NP(235); Big_Bend_NP(305); Blackwater NWR(229); Bliss_SP_(TRPA)(275); Blue_Mounds(160); Bondville(317); Bosque_del_Apache(183); Boulder_Lake(76); Boundary_Waters_Canoe_Area(273); Breton(51); Breton_Island(93); Bridger_Wilderness(310); Bridgton(176); Brigantine_NWR(286); Brooklyn_Lake(101); Bryce_Canyon_NP(306); Cabinet_Mountains(184); Caddo Valley(302); Cadiz(226); Candor(291); Caney_Creek(183); Canyonlands NP(248); Canyonlands_NP(307); Cape_Cod(173); Cape_Romain_NWR(252); Capitol_Reef_NP(178); Casco_Bay(177); Cedar Creek(323); Cedar_Bluff(163); Centennial(312); Chalk River(312); Chapais(286); Chassahowitzka_NWR(272); Cherokee_Nation(91); Chiricahua NM(309); Chiricahua_NM(309); Claryville(241); Cloud_Peak(155); Coffeeville(299); Cohutta(176); Columbia_Gorge_1(152); Columbia_River_Gorge(265); Connecticut Hill(321); Connecticut_Hill(63); Coweeta(329); Cranberry(313); Crater_Lake_NP(296); Craters_of_the_Moon_NM(244); Crescent_Lake(161); Crockett(242); Death_Valley_NP(215); Deer Creek(313); Denali NP(207); Denali_NP(312); Dolly_Sods_Wilderness(288); Dome_Lands_Wilderness(190); Douglas(137); E.L.A.(316); Edgar Evins(313); Egbert(323); El_Dorado_Springs(161); Ellis(159); Everglades NP(180); Everglades_NP(249); Flat_Tops(50); Flathead(161); Fort_Peck(158); Frostberg_Reservoir_(Big_Piney_Run)(140); Gates_of_the_Mountains(177); Georgia Station(311); Gila_Wilderness(257); Glacier NP(312); Glacier_NP(310); Gothic(309); Grand Canyon NP(305); Great Basin NP(235); Great Smoky NP - Look Rock(194); Great_Basin_NP(282); Great_Gulf_Wilderness(200); Great_River_Bluffs(160); Great_Sand_Dunes_NM(312); Great_Smoky_Mountains_NP(309); Guadalupe_Mountains_NP(306); Hance_Camp_at_Grand_Canyon_NP(305); Hells_Canyon(184); Hercules-Glades(178); Hillside(49); Hoover(169); Hopi_Point_1(99); Horton Station(328); Howland(216); Hoxeyville(174); Ike's_Backbone(187); Indian_Gardens(238); Isle_Royale_NP(199); James_River_Face_Wilderness(187); Jarbidge_Wilderness(297); Jefferson_NF(64); Joshua Tree NP(244); Joshua_Tree_NP(198); Kaiser(176); Kalmiopsis(189); Kane Exp. Forest(297); Kejimkujik(312); Lake_Sugema(163); Lake_Tahoe_Community_College(22); Lassen Volcanic NP(236); Lassen_Volcanic_NP(299); Laurel Hill(310); Lava_Beds_NM(189); Linville_Gorge(186); Livonia(118); Londonderry(60); Lone_Peak_Wilderness(83); Longwoods(335); Lostwood(186); Lye_Brook_Wilderness(279); Lykens(239); Lynden(8); M.K. Goddard(321); M.K._Goddard(116); Mackville(279); Mackville Collocated(262); Makah_Tribe(50); Makah_Tribe_Site_2(62); Mammoth_Cave_NP(288); Martha's_Vineyard(155); Meadview(157); Medicine_Lake(190); Mesa Verde NP(236); Mesa_Verde_NP(307); Mingo(184); Mohawk_Mt.(170); Monture(188); Moosehorn_NWR(250); Mount Rainier NP(196); Mount_Baldy(181); Mount_Hood(190); Mount_Rainier_NP(307); Mount_Zirkel_Wilderness(247); Nebraska_NF(159); North_Absaroka(173); North_Cascades(191); Northern_Cheyenne(161); Okefenokee_NWR(287); Old_Town(58); Olympic(173); Omaha(58); Organ_Pipe(156); Owens_Valley(30); Oxford(335); Pack_Monadnock_Summit(98); Parsons(325); Pasayten(178); Penn State(341); Penobscot(119); Perkinstown(314); Petersburg(62); Petrified_Forest_NP(300); Pinedale(297); Pinnacles NM(238); Pinnacles_NM(309); Point_Reyes_National_Seashore(301); Presque_Isle(178); Prince Edward(294); Proctor_Maple_R._F.(179); Quabbin_Summit(175); Quaker City(225); Quaker_City(175); Queen_Valley(176); Redwood_NP(309); Ripple_Creek(9); Rocky Mtn NP(242); Rocky_Mountain_NP(299); Rocky_Mountain_NP_HQ(8); Sac_and_Fox(108); Saguaro_NM(217); Saguaro_West(168); Salamonie Reservoir(300); Salmon_NF(53); Salt_Creek(187); San_Andres(25); San_Gabriel(143); San_Gorgonio_Wilderness(293); San_Pedro_Parks(180); San_Rafael(184); Sand Mountain(296); Saturna(270); Sawtooth_NF(244); Scoville(56); Seney(193); Sequoia_NP(284); Shamrock_Mine(137); Shenandoah NP - Big Meadows(311); Shenandoah_NP(307); Shining_Rock_Wilderness(239); Sierra_Ancha(180); Sikes(116); Sipsey_Wilderness(269); Snoqualmie_Pass(255); South_Lake_Tahoe(80); Speedwell(298); Spokane_Res.(44); St._Marks(179); Starkey(189); Stilwell(68); Stockton(239); Storm_Peak(8); Sula_Peak(243); Sumatra(308); Swanquarter(184); Sycamore_Canyon(189); Tallgrass(158); Theodore Roosevelt NP(190); Theodore_Roosevelt(186); Three_Sisters_Wilderness(269); Thunder_Basin(150); Tonto_NM(301); Trinity(172); UL_Bend(190); Unionville(313); Upper_Buffalo_Wilderness(284); Viking_Lake(162); Vincennes(335); Voyageurs NP(228); Voyageurs_NP_I(40); Voyageurs_NP_2(189); WY(300); Walker_River_Paiute_Tribe(29); Wash. Crossing(312); Weminuche_Wilderness(304); Wheeler_Peak(174); White_Mountain(166); White_Pass(189); White_River_NF(244); Whiteface Mountain(104); Wichita_Mountains(178); Wind_Cave(189); Woodstock(317); Wrightwood(36); Yellowstone NP(228); Yellowstone_NP_1(72); Yellowstone_NP_2(228); Yosemite NP - Turtleback Dome(234); Yosemite_NP(310); Zion(52); Zion_Canyon(149)
NAFRICA	Barcarrota(189); Víznar(240); Zarra(192)

Table S6. Same as Table S2 for SO4 concentration

Region	Sites
EUROPE	kenes II(3120); auw Zijdeweg(1578); enpeissenberg(4170); tiälä(2792); ra(4046); uszta(2884); etice (NOAK)(2061); e Head(4278); pitz(1436); ervatoire Perenne de l'Environnement(1330); las (Sammaltunturi)(4733); TA Atmospheric Research Observatory(624); ihill(412)
NAMERICA	dia National Park-McFarland Hill (ME98)(2281); dville(6441); ndary Waters Canoe Area(330); ar Bluff(607); umbia River Gorge(1780); cier National Park-Fire Weather Station (MT05)(583); at Gulf Wilderness(524); at Smoky Mountains NP(1873); es River Face Wilderness(442); moth Cave National Park-Houchin Meadow(2722); nt Rainier National Park-Tahoma Woods (WA99)(1096); fenokee National Wildlife Refuge (GA09)(404); an Pipe Cactus National Monument(2310); uaro NM - Tucson Mountain 1(1393); ey NWR(414); thern Great Plains E13(4514); ee Sisters Wilderness(1108); nidad Head(5177); er Buffalo Wilderness(1075); hita Mountains(728)

Table S7. Same as Table S2 for Scat. Coef.

Region	Sites
EUROPE	naberg-Buchholz(686); pvreten(817); rkenes II(3459); sel(1241); bauw Zijdeweg(2765); rwell(401); henpeissenberg(4992); ytiälä(4238); pra(5269); puszta(2591); setice (NOAK)(1316); ipzig(2496); ipzig-Eisenbahnstrasse(984); ipzig-West(1328); ce Head(651); lpitz(4264); ntseny(3300); uglobsow(1451); servatoire Perenne de l'Environnement(1927); llas (Sammaltunturi)(4124); RTA Atmospheric Research Observatory(308); vihill(633); ldhof(2082)
NAMERICA	ndville(7116); ble Island(1176); uthern Great Plains E13(6649); inidad Head(5049)

Table S8. Same as Table S2 for Abs. Coef.