Supplementary material

15-year variability of desert dust optical depth on global and regional scales

Stavros-Andreas Logothetis[1], Vasileios Salamalikis[1], Antonis Gkikas[2] Stelios Kazadzis[3,4], Vassilis Amiridis[2] and Andreas Kazantzidis[1]

[1]Laboratory of Atmospheric Physics, Department of Physics, University of Patras, 26500 Patras, Greece
[2]Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing, National Observatory of Athens, Athens, 15236, Greece
[3]Physics - Meteorology Observatory Davos, Word Radiation Center, Switzerland
[4]Institute of Environmental Research and Sustainable Development, National Observatory of Athens, Greece

Correspondence to: Andreas Kazantzidis (akaza@upatras.gr)

Table S1: Seasonal trends over 12 regions of interest. Each column includes: the range of DOD trend (yr^{-1}) and the median DOD trend. Non-available values are shown in blanc cells. The domains of the regions are depicted in Fig. 3.

Region	Winter (DJF)	Spring (MAM)	Summer (JJA)	Autumn (SON)
Central Sahara Desert	−0.007-0.017, 0.004	−0.025-0.027, 0.007	−0.018-0.031, 0.007	−0.014-0.019, 0.005
Western Sahara Desert	−0.009-0.013, 0.004	−0.021-0.022, −0.006	−0.028-0.017, −0.008	−0.016-0.009, −0.004
Eastern Sahara Desert	−0.011-0.007, −0.003	−0.017-0.013, −0.004	−0.020-0.012, −0.003	−0.014-0.006, −0.003
Bodélé Depression		−0.038-0.015, −0.014	−0.025-0.014, −0.011	−0.028-0.011, −0.011
North Arabian Peninsula	−0.011-0.005, −0.003	−0.016-0.026, −0.003	−0.019-0.026, 0.005	−0.010-0.016, 0.004
South Arabian Peninsula	−0.013-0.012, 0.002	−0.019-0.026, 0.006	−0.020-0.024, 0.006	−0.016-0.013, 0.003
East Middle East	−0.011-0.007, 0.002,	−0.022-0.020, 0.004	−0.032-0.016, −0.005	−0.025-0.013, 0.002
East Tropical Atlantic	−0.010-0.022, 0.003	−0.022-0.022, −0.002	−0.029-0.019, 0.00	−0.012-0.014, −0.002
Mediterranean	−0.014-0.009, −0.001	−0.032-0.009, −0.002	−0.035-0.011, −0.002	−0.015-0.004, −0.002
Thar Desert	−0.007-0.002, −0.004	−0.024-0.004, −0.012	−0.047-−0.001, −0.021	−0.013-0.003, −0.005
Taklamakan Desert	−0.005-0.010, −0.003		−0.027-0.019, −0.006	
Gobi Desert	−0.010-0.006, −0.002	−0.023-0.014, −0.005	−0.011-0.005, −0.002	−0.005-0.012, 0.001

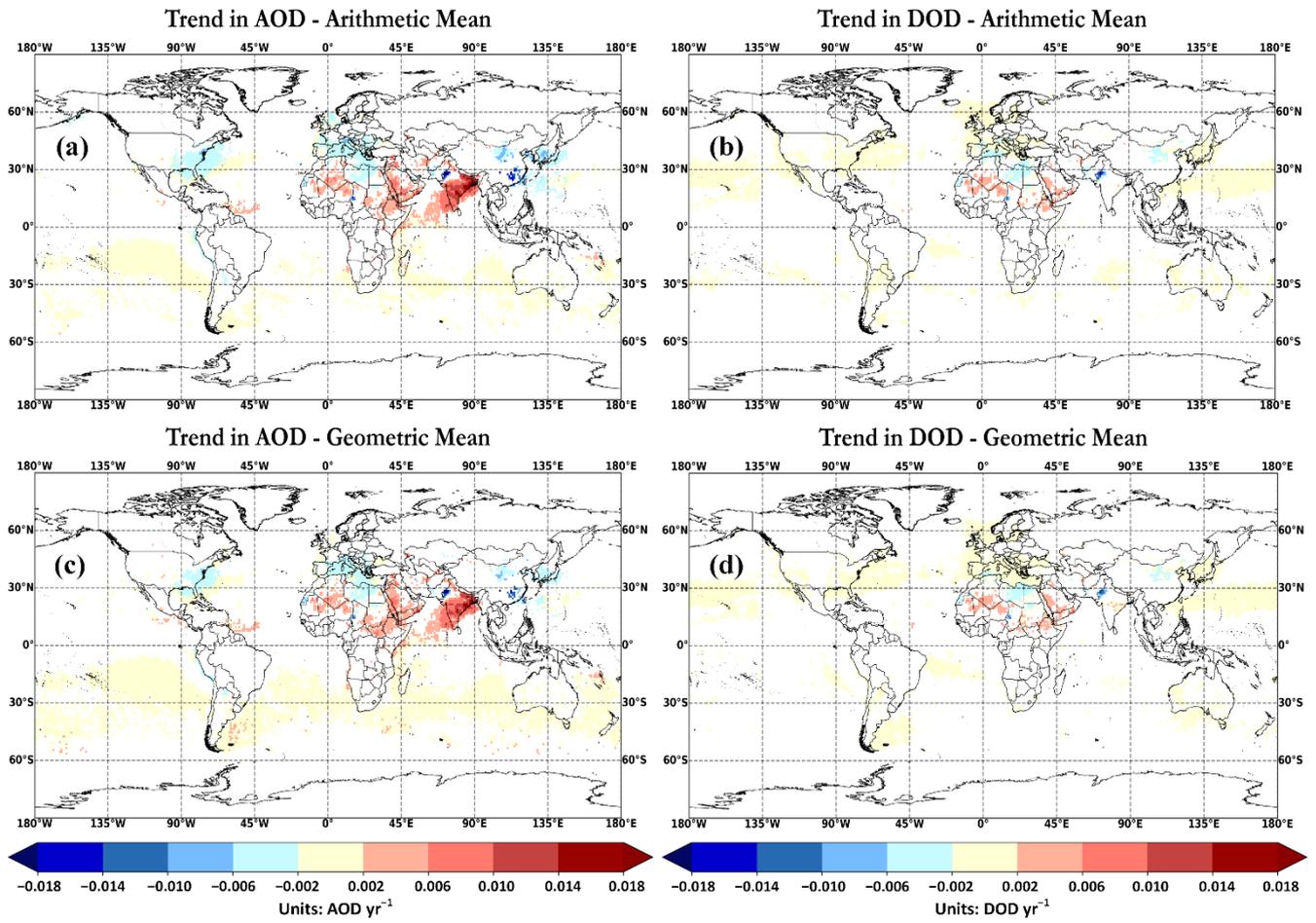**Figure S1: Same as Fig. 1 at 1° x 1° spatial resolution.**

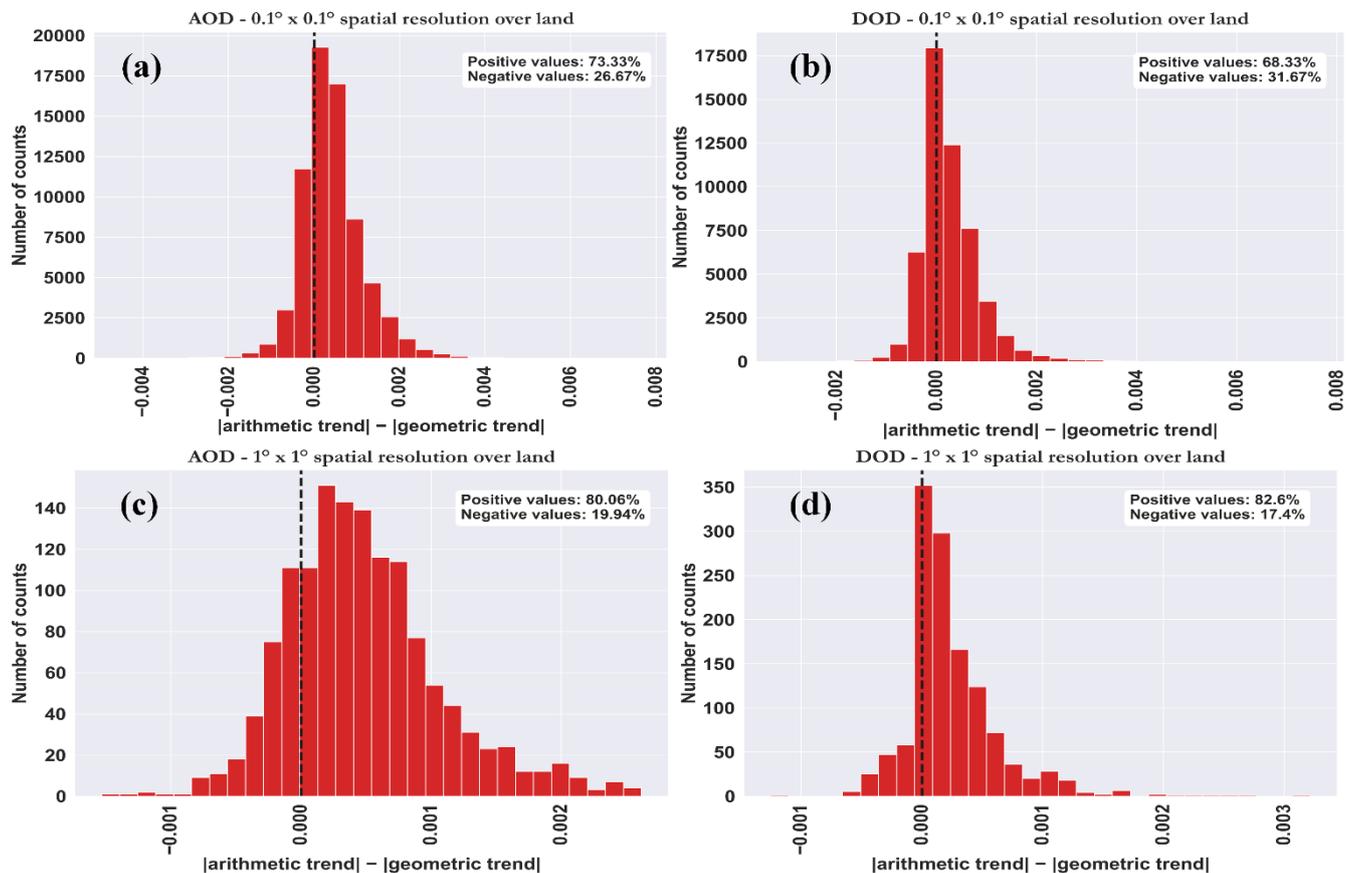**Figure S2: Histograms showing the differences between geometric-based and arithmetic-based trends for (a) AOD and (b) DOD at 0.1° x 0.1° and (c) AOD and (d) DOD at 1° x 1° over land.**
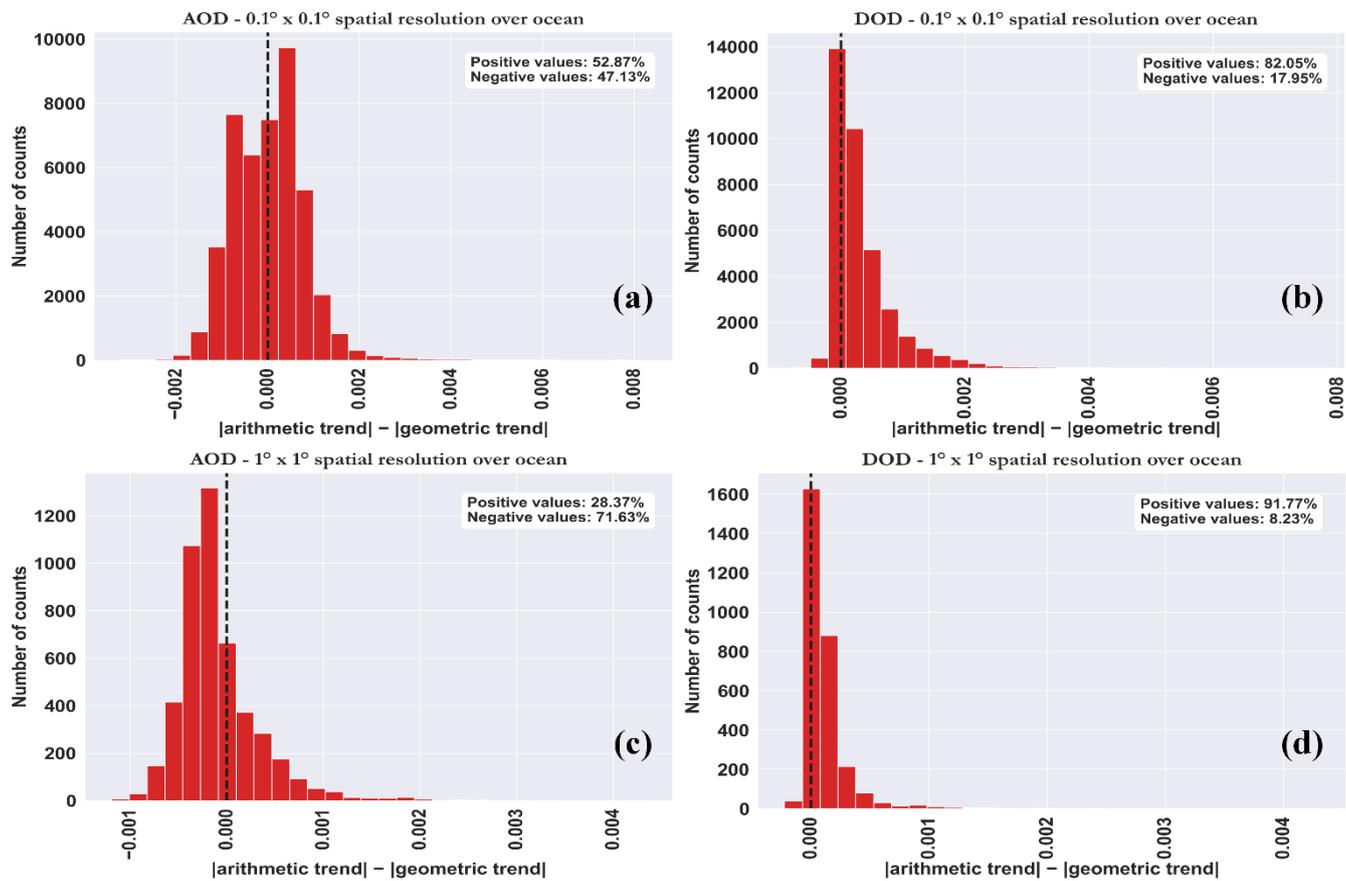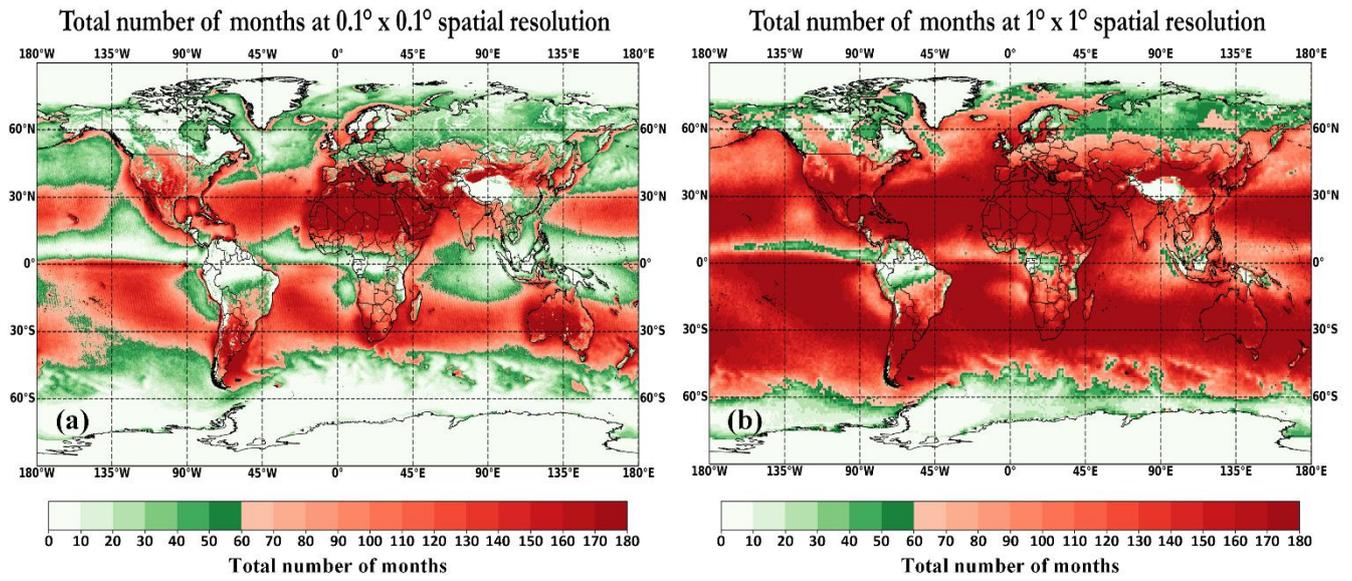
Figure S3: Same as Fig. S2 over land.

Figure S4: Global distribution of total number of months at (a) 0.1° x 0.1° and (b) 1° x 1° spatial resolution.
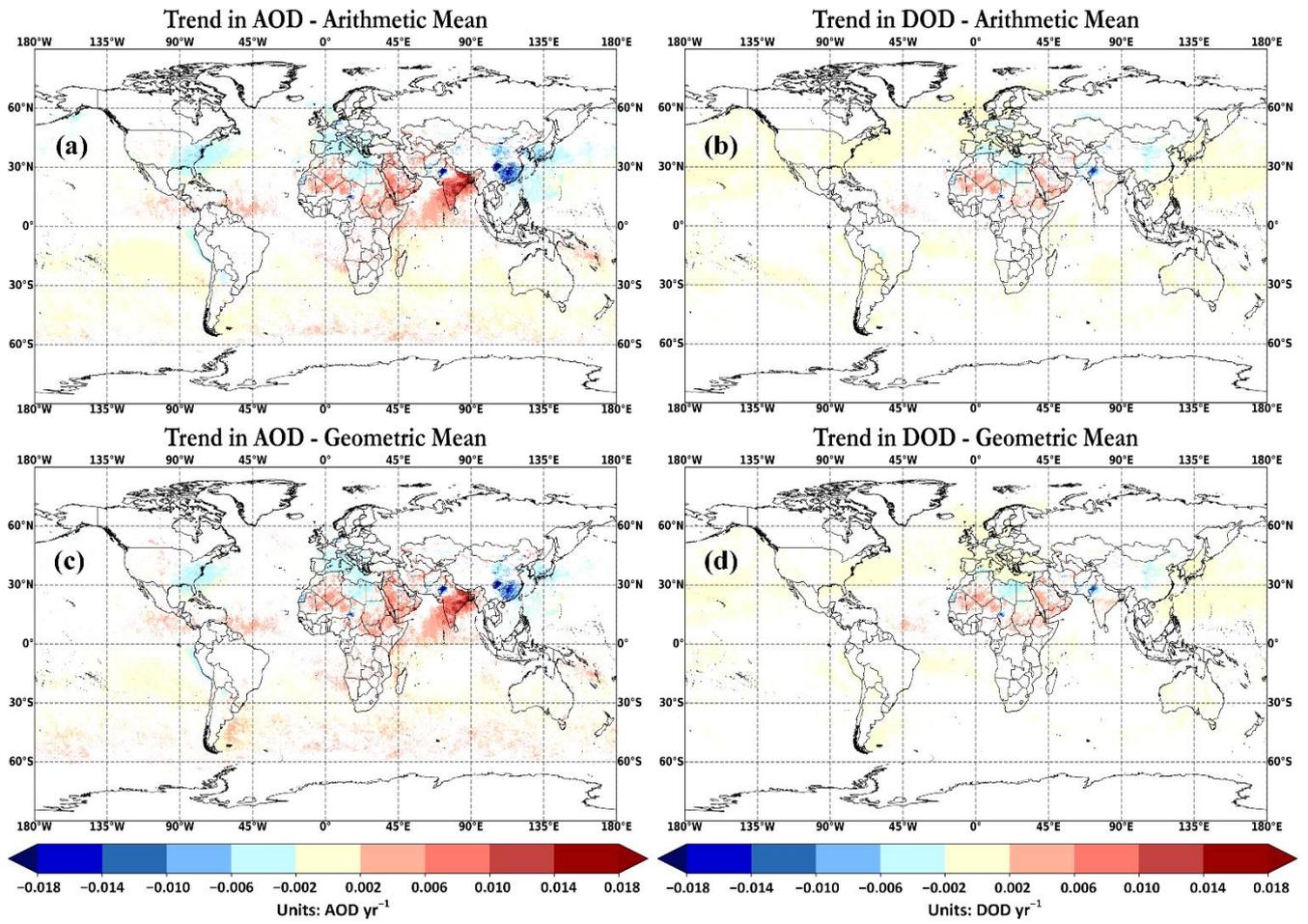
Trend in AOD - Arithmetic Mean

(a)

Trend in DOD - Arithmetic Mean

(b)

Trend in AOD - Geometric Mean

(c)

Trend in DOD - Geometric Mean

(d)

−0.018 −0.014 −0.010 −0.006 −0.002 0.002 0.006 0.010 0.014 0.018

Units: AOD yr^{-1}

Units: DOD yr^{-1}

Figure S5: Same as Fig. 1 without applying any temporal criteria (Sect 2.2).
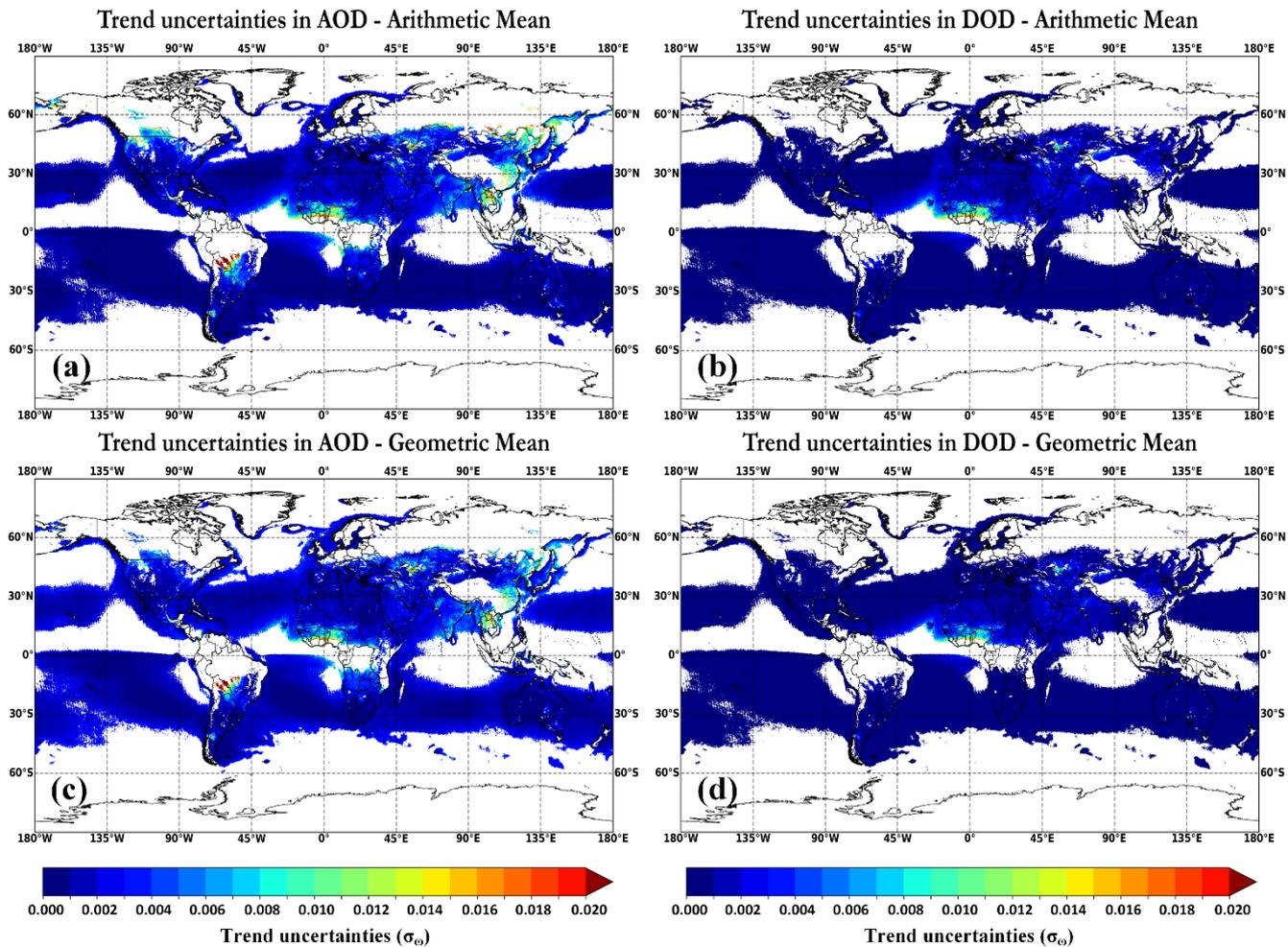
Figure S6: Global maps of temporal trends uncertainties, at 0.1° x 0.1° spatial resolution, using Eq. (3) for AOD (a and c) and DOD (b and d). Upper panel (a, b) shows the arithmetic-based trends while the bottom panel (c, d) indicates the geometric-based trends.
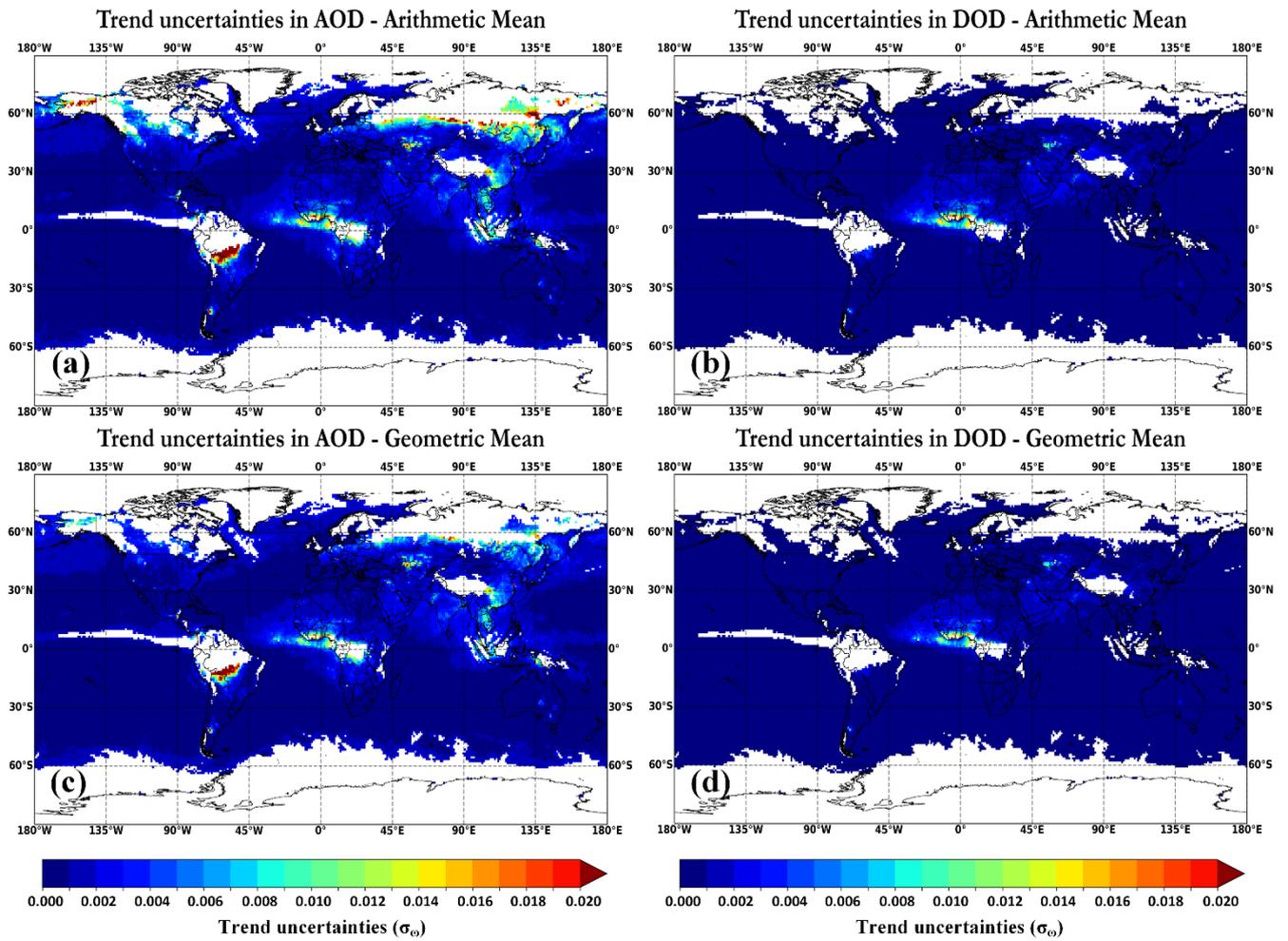
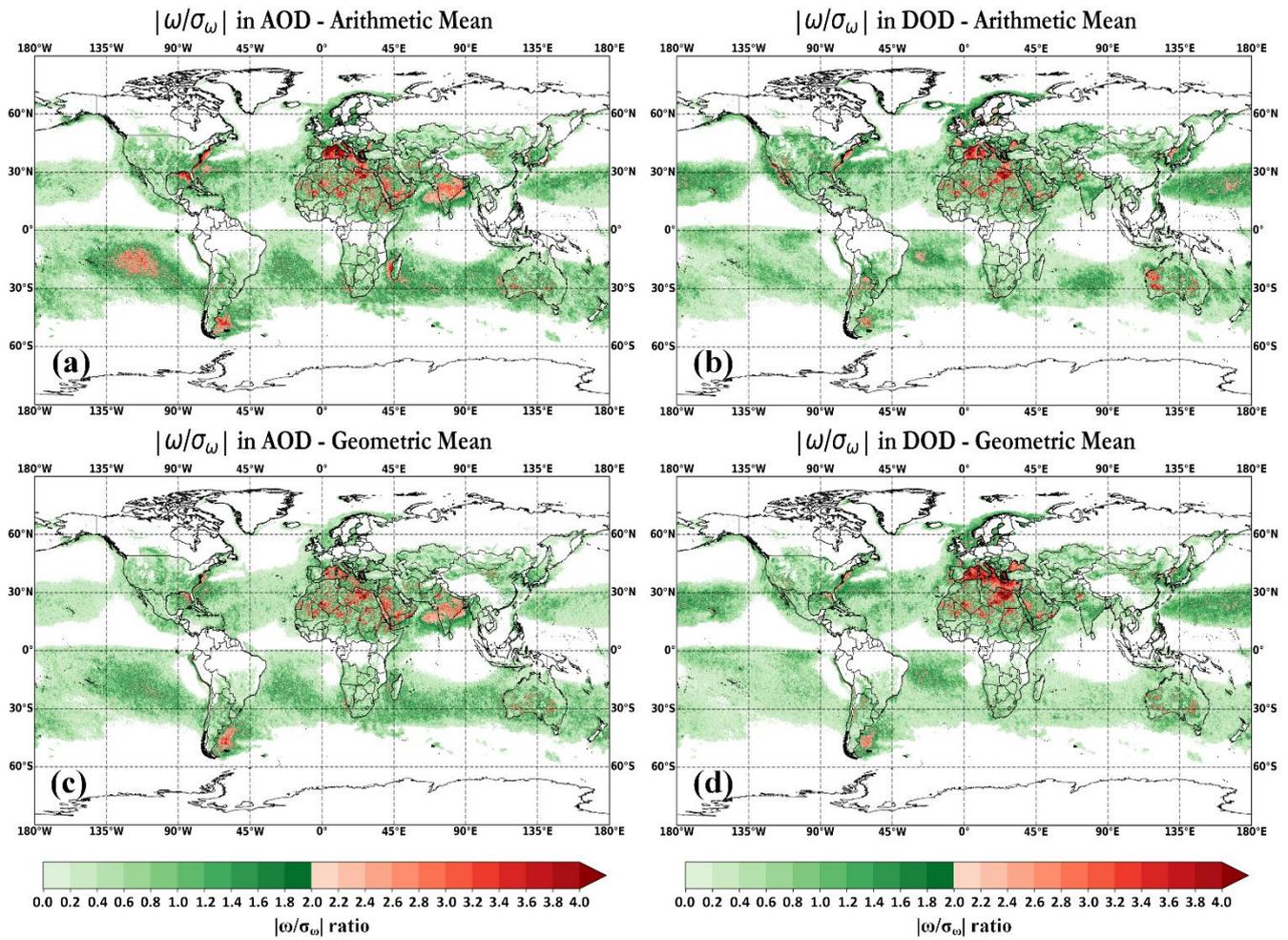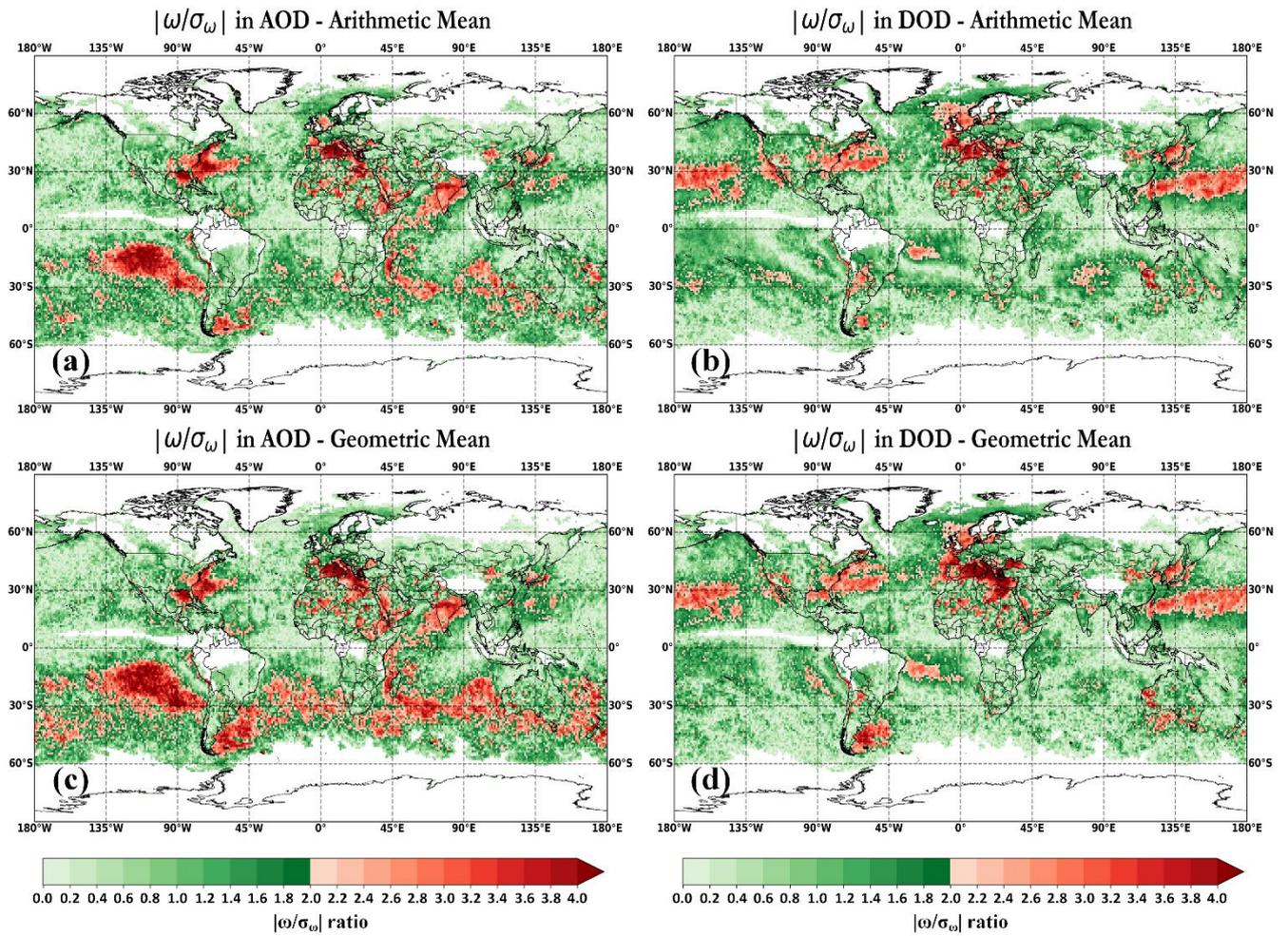**Figure S7: Same as Fig. S6 at 1° x 1° spatial resolution.**

Figure S8: Global maps of |ω/σ_ω| ratio, at 0.1° x 0.1° spatial resolution for AOD (a and c) and DOD (b and d). Upper panel (a, b) shows the arithmetic-based trends while the bottom panel (c, d) indicates the geometric-based trends.

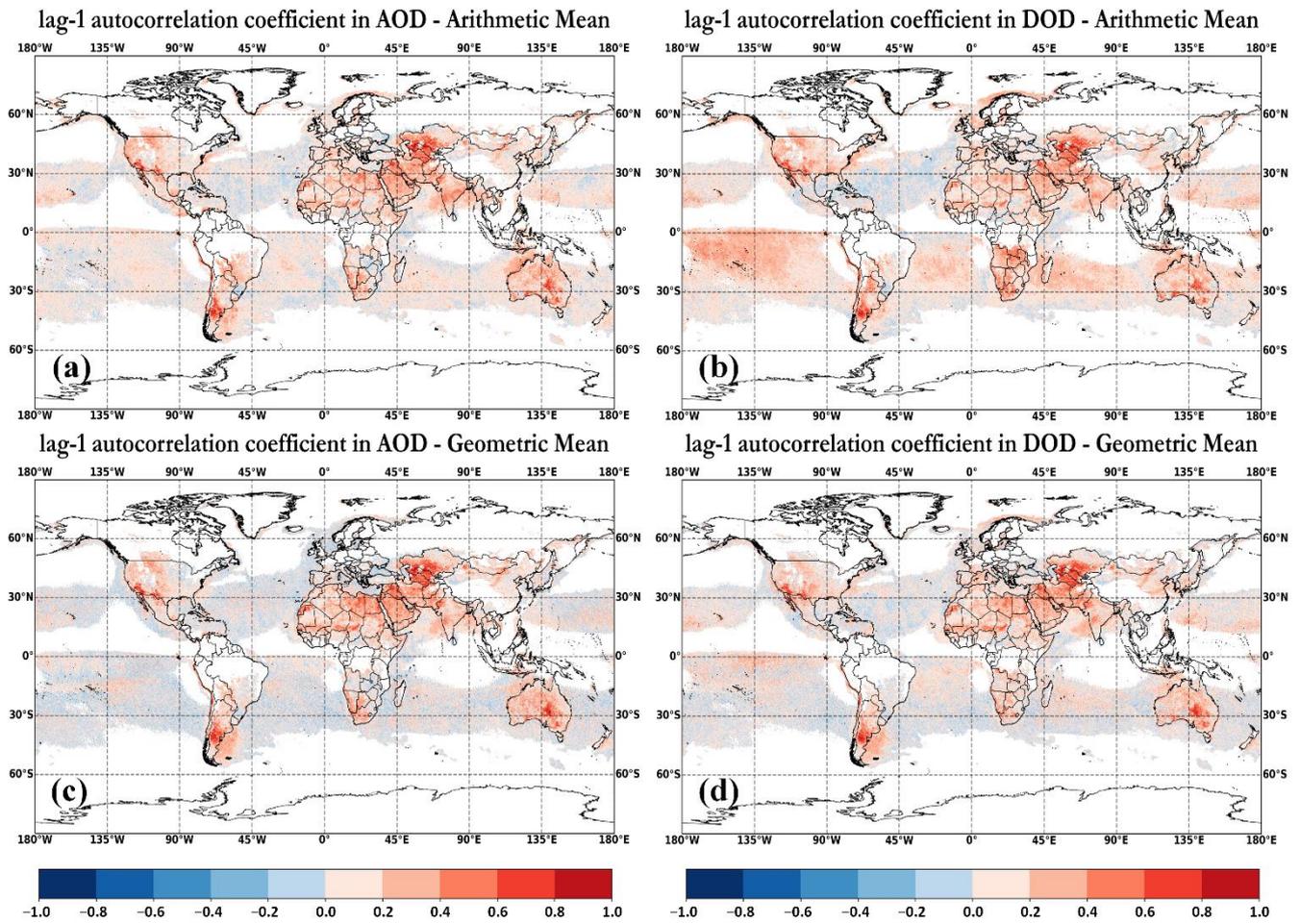**Figure S9: Same as Fig. S8 at 1° x 1° spatial resolution.**

Figure S10: Global maps of lag-1 autocorrelation coefficient, at 0.1° x 0.1° spatial resolution for AOD (a and c) and DOD (b and d). Upper panel (a, b) shows the arithmetic-based trends while the bottom panel (c, d) indicates the geometric-based trends.
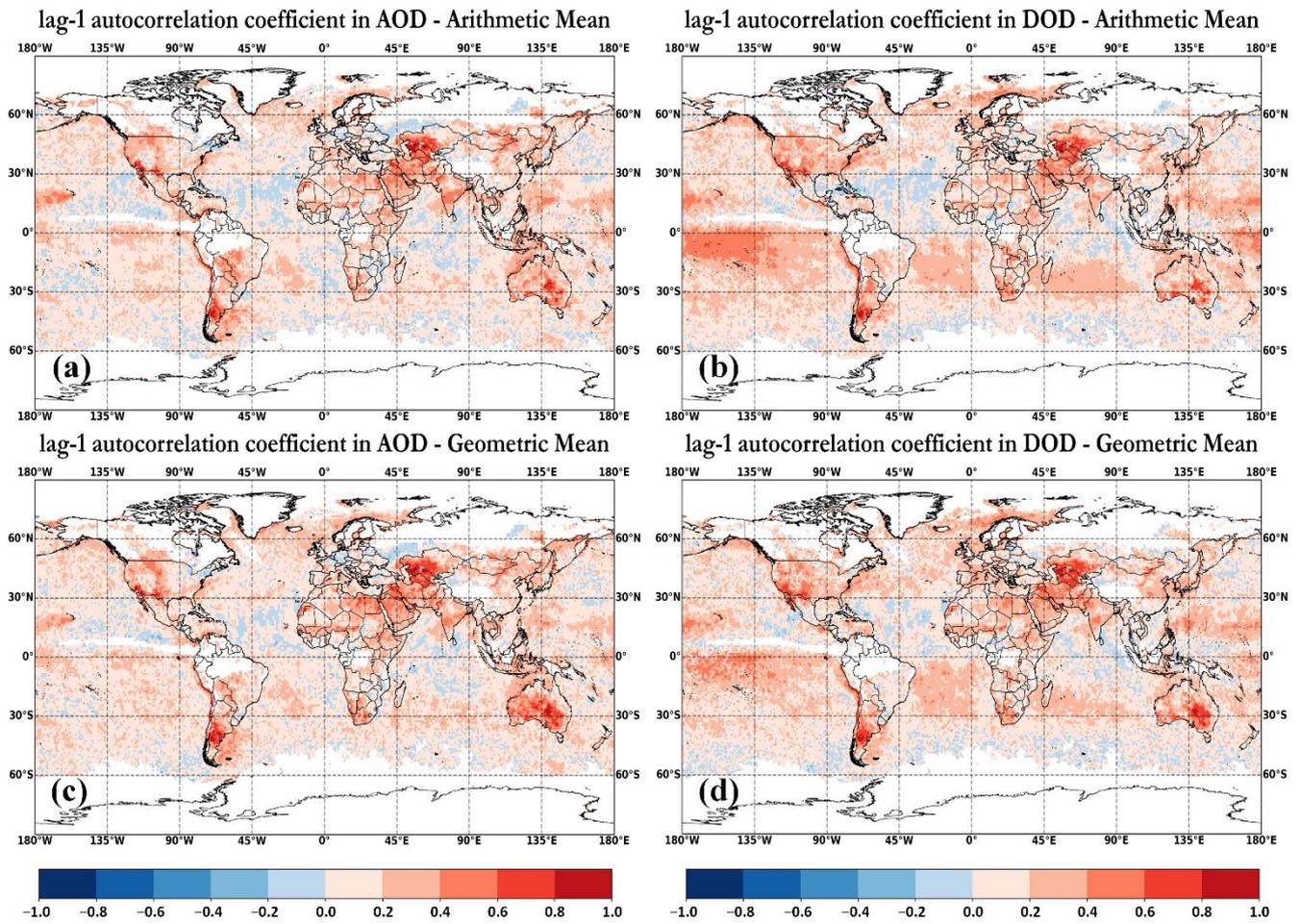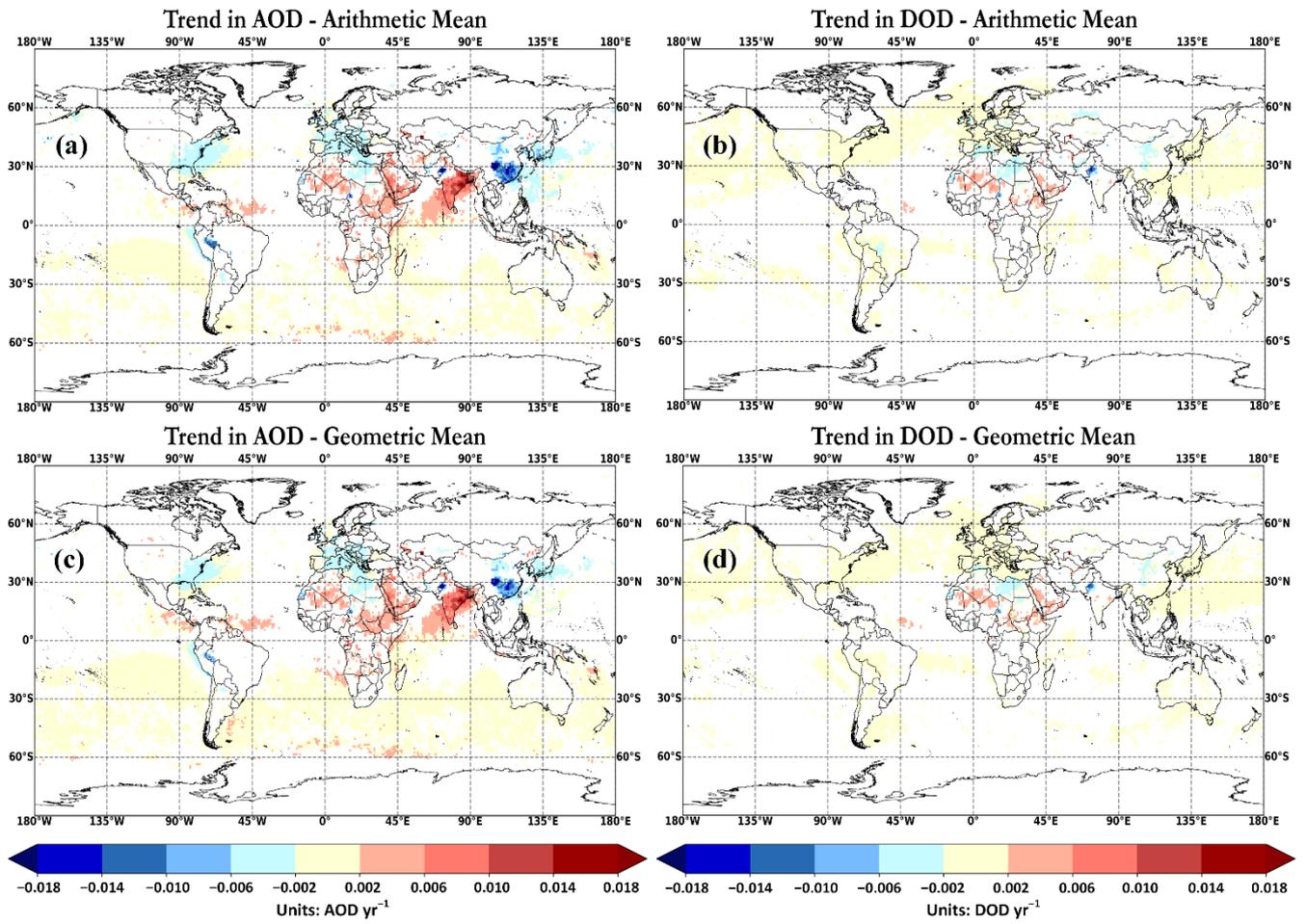
lag-1 autocorrelation coefficient in AOD - Arithmetic Mean

lag-1 autocorrelation coefficient in DOD - Arithmetic Mean

lag-1 autocorrelation coefficient in AOD - Geometric Mean

lag-1 autocorrelation coefficient in DOD - Geometric Mean

Figure S11: Same as Fig. S10 at 1° x 1° spatial resolution.
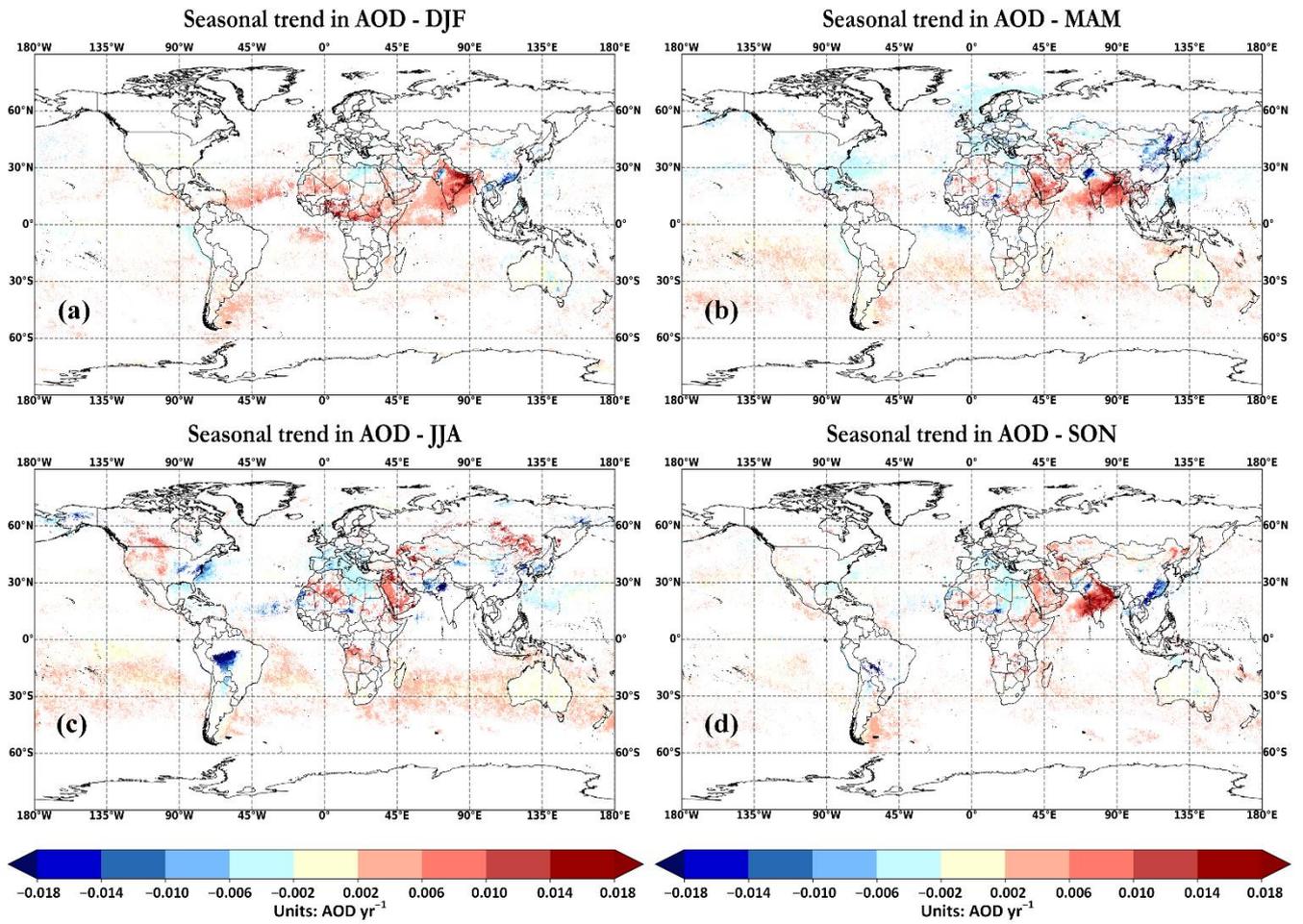
Figure S12: Same as Fig. S5 at 1° x 1° spatial resolution.

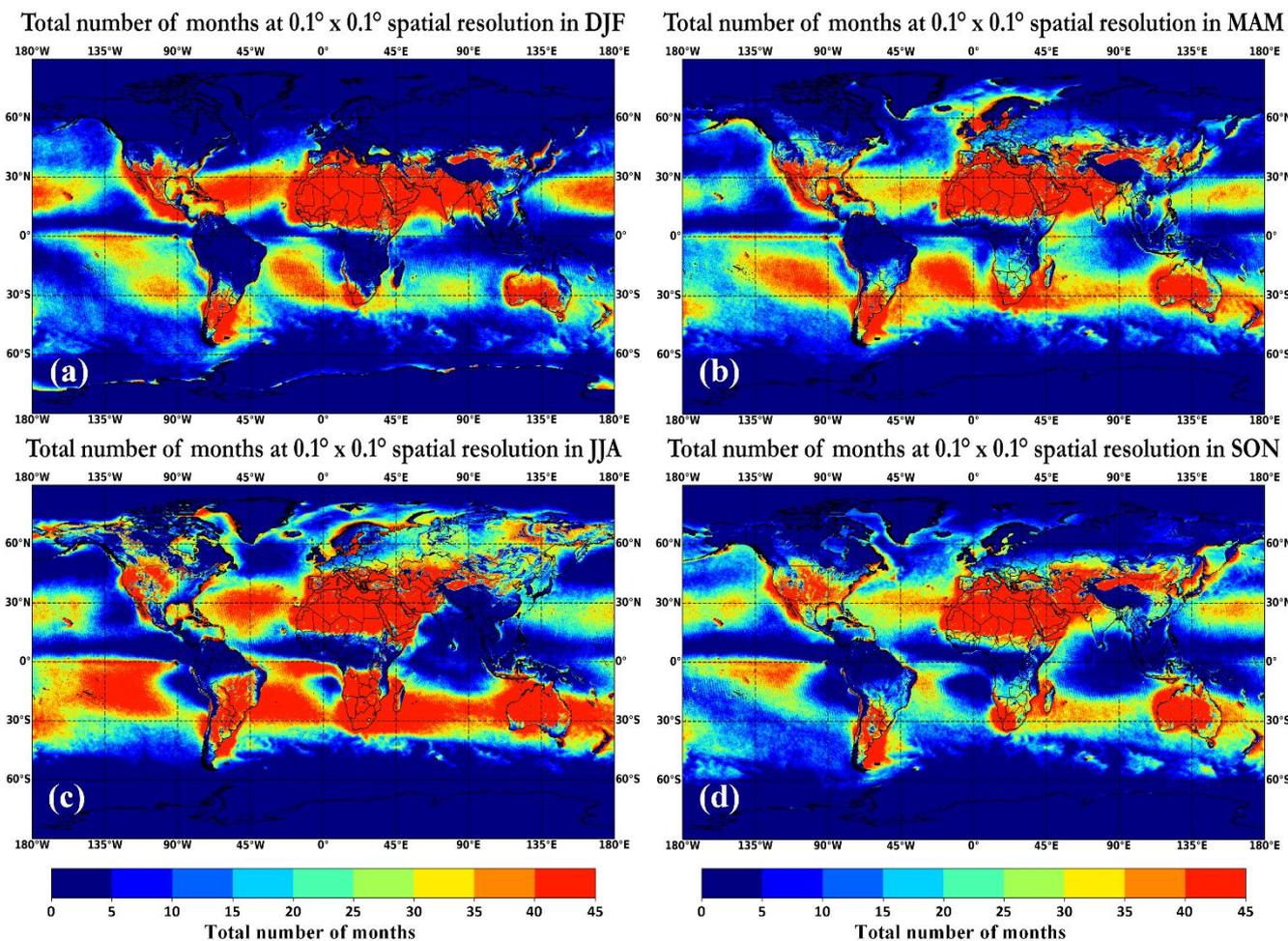**Figure S13: Same as Fig. 2 at 1° x 1° spatial resolution.**

Figure S14: Total number of months at (a) December-January-February (DJF), (b) March-April-May (MAM), (c) June-July-August (JJA) and (d) September-October-November (SOV) at 0.1° x 0.1° spatial resolution.
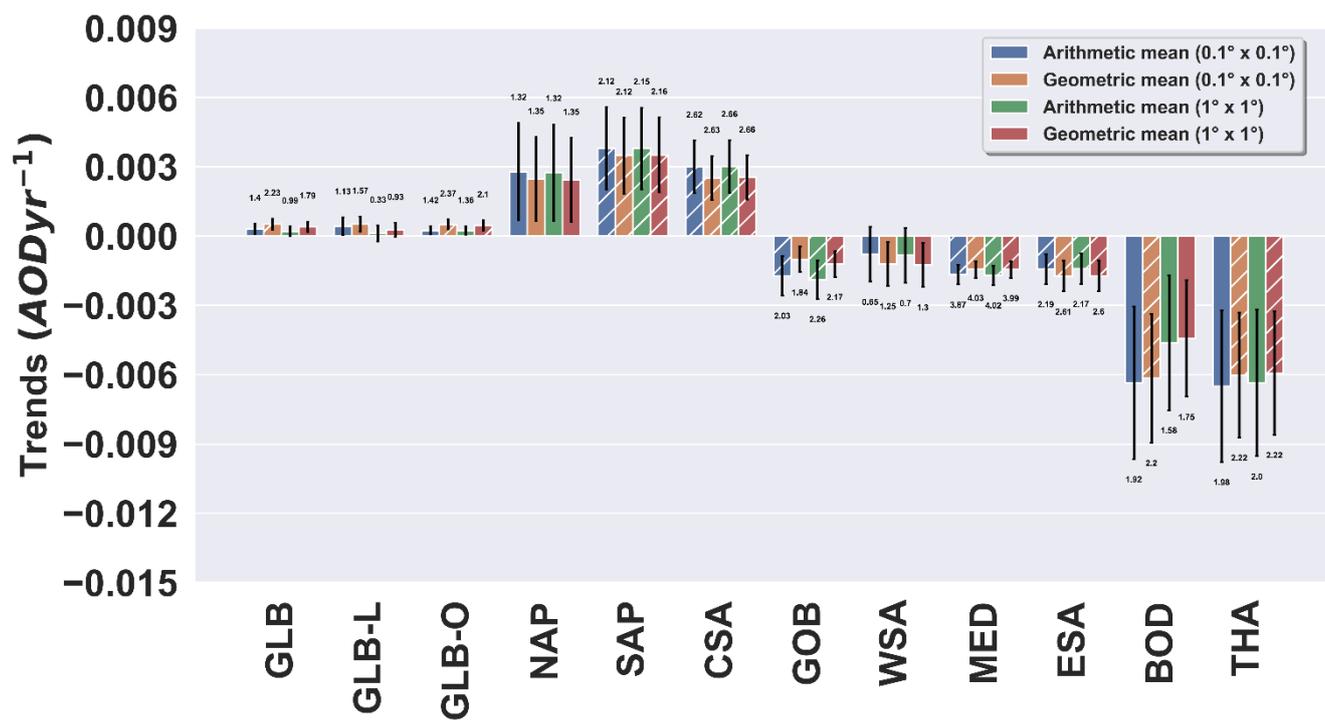
Figure S15: Same as Fig. 4 for AOD.