# Supplementary tables

|  |  |  |
| --- | --- | --- |
| **Field (Units)**  **Annual mean: 2010** | **HTAP v3**  **(this study)** | **HTAP v2**  **(Butler et al. 2020)** |
| CH4 conc. (ppb) | 1788 | 1760 |
| Trop. CH4 burden (TgCH4) | 4216 | 4150 |
| Trop. CH4 loss (TgC) | 492.4 | 410 |
| CH4 lifetime (years) | 6.42 | 7.59 |
| Trop. O3 burden (Tg O3) | 336.4 | 319 |
| Trop. O3\_X\_CH4 burden (Tg O3) | 148.52 | 113 |
| OPE-CH4 (mol O3/ mol C) | 0.08 | 0.07 |

**Table S1**: Comparison of various CH4-related metrics between this study and Butler et al. 2020, for the year 2010.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tag** | **Emissions**  **(TgN/yr)** | **Trop O3 burden (TgO3)** | **OPE**  **(mol O3**  **/mol C)** | **Surface mean (ppbv)** | **Population weighted mean (ppbv)** |
| Explicitly tagged regions within the Rest of the World tag in our NOx-tagged simulation | | | | | |
| Central Asia | 0.55(0.82) | 0.91(0.27) | 0.48 | 0.17(0.62) | 0.2(0.59) |
| Mexico and Central America | 2.01(3.0) | 10.99(3.27) | 1.6 | 0.8(2.96) | 1.03(3.07) |
| North Africa | 0.87(1.31) | 2.08(0.62) | 0.7 | 0.32(1.19) | 0.56(1.67) |
| South-East Asia | 2.58(3.85) | 15.09(4.49) | 1.73 | 0.84(3.11) | 1.72(5.13) |
| Southern Hemisphere regions\* | 4.55(6.79) | 22.95(6.82) | 1.48 | 2.6(9.6) | 1.66(4.95) |

**Table S2**: 2000-2018 Mean contributions from explicitly tagged regions to the “Rest of the World” tag in our NOx-tagged simulation discussed this study.

\*Includes southern hemisphere regions: Sahel Africa, Pacific-Australia-New Zealand and South America.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tag** | **Emissions**  **(TgN/yr2)** | **Trop O3 burden (TgO3/yr)** | **OPE**  **(mol O3**  **/mol C/yr)** | **Surface mean (ppbv/yr)** | **Population weighted mean (ppbv/yr)** |
| Explicitly tagged regions within the Rest of the World tag in our NOx-tagged simulation | | | | | |
| Central Asia | 0.01(2.9) | 0.01(1.49) | -0.004 | 0.003(1.97) | 0.002(1.27) |
| Mexico and Central America | Insig | 0.06(0.58) | 0.008 | Insig | Insig |
| North Africa | 0.03(5.52) | 0.06(3.81) | -0.007 | 0.01(3.33) | 0.01(3.01) |
| South-East Asia | 0.08(4.19) | 0.3(2.16) | -0.019 | 0.02(2.1) | 0.03(2.1) |
| Southern Hemisphere regions\* | 0.09(2.57) | 0.38(1.93) | -0.005 | 0.03(1.14) | 0.04(2.62) |

**Table S3**: Theil-Sen estimator/slope of trends in contributions from explicitly tagged regions to the “Rest of the World” tag in our NOx-tagged simulation discussed this study. Trend slope and significance has been estimated by an original Mann-Kendall test at 5 % significance level using the pymannkendall python module described in Hussain and Mahmud 2019.

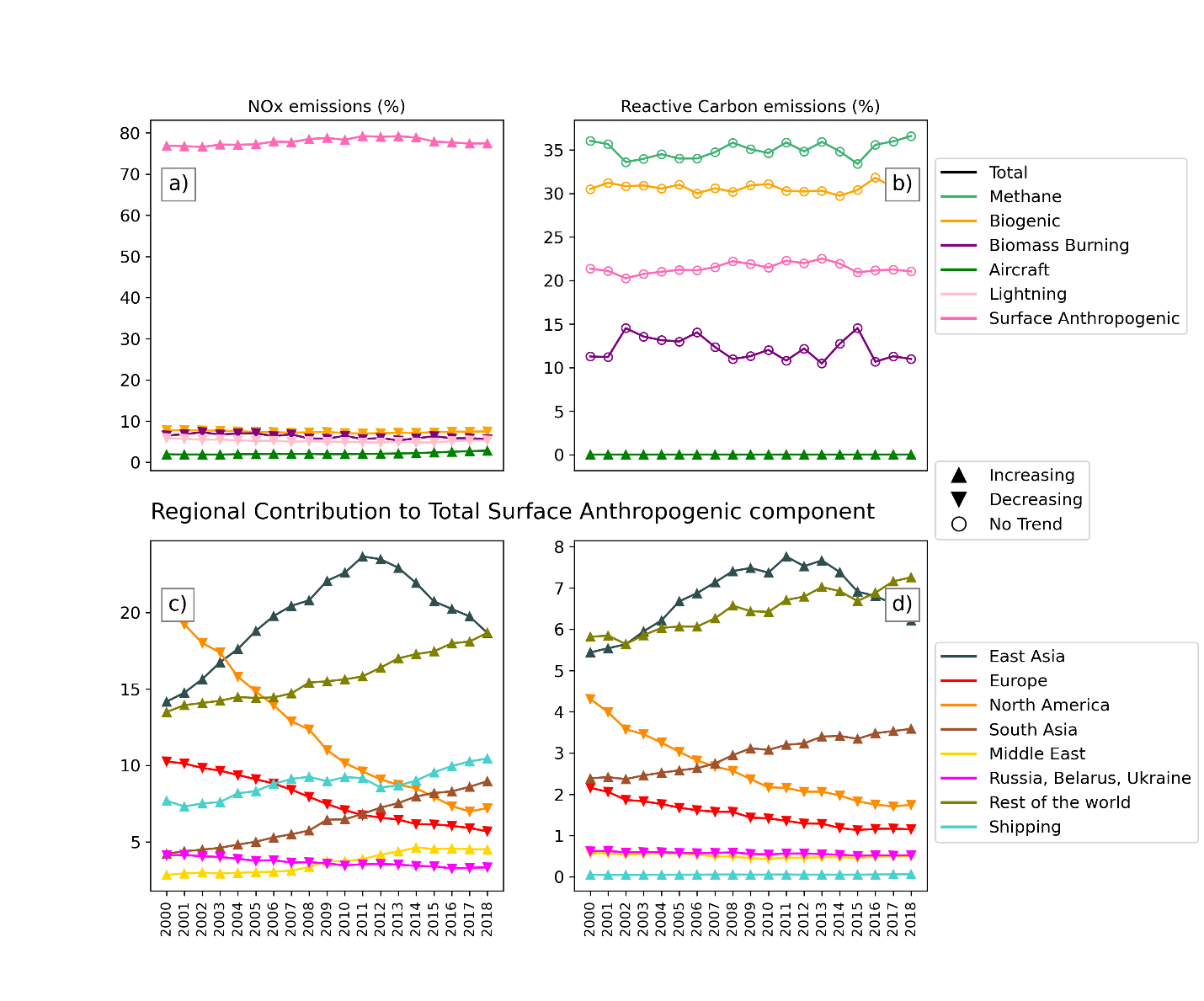
\*Includes southern hemisphere regions: Sahel Africa, Pacific-Australia-New Zealand, and South America.

*Hussain and Mahmud, (2019). pyMannKendall: a python package for non-parametric Mann Kendall family of trend tests. Journal of Open-Source Software, 4(39), 1556,*[*https://doi.org/10.21105/joss.01556*](https://doi.org/10.21105/joss.01556)

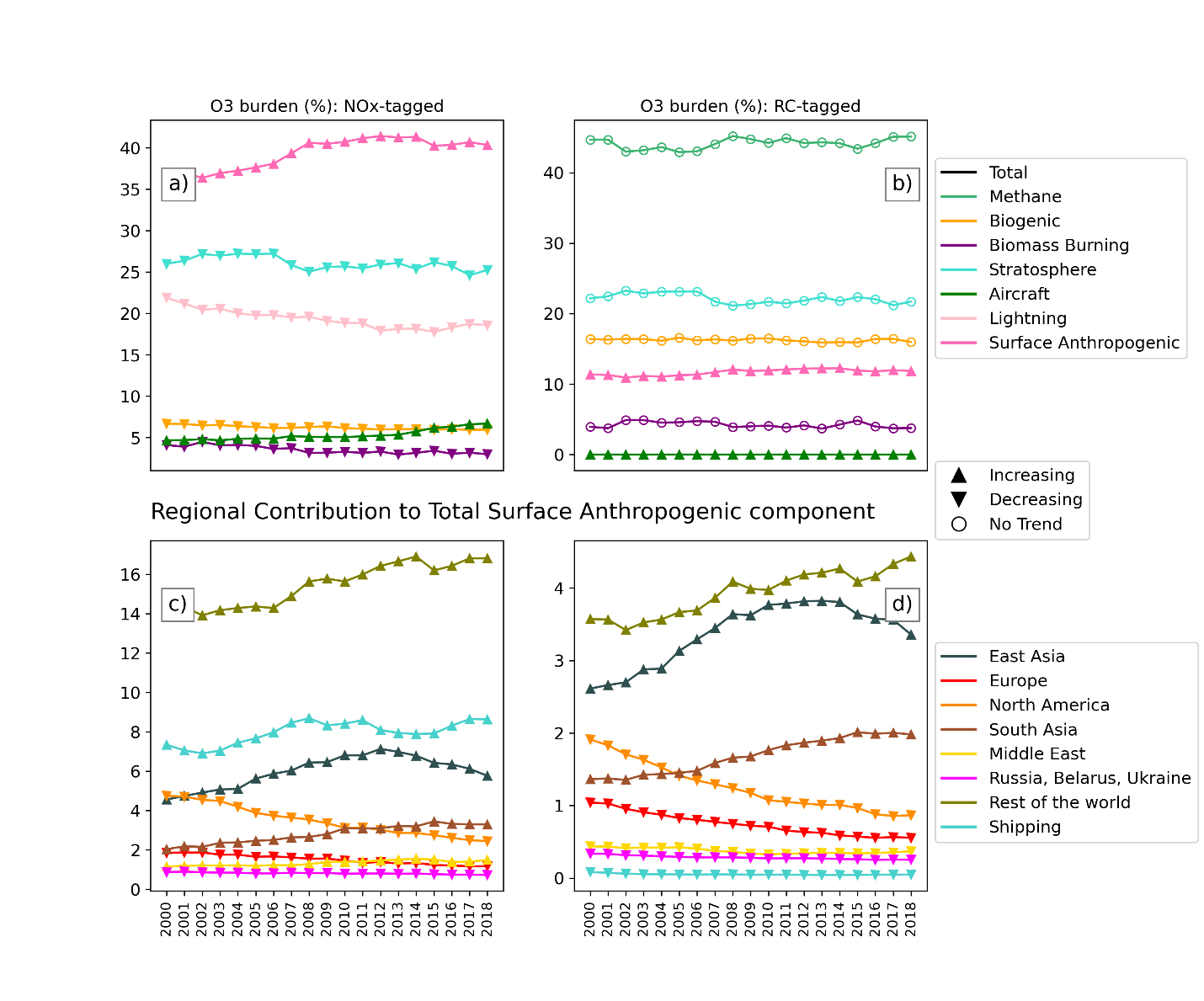
|  |  |  |
| --- | --- | --- |
| **Region** | **Population** | **Population percentage** |
| Total | 7954963550 | 100 |
| Europe | 645060000 | 8.1089 |
| North America | 378064000 | 4.752555 |
| East Asia | 1686480000 | 21.20035 |
| Russia, Belarus, Ukraine | 205763000 | 2.586599 |
| South Asia | 1882710000 | 23.66711 |
| Middle East | 278477000 | 3.50067 |
| Rest of the World | 2875973800 | 36.1532 |
| Explicitly tagged regions in our NOx-tagged simulation within the “Rest of the World” tag | | |
| Southeast Asia | 714549000 | 8.98243 |
| Mexico and Central America | 341845000 | 4.297254 |
| North Africa | 310292000 | 3.900609 |
| Central Asia | 77050900 | 0.968589 |
| Southern Hemisphere regions\* | 1432236900 | 18 |

**Table S4**: Population at various regions considered in this study. These numbers are approximate numbers derived from re-gridding a fine resolution dataset to a coarser resolution grid used in our study.

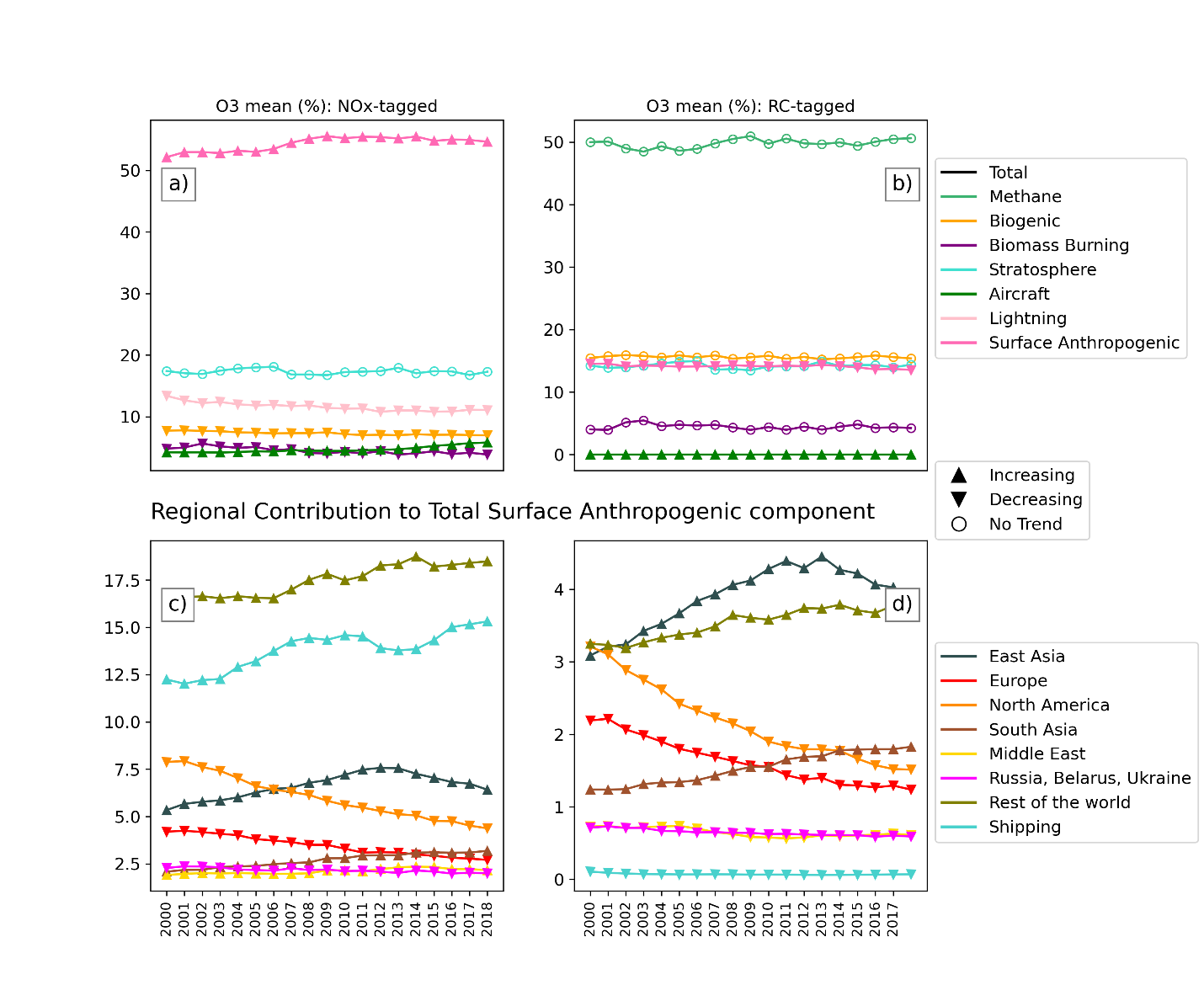
\*Includes southern hemisphere regions: Sahel Africa, Pacific-Australia-New Zealand, and South America.



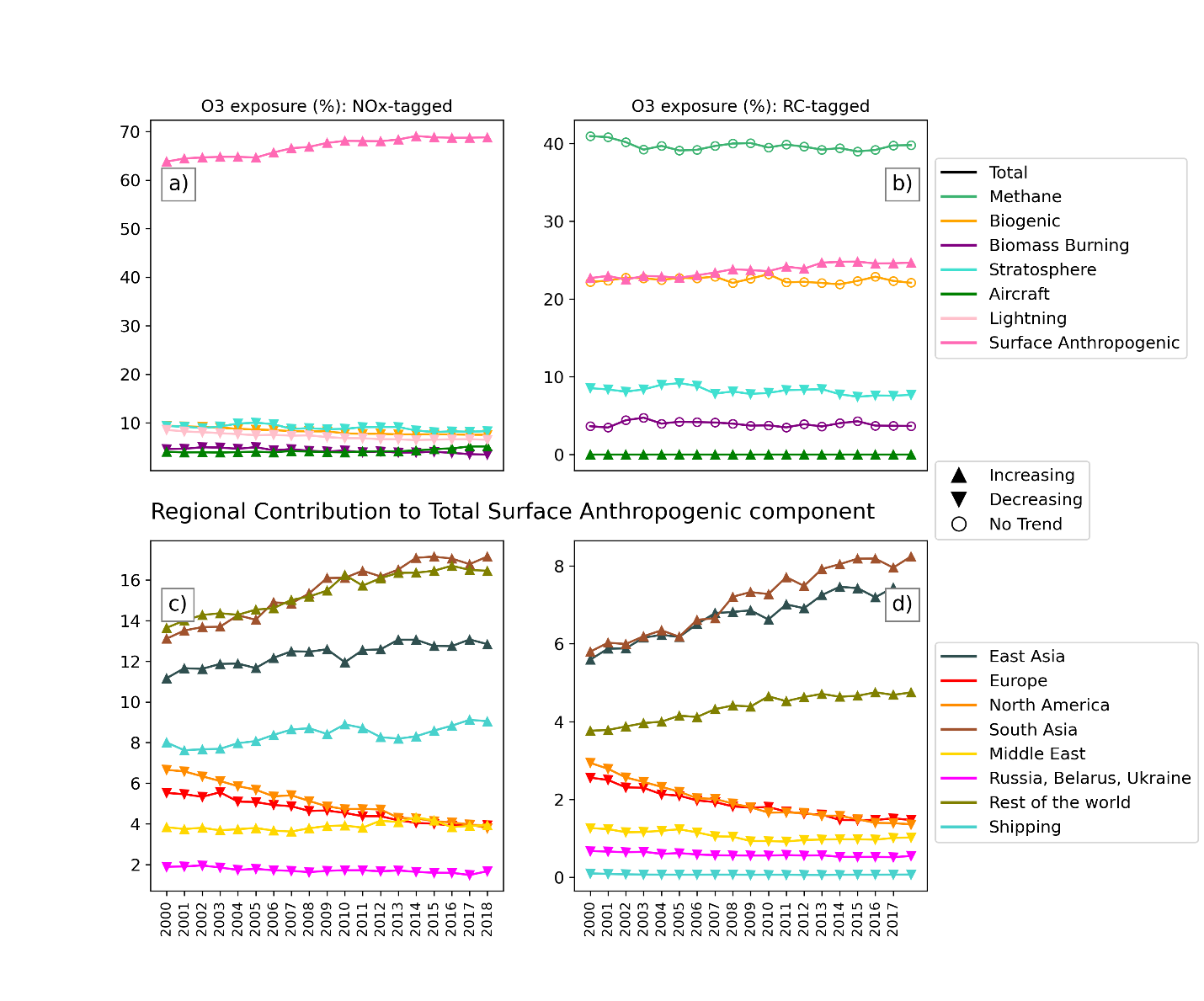
**Figure S1**: Relative contribution of each of the tagged emissions (in %) to the global annual total emissions (Black lines shown in Fig. 3 of the main text) of NOx (left panels) and reactive carbon (right panels).



**Figure S2**: Relative contribution of each of the tagged components (in %) to the total annual mean tropospheric ozone burden (Black lines shown in Fig. 5 of the main text) from the NOx-tagged (left panels) and RC-tagged (right panels) simulations.



**Figure S3**: Relative contribution of each of the tagged components (in %) to the total global annual area-weighted mean surface ozone (Black lines shown in Fig. 7 of the main text) from the NOx-tagged (left panels) and RC-tagged (right panels) simulations.



**Figure S4**: Relative contribution of each of the tagged components (in %) to the total global annual population-weighted mean surface ozone (Black lines shown in Fig. 8 of the main text) from the NOx-tagged (left panels) and RC-tagged (right panels) simulations.

**Trend significance in the above figures has been estimated by an original Mann-Kendall test at 5 % significance level using the pymannkendall python module described in Hussain and Mahmud 2019.**

*Hussain and Mahmud, (2019). pyMannKendall: a python package for non-parametric Mann Kendall family of trend tests. Journal of Open-Source Software, 4(39), 1556,*[*https://doi.org/10.21105/joss.01556*](https://doi.org/10.21105/joss.01556)