Table S1. List of VOCs and their three-letter abbreviation included in the SURFEX-MEGAN3.0 datasets.

RACM name/three-letter abbreviation	Long explanation of chemical species according to RACM definitions
ISO	Isoprene
CH4	Methane
ETH	Ethane
HC3	Sum of alkanes, alcohols, esters, and alkynes with OH rate constant (298K, 1 atmosphere) less than 3.4×10^{-12} cm^3 s^{-1}
HC5	Sum of alkanes, alcohols, esters, and alkynes with OH rate constant (298K, 1 atmosphere) between 3.4×10^{-12} cm^3 s^{-1} and 6.8×10^{-12} cm^3 s^{-1}
HC8	Sum of alkanes, alcohols, esters, and alkynes with OH rate constant (298K, 1 atmosphere) greater than 6.8×10^{-12} cm^3 s^{-1}
OL2	Ethene
OLI	Sum of internal_alkenes
OLT	Sum of terminal alkenes
ALD	Sum of acetaldehyde and higher aldehydes
KET	Sum of ketones
TOL	Sum of toluene and less reactive aromatics
HCHO	Formaldehyde
ORA1	Formic acid
ORA2	Sum of acetic acid and higher acids
API	Sum of alpha-pinene and other cyclic terpenes with one double bond
LIM	Sum of limonenes and other cyclic diene-terpenes

Monthly Mean Isoprene Emissions Over the CAMS European Domain for 2018 - Open Loop
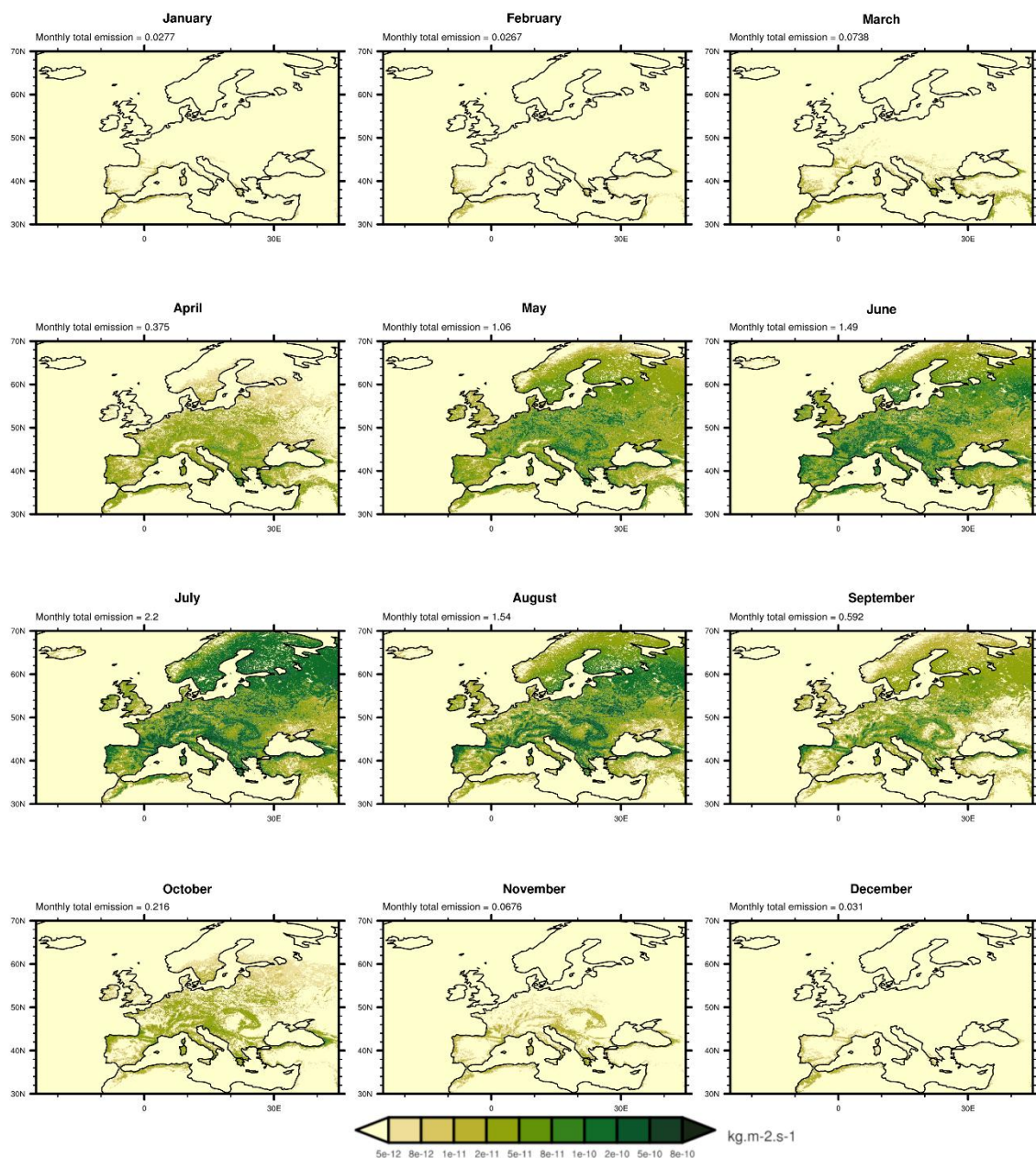
Figure S1. Maps of monthly mean isoprene emissions (units of kg.m^{-2}.s^{-1}) calculated using the SURFEX-MEGAN3.0 algorithms and averaged over 2018 using the open-loop configuration of SURFEX. The panels show each month moving sequentially from January to December first from left to right and then downwards from top to bottom. The colour bars indicate increasing mean isoprene emissions as the colours transition from pale yellow to dark green. Note that the colour bar has a quasi-logarithmic scale. The monthly total mass of isoprene emissions (units of Tg) are shown above each plot.

Monthly Mean Isoprene Emissions Over the CAMS European Domain for 2019 - Open Loop
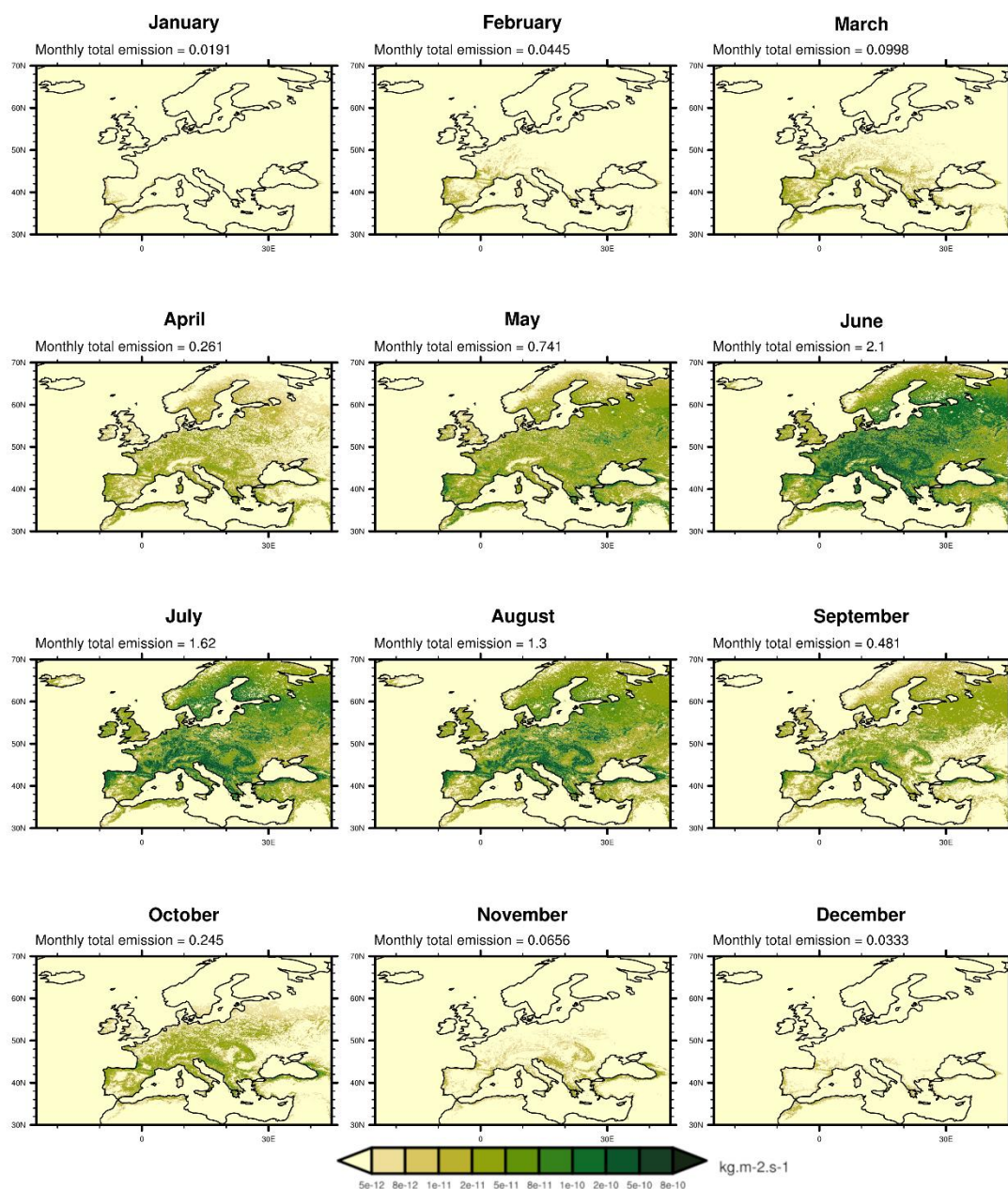
Figure S2. Maps of monthly mean isoprene emissions (units of kg.m^{-2}.s^{-1}) calculated using the SURFEX-MEGAN3.0 algorithms and averaged over 2019 using the open-loop configuration of SURFEX. The panels show each month moving sequentially from January to December first from left to right and then downwards from top to bottom. The colour bars indicate increasing mean isoprene emissions as the colours transition from pale yellow to dark green. Note that the colour bar has a quasi-logarithmic scale. The monthly total mass of isoprene emissions (units of Tg) are shown above each plot.

Monthly Mean Isoprene Emissions Over the CAMS European Domain for 2020 - Open Loop
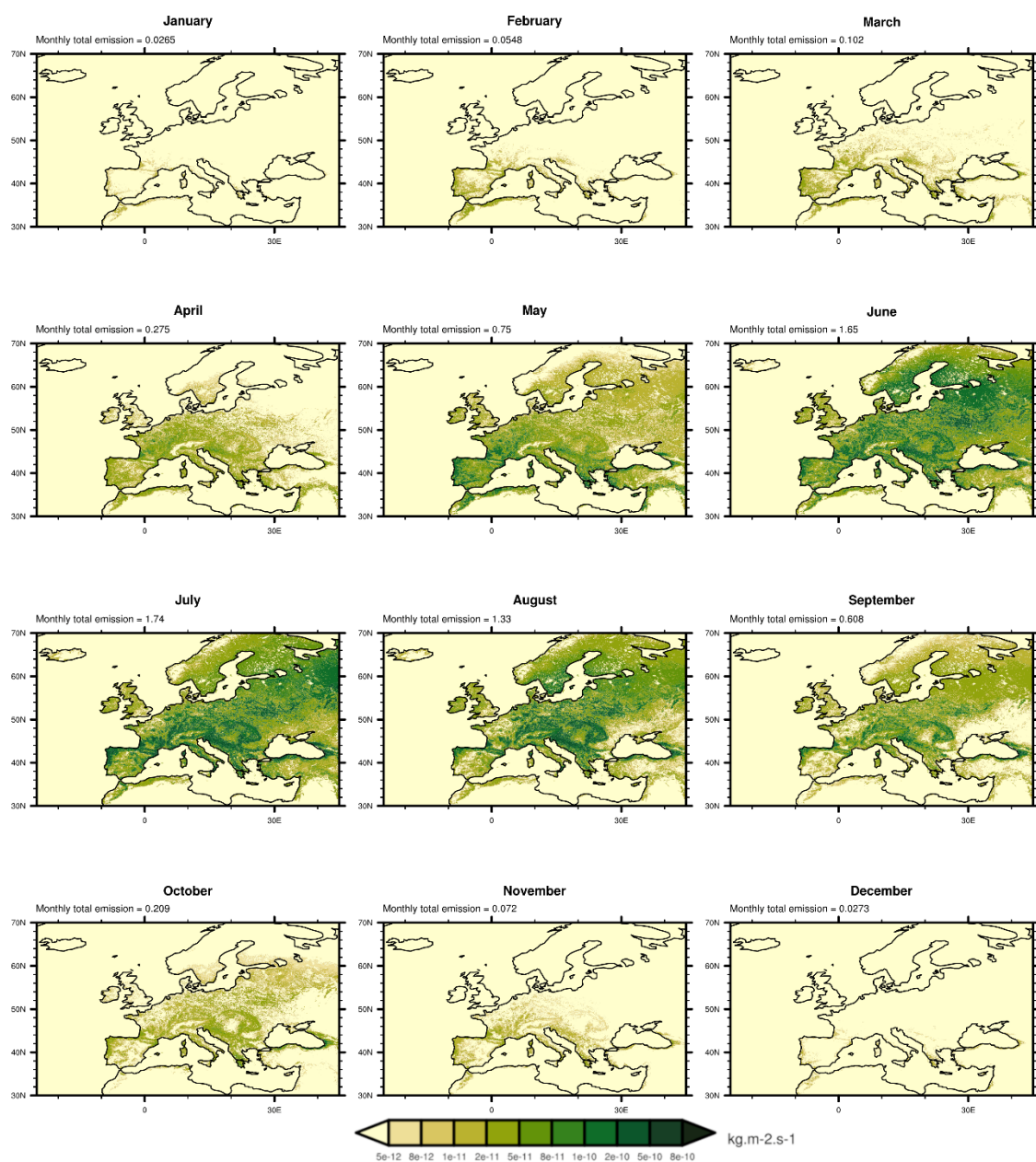
Figure S3. Maps of monthly mean isoprene emissions (units of kg.m^{-2}.s^{-1}) calculated using the SURFEX-MEGAN3.0 algorithms and averaged over 2020 using the open-loop configuration of SURFEX. The panels show each month moving sequentially from January to December first from left to right and then downwards from top to bottom. The colour bars indicate increasing mean isoprene emissions as the colours transition from pale yellow to dark green. Note that the colour bar has a quasi-logarithmic scale. The monthly total mass of isoprene emissions (units of Tg) are shown above each plot.

Monthly Mean Isoprene Emissions Over the CAMS European Domain for 2021 - Open Loop
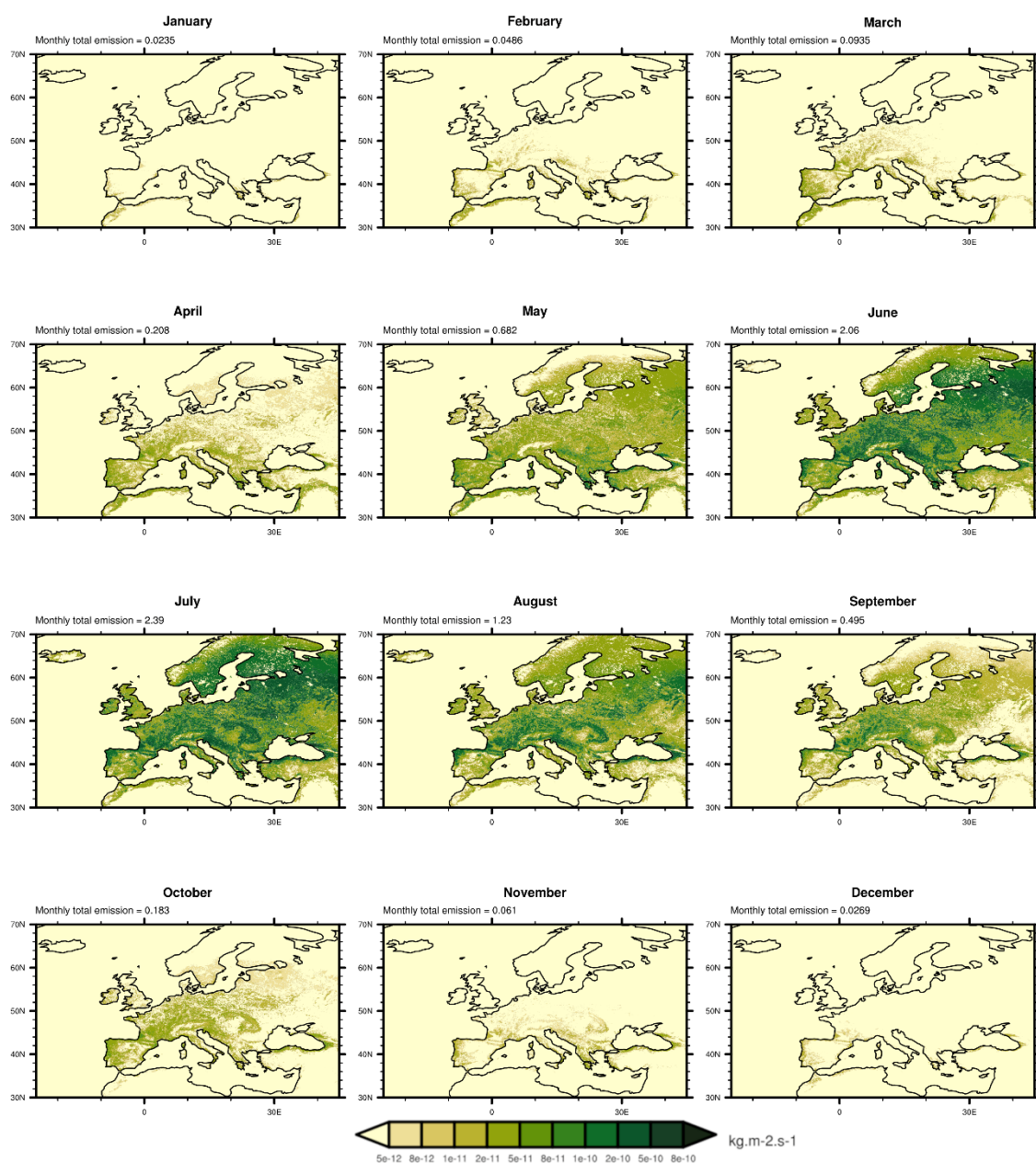
Figure S4. Maps of monthly mean isoprene emissions (units of kg.m^{-2}.s^{-1}) calculated using the SURFEX-MEGAN3.0 algorithms and averaged over 2021 using the open-loop configuration of SURFEX. The panels show each month moving sequentially from January to December first from left to right and then downwards from top to bottom. The colour bars indicate increasing mean isoprene emissions as the colours transition from pale yellow to dark green. Note that the colour bar has a quasi-logarithmic scale. The monthly total mass of isoprene emissions (units of Tg) are shown above each plot.

Monthly Mean Isoprene Emissions Over the CAMS European Domain for 2022 - Open Loop
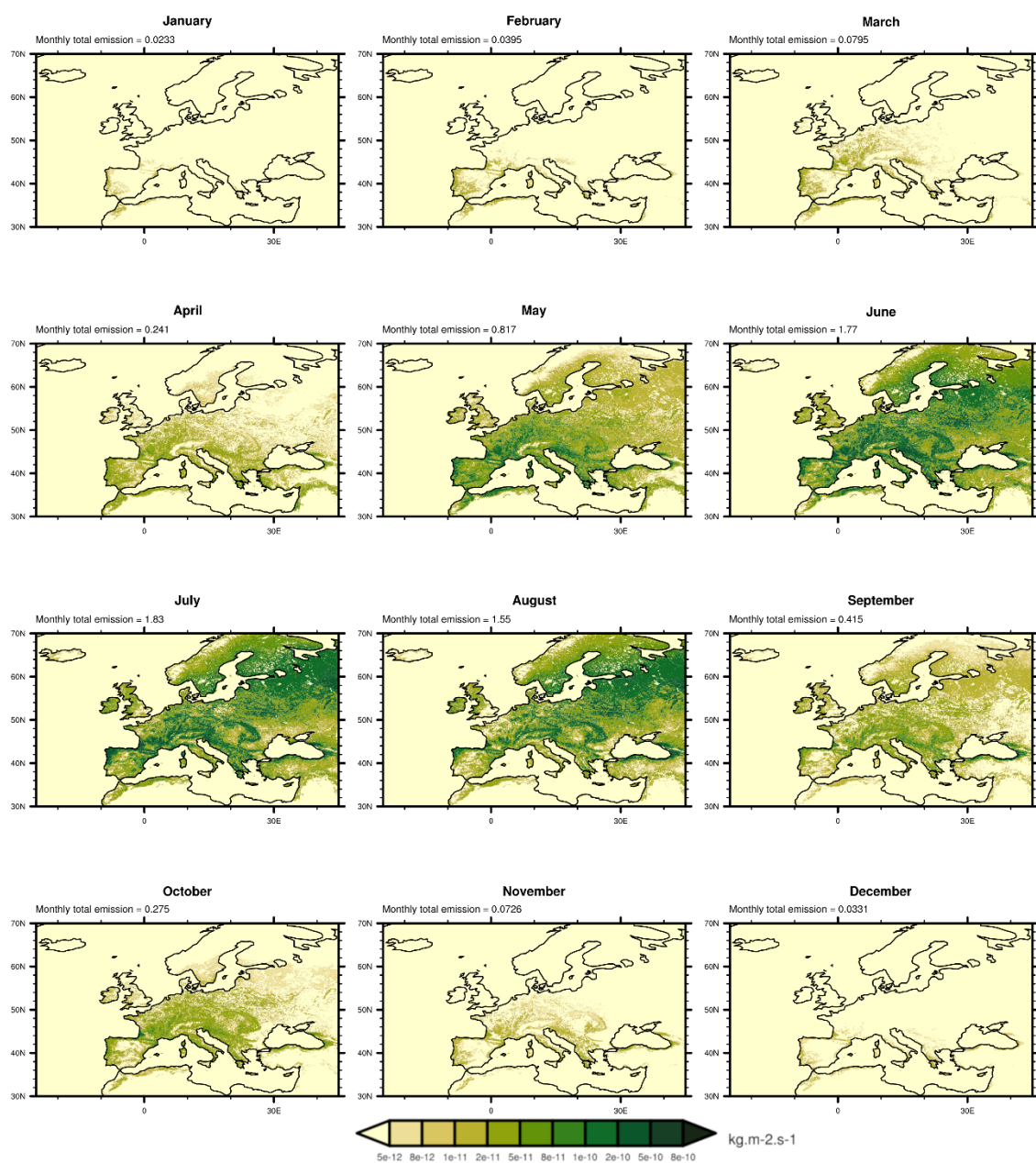
Figure S5. Maps of monthly mean isoprene emissions (units of kg.m⁻².s⁻¹) calculated using the SURFEX-MEGAN3.0 algorithms and averaged over 2019 using the open-loop configuration of SURFEX. The panels show each month moving sequentially from January to December first from left to right and then downwards from top to bottom. The colour bars indicate increasing mean isoprene emissions as the colours transition from pale yellow to dark green. Note that the colour bar has a quasi-logarithmic scale. The monthly total mass of isoprene emissions (units of Tg) are shown above each plot.

Monthly Mean Isoprene Emissions Over the CAMS European Domain for 2018 - LAI Analysis
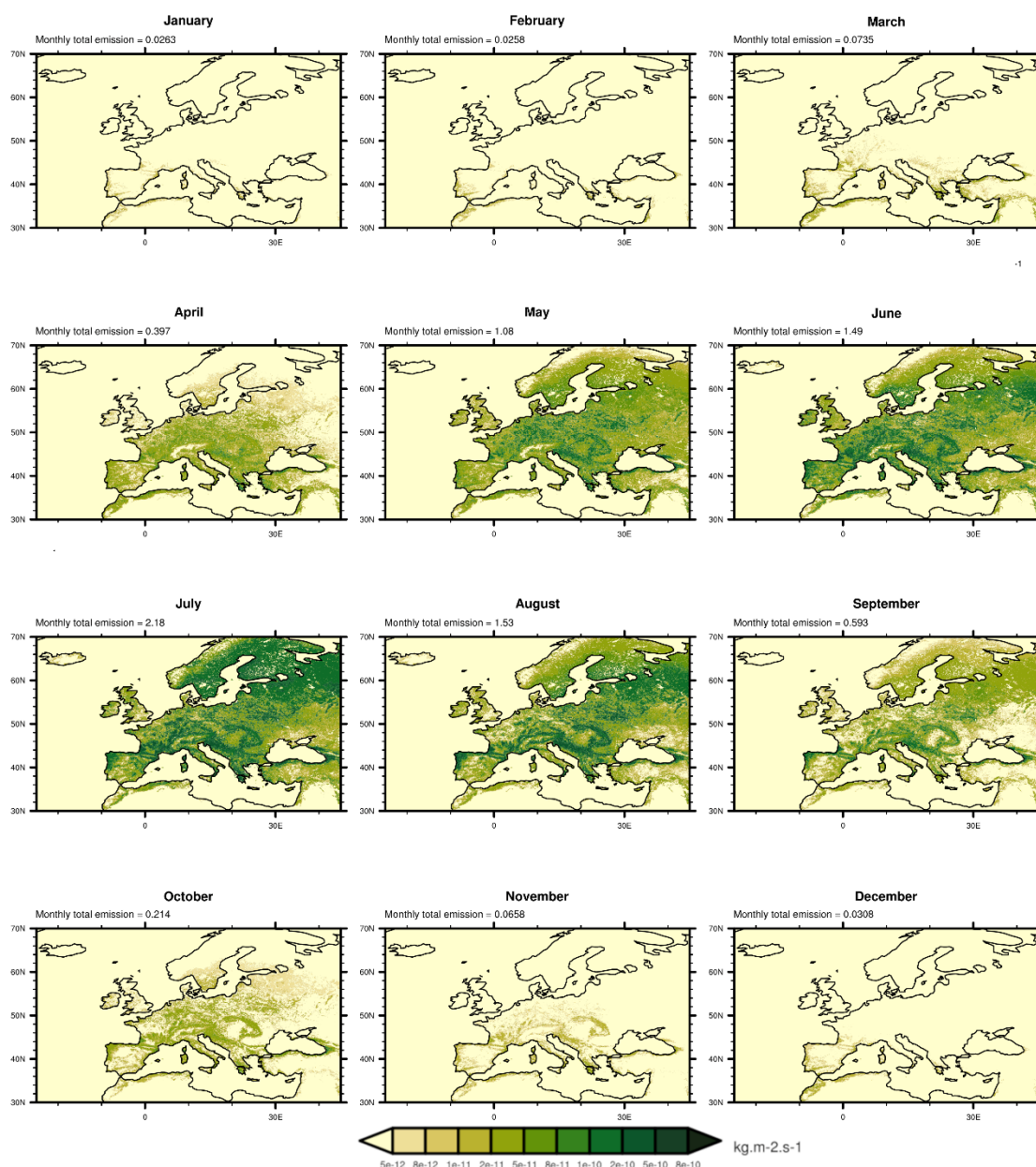
Figure S6. Maps of monthly mean isoprene emissions (units of kg.m^{-2}.s^{-1}) calculated using the SURFEX-MEGAN3.0 algorithms and averaged over 2018 using the analysis configuration of SURFEX. The panels show each month moving sequentially from January to December first from left to right and then downwards from top to bottom. The colour bars indicate increasing mean isoprene emissions as the colours transition from pale yellow to dark green. Note that the colour bar has a quasi-logarithmic scale. The monthly total mass of isoprene emissions (units of Tg) are shown above each plot.

Monthly Mean Isoprene Emissions Over the CAMS European Domain for 2019 - LAI Analysis
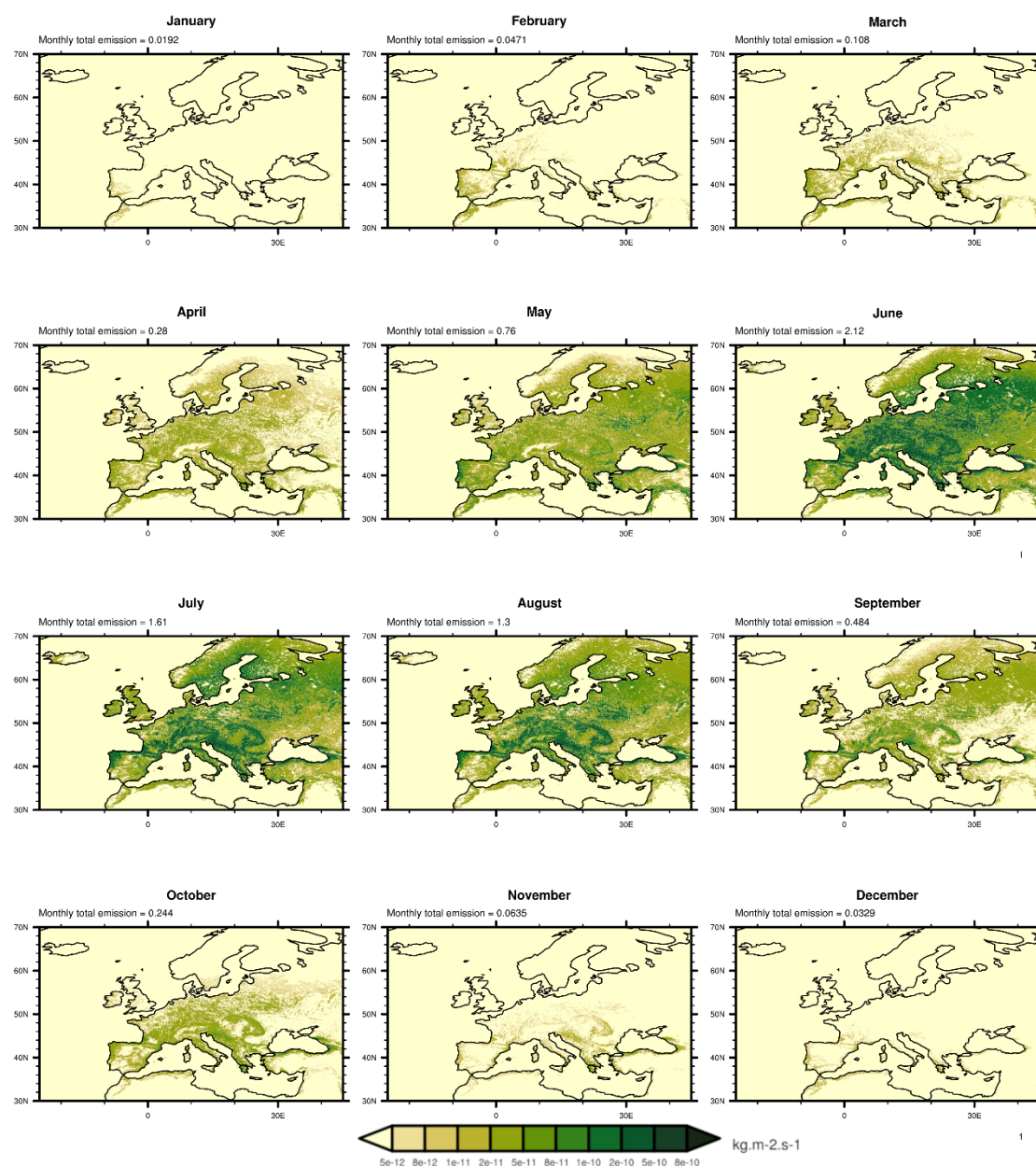
Figure S7. Maps of monthly mean isoprene emissions (units of kg.m^{-2}.s^{-1}) calculated using the SURFEX-MEGAN3.0 algorithms and averaged over 2019 using the analysis configuration of SURFEX. The panels show each month moving sequentially from January to December first from left to right and then downwards from top to bottom. The colour bars indicate increasing mean isoprene emissions as the colours transition from pale yellow to dark green. Note that the colour bar has a quasi-logarithmic scale. The monthly total mass of isoprene emissions (units of Tg) are shown above each plot.

Monthly Mean Isoprene Emissions Over the CAMS European Domain for 2020 - LAI Analysis
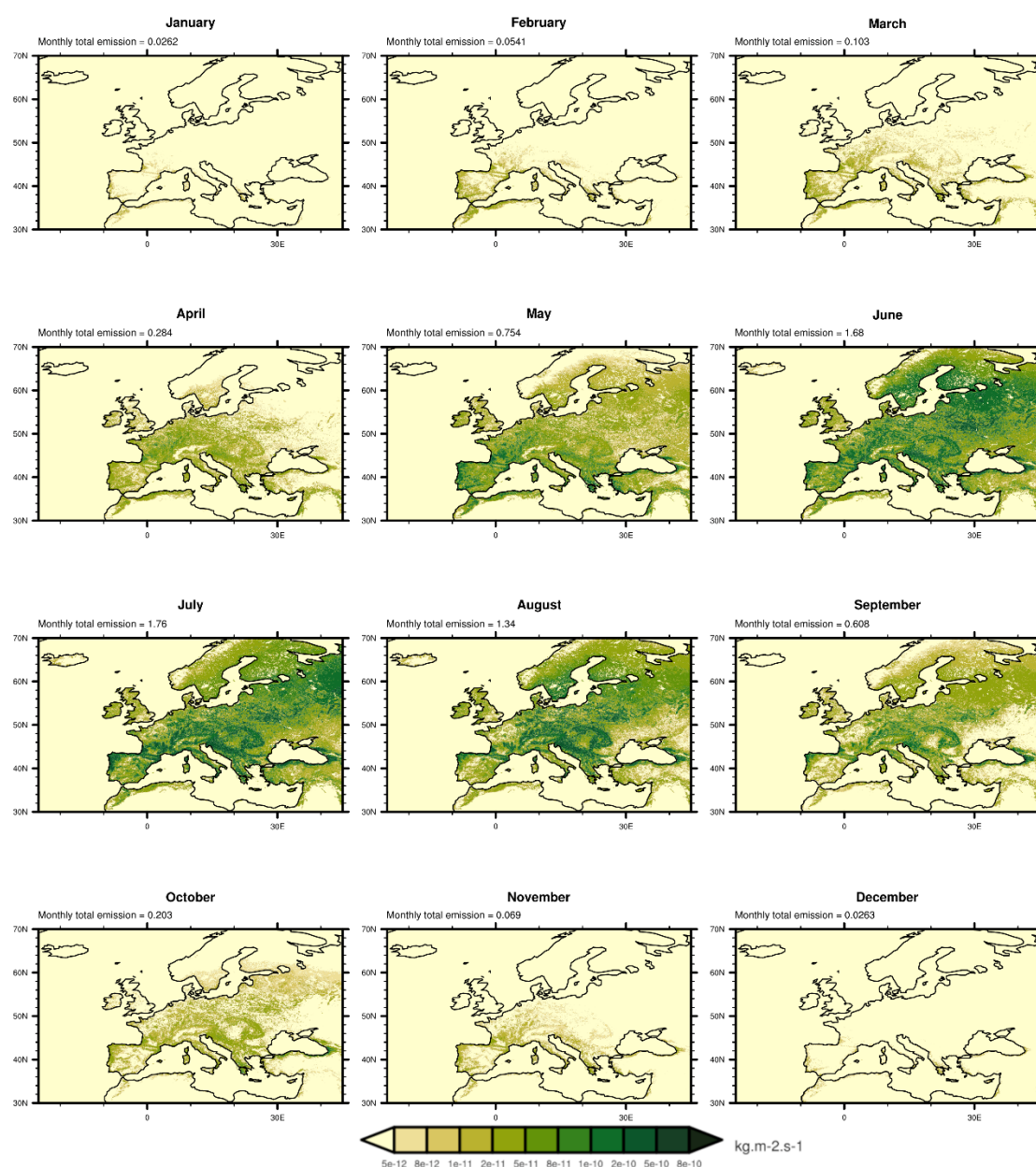
Figure S8. Maps of monthly mean isoprene emissions (units of kg.m⁻².s⁻¹) calculated using the SURFEX-MEGAN3.0 algorithms and averaged over 2020 using the analysis configuration of SURFEX. The panels show each month moving sequentially from January to December first from left to right and then downwards from top to bottom. The colour bars indicate increasing mean isoprene emissions as the colours transition from pale yellow to dark green. Note that the colour bar has a quasi-logarithmic scale. The monthly total mass of isoprene emissions (units of Tg) are shown above each plot.

Monthly Mean Isoprene Emissions Over the CAMS European Domain averaged over 2018-2020 - LAI Analysis
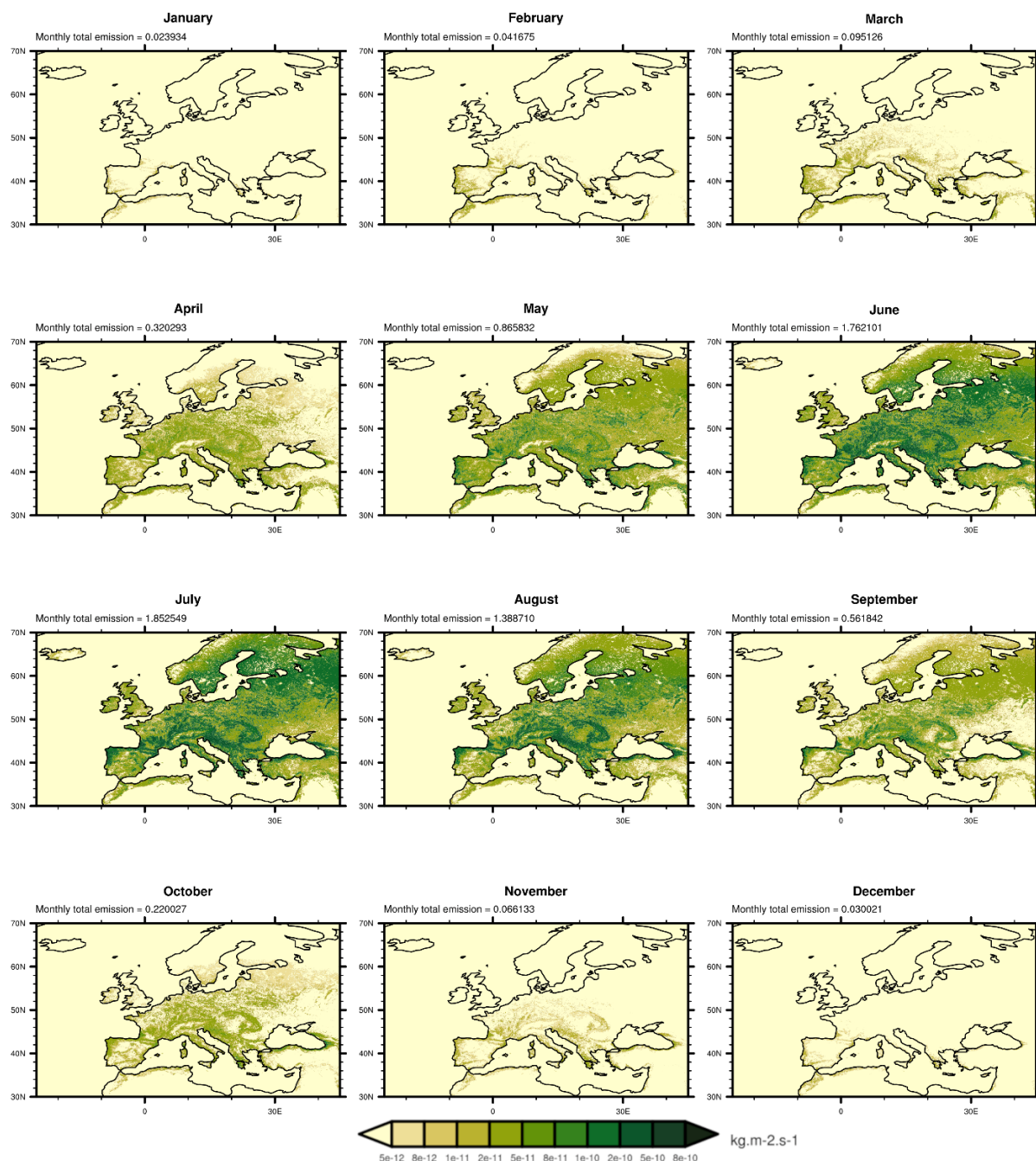
Figure S9. Maps of monthly mean isoprene emissions (units of kg.m⁻².s⁻¹) calculated using the SURFEX-MEGAN3.0 algorithms and averaged over 2020 using the analysis configuration of SURFEX. The panels show each month moving sequentially from January to December first from left to right and then downwards from top to bottom. The colour bars indicate increasing mean isoprene emissions as the colours transition from pale yellow to dark green. Note that the colour bar has a quasi-logarithmic scale. The monthly total mass of isoprene emissions (units of Tg) are shown above each plot.