## Table S1 The settings of combustion completeness in different land cover types.

|  |  |  |  |
| --- | --- | --- | --- |
| **fracforest** | **>60%** | **40%-60%** | **<40%** |
| cropland | 0.93 | 0 | 0 |
| grassland | 0.9 | e−0.13×FB | 0.98 |
| forest | 0.3 | 0.05 | 0 |

Note: fracforest indicates the fraction of percentage of forest cover. FB stands for the fraction of burned within an individual grid cell.

## Table S2 The emission factors of wildfire-induced emissions for various GHG types (unit: g kg−1 dry matter).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **GHG** | **Grassland** | **Trop. F** | **Temp. F** | **Bor. F** | **Cropland** | **Wheat** | **Rice** | **Maize** | **Sugarcane** |
| CO2 | 1666.3±81.2 | 1632.1±65.0 | 1583.7±123.3 | 1519.2±136.5 | 1452.8±222.7 | 1454.4±50.0 | 1474.0±221 | 1336.0±36.6 | 1270.0±170.0 |
| CH4 | 2.63±2.12 | 6.10±1.82 | 5.05±2.79 | 5.59±2.65 | 5.72±5.60 | 2.46±1.19 | 3.51±3.12 | 3.72±1.72 | 0.40±0.20 |
| N2O | 0.17±0.09 | 0.20±0.1 | 0.19±0.18 | 0.27±0.12 | 0.09±0.04 | 0.07±0.02 | 0.07±0.02 | 0.14±0.03 | 0.09±0.04 |

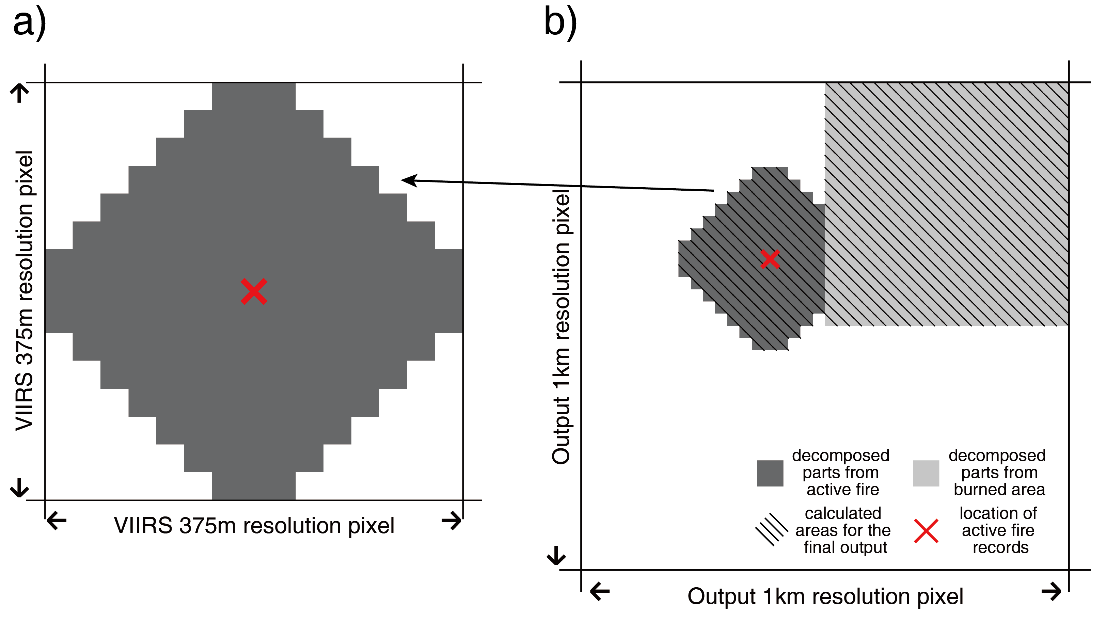
Note: Grassland represents all short vegetation dominated areas including grassland, shrubland and other herbaceous areas. Trop. F, Temp. F and Bor. F are the abbreviations for tropical, temperate and boreal forest. The different types of crop residues including wheat, rice, maize and sugarcane were contained within the extent of cropland pixels, using the ratio between planting area and grid area for calculation. The references are listed at the end of the text [1–14].

## Table S3 Average burned area and wildfire-induced GHG emissions at regional and provincial level from 2012 to 2022.

| **Region/Province** | **Burned area (Mha yr-1)** | **CO2 (Tg yr-1)** | **CH4 (Gg yr-1)** | **N2O (Gg yr-1)** | **Major fuel typeⱡ** | **Peak month#** |
| --- | --- | --- | --- | --- | --- | --- |
| *Northeast China* | 3.29 ± 1.49 | 43.07 ± 19.22 | 159.34 ± 73.01 | 3.33 ± 1.31 | Crop | April |
| Nei Mongol | 0.48 ± 0.16 | 4.98 ± 2.16 | 16.48 ± 7.53 | 0.54 ± 0.30 | Crop | March |
| Liaoning | 0.09 ± 0.04 | 1.28 ± 0.57 | 4.85 ± 2.22 | 0.10 ± 0.04 | Crop | April |
| Jilin | 0.65 ± 0.50 | 9.10 ± 6.80 | 34.28 ± 25.09 | 0.58 ± 0.41 | Crop | April |
| Heilongjiang | 2.06 ± 1.18 | 27.71 ± 15.22 | 103.73 ± 57.72 | 2.12 ± 1.03 | Crop | April |
| *East China* | 0.73 ± 0.95 | 10.51 ± 10.75 | 38.20 ± 38.60 | 0.73 ± 0.69 | Crop | June |
| Shanghai | 0.00 ± 0.00 | 0.01 ± 0.01 | 0.03 ± 0.03 | 0.00 ± 0.00 | Crop | November |
| Jiangsu | 0.13 ± 0.21 | 1.43 ± 2.12 | 5.22 ± 7.64 | 0.09 ± 0.13 | Crop | June |
| Zhejiang | 0.01 ± 0.01 | 0.40 ± 0.21 | 1.44 ± 0.73 | 0.03 ± 0.02 | Crop | March |
| Anhui | 0.41 ± 0.67 | 4.26 ± 6.75 | 15.29 ± 24.10 | 0.26 ± 0.41 | Crop | June |
| Jiangxi | 0.04 ± 0.03 | 1.32 ± 0.98 | 4.76 ± 3.52 | 0.11 ± 0.08 | Crop | January |
| Hubei | 0.08 ± 0.05 | 1.27 ± 0.96 | 4.72 ± 3.53 | 0.09 ± 0.07 | Crop | February |
| Hunan | 0.06 ± 0.03 | 1.82 ± 1.20 | 6.74 ± 4.35 | 0.14 ± 0.10 | Crop | January |
| *North China* | 0.74 ± 0.58 | 6.14 ± 4.64 | 21.57 ± 16.34 | 0.41 ± 0.29 | Crop | June |
| Beijing | 0.00 ± 0.00 | 0.03 ± 0.03 | 0.13 ± 0.11 | 0.00 ± 0.00 | Crop | October |
| Tianjin | 0.01 ± 0.01 | 0.11 ± 0.06 | 0.41 ± 0.22 | 0.01 ± 0.00 | Crop | January |
| Hebei | 0.11 ± 0.07 | 0.83 ± 0.46 | 2.83 ± 1.58 | 0.06 ± 0.03 | Crop | June |
| Shanxi | 0.08 ± 0.03 | 0.70 ± 0.33 | 2.29 ± 1.05 | 0.06 ± 0.03 | Crop | March |
| Shandong | 0.17 ± 0.03 | 1.54 ± 1.14 | 5.57 ± 4.08 | 0.10 ± 0.07 | Crop | June |
| Henan | 0.37 ± 0.43 | 2.93 ± 3.26 | 10.35 ± 11.39 | 0.18 ± 0.20 | Crop | May |
| *South China* | 0.16 ± 0.05 | 5.93 ± 1.97 | 20.49 ± 6.83 | 0.53 ± 0.17 | Crop | January |
| Fujian | 0.02 ± 0.01 | 0.66 ± 0.21 | 2.24 ± 0.74 | 0.06 ± 0.02 | Forest | January |
| Guangdong | 0.05 ± 0.03 | 1.92 ± 1.19 | 6.72 ± 4.15 | 0.16 ± 0.10 | Crop | January |
| Guangxi | 0.08 ± 0.01 | 3.02 ± 0.63 | 10.32 ± 2.17 | 0.27 ± 0.06 | Crop | January |
| Hainan | 0.01 ± 0.01 | 0.25 ± 0.14 | 0.91 ± 0.51 | 0.02 ± 0.01 | Crop | February |
| Taiwan | 0.00 ± 0.00 | 0.07 ± 0.02 | 0.27 ± 0.09 | 0.00 ± 0.00 | Crop | March |
| Hong Kong | 0.00 ± 0.00 | 0.01 ± 0.01 | 0.03 ± 0.04 | 0.00 ± 0.00 | Forest | March |
| Macau | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | Grass | January |
| *Northwest China* | 0.12 ± 0.06 | 1.36 ± 0.77 | 4.84 ± 2.76 | 0.10 ± 0.06 | Crop | April |
| Shaanxi | 0.03 ± 0.02 | 0.29 ± 0.18 | 1.02 ± 0.64 | 0.03 ± 0.02 | Crop | March |
| Gansu | 0.02 ± 0.01 | 0.14 ± 0.04 | 0.48 ± 0.13 | 0.01 ± 0.00 | Crop | March |
| Qinghai | 0.00 ± 0.00 | 0.03 ± 0.01 | 0.08 ± 0.03 | 0.00 ± 0.00 | Crop | October |
| Ningxia | 0.01 ± 0.01 | 0.09 ± 0.06 | 0.29 ± 0.20 | 0.01 ± 0.00 | Crop | October |
| Xinjiang | 0.06 ± 0.04 | 0.82 ± 0.58 | 2.97 ± 2.05 | 0.06 ± 0.04 | Crop | April |
| *Southwest China* | 0.26 ± 0.09 | 11.11 ± 4.45 | 35.02 ± 13.47 | 1.17 ± 0.50 | Forest | February |
| Chongqing | 0.00 ± 0.00 | 0.19 ± 0.10 | 0.72 ± 0.36 | 0.01 ± 0.01 | Crop | August |
| Sichuan | 0.05 ± 0.03 | 2.11 ± 1.23 | 6.80 ± 3.88 | 0.23 ± 0.16 | Forest | January |
| Guizhou | 0.04 ± 0.02 | 1.18 ± 0.58 | 4.17 ± 2.10 | 0.10 ± 0.05 | Crop | March |
| Yunnan | 0.16 ± 0.07 | 7.57 ± 3.71 | 23.13 ± 11.08 | 0.81 ± 0.41 | Forest | February |
| Xizang | 0.00 ± 0.00 | 0.06 ± 0.05 | 0.19 ± 0.15 | 0.01 ± 0.01 | Forest | March |

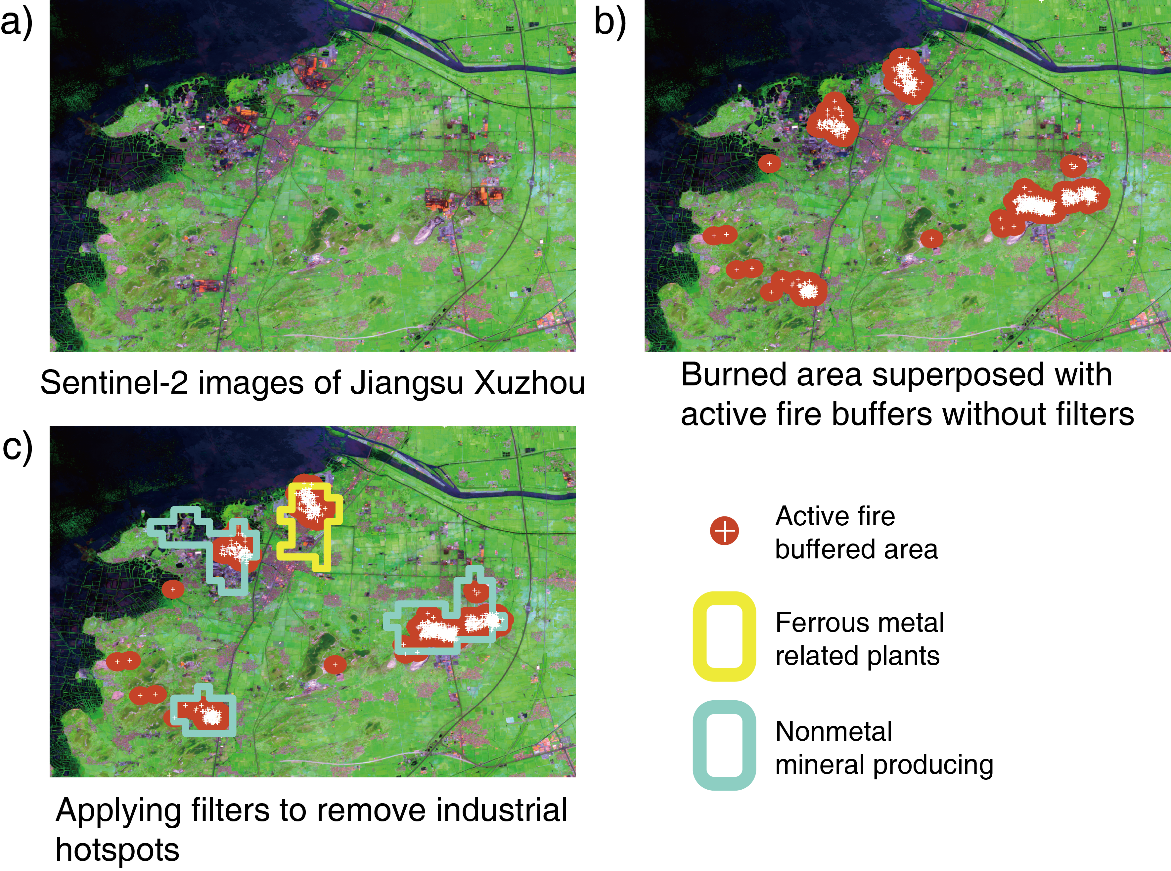
ⱡ The land cover types (Cropland, Grassland, Forests) with the most wildfire-induced CO2 emission.

# The single month with the most wildfire-induced CO2 emission.



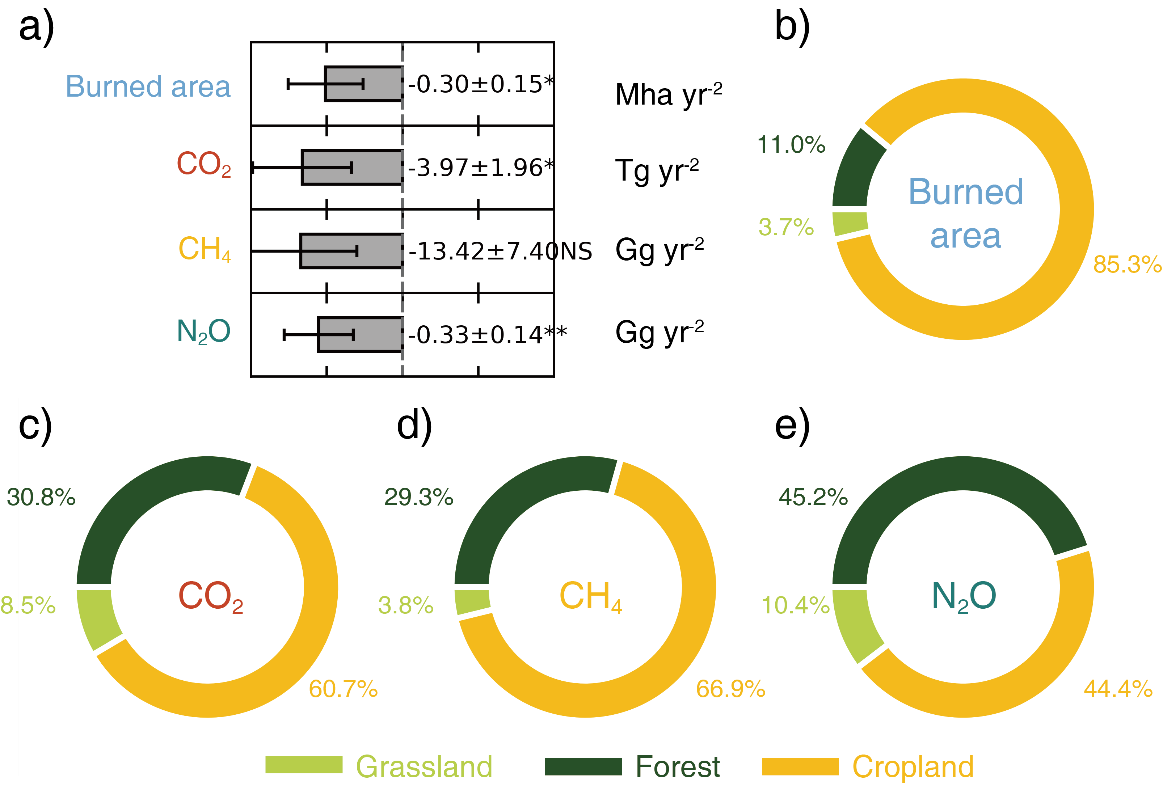
## Fig. S1 Samples of processing active fire and burned area products.

In subplot (a), the red cross indicates the longitude and latitude information derived from active fire records. The outer boundaries represent the extent of a 375-meter resolution VIIRS pixel, while the dark gray areas illustrate the calculated active fire pixel area. Subplot (b) provides an example of a 1-kilometer resolution pixel that integrates burned area and active fire products. The light gray area represents the internal conditions of the 500-meter burned area product, while the dark gray area corresponds to the active fire pixel described in subplot (a). Note that overlapping areas are not double counted.



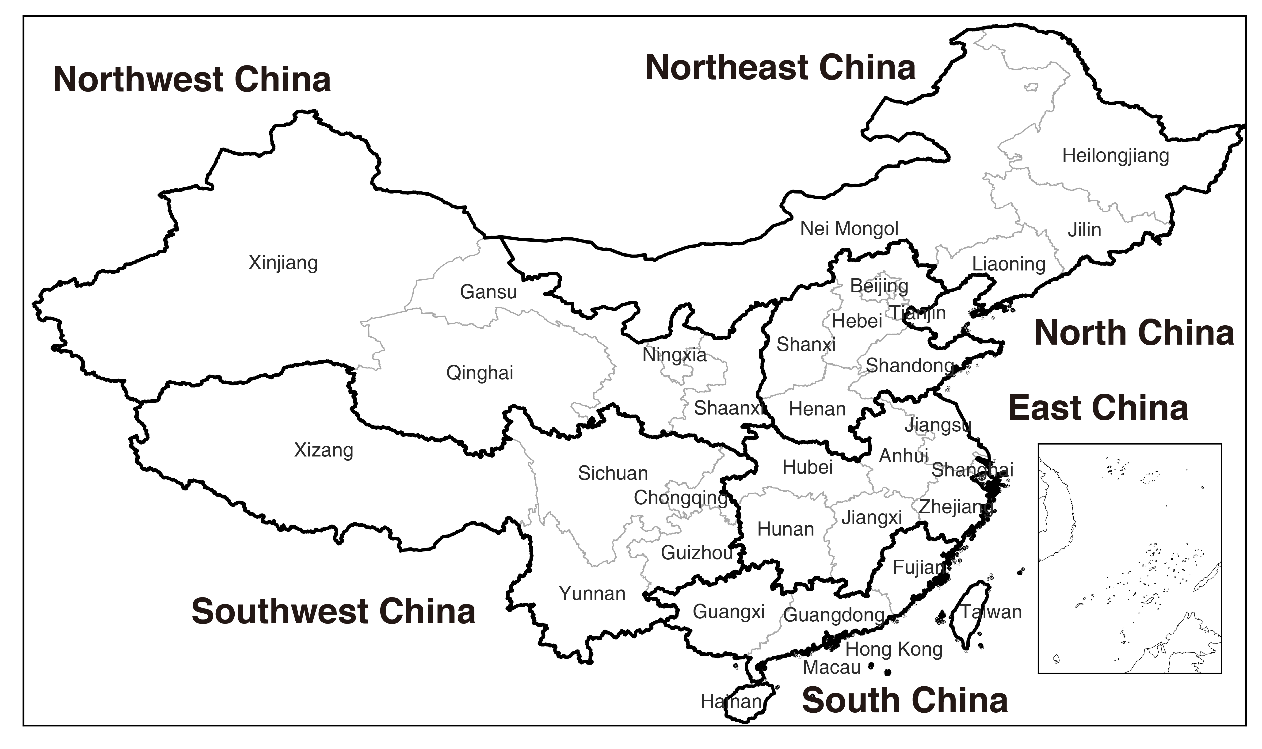
## Fig. S2. Samples of the removal of industrial hotspots

The background images are composites of Sentinel-2 imagery taken over Xuzhou, Jiangsu Province. Subplot (b) presents the initial results after combining the burned area and active fire datasets. Subplot (c) reveals that some burned areas are false detections, as identified using Liu's industrial hotspot dataset [15] (including ferrous metal-related plants and nonmetal mineral production sites in this sample), and should be filtered out.



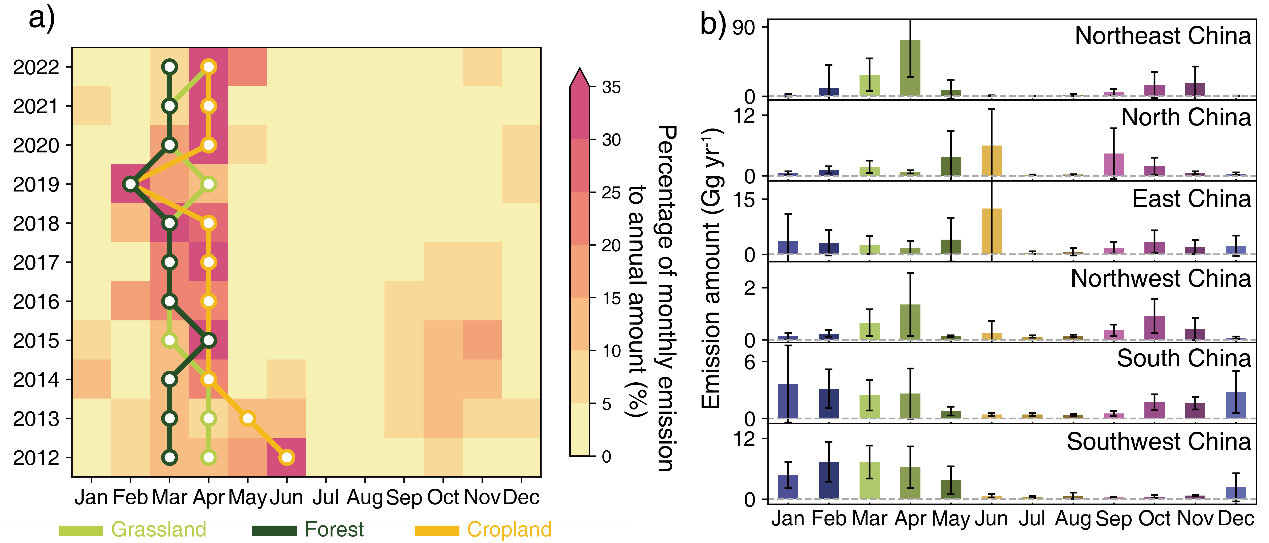
## Fig. S3 The national trends of burned area and three wildfire-induced GHGs.

Subplots b) to e) demonstrates the relative proportions of different types of fuels contributing the overall trends.



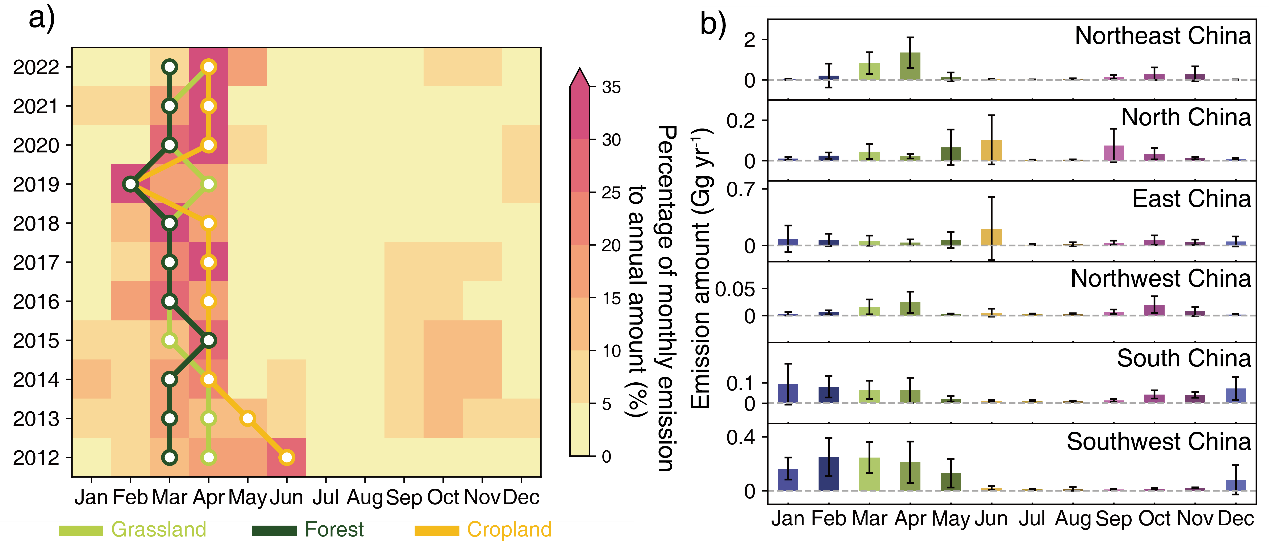
## Fig. S4 The classification of six major regions discussed.

All the provincial administrative units are marked in lower font within the regional scope.



## Fig. S5 Seasonal cycle of national and regional wildfire-induced CH4 emissions.

Note that the lines and bars share the same meaning with that in Fig. 2. Emissions from six regions are depicted on distinct Y-axes to accurately capture the seasonal variations in emissions patterns. Four sets of colors indicate four seasons.



## Fig. S6 Seasonal cycle of national and regional wildfire-induced N2O emissions.

Note that the lines and bars share the same meaning with that in Fig. 2. Emissions from six regions are depicted on distinct Y-axes to accurately capture the seasonal variations in emissions patterns. Four sets of colors indicate four seasons.

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