

A global fire emission dataset using the three-cornered hat method (FiTCH)

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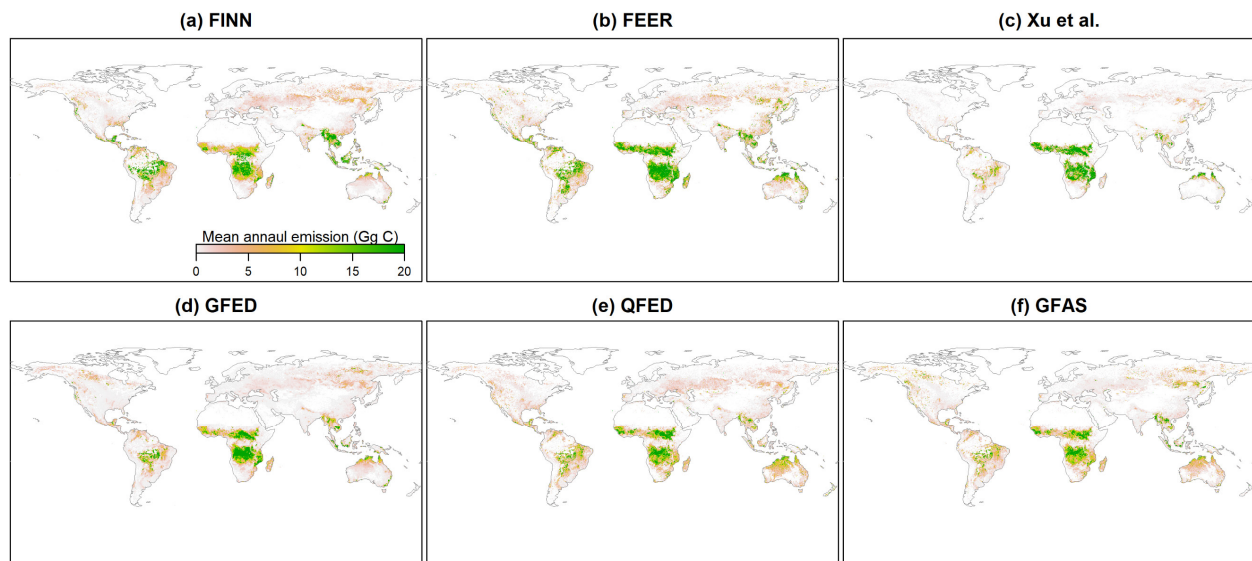


Figure S1. Spatial distribution of mean annual fire emissions from the six satellite-based emission products.

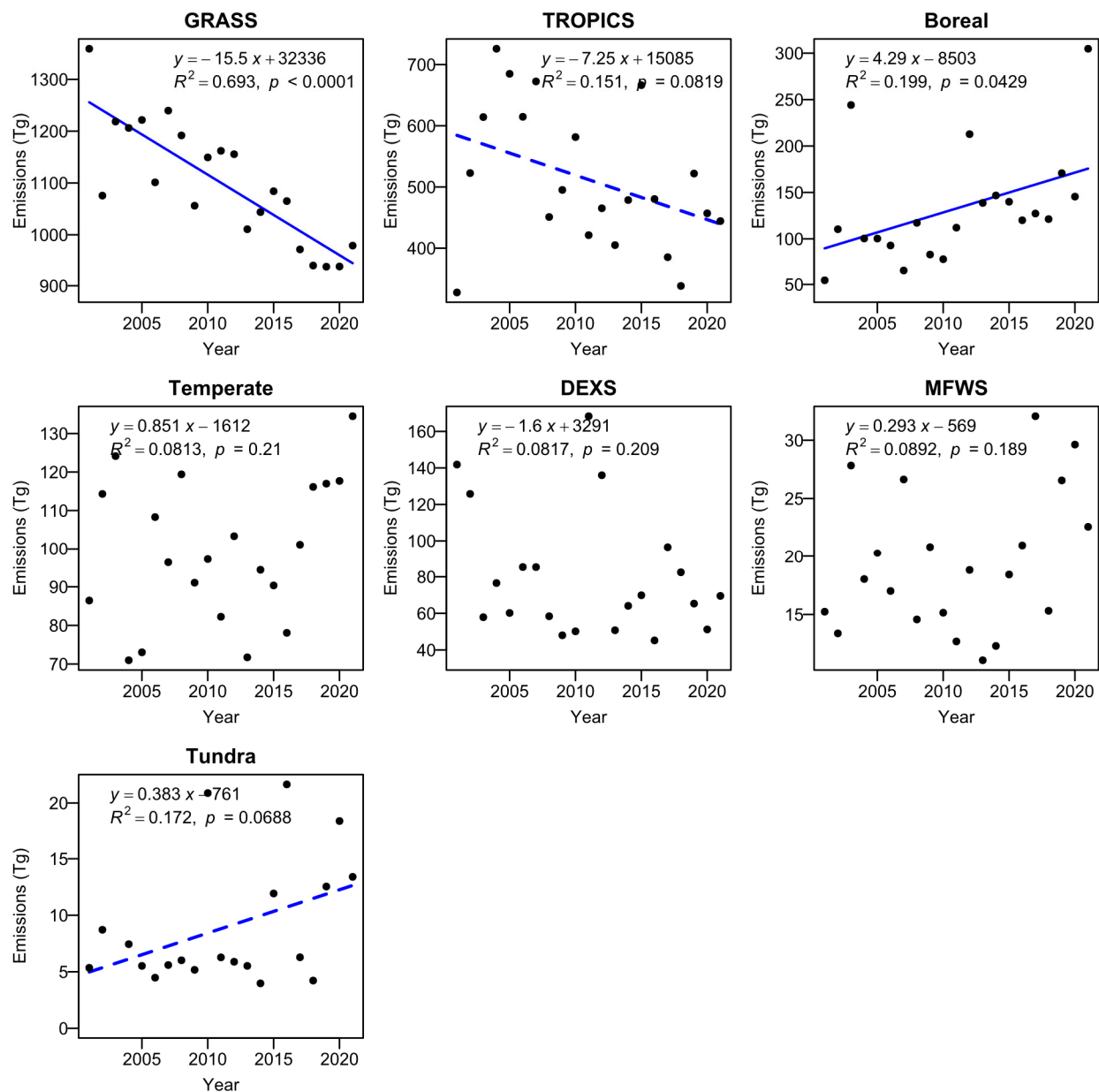


Figure S2. Annual fire emissions of the seven biomes, including GRASS – Grasslands, savannas, and shrublands, TROPICS – Tropical and subtropical forests, Boreal – Boreal forests, Temperate – Temperate forests, DEXS – Desert and xeric shrublands, MFWS – Mediterranean forests, woodlands and scrub, and Tundra. The blue lines are the regression lines (solid lines and dashed lines indicate $p < 0.05$ and $p < 0.1$, respectively). For Tundra, one outlier was removed using the boxplot and the rest points were used for regression.

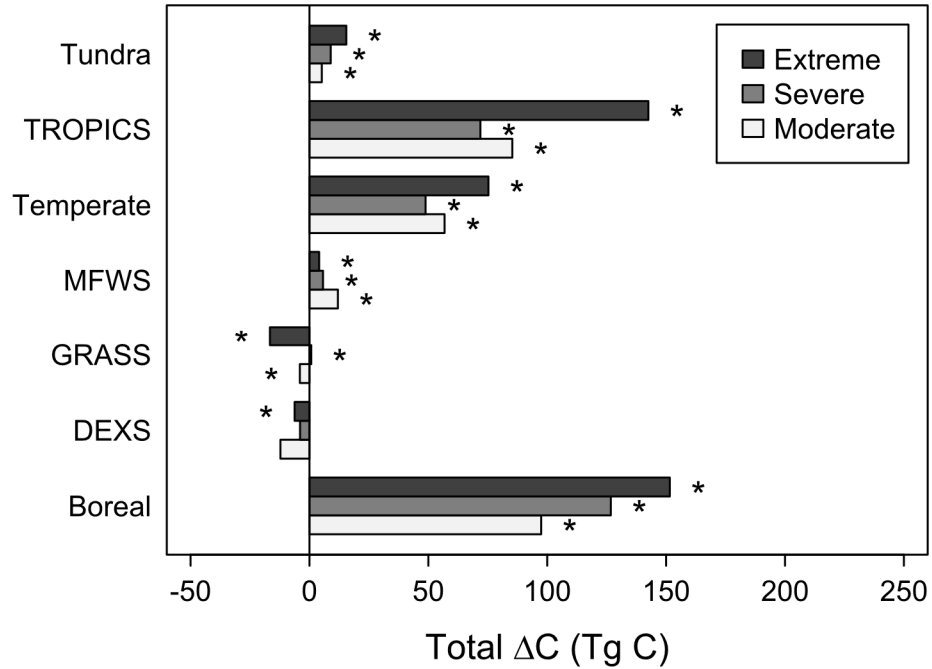


Figure S3. The impacts of drought severity (moderate, severe, and extreme drought) on fire emissions, where the asterisk indicates significant ($p < 0.05$). For extreme drought, the difference between average fire emissions (ΔC) in extreme drought ($\text{PDSI} < -4$) years and non-drought years was calculated following the procedure in Eq. (8). The ΔC values for severe ($-4 < \text{PDSI} < -3$) and moderate ($-3 < \text{PDSI} < -2$) droughts were also calculated using Eq. (8). Total ΔC was the sum of ΔC from the available 0.1° pixels. Some pixels might not have extreme drought years, and they were not considered when analyzing extreme drought. $1 \text{ Tg} = 1000 \text{ Gg}$.

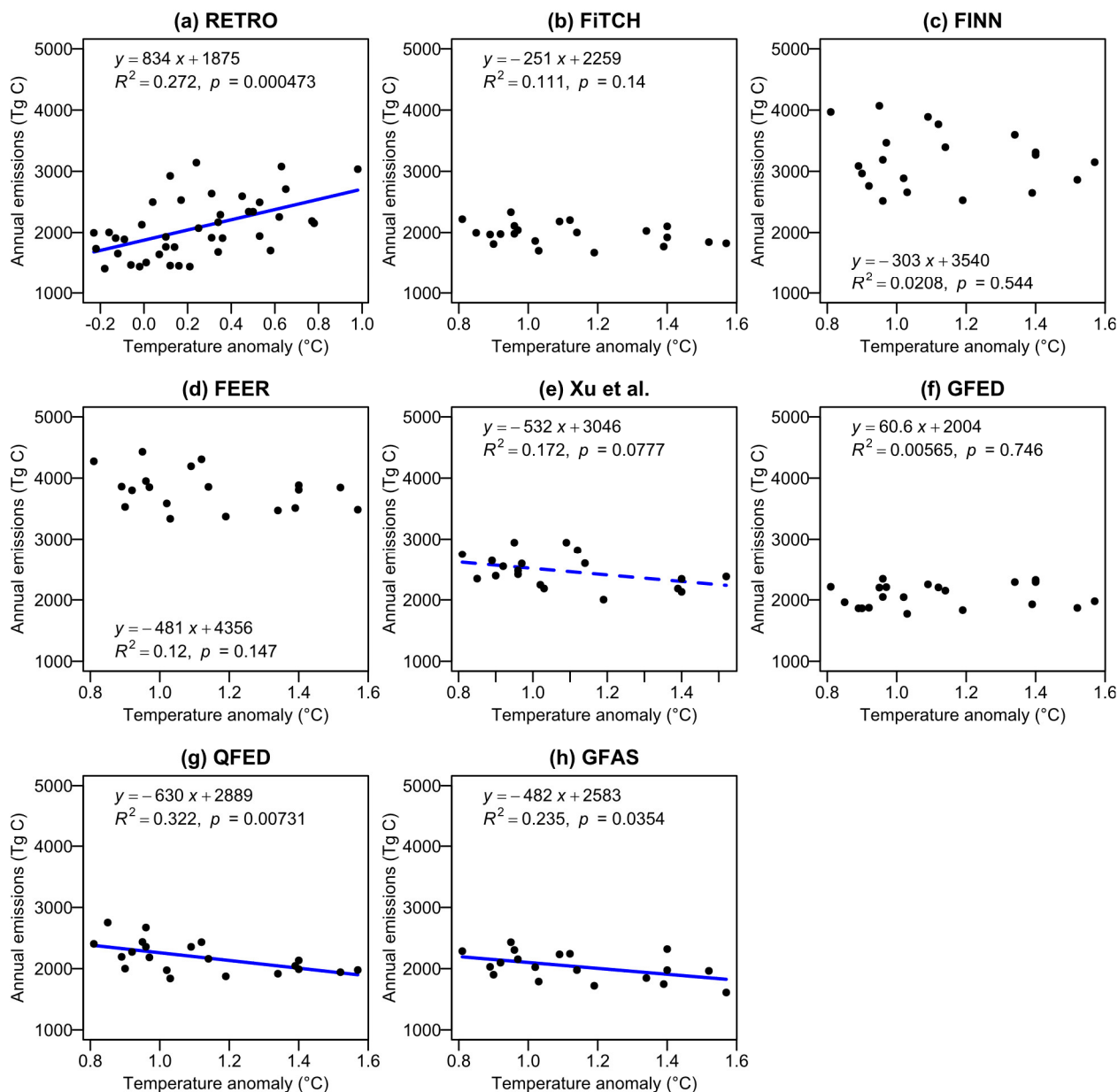


Figure S4. The correlation between temperature anomalies and annual fire emissions using the (a) RETRO (1960–2000), (b) FiTCH (2001–2021), (c) FINN (2002–2021), (d) FEER (2003–2021), (e) Xu et al. (2001–2019), (f) GFED (2001–2021), (g) QFED (2001–2021), and (h) GFAS (2003–2021). The blue lines are the regression lines (solid lines and dashed lines indicate $p < 0.05$ and $p < 0.1$, respectively).

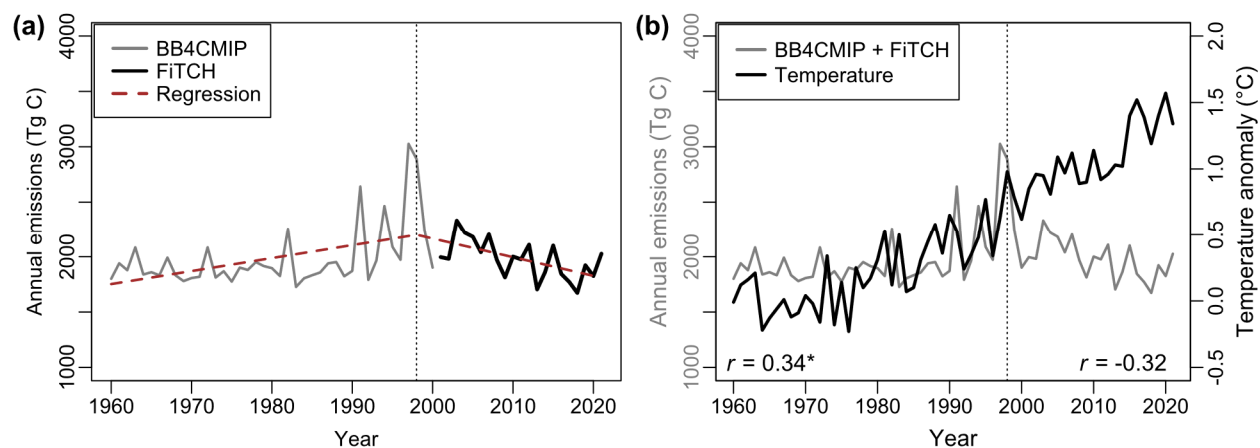


Figure S5. Synthesis of global fire emissions in 1960–2021: (a) time series of annual fire emissions, where the brown dashed lines are regression lines produced with the ‘segmented’ package. The vertical black dotted line indicates the break year 1998; (b) long-term fire emissions (gray line) and global land temperature anomalies (black line). The BB4CMIP data in 1960–2000 were obtained with the WebPlotDigitizer (<https://automeris.io/WebPlotDigitizer/>).