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Fire - climate interactions in a warming world

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Elevated fire activity in 2019 across the arctic, Amazon, Australia, and other regions sparked a discussion about the role of climate change for the recent rise in biomass burning. Given that drivers of fire vary widely between different fire types and regions, interpreting trends requires a regional breakdown of the global pattern. Our Global Fire Emissions Database (GFED) now provides nearly 25 years of consistent data and offers important insights into changing fire activity. The GFED record captures a global decline in burned area, driven mostly by reductions in savanna fires from fragmentation and land use change. The global declining trend is therefore driven by areas with relatively low fuel loads where fire often decreases during drought. Here, we report on increasing fire trends in several other regions, which become even more apparent when proxy data from before the satellite era are included. Increasing trends are concentrated in areas with higher fuel loads that burn more easily under drought conditions, and where warming leads to increasing vapor pressure deficits that contribute to more extreme fire weather and higher combustion completeness values. Therefore, the rate of decline in fire emissions is less pronounced than that in burned area, and emissions of several reduced gases have actually increased over time. The historic time series provides important context for trends and drivers of regions that burned extensively in 2019, and moving beyond burned area to estimate fire emissions of greenhouse gases and aerosols is critical to assess how these events may feed back on climate change if trends continue.