Climate chronicles

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# Wildfires in 2024

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Wildfire burned area was 367 Mha in 2024, ranked 17th since 2001. An estimated 1,965 Tg C was released from these fires, 41% of which came from the Americas, far exceeding their usual 25% contribution.

At the global scale, land area burned by wildfire has declined since 2001, dominated by reductions in Africa. Every other continent, however, has experienced positive trends in area burned alongside more extreme wildfire events[1]. These increases in disastrous wildfires highlight the role of changing human land use and an expanding wildland–urban interface that exposes more people to wildfire. Indeed, for many regions across the globe, relatively small extreme fires increasingly produce disproportionately fatal outcomes, either immediately during the fire or as secondary mortality through broader exposure to toxic smoke. They are also causing tens of billions of dollars in economic and infrastructure losses from destroyed buildings and mass evacuations. Such outcomes are not historically catalogued systematically (compared with burned area and emissions, for example) but present an ever-growing threat that highlights a need for improved documentation.

Here, we outline burned area[2], fire-related carbon (C) emissions[3], fire weather[4], and socioeconomic disasters during the 2024 wildfire season. Discussion is focused on regions that experienced extreme positive or negative anomalous fire.

## Wildfire area burned in 2024

In 2024, global area burned totalled 367 Mha, the 17th highest since records started in 2001 (Fig. 1a). This burned area is 8.7% below the total fire record average of 2001–2024 (402 Mha), 5.4% below the more active fire period of 2001–2010 (388 Mha), and just 1% higher than the less active fire period of 2014–2023 (364 Mha). Burned area declined by 4.4% relative to 2023 (384 Mha) (ref. 5).

Fire carbon emissions also declined in 2024 to 1,966 Tg C (Fig. 1a). These emissions were the 15th highest in the global records beginning in 2003, and 2.8% below the 2003–2024 emissions average (2,023 Tg C). They were 9.7% lower than the more active fire period of 2003–2012 (2,177 Tg C) and 3.6% higher than the less active fire period of 2014–2023 (1,899 Tg C). Emissions were 9.6% lower than the 2023 peak associated with record area burned across Canada (Fig. 1a).

The geographic distribution of these emissions was notable in 2024 (Fig. 1b). Fire emissions were 20.5% lower than the 2003–2024 average in Africa (690 Tg C), 29.4% lower in Asia (320 Tg C), 26.8% lower in Australia (105 Tg C), and 12.8% lower in Europe (18 Tg C). By contrast, emissions were 67.4% higher in North America (318 Tg C) and 44% higher in South America (466 Tg C). Hence, the Americas accounted for nearly 41% of global fire emissions in 2024, the highest proportion since 2003 (Fig. 1a). The rise in fire carbon emissions from the Americas stems from anomalously high fire activity in tropical South America and increasing extratropical wildfire in North America, coupled with the decline in tropical burning in Africa[1].

## Drought produced disaster in South America

South America observed record wildfires in 2024. Burned area totals were 47.5 Mha (41% above the average since 2001). Peru, Bolivia, Ecuador, Venezuela and Guyana all experienced the worst fire season since 2001, while the 2024 Brazil fire season ranked third since 2001 (Fig. 1c). This anomalous fire activity was linked to high aridity, with the 2023–2024 drought causing the lowest precipitation totals in several decades across many subregional units in South America, including aridity levels without analogue for over seven centuries in central Brazil. Following policy-related 80% reductions in deforestation burning from 2004 to 2012, these protracted drought conditions also caused spikes in degradation fires of increasingly fragmented forests[6].

More regionally, severe fires were observed in the Pantanal wetlands region spanning parts of southern Brazil, Bolivia and Paraguay. The wetlands were historically dry in 2024 and experienced extreme (95th percentile) fire weather for nearly three months (Fig. 1d). As a result, 4.9 Mha were burned, 115% of the 2001–2023 average. Smoke from these fires accumulated on the eastern flank of the Andes and travelled south as a plume that degraded air quality throughout southern Brazil; some cities measured fine particulate matter (PM2.5) concentrations as high as 400 μg/m$^3$ in August 2024, more than 25 times the limit recommended by the World Health Organization.

Relatively small but extreme fires were also observed in central Chile in February 2024. Here, offshore winds exacerbated drought conditions and a heat wave, producing optimal fire weather conditions for extreme fire behaviour (Fig. 1e). Multiple wildfires broke out in several states, ultimately burning 70,700 ha. These included a fire near Valparaíso that burned into unregulated housing in the densely populated wildland–urban interface from 2 to 6 February. This fire killed 131 people, destroyed over 7,000 homes, and covered the city in toxic smoke that registered double the Chilean PM2.5 and PM10 standards, as well as black carbon levels that were 50–100 times higher than the pre-fire baseline[7]. The event was consistent with the increasing potential for extreme wildfires in Chile from multiple human–environmental factors despite a long-term coastal cooling trend[1]. Nevertheless, total

## Key points

- Exceptional drought drove catastrophic wildfires across South America, with Bolivia (10.7 Mha), Venezuela (5.2 Mha), Peru (0.30 Mha), Guyana (0.26 Mha), and Ecuador (0.09 Mha) experiencing record burned area; millions were exposed to long-duration hazardous air quality.
- Holdover ignitions from the record 2023 Canada wildfire season extended numerous fires into 2024 such that 4.86 Mha were burned, the second highest since 2001.
- Catastrophic loss of life in Chile, where 131 people died in a relatively small but extreme wildfire event, underscored the need to look beyond area burned and emissions in understanding wildfire impacts.

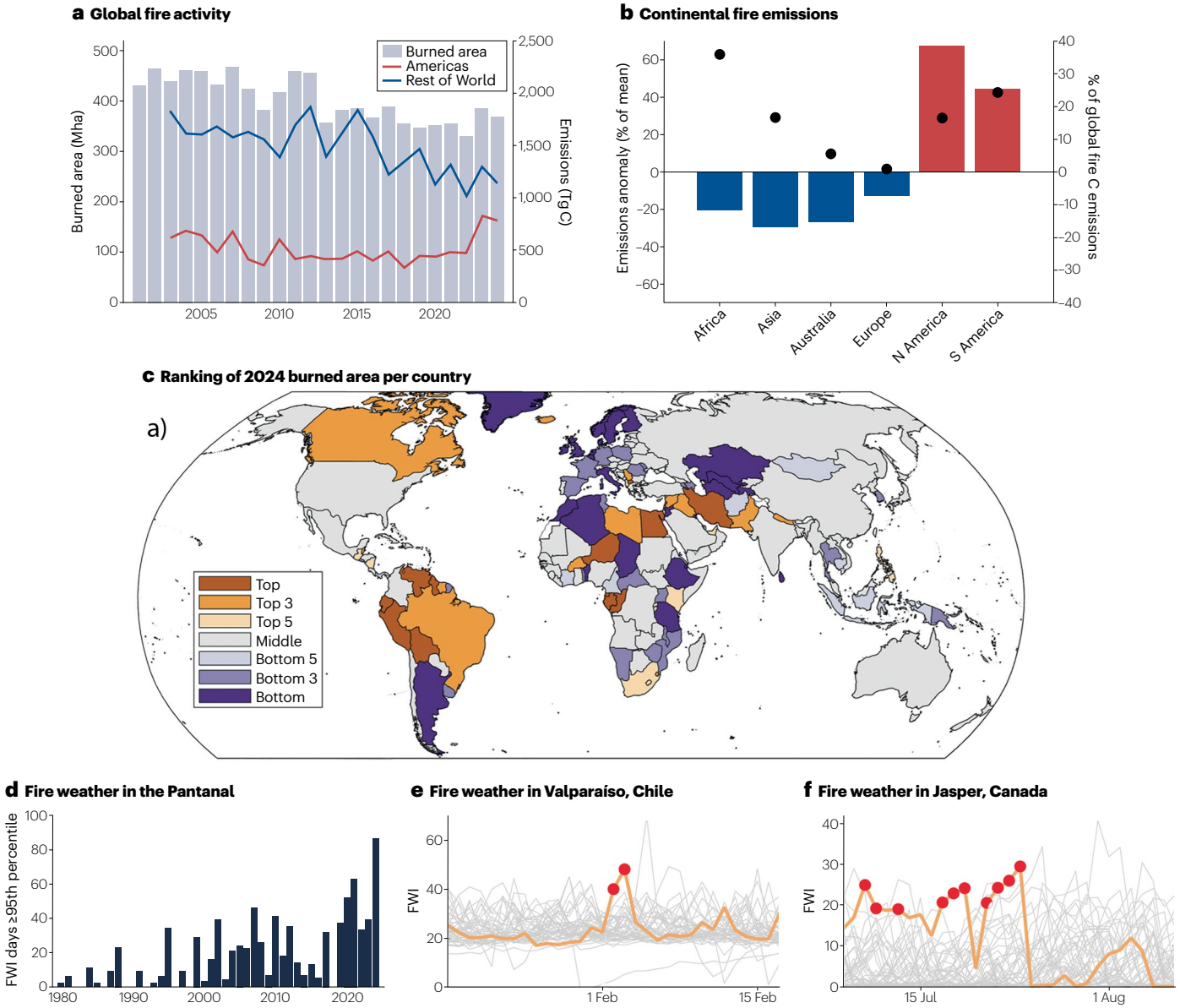


**Fig. 1 | Global wildfire in 2024. a**, Time series of burned area[2] (BA; grey bars) and fire-related carbon emissions[3] for North and South America (red) and the rest of the world (blue). **b**, 2024 continental fire emission[3] anomalies (blue and red bars) and their proportion of the global total (black dots). **c**, Country-level ranking of 2024 wildfire area burned[2] over 2002–2024. **d**, The number of days per year that the fire weather index (FWI)[4] exceeded the climatological 95th percentile for a 0.25-degree pixel centred over the Pantanal wetlands region of South America. **e**, FWI for a 0.25-degree pixel near Valparaíso, Chile, from 18 January to 17 February 2024 (orange). Red circles indicate >99th percentile FWI and grey lines individual years from 1979 to 2024. **f**, As in panel **e**, but for a pixel centred over Jasper, Alberta, Canada, from 8 July to 8 August 2024. The highest proportion of global fire emissions from the Americas over the last 22 years stemmed from record burned area across much of South America and a consecutive large fire year in Canada, contrasting with very low fire activity across the rest of the world.

2024 fires in Chile were not exceptional, with the 7th lowest burned area since 2001 (Fig. 1c).

## North America continued to burn

Following the record 2023 wildfire season, where 15.0 Mha was burnt, Canada experienced the second worst fire season since 2001 (Fig. 1c). Numerous large wildfires ultimately burned 4.9 Mha across Canada, the 6th highest since modern satellite-based record-keeping began in 1972 (ref. 8). Many of the 2024 fires in the western provinces of British Columbia, Alberta and the Northwest Territories were spring reignitions from fires that started in 2023 and smouldered through the winter under the snow in the deep duff and peat. Accordingly, these overwintering ignitions produced an early start to the summer fire season, with activity picking up one to two months earlier than normal. Extensive wildfire evacuations of over 60,000 people occurred across the four western provinces (British Columbia, Alberta, Manitoba and Saskatchewan) and Labrador; and one third of the town of Jasper, Alberta, burned down in July (358 structures) during a week of extreme, 99th-percentile fire weather (Fig. 1f).

In the USA, 2024 burned area was only the 9th highest total since 2001 (3.8 Mha) and only 15% above the average over the 2001–2024 period (Fig. 1c). However, these fires killed five civilians, destroyed an estimated 3,000 homes, and caused the evacuation of an estimated 75,000 people across 12 western and southwestern states. The occurrence of extremely large fires with high growth rates is consistent with a multi-decadal trend in the USA; fires with high rates of spread are responsible for the vast majority of increasing civilian fatalities, destruction of infrastructure, and mass evacuations seen in the USA

in recent years. Similarly, extreme fires stemming from drought in Mexico's central and northern states burned only 1.9 Mha (the 6th highest total since 2001; Fig. 1c), but killed 18 people, including firefighters and civilians.

## Global extremes yielded acute losses

Extreme events in the temperate latitudes continued to produce fires that generate substantial loss of life and property. Notably, many regions with adverse outcomes were not subject to above-average burned area (in some cases, burned area was even the lowest or near lowest). However, extreme aridity exacerbated by a changing climate facilitated extreme fire behaviour and deadly outcomes when occurring near the wildland–urban interface. Indeed, deadly and highly destructive fires occurred beyond the aforementioned events in Valparaíso, Chile, and in North America. For instance, in June 2024, a fire in Turkey killed 12 people and hundreds of cattle. The June fires across Turkey also produced several evacuations in rural areas, while August fires in Greece destroyed homes in several small towns and produced one fatality. At least 15 people and over 300 livestock died in the record fires in Peru between July and September. Many areas in Europe and Asia experienced the lowest area burned over the 2001–2024 period of record (Fig. 1c), but northeastern China and eastern Siberia had above-average area burned, which resulted in evacuations in many isolated rural villages.

## Summary

Wildfires in 2024 exemplified the complex nature of climate change impacts. Although no regional burned area records fell, extreme events produced acute societally disastrous outcomes across the globe. Furthermore, increasing extratropical fire in North America and severe drought in South America, together with the continued decline of African savannah burning, produced the highest proportion of global fire emissions from the western hemisphere this century. These types of unusual or unexpected outcomes are the hallmark of climate change projections for wildfire and, further, highlight key trends that are expected to continue[9]. These include extended fire activity in fire-limited extratropical and high-latitude regions, expanded drought-induced consumption of fire-limited wetlands and tropical forests, and extreme events associated with record fire weather that are both exceptionally difficult to predict and increasingly destructive[10]. While many type of natural disasters are exacerbated by climate change, wildfires continue to demonstrate that they can strike anywhere where there is flammable material and, increasingly, at nearly any time, with devastating results. For humans, this requires a more comprehensive approach to mitigating such disasters at a much greater scale than has historically been the case, from global fossil fuel emissions reduction to innovative and inclusive landscape management strategies.

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## Competing interests

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