When the Sky Burned: Understanding Climate Change and Bushfire Risk in Australia

BLOG

AUTHOR
Ziqi Feng

PUBLISHED
October 9, 2025

When the sky burned, were we just unlucky, or was the deck already stacked?

Figure 1: Image related to the 2019–20 Black Summer in Australia. *Note*. From *Our sky turned red in Black Summer: Australia stepped off some kind of precipice*, by Bradley, J. 2024, The Guardian, (https://www.theguardian.com/australia-news/2024/dec/31/our-sky-turned-red-in-black-summer-australia-stepped-off-some-kind-of-precipice)

A short story about risk and why it matters

Between 2019 and 2020, Australia suffered an unprecedented Black Summer (See Figure 1). Even now, I still remember the constant stream of headlines, the images of thick smoke blanketing the skies, and the overwhelming sense that this was no ordinary fire season. It forced us to confront a

stark question: **to what extent can the risk of such fires be attributed to human-induced climate change?**

In this blog, I turn technical reports into accessible stories: **what exactly has changed in the world? How do we know these changes have occurred?** And **what do these changes mean for us and what we can do?**

Analysis: what the data say?

Data sourse

We begin with three core datasets:

1. the **ERA5** observational reconstruction (which may be regarded as a "climate reality recorder")
2. two **simulated climate worlds** (one incorporating anthropogenic influences, the other not)
3. two fire meteorological indicators: **FWI** and **MSR**. These are not academic jargon, but the danger dashboard for measuring fire risk.

What we find

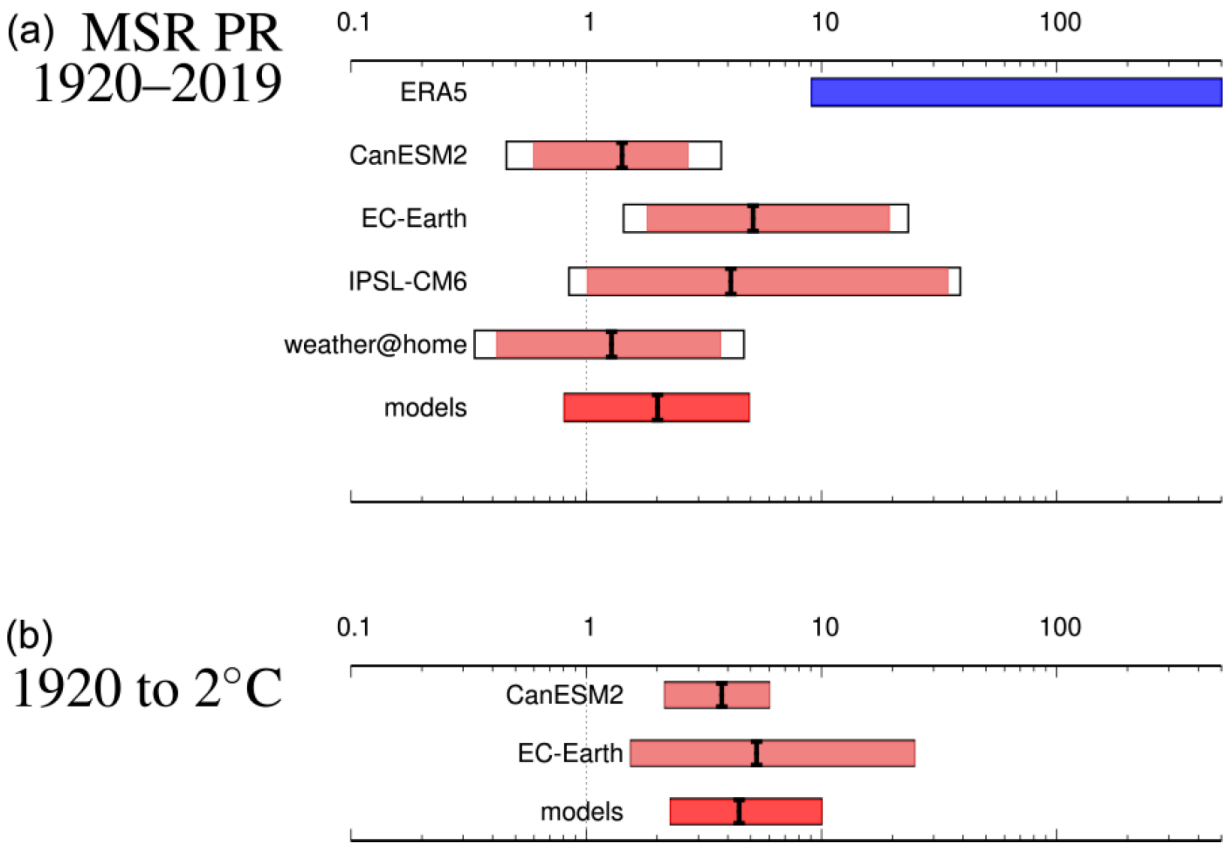

Figure 2: Probability ratios for extreme fire-weather seasons (cropped from Fig. 7a of Van Oldenborgh et al. 2020).

The 2019–2020 season didn’ t just feel extreme. It **was** extreme. The danger dashboard for fire weather were pushed to record or near-record levels (see Figure 2). This means that when unfavourable factors such as **high temperatures**, **dry conditions** and **wind** all coincide, any outbreak of fire becomes extremely difficult to control.

The more crucial question is: **how much more likely has a season like this become in a warmer world?**

Table 1: Headline probability ratios (PR) from Fig. 6–7 plus an illustrative conversion to probabilities/return periods.

Metric	What it measures	PR (Present vs ~1900)	PR (2 °C vs ~1900)	Baseline p_0	Now p (=PR×p_0)	Now return 1/p	2 °C p (=PR×p_0)	2 °C return 1/p
FWI	Weather-driven fire danger	**ERA5 ⩾ 4×**; models	**models ≈ 8×**	**2%**	**8%**	**12.5 yrs**	**16%**	**6.25 yrs**

Metric	What it measures	PR (Present vs ~1900)	PR (2 °C vs ~1900)	Baseline p_0	Now p (=PR×p_0)	Now return 1/p	2 °C p (=PR×p_0)	2 °C return 1/p
	(difficulty to control if ignited)	≈ 1.8× (LB ≈ 1.3×)	(LB ≈ 4×)					
MSR	Seasonal severity (how severe the whole season feels)	**ERA5 ⩾ 9×**; models ≈ 2× (LB ≈ 0.8×, n.s.)	**models ≈ 4×** (LB ≈ 2×)	**1%**	**9%**	**11.1 yrs**	**4%**	**25.0 yrs**

- **At least 4× more likely for FWI** (a weather-driven danger index).
- **About 9× more likely for MSR** (a seasonal severity score).

  (See Table Table 1 for the at-a-glance numbers.)

To understand exactly **how alarming this is**, I will give an example. Suppose that in a climate close to that of 1900, an unusually dramatic fire season occurred once every 50 years.

- After **x4**, it would occur roughly **once every 12.5 years**
- After **x9**, it would occur roughly **once every 5–6 years**

This means that **what was rare is becoming commonplace**.

What does this mean for reality?

- **Recovery windows are shrinking**. Extreme seasons are becoming more frequent. This means the time between major fire seasons for ecosystems and communities to recover is diminishing.
- **Risks compound more readily.** Fire weather may co-occur with heatwaves, smoke, and power stress, mutually amplifying each other.
- **Communication methods must evolve.** Officials can’ t rely on historical return periods that assumed a cooler world.

What should we do with this signal?

Evidence indicates that human activity has altered the probability with which nature rolls the dice: **the risk of extreme fire seasons occurring has risen significantly**. What was before a once-in-a-century fire season is now becoming a once-in-a-decade event, or even more frequent.

So what should we do?

This means that **fire prevention strategies must change**. Land planning, building standards, and emergency systems should all be based on this new normal, rather than continuing to assume that past data remains applicable.

Uncertainty persists, but waiting for perfect certainty has become a luxury.

Reference

Bradley, J. (2024, December 31). *Our sky turned red in Black Summer: Australia stepped off some kind of precipice. The Guardian.* https://www.theguardian.com/australia-news/2024/dec/31/our-sky-turned-red-in-black-summer-australia-stepped-off-some-kind-of-precipice

Van Oldenborgh, G. J., Krikken, F., Lewis, S., Leach, N. J., Lehner, F., Saunders, K. R., … & Otto, F. E. (2020). Attribution of the Australian bushfire risk to anthropogenic climate change. Natural Hazards and Earth System Sciences Discussions, 2020, 1-46.