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A view of Australia's climate in 2020

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The recently released biennial BoM/CSIRO State of the Climate 2020 Report (SoC 2020) provides a summary of the changes that have occurred in Australia over the past century, including projections for the future. Australia's climate has warmed on average by 1.44 ± 0.24 degrees Celsius since national records began in 1910, which is shown to be linked to an increase in the frequency of extreme heat events. This observed increase is within error of the increase of 1.5 degrees relative to pre-industrial levels recommended as a global (best-case) target under the 2015 Paris Climate Accord, to which Australia is a signatory.

Long-term warming leading to higher probabilities of extremes

As with previous reports, SoC 2020 has a primary focus on the increasing frequency and severity of extremes. This is of particular relevance to insurance and emergency management as most natural disasters affecting Australia are weather or climate related. The report concludes that the science has been broadly consistent and largely accurate in the way that it has described and projected the climate system for the last several decades. Australia is experiencing climate change now, and the warming trend is continuing (Figure 1).

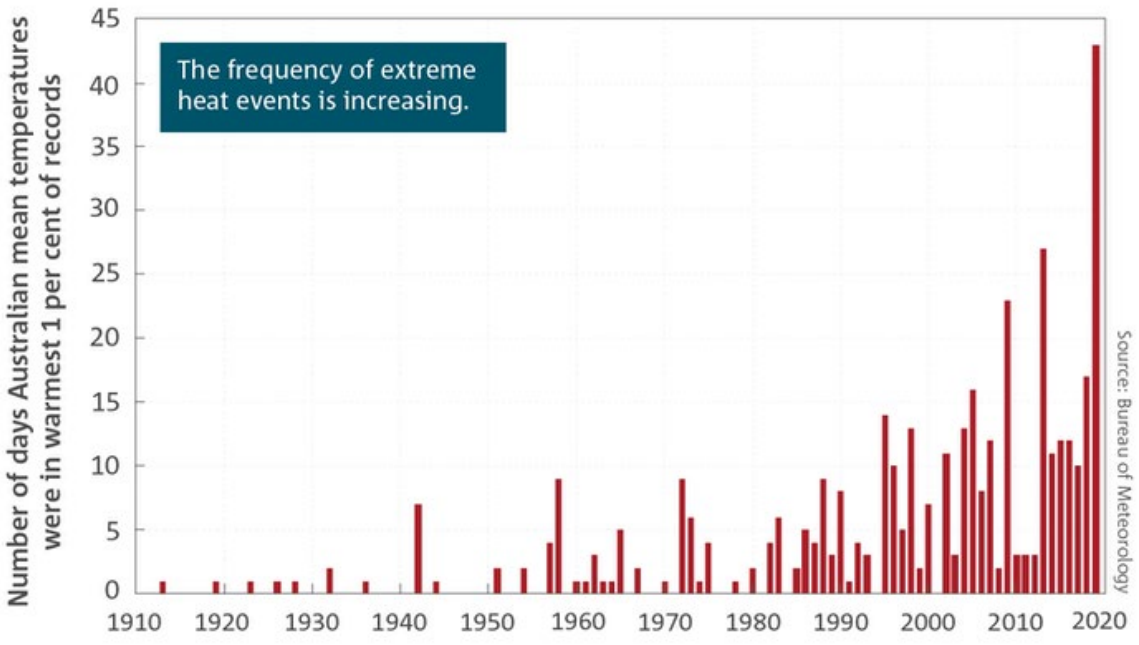

Figure 1. The number of days each year in which the Australia area averaged daily mean temperature each month is extreme (warmest 1% of days for each month). Source: BOM/CSIRO (2020)

In the two years since the SoC 2018 report, Australia has experienced its hottest and driest year on record: 2019. These extremes, combined with anomalously windy conditions, played a pivotal role in the disastrous Black Summer fires. SoC 2020 explains that these conditions would not be considered extreme in a 1.5-degree warmer world (best case scenario), let alone the 6 degree warmer world projected by some simulations under a 'business as usual' scenario.

Climate extremes experienced in Australia, and globally during 2019, are part of a continuing trend where each decade is hotter than the previous one—this warming is entirely consistent with global climate model projections produced more than 20 years ago (Hausfather et al 2020). Global climate models continue to paint a disturbing picture of future climate under business as usual scenarios. One of the key arguments for inaction on addressing climate risk has been perceived uncertainty around climate model skill. As we move further into the 21st century we are now able to assess the performance of previous generations of climate models. This proof-of-skill comes at a critical time, as projections from the latest generation of the Coupled Model Intercomparison Project (CMIP) models are increasingly incorporated into climate related decision making and disclosures across the global financial sector.

SoC 2020 also includes a brief discussion on the role of climate trends on compound disasters. Compound disasters describe a situation where successive events occur over a short timeframe. Due to their role in amplifying losses and straining resilience, Risk Frontiers and the Bushfire and Natural Hazards CRC have recently completed a comprehensive research piece on compound disasters (Gissing et al., 2020). Natural climate drivers, such as El Niño Southern Oscillation (ENSO), strongly influence the type of events that comprise compound disasters. For example, during El Niño years, compound disasters usually comprise of heatwave and fire, and are often superimposed on drought stressors, whereas during La Niña years compound disasters are more likely to comprise storm, flood,

and cyclone. This helps to explain why the approaching 2020-21 summer season will be very different from last year. While swings from drought to flood are a natural and defining characteristic of Australian climate, SoC 2020 describes how long-term warming trends amplify this natural variability and will continue to do so in coming decades.

Long-term warming increases the likelihood of extreme events beyond our historical experience, calling into question the applicability of historical records to accurately project the risk environment of the future. For this reason, Risk Frontiers has now 'climate-enabled' their catastrophe loss models using the latest CMIP6 simulations, meaning estimated financial losses due to extreme weather events can be modelled for a range of future climate scenarios and time horizons by blending and downscaling historical and future climate model data.

References

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