Frequency of compound hot-dry weather extremes has significantly increased in Australia since 1889

Brian Collins

The University of Queensland, The Queensland Alliance for Agriculture and Food Innovation (QAAFI), Toowoomba, QLD 4350, Australia. Email: brcollins2020@gmail.com.

Supplementary Material
Figure S1. Annual and seasonal averages of daily maximum temperature (A) and total daily precipitation (B) across states and whole Australia. A2O: autumn-winter, DJF: summer, MAM: autumn, JJA: winter, SON: spring. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S2. Trends in autumn-winter mean maximum daily temperature (MMT; A,B) and total precipitation (TPR; C,D) over 1889-1989 and 1990-2019. Dots show significant trends (P<0.05).
Figure S3. Trends in summer mean maximum daily temperature (MMT; A,B) and total precipitation (TPR; C,D) over 1889-1989 and 1990-2019. Dots show significant trends (P<0.05).
Figure S4. Trends in autumn mean maximum daily temperature (MMT; A,B) and total precipitation (TPR; C,D) over 1889-1989 and 1990-2019. Dots show significant trends (P<0.05).
Figure S5. Trends in winter mean maximum daily temperature (MMT; A,B) and total precipitation (TPR; C,D) over 1889-1989 and 1990-2019. Dots show significant trends (P<0.05).
Figure S6. Trends in spring mean maximum daily temperature (MMT; A,B) and total precipitation (TPR; C,D) over 1889-1989 and 1990-2019. Dots show significant trends (P<0.05).
Figure S8. Trends in return periods of autumn-winter hot (A,D), dry (B,E) and compound hot-and-dry (CHD; C,F) extreme events over 1889-1989 and 1990-2019. Dots show significant trends (P<0.05).
Figure S9. Trends in return periods of summer hot (A,D), dry (B,E) and compound hot-and-dry (CHD; C,F) extreme events over 1889-1989 and 1990-2019. Dots show significant trends (P<0.05).
Figure S10. Trends in return periods of autumn hot (A,D), dry (B,E) and compound hot-and-dry (CHD; C,F) extreme events over 1889-1989 and 1990-2019. Dots show significant trends (P<0.05).
Figure S11. Trends in return periods of winter hot (A,D), dry (B,E) and compound hot-and-dry (CHD; C,F) extreme events over 1889-1989 and 1990-2019. Dots show significant trends (P<0.05).
Figure S12. Trends in return periods of spring hot (A,D), dry (B,E) and compound hot-dry (CHD; C,F) extreme events over 1889-1989 and 1990-2019. Dots show significant trends (P<0.05).
Figure S13. Average frequency of annual CHD events across states and whole Australia. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S14. Average frequency of autumn-winter hot (A,D,G), dry (B,E,H) and compound hot-and-dry (CHD; C,F,I) extreme events over three consecutive 30-year periods between 1930 and 2019.
Figure S15. Average frequency of summer hot (A,D,G), dry (B,E,H) and compound hot-and-dry (CHD; C,F,B) extreme events over three consecutive 30-year periods between 1930 and 2019.
Figure S16. Average frequency of autumn hot (A,D,G), dry (B,E,H) and compound hot-and-dry (CHD; C,F,B) extreme events over three consecutive 30-year periods between 1930 and 2019.
Figure S17. Average frequency of winter hot (A,D,G), dry (B,E,H) and compound hot-and-dry (CHD; C,F,B) extreme events over three consecutive 30-year periods between 1930 and 2019.
Figure S18. Average frequency of spring hot (A,D,G), dry (B,E,H) and compound hot-and-dry (CHD; C,F,B) extreme events over three consecutive 30-year periods between 1930 and 2019.
Figure S20. Area affected by autumn-winter hot, dry and compound hot-and-dry (CHD) extreme events over 1889-2019. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S21. Area affected by summer hot, dry and compound hot-and-dry (CHD) extreme events over 1889-2019. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S22. Area affected by autumn hot, dry and compound hot-and-dry (CHD) extreme events over 1889-2019. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S23. Area affected by winter hot, dry and compound hot-and-dry (CHD) extreme events over 1889-2019. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S24. Area affected by spring hot, dry and compound hot-and-dry (CHD) extreme events over 1889-2019. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S25. Trends in Moran–I values for autumn-winter hot (A,B), dry (C,D) and compound hot-and-dry (CHD; E,F) extreme events over 1889-1989 and 1990-2019. Blue and red colors show significant (P<0.05) decreasing and increasing trends. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S26. Trends in Moran-I values for summer hot (A,B), dry (C,D) and compound hot-and-dry (CHD; E,F) extreme events over 1889-1989 and 1990-2019. Blue and red colors show significant (P<0.05) decreasing and increasing trends. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S.27. Trends in Moran–I values for autumn hot (A,B), dry (C,D) and compound hot-and-dry (CHD; E,F) extreme events over 1889-1989 and 1990-2019. Blue and red colors show significant (P<0.05) decreasing and increasing trends. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S28. Trends in Moran-I values for winter hot (A,B), dry (C,D) and compound hot-and-dry (CHD; E,F) extreme events over 1889-1989 and 1990-2019. Blue and red colors show significant (P<0.05) decreasing and increasing trends. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.
Figure S29. Trends in Moran-1 values for spring hot (A,B), dry (C,D) and compound hot-and-dry (CHD; E,F) extreme events over 1889-1989 and 1990-2019. Blue and red colors show significant (P<0.05) decreasing and increasing trends. NSW: New South Wales, NT: Northern Territory, QLD: Queensland, SA: South Australia, TAS: Tasmania, VIC: Victoria, WA: Western Australia.