

Review of manuscript

“Attribution of the Australian bushfire risk to anthropogenic climate change”

by

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This manuscript aims to evaluate if the exceptional fire risk associated with the bushfire during the last months of 2019 and January of 2020 was exacerbated by anthropogenic climate change, namely in the Southeastern Australia, where the fires were particularly severe. The authors analysed the exceptionally of the heatwaves and drought and how they reflected on the Canadian Fire weather Index (FWI). The analysed also, using the current climate models, the long-term trend of the above-mentioned parameter. The driver effect of the Indian ocean dipole and Southern Annular Mode was also assessed. The overall context of the subject is very important in Australia context taking in account the importance of extreme climate events, such as drought and heatwaves, for the region within the context of warming tendency. It should be noted that Australia has a large history of tragic events despite being one the countries (maybe the first one) with better management strategies. Therefore, the work seems to be appropriate for this journal.

However the manuscript is very exhaustive, very hard to follow with an excessive number of figures and details. The analysis is very repetitive and should be organized in a more effective way in order to increase readability. Otherwise, the main achievements will be lost in somewhere.

MAJOR

As I said the subject and results of this manuscript are of great interest for a wide range of readers. However, the reading of the paper is very tiring, the number of figures in the manuscript is very high and the results, synthesis, interpretation and and

conclusion for each topic is really tedious. Nevertheless, I recognize that present these results is a very hard task. Therefore, my next comments are suggestion that may increase the readability and increase the number or interested readers that should be attracted to the important results of the manuscript.

1. Some paragraphs of Introduction show a strong lack of references, namely the first ones that have only references to national reports. The same situation occurs in several paragraphs of the introduction and along the manuscript that seems to be more appropriated for a technical report than to a paper.
2. The entire paper should be reorganized. The structure should be less technical and descriptive and more similar to paper structure: Introduction, Data and Methods, Results, discussion and conclusions. Several section should be merged, and the figures reduced significantly in the maintext. The remaining figure should be moved for Supplementary Information.
3. I understand other factor should be included in fire risk analysis. However the present manuscript is so long and the main contribution of the authors are related with Fire Weather Risk. Therefore, I suggest removing section 7 from the manuscript. A paragraph related with the other drivers may be included in Section 8. Conclusions. Consider changing the title accordingly.
4. Clarify if Figure 1 shows the forested areas over the entire Australia or over Eastern Australia. Consider move Figure 1 to Data and Methods.
5. The option of using the Canadian Fire Weather Index (FWI) instead of the FFDI is neither presented, neither justified.
6. Consider comparing the performance of FWI with Forest Fire Danger Index (FFDI) developed and commonly used over Australia for indicating dangerous weather conditions for bushfires.
7. The author used several different datasets for reanalysis the different variables and models. I would prefer to see a less wide lack of reanalysis and gridded datasets. For instance, why do not used precipitation AND temperature from CRU.
8. The author use ERA5 from ECMWF to compute FWI. Why do not use the FWI computed using ERA5 by ECMWF and disseminated already by Copernicus?
9. Data from FFDI using ERA5 computed by ECMWF? Did the authors compare their results for FWI with the ones disseminated by Copernicus?

10. The option of using a window of 7 days for temperature and FWI is not fully presented and justified. Did the author make a sensitivity study to define the 7-days window? Why 7 days and not 5 days? Provide references and justification for the option made, including a comparison with the widely accepted definitions of heatwaves adopted by WMO or based on percentiles.
11. Figures in Figure 3 correspond to averaged values over the southeastern Australia? Information must be presented in figure caption and maintext. Consider moving Figure 3 to Supplementary information.
12. Lines 275 consider to present figure for JRA-55 in Supplementary information.
13. Consider reducing Figures 5-7 to one figure and moving the remaining for Supplementary information.
14. Line 335: Analysis of the driest month in fire season: How must dry is considered month? A difference of 2 mm/day makes has a significant impact on this DMC, DC, FFMC and FWI? The impact of a delta of precipitation in a region with very low values of daily precipitation should be assessed in terms of fire weather risk. Consider providing a sensitivity analysis on this impact.
15. Line 339: please provide quantitative information. What are the observed values and the normal values.
16. Line 351: Annual mean low precipitation analysis: information about the precipitation regime over the region is desirable over a region, i.e., information about inter and intra annual variability of precipitation on the region.
17. Line 366: What are the observed values and the normal values.
18. Consider reducing Figures 9-11 to one figure and moving the remaining for Supplementary information.
19. Lines 411: Why do you use a window of 7 days for FWI and after the MSR instead of the DSR for a window of 7 days.
20. Line 515 did the authors evaluate the formula of DSR for Australia region?
21. Figure 13. In the figure caption describe the information for dots.
22. Consider reducing Figures 15-17 to one figure and moving the remaining for Supplementary information.

MINOR

- 1) (Line 61): parenthesis is missing before 'Clarke'
- 2) The link for each database should be provided.
- 3) Figure 8: titles are not completed