Reply to the reviewer #3

Thank you very much for your helpful comments. Based on your comments, we have improved the manuscript.

- Re: We explain the relationships between the 2015 El Niño and drought in lines 36-44 and 139-145. We apologize that our comment wasn't clear; the description of the 2015 El Niño event in the introduction should not be done in terms of Figure 1, it should be done in terms of relevant literature.
Recommendations:
Stockwell, C. E., Jayarathne, T., Cochrane, M. A., Ryan, K. C., Putra, E. I., Saharjo, B. H., ... & Stone, E. A. (2016). Field measurements of trace gases and aerosols emitted by peat fires in central Kalimantan, Indonesia, during the 2015 El Niño. Atmospheric Chemistry & Physics, 16(18).
Liu, J., Bowman, K. W., Schimel, D. S., Parazoo, N. C., Jiang, Z., Lee, M., ... & O'Dell, C. W. (2017). Contrasting carbon cycle responses of the tropical continents to the 2015–2016 El Niño. Science, 358(6360), eaam5690.
Santoso, A., Mcphaden, M. J., & Cai, W. (2017). The defining characteristics of ENSO extremes and the strong 2015/2016 El Niño. Reviews of Geophysics, 55(4), 1079-1129.

Thank you for your advice. By citing these papers and others, we explain the relationships between the 2015 El Niño, Walker circulation, drought and emissions in lines 36-41 and 47-48.

- It's challenging to follow the added discussion of Lestari et al. 2014 because it comes before the discussion of what is being done [L84]. Additionally, [L72-74] and [L84] are somewhat redundant, could they be combined and could the description of what was and wasn't done in Lestari et al. 2014 be moved to the discussion section?

These two paragraphs including [L72-74] and [L84] are different form each other, because they explain the studies of the attribution of historical changes and the future projections, respectively. Before these two paragraphs, we describe that Lestari et al. (2014) investigated both the historical trends and future projections in lines 52-56.

[L84] just denoted that Lestari et al. (2014) and Yin et al. (2016) did not analyze droughts at specific warming levels. We omit this sentence and add "transient" in line 75 and "also" in line 77.

We suppose that [L72-74] was [L74-75] "Because the 10 member ensembles of Lestari et al. (2014) are too small to estimate probabilities of extreme events, we use 100 member ensembles of Shiogama et al. (2014)". We omit this sentence. Instead, we write "We use the 100-member PEA ensembles of

MIROC5 (Shiogama et al. 2014)" in line 73 and "The 10 member ensembles of Lestari et al. (2014) were too small to estimate probabilities of droughts. Our large ensemble simulations enable us to estimate the probabilities of drought exceeding the observed value" in lines 206-207.

Empirical Functions

- The descriptions of Figure 1 and the datasets used should be in this section.

We move those to lines 105-111.

- L135: "the observed △P (△ω500) is divided by their standard deviation value." -> …△P and △ω500 are divided…

We change those in line 137.

Results

- It would still be interesting to determine why the 2˚C pathway leads to a less intense SST anomaly, more precipitation, and therefore less change in the fire statistics. Does it have anything to do with the weighted sum? My understanding is that the weighted sum is applied to the RCPs and not the prescribed SSTs, is that correct? [L169]

The weighted sum is applied for both the concentrations and the prescribed SSTs [lines 170-174]. Therefore it is necessary to reveal the reasons of differences in "El-Nino like warming patterns" between the RCP scenarios to understand the why the 2˚C pathway leads to a less intense SST anomaly. Although it is an interesting and challenging research topic, it beyond the focus of this paper.

- I notice the uncertainty range in changes in burn area fraction, CO2 and PM2.5 reach 0% change, but do not go below. Does this indicate there is no chance for smaller-than-observed fire in any scenario? [L223-225]

For example, 0%-5% chances of exceeding the observed value indicate 95%-100% chances for smaller-than-observed fire.