**Response to reviewers:**

**R2**

Comment1:

No fundamental flaws but two weakspots in the argument to be solved:  
  
Authors clearly describe why OA publishing can be beneficial for climate change research, however does not become clear why OA publishing comes with benefits specific to climate change research (i.e. benefits not true for other areas) [can be solved by not overstating this argument and simply clarifying that OA is beneficial to climate change research (along other areas)]  
  
Unexplained (or unsatisfactorily explained) discrepancy btw. the argument that OA publishing would improve public uptake but evidence shows that political uptake is higher for closed research

Response: Thank you for providing these helpful comments. We have revised our manuscript to improve the structure and our message for OA publications, and specifically include the point that OA is beneficial to climate change research and other fields (L39, L121).

In response to a different reviewer comment, our analysis of citation and new/policy mention data now includes more papers and journals (our threshold cutoff was lowered to 100 papers, which results in a doubling of journals included in our analysis). With these changes, political uptake is clearly higher for open research, but there is no journal rank trend (Fig. 2d). We explain that these documents are often created by international organizations (i.e. United Nations) yet a lot of important research remains behind paywalls (Fig. 1). While the trend towards OA is increasing, we stress that OA is especially important for local management and policy, which often depend on smaller local-scale studies published in lower-impact journals and receive far less publicity.

Comment 2:

Authors provide evidence for the connection btw. the mode of publication (open / closed) and societal impact, based on their analyis of publicly avaliable data, which can be considered a useful and interesting contribution to the debate on the role of OA and Open Data in climate change research.  
  
Two weakspots in the argument need to be solved (see review comment under Q2)  
  
The structure of the paper should be revised as it inconsistently mixes conclusion /opinion, with the evidence for the opinion being only disclosed at the very end: proposed structure: part (1) - main line of arguments to be explored, part (2) evidence / data analysis (incl. figures), part (3) conclusions / recommendations (incl. table 1)  
  
Argument in Line 130/131 that tackling climate change in time will require rapid collaborative efforts, would be excellent entry point for the whole paper / intro section  
  
The argument that OA climate change research can have a greater societal impact among non-academic audiences should be substantiated with more then just one evidence / reference (Cvitanivic), as otherwise the evidence seems rather anecdotic)

Response: Thank you for your helpful comments to improve our manuscript. We have revised the paragraph structure and our arguments now have greater clarity. Specifically, we now introduce our commentary structure in the first paragraph (L25) and separate OS arguments (L42 – L70) from citation/altmetric analyses (L72 – L116) with different subheadings. We also bring the climate change triage argument above the citation analysis (L42), and so keep comment sections separate from analysis sections. Finally, we include a recommendations paragraph before the conclusion, which outlines information in Table 1 and potential OS barriers (L118 – L140).

Thank you for the suggestion to bring the ‘rapid collaborative effort’ point forward. This is now stated in the introduction (L31).

Regarding support for OA research to have a greater societal impact, we have included an additional reference for support (L114):

1. Fuller et al. 2014 (Conservation Biology), who show that conservation science is limited by paywalls and also argue that OA can help progress conservation management efforts.
2. Rafidimanantsoa et al. 2018 (Madagascar Conservation & Development), who show that managers and decision makers do not regularly use research results to inform conservation programs, due to reasons including barriers to access research.

We also cite several recent studies that demonstrate the importance of Twitter in increasing the societal impact of academic research (e.g. Cote & Darling 2018, FACETS), and further expand on the policy results in a separate paragraph (L106 – L116).

**R3**

Comment 1:

Tai and Robinson make important points how wider adoption of open science practices could improve both the research process and the dissemination of results.  
  
Comments on how the manuscript could be improved below:  
  
Title: "Transforming" is probably too strong, as the manuscript doesn't detail how full adoption would completely "transform" climate research, "Improving" or "Enhancing" or similar might be more appropriate.

Response: Thank you for your suggestion. We agree. The title now reads ‘Enhancing…’.  
  
# L. 57  
  
Here some discussion of the Journal Rank used would be useful. A citation seems to be missing:  
  
SCImago, (n.d.). SJR — SCImago Journal & Country Rank [Portal]. Retrieved Date you Retrieve, from http://www.scimagojr.com  
  
As Altmetric is used as an alternative to citation based metrics some discussion of Impact Factors (see e.g. discussion in https://doi.org/10.1101/062109) might also be appropriate.

Response: We have included the SCImago citation (L265), and also mention briefly the utility of Impact Factors for measuring research quality and impact (L89-92). We also describe the breakdown of our Journal Rank bins (from low to very high).

# L. 86  
  
https://doi.org/10.7554/eLife.32822 and https://doi.org/10.1126/science.352.6285.508 provide further evidence on journal access needs in the developing world.

Response: Thank you for bringing our attention to these papers. We have included a statement regarding the demand for scientific literature, as indicated by pirating websites (i.e. Sci-Hub), and cite both papers (L71-72).  
  
# L. 105  
  
"have successfully implemented open data climate science" - this is explained a bit in the next sentence, but could maybe worded differently, something like "share research results in open data archives"

Response: We have changed our wording accordingly at L56-57.  
  
# L. 108  
  
The potential inadequacy of Journal policies might be worth discussing here (https://doi.org/10.1073/pnas.1708290115). Funders (e.g. in Horizon 2020) have also set up open access requirements.

Response: Excellent suggestion, we agree that most journal OA policies are inadequate. We have added this point to L57.  
  
# Table 1  
  
The table doesn't seem to be referenced in the main text.  
The last row could add EarthArXiv (https://eartharxiv.org/) as well.

Response: Table 1 is now referenced in a new subheading section ‘Transitioning to open climate change research’ (L118) and we have added EarthArXiv to the table.  
  
# Figure 1  
  
The choice of 200 total citations would need to be justified. It could also be appropriate to pick an average publication rate, as newer journals might be otherwise left out.  
  
E.g. Searching for "climat\* change" in Abstracts in Earth System Dynamics https://www.earth-syst-dynam.net/search.html?abstract=climat\*%20change  
yields 198 results in 2010-2016 alone.  
  
Also, Geoscientific Model Development returns 491 search results for abstract "climat\* change" in 2008-2016 but doesn't show up in the list of journals in the dataset.  
https://www.geosci-model-dev.net/search.html?abstract=climat\*%20change  
  
Newer paywalled journals like Nature Sustainability or Nature Energy might also be included if a different threshold or metric to select journals were selected.

Response: Thank you for identifying this error in our analysis. We revised our threshold cut off to >100 to include more journals and updated the analysis and figures. Our revised threshold number approximately doubled the number of journals included in our analysis from 116 to 225, and includes the journals mentioned above. Our results have changed slightly, which we have incorporated into our discussion. However, the overall trend of open access > closed access holds true across all metrics. As such, our arguments remain unchanged.

We also improved the modelling of Altmetric mentions to match the Scopus citation model. We now present log10 transformed mentions (using a Gaussian distribution in a linear mixed effects model), and compare mentions of closed vs. open access papers that were picked up by media, twitter, and in policy. Previously, we had analyzed mean mention rates that included papers which were not tracked by Altmetric.

Importantly, we would like to clarify that our criteria for journal selection from the Scopus database were based on the number of total articles published (revised to >100) for each journal from 2007-2016 (with the “climat\* change” keyword search), rather than number of citations. Thus we did not select articles based on number of citations, and our analysis is not biased towards earlier publications that may receive more citations.  
  
# Figure 2  
  
The y-label needs clarification ("Mean #")

Response: We have changed the axis label to ‘Mean citations/mentions’ to improve clarity.  
  
# Code and Data availability  
  
The code used for the analysis should be archived together with the data in a suitable archive, e.g. Zenodo which provides simple integration with GitHub (https://guides.github.com/activities/citable-code/)  
  
The repository at https://github.com/travistai2/open-science-cc seems to miss the actual article data.  
  
Some more description on how to reproduce the analysis and figures in the Readme would be helpful.  
  
The code makes reference to a local directory structure which might not be reproduced after cloning the repo. Adjusting these to relative paths (if possible) would be helpful.  
  
This line seems to have some whitespace issues: <https://github.com/travistai2/open-science-cc/blob/master/scripts/Scopus_models.R#L44>

Response: Thank you for the code archiving suggestions. We will archive the code and data via Zenodo if our revised manuscript is accepted for publication.

For providing the data analysed: the raw citation data remain the property of Scopus, and the raw mentions data remain the property of Altmetric. However, Altmetric have permitted us to provide mean mention data analysed, and the mean predictions underlying Figure 2. These data are now available at our Github repository. We have contacted Scopus to request permission to publish their data on mean citation rates and, if approved, we will also these data available via Github.

We have also fixed the whitespace issues, specified relative file paths and set working directory using the here package, and improved the readme file for greater reproducibility.

# References  
  
A few references are websites (e.g. Obama, McSweeney), here providing a link, access date and/or alternative archive link (http://archive.org/) would be helpful. For the McSweeney reference it might be useful to document the relevant data points in the accompanying data, as some results appear only in an image in the Carbonbrief article

Response: We have now included the access date and a link to the websites referenced in our manuscript. Regarding the McSweeney reference, we use this reference to indicate that developed countries have far higher publication rates than developing countries. It would be difficult to extract data points on developing countries from the McSweeney article, as those data are presented as a heat map.