

Authors' reply to reviewer comments GC-2019-22

Weather and Climate Science in the Digital Era, Martine G. de Vos et al.

Reviewer 1:

- I would recommend to shorten the second half of the abstract.

We agree with the reviewer that a concise abstract is more clear and convenient. However, as we also want to be specific and concrete in our information, which in our case includes providing examples, we have chosen not to shorten the second half of abstract.

- "weighting of those multiple models" should be rephrased

We have rephrased the sentence (line 46)

- "10¹⁸"

We have rephrased the sentence (line 53)

- "three orders of magnitude greater than the speed of current machines" This is incorrect.

We have rephrased the sentence to : Exascale (i.e., 10¹⁸ operations per second) is the next proxy in the long trajectory of exponential performance increases that has continued for more than half a century (Reed,2015) (lines 53-55)

- "In the section Towards Open Weather and Climate Science" Maybe use italic to highlight that this includes the actual title.

We have adopted the suggestion (line 154)

- "In the Methods section" Is there actually a methods section? This section seems to be present in the diff document but missing in the main document.?

The reviewer is right, we have forgotten to include this new section in the main document. We have included the Methods section in this second revision of the manuscript (lines 82-96)

- "depending as it does on its intended use" should be reformulated

We have rephrased the sentence (line 282)

- "this is true for hardware and software-hardware interaction as well" I do not understand what this means in this context.

We have rephrased the sentence to : this is true for hardware and the software run by these hardware as well (line 285)

Reviewer 2:

Firstly, I would like to comment that the authors' response is not particularly kind to reviewers in our attempt to determine if the requested changes have been made. Whilst areas of change have been highlighted, none of the responses are linked to the changes (e.g. line numbers in new document), and my major comments 2-4 with a single comment that is essentially 'Read the new Methods section, and we've made a selection of changes throughout'. I request that, in future, the authors please empathize more with the reviewers.

We apologize for not being clear to the reviewer how we responded to your valuable comments. We include a more extensive response and references to line numbers now.

I appreciate the addition of a Methods section; this is simplistic, but GC allows for a pragmatic and ad hoc data collection methodology. Attention has been paid to my detailed comment. I am afraid, however, that the authors have failed to make progress with respect to my criticism about 'novelty'. In short, it is not clear from the writing that the outputs of a similar workshop, with identical findings, was not published last year in the Journal of XXXXXX.

Our manuscript reflects the current discourse on research software, infrastructure and open science in weather and climate research and the opportunities for sharing and combining data, software and infrastructure. This is an ongoing debate in the community of which aspects are discussed in isolation. Here we report on these discussions as part of eScience developments. Elements have been discussed in literature, e.g. in Ruti et al (2020) on strategic programming level, in Righi et al (2020) on a generic software tool for Earth system model data diagnostics, the open software platform PANGEO (<https://pangeo.io/>), and community simulation model as the regional model WRF and CESM (Skamarock,2019; Hurrell, 2013). Additionally, these aspects are discussed in Climate Informatics workshops (<http://climateinformatics.org/>), workshops held as part of the European Network on Earth System Modelling (ENES, <https://portal.enes.org/>), workshops of operational centres as the European Centre for Medium-Range Weather Forecasting (e.g. the bi annual High Performance Computing workshop) to name a few. Our approach in this paper goes further in a) discussion of open science aspects which is developing recently in our field (e.g. FAIR principles on data and research software) and b) the direct relation with compute infrastructures. These aspects make the approach novel.

This could be fixable relatively simply through a number of actions - see detail below (i) a few sentences, (ii) a little stylistic tweaking in places including the abstract, and (iii) some detail to your recommendations. But, this remains a major point in terms of the presentation/framing of the work.

In light of how the response was presented, I started re-reading the abstract, including re-reading the initially submitted abstract. At the end, despite various changes e.g. a 'list of concrete recommendations' I still have no idea about the novelty in this work. To be specific: How many of these recommendations are new, and how many are simply repeats of previous similar workshops? In reality, if none are new, and all are simply repeats of suggestions in previous work (i.e. our problems have not gone away since 2015), this is fine. But, I personally believe it is necessary to give due credit to past 'state-of-the-subject' workshops and similar if they exist, or be clear if they do not.

See response above, we believe two aspects are novel: 1) the emphasis on open science in weather and climate research, which hardly received attention so far and 2) the consideration of the integration of new developments in data, software and hardware and the challenges and opportunities that come about.

Indeed, this type of paper, unlike a scientific paper where a hypothesis is developed and tested using data, this paper reflects more the expert opinions of the authors.

The following bullets are suggestions, which I intend to be constructive to fix the 'novelty' issue on the assumption it is presentational (i.e. there isn't a recent similar identical paper).

- Is it that there are no previous/recent/relevant attempts to summarize views on this subject? If so, please state this. If there are, please add a couple of sentences to outline what they are, giving references.

We have added references and descriptions to related studies and discussions to the OPEN SCIENCE section (lines 122-129)

- Is the contribution of this paper that it has a small but convenient literature review that 'describes the progress of open weather and climate science in the context of open science developments in general'? (OPEN SCIENCE section). This could have value. • Is the contribution a snapshot of expert opinion? (TOWARDS OPEN WEATHER AND CLIMATE SCIENCE section). This will have value if it isn't re-inventing the wheel, with a few sentences are no added to demonstrate/assert that this is not the case.

We have formulated the contribution and novelty of the paper in paragraphs in both the abstract (lines 22-25) and the discussion (lines 245-250)

- You could partially for my concerns about a disconnect/lack of awareness of previous views of challenges/issues by adding some kind of categorization to your list of recommendations (e.g. N = new, R = recent - perhaps last 2 years, O = ongoing/long-term). A simple round-robin e-mail to the coauthors asking them to assign these, then going with the majority, would work.

We have added a reflection on novelty per recommendation and add a reference when it is ongoing work.

I apologise if the tone of this review is 'grumpy'. I think it is fair, but it highlights the potential value in making life easy for reviewers (i.e. some of them may not make the effort to get over their initial mood).

The review is fair and it is critical for the quality of the peer review system that reviewers are critical.

I look forward to re-reading this relatively soon,