Geoscientific

Model Development

Discussions

[GMDD]

Interactive

comment

Interactive comment on "Current status on the need for improved accessibility to climate change models" *by* Juan Antonio Añel et al.

Anonymous Referee #1

Received and published: 10 September 2019

Review of "Current status on the need for improved accessibility to climate change models" by Juan A. Añel, Michael García-Rodríguez, and Javier Rodeiro.

The manuscript looks into the availability of the source code of models which contributed to CMIP5. The authors basically use a three-step approach to get access to the code (direct download, "anonymous" email and email stating their research). Their results show that more than half of the model source code is not made made available after step three. In addition, they discuss the documentation quality and licensing issues.

I find the topic of the manuscript to be highly relevant and the results presented by the authors raise a crucial issue which is of high importance for the climate model community. However, I find the manuscript to have several weaknesses which should

be addressed before a possible publication in Geoscientific Model Development as outlined in the comments below.

General comments:

#1 The manuscript contains several generalized statements which I find to need further support by (scientific) literature or the results. I've addressed them also in the specific comments but in general I refer to statements like the following: "...it is generally the case that climate models do not comply with what would be the ideal level of programming practice." (page 1, line 11) "...the incidence of comments throughout the code is very low" (p1, l13) "It is widely acknowledged that some scientists are reluctant to share code because of the perceived potential damage to their reputations." (p4, l14)

#2 I find the discussion about the need to publish model code in the introduction too one-sided. While the authors give several good reasons why code should be made publicly available, there might be equally valid counter-arguments. It would be good to discuss some of them as well and possibly offer solutions. Some things that come to mind:

- National or institutional copyright that prevents authors from publishing code

- Dependencies of the model on third party code that is under copyright

- A lack of funding to set up and maintain a public code repository

- Fear that ones property rights might be violated if the code is freely available in the web. This might be particularly true for newer models. An argument could be made that a group developing a model has the right to also publish the results produced with this model (they might even be required to do so by their funding agency).

#3 The way the authors tried to establish contact is not clearly enough documented and needs clarification. As it is, it seems quite subjective to me. In particular:

- How did the authors search for contact information? They mention that they searched

the internet. But how easy was it to find the information and at what point (after how much time) did the authors give up? One could for example go as far as looking for publications by the same group investigating the desired model and writing the authors. I was quickly able to find contact information for all five model centres the authors list as "No email or contact phone is available" (see specific comments below).

- The two mails in A1 and A2 are identical. Is that a mistake or did the authors just send the same mail again? In this case they could consider deleting A2. In section 2.1 the authors mention that in "the final email" they identified themselves. After how many mails of type one was that? The "final email" should also be in the appendix. In table 1 only email 1 & 2 are listed. Are these two columns indeed refering to the identical emails from A1 & A2? If yes I'm missing the column for the final email.

- The authors mention one specific model for which they got access after direct contact to the developers at a conference. Was this approach tried for all model centres which did not reply to the emails or was it based on a coincidence? If it was only done in this one case, one could argue that this partly jeopardizes the objectivity of the approach.

#4 The manuscript would benefit from proof-reading by a native speaker. There are a number of very long and somewhat convoluted sentences. This sometimes makes it hard to follow the authors point as I mention at several occasions in my specific comments.

Specific comments:

Title: Maybe change to "model code" in order to make clear that this is about the source code and not about output? Also I believe that it would be more appropriate to call them "climate models" instead of "climate change models" because they are used to investigate the climate system in general not only climate change.

Abstract: "models from the Climate Model Intercomparison Project" Add "fifth"

Page 1, line 13-16: This is a very long sentence and I'm not quite sure what the authors

try to say here. Is this addressing the issue of reproducability in general? E.g., subjective judgments (as long as they are properly documented) to not hinder reproducability. So maybe the authors try to say something else? Please clarify, since this seems to be an important point.

P1, l16: replace "matters" by "CSR"

P1, l19: It would be convenient for the reader to have the (most important) recommendations listed here, instead of only quoting Wilson et al. 2017.

P2, l11: "It could be said that adequate sharing and documentation is not necessary if the code used in the models includes appropriate comments," I'm not sure what the authors try to say here. Why would commenting the code make publishing unnecessary? Also I find the statement that commenting code can replace a proper documentation problematic.

P2, l12-15: "...but it is generally the case that climate models do not comply with what would be the ideal level of programming practice." I'd like to see some evidence to support this statement.

P2, l13-15: "Indeed, the incidence of comments throughout the code is very low, and programmers have tended to perform very badly in this regard in particular (García-Rodríguez et al., 2019)" What code to the authors refer to here? What does low number of comments mean? The citation (García-Rodríguez et al., 2019) is listed as submitted, it should be provided.

P2, l21: CMIP 5 I assume?

P2, l30 I wouldn't call two different emails a "variety of different approaches".

P3, l3: add "as a first step..."

p3, l3: Could the authors provide a link to the CMIP5 webpage they refer to here?

P3, l5: Why English and French? Several models are developed, e.g., in China it

seems to me that for a systematic and objective methodology it should be either only English (the language used in the vast majority of climate model related publications) or all respective native languages of the model centres.

P3, l11-12: "to check whether after it had become obvious that the models were not available easily, institutions and researchers would then share them with someone from the general public." To really represent the general public it would have been better to use a not-university related mail address I assume. Maybe change to something like "with someone from outside the community"?

P3, l18: Why did it take several months? The authors state above that they send an initial email with a follow-up two weeks later. Was it the process of actually getting the code after establishing contact that took so long?

P3, l18: To I assume correctly that "10 out of 26 models" referrers to "models from 10 out of 26 institutions" and "27 out of 61" referrers to multiple models from the same institution (such as GCM and ESM versions)?

P3, l23: The percentages refer to the numbers in the first line of the paragraph, I assume. The "they" seems to indicate that only USA, Germany, and Norway are meant.

P3, l24-26: "This analysis is relevant, because in some cases the decision on whether to share the code of the models could have been due to national or regional regulations on software copyright, intellectual property, etc." It would be interesting to detail this point further. Did the authors get concrete answers citing (national) copyright law as response? Did they check the copyright law in countries where they did not get access to any models?

P3, l30: "in six cases" & "in five cases" Table 1 only lists 5 cases with "No email or contact phone is available." and only 4 cases with "No answer".

P4, l3-5: "We considered the level of requirements introduced by the GPLv3 license (https://www.gnu.org/licenses/gpl-3.0.en.html) as the ideal case, or a license under

which the model can be shared, modified and used without restriction." This seems to be contradictory. Is the GPL the ideal case or "a license under which the model can be shared, modified and used without restriction"? Because to my knowledge the GPL has very strict requirements that need to be fulfilled to share, modify and use code which is licensed under it (such as: disclosure of source, stating of all changes, further publication only under the same license).

P4, l14-15: "It is widely acknowledged that some scientists are reluctant to share code because of the perceived potential damage to their reputations." Can the authors provide some evidence for this statement?

P4, l20-23: "Barriers to code-sharing through licensing, imposed by e.g., government bodies, cannot be an excuse and when contributing to scientific studies and international efforts where collaboration and trust are critical, such practice is not acceptable." It seems to me that following the laws of ones country (even when they hinder research and collaboration) is indeed a completely valid excuse for not sharing code.

P4, l22-24: "For cases where we obtained the code of a given model, we were not provided with a reason for the license behind it. In fact, in some cases despite getting the code we did not see a license explaining clearly the terms of use." It would be interesting indeed to know the rationale behind different licenses (or for the absence of a license), did the authors inquire about this at the groups which provided code?

P4, l31-32: "we encourage all model developers to improve the availability of the codes of climate models and their CSR practices." As I've mentioned before this might not be only the developers responsibility but also includes institutions, funding agencies and even country copyright laws.

P4, l33: "which is in some cases very poor (García-Rodríguez et al., 2019)" Again, please provide this paper as it is not yet available.

Figure 1a: Maybe delete the axis? (or fix the y-axis, which should run from -90 to

90 I assume?) The percentages are not per country as stated by the caption but by continent I assume? Could the authors find a way to explicitly show that there are now model centres in South America and Africa?

Figure 1: I personally would find it more helpful to see absolute numbers of provided/not provided models instead of percentages.

Table 1: I checked our CMIP5 archive and found all of the contact information flagged as missing in the metadata of the output netCDF files for the respective models. I understand that at this point it is probably too late to include them in the study, yet I'm copying them in here in case they are helpful to the authors.

BCC: "contact = "Dr. Tongwen Wu (twwu@cma.gov.cn)""

CSIRO-Mk3.6.0: "contact = "Project leaders: Stephen Jeffrey (Stephen.Jeffrey@qld.gov.au) & Leon Rotstayn (Leon.Rotstayn@csiro.au). Project team: Mark Collier (Mark.Collier@csiro.au: diagnostics & post-processing), Stacey Dravitzki (Stacey.Dravitzki@csiro.au: post-processing), Carlo Hamalainen (Carlo.Hamalainen@qld.gov.au: post-processing), Steve Jeffrey (Stephen.Jeffrey@qld.gov.au: modeling & post-processing), Chris Moeseneder (Chris.Moeseneder@csiro.au: post-processing), Leon Rotstayn (Leon.Rotstayn@csiro.au: modeling & atmos. physics), Jozef Syktus (Jozef.Syktus@qld.gov.au: model evaluation), Kenneth Wong (Kenneth.Wong@qld.gov.au: data management), Contributors: Martin Dix (Martin.Dix@csiro.au: tech. support), Hal Gordon (Hal.Gordon@csiro.au: atmos. dynamics), Eva Kowalczyk (Eva.Kowalczyk@csiro.au: land-surface), Siobhan O\'Farrell (Siobhan.OFarrell@csiro.au: ocean & sea-ice)""

INM-CM4: "contact = "Evgeny Volodin, volodin@inm.ras.ru,INM RAS, Gubkina 8, Moscow, 119333 Russia,+7-495-9383904""

LASG-IAP: ":contact = "Dr. Tianjun Zhou(zhoutj@lasg.iap.ac.cn)" "

MRI: "contact = "Seiji Yukimoto (yukimoto@mri-jma.go.jp)"""

Table 3: I find the star-rating system slightly in-transparent. Why not just list the criteria in columns and indicate where models passed/failed?

———————————————