# Review 2: “CropSuite - A comprehensive open-source crop suitability model considering climate variability for climate impact assessment” (egusphere-2024-2526)

## General comments

Thanks to the authors for their revisions. I have a few more minor comments. (Line numbers in my notes refer to the tracked-changes version.)

Reply: Dear reviewer, we thank you your sincere interest and support! We think we have now been able to clarify the final details. Unfortunately, the links embedded into your comments were not available for us in the pdf. However, we have researched the respective entries ourselves and found good content (although possibly not what was originally intended).

Colors

- Re: the colorbars of Figs. 10(a) and 12(a, d)
  - There are indeed no points where a one-pixel change results in a categorical color difference, but there are some very sharp gradients. This blog post explains why this isn’t great for figure design (even when not considering color vision deficiencies). In your case I actually think such gradients could be okay, but only if they (approximately) line up with the boundaries between your suitability bins (0/1, 32/33, 74/75).
  - Look at the difference between, e.g., 16 and 24, where it goes from gray to red. This stark difference contrasts with the fact that those are both categorized as “unsuitable” according to Table 3.
  - The “perceptually uniform sequential colormaps” at the “Choosing colormaps in Matplotlib” webpage are great choices without this issue that still work under red-blindness and green-blindness.
  - The GMD Guidelines for Authors section on Figures & Tables recommends strongly that figures should be made accessible to people with color vision deficiency. I’m not sure “other people use the same inaccessible color scheme” is a good enough reason to ignore that.
  - Also note that the FAO plot linked doesn’t actually use red, but rather brown. So it’s not the same color scale anyway. (Not that the FAO scale is any more colorblind-friendly.)
- If keeping some colorblind-friendly maps out of the main text, they should be included in the supplemental PDF , not in a separate 5 GB (!!) file. They should also be referenced in the captions of the figures in question.

Reply:
The crop suitability is a continuous dataset between 0 and 100 (actually between 0 and 1, however we save the data as 8-bit integer between 0 and 100 to increase efficiency and save disk space and memory). We added a short description in Line 63-65 to better explain why the data is saved between 0 and 100. The suitability categories are basically interchangeable and arbitrary. However, they are helpful and required to analyze and assess the results. The data itself, however, is not categorical or discrete. Therefore, a reduction or increase of suitability by e.g. 8 points has the same quantitative meaning, regardless of whether the difference falls into a different category or not.

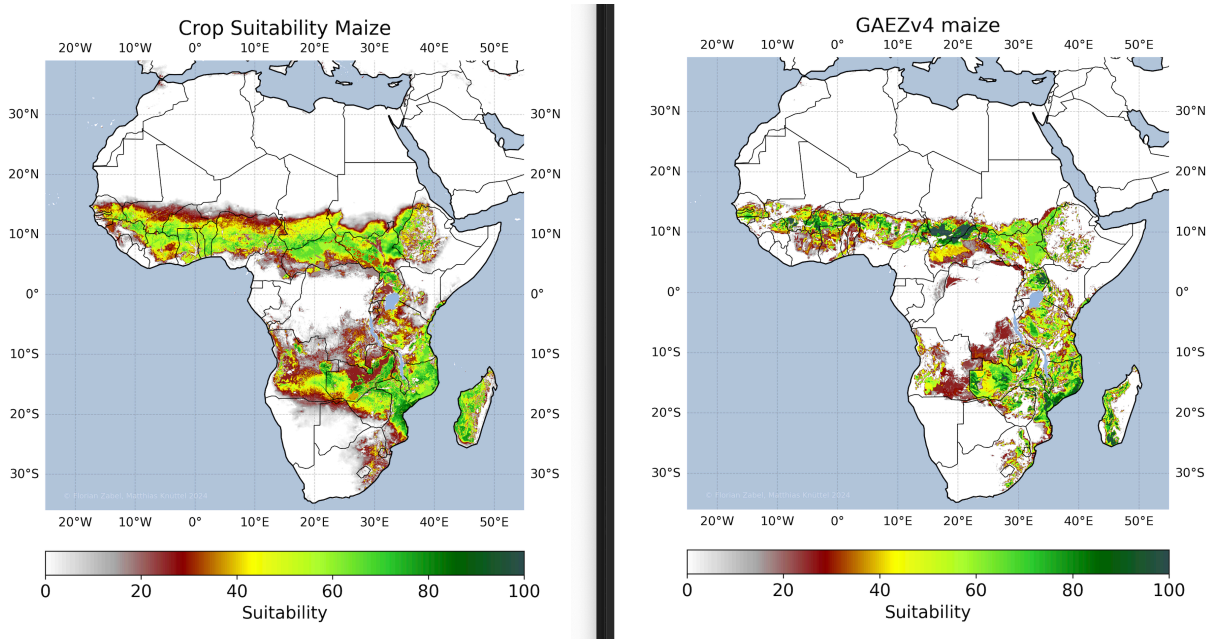
You are right that GMD strongly encourages authors to use colorblind friendly colormaps. Therefore, we replaced Figs 10(a) and 12(a, b, d) in the main text with colorblind-friendly colormaps. Thanks a lot for your suggestions. We now chose ‘viridis_r’ in Matplotlib. We now added the figures with the more color-intuitive colormaps which are however not colorblind-friendly but are similarly used by other approaches to the supplement. We think that this is a good compromise, that is bringing all interests and arguments together. In addition, as already said, all maps are available for download, in both versions. In CropSuite (v1.0), we put a lot of effort into being user-friendly. For colorblind people, we also implemented the possibility to output standard maps in colorblind-friendly colormaps.

Other

- Reviewer 2 had the following comment: “In theory, I would expect a smaller area in this study because this study considers additional climate variability. However, Figure 8 shows a larger area by this study. Can the authors explain more about this?” The authors changed Fig. 8 to not consider climate variability for consistency with GAEZ, which makes sense, and they note that when variability is considered, more area is considered unsuitable (i.e., the purple bars shrink and orange bars grow between Figs. 8 and S4). However, the reviewer’s original comment still stands: There are still a lot of crops where a substantial fraction of their CropSuite-suitable area is GAEZ-unsuitable. The Results or Discussion might benefit from highlighting this and perhaps investigating the reasons for one such crop (e.g., cabbage).

  Reply: We generally find more CropSuite area suitable than in GAEZ (with or without variability). We already discuss this issue, which we particularly identified for barley, cabbage, chickpea, rapeseed, rye

and wheat in Ln 333-336. This point is already also discussed in reply #5 to the other reviewer. We think that the different soil data used in GAEZ (HWSD) and CropSuite (SoilGrids) is a main reason of this difference. This is illustrated by the following figure, indicating more gradual changes in CropSuite, whereas GAEZ shows strong and abrupt changes, especially between borders (e.g. between Angola and Zambia). This follows patterns of the underlying soil data, which is a known issue in the HWSD data.
We added a paragraph to ln338-340 to better address this issue!




*Suitability for maize for CropSuite (left) and GAEZv4 (right).*

- Fig. 9: Some of the bars (e.g., rye) seem to have changed color (i.e., climatically suitable area value) pretty dramatically between the original manuscript and the revision. What happened there?
  Reply: For rye (only), we identified an error in the climatically suitable area. This was corrected. For the other crops, nothing changed, but the colorbar limits changed between the two plots!

- Figs. 9 and S5 look identical to my eyes; please double-check that the correct figures were both included.
  Reply: Thanks a lot for taking such a close look! Indeed, they were identical. We inserted Fig. S5 as Fig. 5 by mistake. We apologize a lot for that mistake. We changed Fig. 5 accordingly with the correct one. Regarding the previous question, the colors of the bars are the same again than in the initial version (except for rye).

- Fig. S5 caption: “modulo” should be “mode. ” Sorry for the confusion in my original comment.
  Reply: Thank you, we corrected that.

- Fig. 12a: Color bar label is only partially visible.
  Reply: Thank you, we corrected that.

- Great job with the Fig. 13b redesign.
  Reply: Thanks! It was some work.

  - Thank you for the response to my “Do there tend to be any patterns in the discrepancies that might explain them?” question. Please consider including something like that in the Results or Discussion (sorry if it’s there and I missed it!).

  Reply: We added a paragraph on this in line 357-362 and also added Fig. S6 to the Supplement, showing the histogram for comparison between CropSuite and the GGCMI crop calendar.