Re-review: “A modeling System for Identification of Maize Ideotypes, optimal sowing dates and nitrogen fertilization under climate change - PREPCLIM-v1” (gmd-2024-105)

Unfortunately, the authors’ revisions did not do much to improve the paper’s organization, language, or figures, which were the three major themes of my first review. I recommend another set of major revisions.

The issues of most critical importance to the paper are marked in **bold**.

General

1. Are these tools publicly accessible? If so, please provide URLs. If not, please explain why.
2. **Figures throughout (including the Supplement) are very low-quality with obvious JPEG artifacts. PDF should be used when possible for vector-based figures and PNG elsewhere, with a resolution of at least 300 dpi. (JPEGs should only ever be used for photographs.) See “Figure composition” bullet at https://www.geoscientific-model-development.net/submission.html#figurestables**
3. **Code is still not associated with a DOI, despite the GMD requirement: https://www.geoscientific-model-development.net/policies/code_and_data_policy.html#item3**

Abstract:

4. L18: Specify *Southern* Romania.

Sect. 1: Introduction

5. L90: What is a “cross-range”?
6. **L110: Portability is more than just showing that changing inputs doesn’t change the results much, which seems to be what Sect. S2 is saying, although it’s very unclear. I suggest deleting this sentence, as well as deleting Sect. S2, which is an unnecessary hodgepodge of manipulations that don’t seem comprehensive enough to draw meaningful conclusions from. It’s just distracting and confusing.**

Sect. 2: Data and Methods

7. Split Sect. 2 (Data and Methods) into subsections for science (L119-173) vs. software (L174-204).
8. **From reading Sect. 2 (Data & Methods), I don't have a sense of whether the optimal management and cultivars are allowed to evolve over time. Is the optimization taking place for each year?**
9. L137-140: This description of P2 is hard to understand. What does it mean to "delay" development? Can P2 be summed up as, "Longer days increase plant growth only up to a point P2, above which plant growth decreases"? If so, please explain why.
10. I ask again: If P4 was kept constant, why is it even mentioned? You only analyze responses across five parameters, so why talk about this sixth one? Is it because it's something that the application COULD analyze, you just didn't do it here? That's relevant for the software side of things but not the science.
11. L149: Thermal time parameter is missing (a) base temperature and (b) and time component. Is it 3-70 °C-*days*? Above what base temperature?
12. L154: "representatives" should be "representativeness".
13. **L154-155: What did you actually do to "rigorously test" the parameter range? What "analysis of extreme values"? If you mention these tests/analyses, you need to give details of their methods and results.**
14. **L155-6 and throughout the rest of the manuscript: For clarity, do not say "Pi" when you can just say "parameter" or "parameters" instead.**
15. L164: It's not a "proposed" approach; it's the approach you actually used. Delete "proposed".
16. L174: "optimal paths" of what? Cultivars and management?
17. L175:
    a. "one-way interactive (static)" confuses more than it helps. Please consider deleting, because "providing agro-climate information" already implies "the user is just browsing existing content, not generating anything themselves."
    b. Mention that NUTS3 in Romania corresponds mostly to the county level.
18. L177:
    c. "climate -agro-climate" typo?
    d. What indicators and indices?
19. L204-208 (Table 1 caption) and elsewhere throughout paper: Replace "exper" with "experiment."
20. Table 1 is not mentioned anywhere in its section.
21. **Table 1 is still extremely confusing.**
    e. **The authors now explain that "1N" and "3N" are experiments, but they don't explain *why* they're experiments. The text in Sect. 2 says at L159-160, "By default, the twelve agro-management scenarios encompass**

four sowing dates (spaced five days apart) and three fertilization levels (zero, then a regional average and its double)." That explains *either* 0-60-120 ("3N") or 0-23-46 ("1N"), but I don't understand why the authors have *both*. What exactly is the regional average? Is it 23 or 60?

f. **It's very confusing to have one "treatment," e.g. TR7, corresponding to both "May 5 planting with 60 kgN/ha" and "May 5 planting with 23 kgN/ha." Why are those not designated as separate treatments within a single experiment?**

Sect. 3: Results

22. **It's still very jarring to see the agro-climatic indicators introduced in a Results section. The authors' explanation that this section is simply to "justify" the work makes it even odder—generally those kinds of things are in a Methods section titled something like "Study Region." This paper is about the experiments and the software; the region the authors chose to test is of secondary importance. The authors' citation of the Copernicus 2023 report confirming that the region is a European hotspot further confuses me—why include this three-page analysis, with climatic indicators that the reader is almost certainly not familiar with and which haven't been previously explained? I *strongly* suggest the authors (a) add a subsection at the beginning of Sect. 2 titled something like "Study Region" consisting of a paragraph or two describing how the region is a hotspot of climate change but not introducing any original analysis. The authors' analyses can be included in a Supplement instead, so as not to distract from the focus of the paper. This will also allow me to be less critical of the organization of the authors' analyses, since the separation into "indicators" vs. "extremes" is still giving me trouble (although the authors did explain well why my "temperature" vs. "precipitation" idea wouldn't work). It would also make it perfectly fine to have the indicators explained in the midst of their results—indeed, this would work better! Any tidbits from the authors' analyses that are especially interesting and/or useful for interpreting results can be mentioned in the new Methods subsection, with reference made to the new Supplement section.**
23. L213: Again, specify that NUTS3 in Romania mostly corresponds to the county level.
24. Fig. 5:
    a. In addition to "NUTS region 103032," say the name of the place.

b. Needs in-figure legend explaining the lines, their colors, and what the shading represents.
c. Y-axis labels needed with text explanations and units

25. L269: No significant or near-significant decreasing trend is observed in the first dekad for either RR10 (p=0.7, Fig. 5b left side) or RR (p=0.3, Fig. 5c left side).
26. L279: Section 3.c?
27. **L280-284: Model validation needs its own subsections in the methods and at the beginning of the results. While three pages are dedicated to what is essentially a supplementary analysis (agro-climatic indicators/extremes), in this revision the validation of the model that is the *actual focus of the paper* only gets two sentences (L280-284), including one for the methodology (in the Results section for some reason), and its results figure is shunted off to the Supplement. This is a critically important part of the paper and *must* be treated as such.**
28. L286-291: Speculation about how models could be improved is material for a Discussion section, not Results. Also, where do the authors get the data about 1995's real values being close to 80-120 kgN/ha and April 15th?
29. Figs. 6 and 7:
    d. What is "ENS"? Ensemble? Ensemble of what? Does each data point represent an ensemble mean? If so, uncertainty intervals should be added.
    e. Need in-figure legend explaining the colors. From the GMD guidelines at https://www.geoscientific-model-development.net/submission.html#figurestables: "A legend should clarify all symbols used and should appear in the figure itself, rather than verbal explanations in the captions."
30. L301-306, 316-317, 325-326: These results should be illustrated with figures (supplement OK). Also, what was the method for the correlation analyses?
31. L319: "H difference Hist minus scenario"?
32. Fig. 8: Needs in-figure legend explaining the colors. From the GMD guidelines at https://www.geoscientific-model-development.net/submission.html#figurestables: "A legend should clarify all symbols used and should appear in the figure itself, rather than verbal explanations in the captions."
33. **L337-479 (Sect. 3.3):**
    f. Instead of GX and GI, refer to these percentile ranges as "upper"/"top" and "middle"/"intermediate". Also, why is the intermediate range 25th-70th (asymmetric around median) rather than 25th-75th?
    g. Again, avoid the use of things like Pi and P0i, which make this section hard to parse. Use words instead.

34. L372: Why are some numbers in parentheses?
35. **L380-385: I don't understand this almost at all.**
36. Fig. 9:
    h. Legends should have sowing date + fertilization level instead of TR#.
    i. What is ORD?
    j. All the text about Fig. 9 refers to percentile ranges, so those should be the X axis, not rank. Specifically be sure to mark the 2.5th, 25th, and 70th percentiles, labeling ranges GI and GX.
    k. Each one of these lines is an ensemble across three climate models, right? What is the inter-model variation like?
    l. Fig. 9a: What is the arrow?
    m. Why are lines in Figs. 9b and 9c not monotonically increasing?
37. L415-417: Please include P# labels here for ease of comparing the text to the figure.
38. L418: What are the "main stages of the development"?
39. Fig. 10:
    n. Too small.
    o. I don't understand what the X axes are supposed to be here.
    p. Where is Harvest?
    q. Needs in-figure legend explaining the colors. From the GMD guidelines at https://www.geoscientific-model-development.net/submission.html#figurestables: "A legend should clarify all symbols used and should appear in the figure itself, rather than verbal explanations in the captions."
    r. What are the things in the background? Full ensemble ranges for red and black lines? Why not also blue?
40. Fig. 11:
    s. Too small.
    t. I don't understand what the X axes are supposed to be here.
    u. Where is Harvest?
    v. Needs in-figure legend explaining the colors. From the GMD guidelines at https://www.geoscientific-model-development.net/submission.html#figurestables: "A legend should clarify all symbols used and should appear in the figure itself, rather than verbal explanations in the captions."
41. **L 462-469: I don't understand this at all.**

"Annex" (should be "Appendix" in *GMD*'s style):

42. Please number the steps.

43. L805: Repeat starting from which step?
44. Consider putting this in Sect. 2 (Data and Methods), because that section is rather short anyway, and *GMD* encourages technical details.

Supplement:

45. **All figures: Do not use red and green in the same figure, as this is difficult for people with the most common form of color-blindness. See yellow box at the top of https://www.geoscientific-model-development.net/submission.html#figurestables**
46. Fig. S1:
    a. **Move back to main text (see above).**
    b. **Use date + fertilization instead of TRT #.**
    c. What are the four-digit numbers? The observed values? Why include these?
    d. Many colors are hard to see against the white background.
    e. Missing values should be represented as breaks in the lines rather than zero.
47. **Sect. S2: Just delete this; see comment about L110 above.**
48. Fig. S3:
    f. **Too small.**
    g. Why here do you split into 1-200 and 201-1890 as opposed to the percentile ranges from the main text?
49. **Fig. S4 is so small, and the image quality is so low, that the figure is unintelligible.**