Dear Editor, dear Reviewers

We thank you very much and are indeed, highly grateful for your support, valuable suggestions and corrections to the manuscript.

Here are the answers point-by-point to the required revision.

Re-review 2: “A modeling System for Identification of Maize Ideotypes, optimal sowing dates and nitrogen fertilization under climate change -PREPCLIM-v1” (gmd-2024-105)

The authors have significantly improved this manuscript, but some issues still remain. I think the editor can handle them, though, so I’m happy to say accept after minor revisions.

General

1) Thank you for adding the link to the info platform; I was able to access it successfully. (That’s a very nice interface!) Please also add the link to the Code Availability section.

A1: added to the Code Availability section

2) Thank you for adding code/data DOIs. Please also mention them in the Code and Data Availability sections.

A2: added to the Code Availability section

3) Figures are still too low-resolution, and this results in some of them being hard to read. The authors mention that they’re now 1000x800 pixels, but that by itself doesn’t mean anything—what matters is the pixels *per inch*. The GMD submission guidelines specify at least 300 ppi. Fig. 8, for example, is conservatively about 6 inches wide.

That would require it to be at least 300 x 6 = 1800 pixels across, not 1000. Note that using PDF instead of PNG would be preferable for most of these plots, as—being a vector-based format—it allows “infinite resolution.” Fig. 8 might be an exception, because the large number of objects (background points) would cause the PDF to be extremely large.

A3: We have redone all the figures of the text and of the Supplement by doubling the initial resolution, we used now x2000; y1600 png.

Sect. 2: Data and Methods

4) New text describing P2 in the tracked-changes version (L150-152) seems not to have made it into the final manuscript. Was this intentional? I find the sentence after “Or:” to be a helpful description.

A4: We included this sentence in this revised form at lines 143-144 in the new Track-changes version.

Sect. 3: Results

5) L280: Replace “exper” with “experiment”.

A5: This is now corrected (line 282 in the new Track-changes version)

6) L294-297 (Fig. 4 caption):

a) Replace “exper” with “experiment”.

A6a: This was corrected (at line 328 in the new Track-changes version)

b) Mention that the lines represent the mean for each treatment x climate.

A6b: This mention was include at line 330 in the new Track-changes version.

7) L286-291: “Under warmer climates we note more frequent occurrences of critical situations with suboptimal grain filling and potential crop failure, under fertilization….

In our study premature ending of simulated vegetation season occurred more frequently in treatments with higher nitrogen fertilization, leading in average only small changes in maturity days.” Reiterating my request that this be illustrated with a figure (in the Supplement is okay). The authors provided one in their response (albeit without a legend or Y-axis labels) but seemingly not in the manuscript or Supplement.

A7: We included the Figure specified by the reviewer, in the Supplementary (the new S3), and included the legend of Y-axis labels. S3 is referred at line 293 in the new Track-changes version.

8) L303: “in the Ctrl and in model simulations”: Replace “model” with “future”. They’re all *model* simulations.

A8: “Model” was replaced with “future” at line 336 (of the in the new Track-changes version)

9) L305-308: When I first re-read this, I thought “they should really look at the changes in extremes, too”—which you do later. Consider saying here something like “Further analysis on the change in intermediate and extreme harvest values can be found in Sect. 3.3.1,” or reorganizing to put these analyses together.

A9: We included this note at lines 343 and 344 of the new Track-changes version)

10) L311-313: “The correlation along sowing dates between H and accumulated precipitation until maturity (Pmat, Fig.6), is r(H, Pmat) >0.96 in both scenarios.” Fig. 6 does suggest this, but showing the dots for each ensemble member would help. It would match the text I quoted even better to draw the best-fit lines for each point cloud rather than a line through their means at each date. Also, the X-axis (and independent variable in the correlation tests) should be the quantitative sowing date rather than the categorical “treatment”—these are almost identically-spaced but not exactly.

A10: We have redone these Figures (Fig.4, Fig5, Fig6), now these use unequally spaced intervals on Ox such as to represent not the number of the treatment but the number of days between sowing dates. The difference is small but is apparent on the Figures, the dates being: 01 April, 15 April, 01 May, 15 May.

Regarding using best-fit curves instead of ensemble means, for this work this would bring here some new, different issues, difficult here to link to the rest of the results (that target ensemble means), but it is an interesting idea that will be considered in a further investigation.

11) L354: Upper limit of “intermediate” interval still says 70% here, whereas in their response the authors say they changed it to 75%.

A11: This was corrected to 75% at line 417 of the new Track-changes version); all the figures (Fig.7b.c) were containing the correct value, 75% for the definition of the intermediate H values.

12) L355: Replace “projected higher H values in GI” with “projected higher intermediate H

values”.

A11: This was replaced at line 418 of the new Track-changes version;

13) L369-375:

a) L371-372: Replace “GI and also in GX” with “both the intermediate and top percentiles”.

A13a: This was replaced at line 436 of the new Track-changes version

b) L374: “leading”? Reformulated at line 440 of the new Track-changes version

A13b:

c) Mention any interesting results from Fig. S3. E.g., how some ensemble members actually show improvements. Also, it seems like there is substantial inter-model spread in the historical and to a lesser extent future periods—this is not a dealbreaker but it should be acknowledged in the main text.

A13c: These were now noticed specifically in the text (lines 415-416 Track-changes) with reference to the two Supplementary materials: to the Fig.S3 (showing the link between precipitation and Harvest) and to the Fig.S5 (showing the inter-model spread in simulated Harvest).

14) Fig. 7a

a) This is actually harder to read in some ways than it was before (then Fig. 9a). The first two lines for each color are impossible to distinguish. Using a PDF as requested in the guidelines could help with this.

A14a: We changes the thickens of the lines and also changed the line style of the lines (for first two sowing dates) to make it more distinct, in Fig.7.

b) Fig. S3 should be mentioned in the Fig. 7a caption. This was done in the caption of Fig.7a, line 487 (new Track-changes text)

c) I still don't understand what I'm supposed to take away from the "mitigation window." How was it drawn, exactly? I.e., how were the edges determined?

A14c: The square is defined by the points where H-percentile curves obtained in different management scenarios (as a function of genotype), are first crossing each-other. This intersection is due to different curvatures of H(genotype) functions for the various treatments (showing a different response to genotype perturbation under different managements).

These squares delimit genotype parameter-areas where, using a same (or close-range) genotype and just changing the management (sowing or fertilization) one can obtain the same or even an improved H, for a given climate.

This is important feature that can be used in practice, because one can reduce pollution (fertisation) but using the alternate management (sowing date or genotype) using this identified parameter-area, called "mitigation window"; hence can mitigate the climate change change effects without loosing Harvest potential (discussed in 3.3.1 ii, window definition explanation added now in the caption of Fig.7a).

15) Figs. 7b and 7c: Y-axis labels should be "Difference in harvest relative to Hist".

A15: We modified in the figure the Y-axis labels, to: "Difference in harvest relative to Hist".

16) Fig. 8 is still too low-resolution to properly display the point clouds in the background.

A16: we enhanced the resolution for this Figure (as for all) to x2000 y1600

17) L423: “Ox” should be changed to “X axis”.

A17: done

18) L452: “Ox” should be changed to “X axis”.

A18:This was replaced at line 541 and line 586 (new Track-changes text)

19) L459: “lead” should be “lead to”.

A19: Was corrected at line 593

20) L462-466: I still don’t understand this part (although the preceding part of this section is better than before; my previous comment 41). I don’t really get what “expectancy” means, and I don’t know what the Y-axis in Fig. S5 is. I think “border” at L464 should be “broader”?

A20: replaces “expectancy” with “probability”

A20: corrected “border” to “broader”

Sect. 4: Discussions

21) L500: Leftover “P0i” that didn’t get changed.

A21: Replaced at line 634 with “genotype parameter value”

22) L544: Leftover “P01” that didn’t get changed. Line 678

A22: Replaced at line 678 with “genotype parameters”

23) L545: Leftover “P0i” that didn’t get changed.

A23:Replaced at line 679 with “these cultivar dependent parameters”

Supplement:

24) Throughout: Start section headers with “Section” and figure captions with “Figure” to clearly distinguish them each other.

A24: This was done in Supplementary material: Supplementary materials are named “Section” and figures are Fig.S* (in the same way referenced in the text)

25) Fig. S.1b (previously Fig. 5): The authors mention that my comments 24b (“Needs in figure legend explaining the lines, their colors, and what the shading represents”) and 24c (“Y-axis labels needed with text explanations and units”) were addressed, but it doesn’t look like those changes made it into the updated Supplement file.

A25: We addressed these in the new Supplementary material version. All contain now legend for lines, colors and shading and explained axis.

26) L19: “Fertlization” typo

A26: Done

27) L26: “string” should be “strong”.

A27: Done

28) L28: “dt-line” should be “dot-dash line”.

A28: is now corrected

29) Fig. S3:

a) Refer back to Fig. 7a in the caption.

A29a: This reference was included in the caption of Fig.7a (line 487)

b) These figures should also be remade to match the design of Fig. 7a.

A29b: These figures were remade, with same pattern as Fig.7

30) Fig. S5:

a) What is the Y-axis here? Now this is Fig.S7, and the

A30a: we added a caption line to explain Y-axis in this Figure, now Fig.S7.

b) Why split at the 200th parameter instead of percentiles as in the rest of the paper?

A30b: The split was done at the point (range) of maximal change in the slopes in Scenarios relative to the slopes in Hist, in order to identify the percentile range most affected by climate. The maximal change is at about 10-20% percentile in all cases (coherent with Fig.7b,c), such as slopes higher in Scenarios in the first interval become lower afterwards compared to Hist, in function of the genotype parameter. The relative change is slope indicates how (and how much) to perturb a parameter to maintain about current H percentile.

c) Linear regression doesn't look like a good fit for the two plots on the left.

A30c: Yes, it appears for some parameters that the linear fit is poorer, mainly for un-fertilised case (Fig.S7)

However, here we are interested first on the sign of the relative change and then (also interesting) on how this difference evolves (where it accelerates or is more linear as a function of the parameter).

31) L59: Replace "TR12" with the actual details of the treatment.

A31: done (the treatment is defines as in figures, by "date_fetilization" and reference is to GTR, Table 1b)

32) L60: Delete "GI".

A32: done