#Response to RC1 :

We thank the reviewers for their careful reading of the manuscript and for their constructive and insightful comments, which helped improve the clarity and quality of the paper.
Please note that several figures referenced in the reviewer comments, including Figures 4 and 6, have been updated to the final version for improved clarity and consistency. These updates do not affect the results, analyses, or discussion presented in the manuscript. All updated figures, including those with minor modifications, are provided at the end of this document.

General comments :

First, I think that all three key objectives of the study would benefit for more detailed analyses. For this, you could consider splitting the study into two manuscripts – one focussing on the evaluation of the new *Sphagnum* PFT and one on the long-term reconstruction of NEE dynamics and the identification of their environmental controls.

We thank the reviewer for this suggestion. After careful consideration, we decided to retain a single manuscript to maintain a coherent presentation of the study. However, the validation of the Sphagnum PFT and the analysis of NEE dynamics have been substantially enhanced in response to reviewer comments. In particular, six figures have been significantly updated:

- Figure 4 now includes an analysis of slopes, p-values, and the standard deviation of NEE across the three periods studied.
- Figure 6 has been revised to provide a finer analysis of seasonal contributions to NEE through the distribution of SHAP values, as explained in a previous comment.
- Figure 8 now also includes, as supplementary material (Figure A10), the probability density functions (PDFs) of GPP and ER.
- Validation figures (Figure A4-6) comparing ISBA model outputs to the statistical model have been updated to reflect the actual mixed vegetation composition of the site.

These improvements strengthen both the evaluation of the Sphagnum PFT and the reconstruction of long-term NEE dynamics, providing a more detailed and comprehensive analysis within a single, coherent manuscript.

Regarding the first research objective, I have some concerns about the model validation. As you mention yourself in the discussion section of the manuscript, the model results are validated against the results of a statistical model that is based on monthly in-situ data obtained from chamber measurements. First, it would be helpful to include some information about the spatial distribution/replication of chamber measurements in the manuscripts to give an indication of their spatial representativeness (even thought this information is given in Garisoain et al., 2024).

We thank the reviewer for this comment. In the revised manuscript, we have clarified the methodology regarding water table monitoring and the spatial distribution of chamber measurements.

L73 : « *Piezometer wells are 50 mm diameter PVC tubes distributed across the peatland to cover the full spatial extent of the site (Figure 1 from Garisoain et al., 2024), and their placement corresponds to the locations where chamber measurements were conducted. Water* *table depth (WTD) data were recorded at 1-hour intervals, and the mean value from the nine piezometers is used throughout the study.* »

We have also changed subsection « Carbon Fluxes » L81 :
« *These time series were derived from statistical models based on monthly CO2 flux measurements using the static chamber technique. The use of the statistical model allows reconstruction of daily fluxes, enabling direct comparison with the ISBA model outputs at the same temporal resolution. The reconstructed fluxes are considered spatially representative of the peatland due to the coverage and replication of the chamber measurements. In the following sections, these reconstructed datasets are used as a reference for model validation, and readers should note that the validation is performed against the derived statistical model rather than the raw measurements.* »

Second, while six years is a comparatively long time series of validation data, I am concerned about the low temporal resolution (monthly) of the in-situ data and the consequential use of a statistical model to reconstruct daily flux dynamics for validation of the IBSA model. I agree that it would be highly beneficial to instead or additionally use an eddy covariance data set or a chamber data set with higher temporal resolution for the model validation.

We thank the reviewer for this important comment. We fully agree that higher temporal resolution data, such as eddy covariance measurements or more frequent chamber observations, would provide additional confidence for model validation. In the present study, we therefore aimed to make the best use of the available data: although the chamber measurements are available at a monthly resolution, the six-year duration of the dataset is relatively long, and the statistical model allows reconstruction of daily fluxes for direct comparison with ISBA outputs.
We have clarified in the revised manuscript that the validation relies on the reconstructed statistical model rather than on raw measurements, and that caution is required when interpreting results at daily timescales. Importantly, over the six-year period, both approaches exhibit comparable orders of magnitude and similar interannual variability in carbon fluxes, and consistently identify the ecosystem as a carbon source in 2022.
Although the statistical model is associated with larger uncertainties, it is constrained by satellite-derived phenological information that is not explicitly represented in ISBA. The overall consistency between the two approaches therefore lends confidence to the statistical reconstruction and supports the main objective of this study, which is to investigate long-term carbon dynamics. Future work would indeed benefit from high-frequency flux measurements to further strengthen the evaluation of both carbon and water cycle processes.

Furthermore, I think that for model validation the in-situ data (the statistical model results) should also be compared to the ISBA model results using the actual vegetation distribution of the peatland (30% *Sphagnum*, 70% herbaceous) instead of just 100% *Sphagnum* and 100% herbaceous species.

We thank the reviewer for this suggestion. This comparison using the actual vegetation distribution of the peatland (approximately 30% Sphagnum, 70% herbaceous) has in fact been systematically carried out for all figures comparing ISBA model outputs with the statistical model, as shown in Figures A4–A6. We agree that it is important to highlight this, as it clearly demonstrates that the mixed vegetation scenario yields better performance metrics for NEE compared to the simulations with only Sphagnum or only herbaceous layers. These results have now been more explicitly referenced in the main text and incorporated into the discussion to emphasize the benefits of representing mixed PFTs for capturing ecosystem-scale carbon fluxes.

From your model validation it seems that the *Sphagnum* PFT improves model performance (alignment between IBSA results and in-situ data) mainly for ecosystem respiration (ll. 330-332). From my point of view this is a key result that requires a paragraph in the discussion section relating this finding to the Sphagnum PFT parameterization.

We thank the reviewer for highlighting this point. Indeed, one of the key outcomes of our study is that the inclusion of the Sphagnum PFT improves the representation of ecosystem respiration at the site. We have changed the discussion section « model validation and vegetation sensitivity » which appears now as :

« *The primary objective of this study was to evaluate the newly implemented Sphagnum PFT in the ISBA land surface model. Sphagnum photosynthetic activity is linked to water content in the top 10 cm of soil. While the model reproduces site-scale carbon fluxes reasonably well, a more detailed validation of the water cycle would require eddy covariance data and multi-site evaluations to assess parameter transferability. The aim was not to optimize parameters, but to test whether realistic behavior could be reproduced at a well-instrumented site using literature-derived values.*

The mixed representation, combining Sphagnum and herbaceous PFTs, accounts for contrasting responses to soil moisture. We removed the influence of soil moisture on respiration (θ(z)) for Sphagnum, allowing the moss layer to maintain microbial activity under dry conditions, while it was retained for herbaceous layers to preserve the soil moisture sensitivity of heterotrophic respiration. Although respiration from the herbaceous component alone is not improved, retaining θ(z) is consistent with previous validations of the ISBA model for herbaceous vegetation, ensuring the parameterization remains grounded in established formulations (Gibelin et al.,2008).

Importantly, the combination of PFTs captures contrasting responses to soil moisture, introducing functional diversity that likely increases the robustness of ecosystem carbon fluxes. This mechanism is reflected in the observed improvement of NEE on the mixed vegetation dataset, even if GPP and respiration alone do not always show large gains. These results also highlight the broader uncertainty in representing heterotrophic respiration as a function of soil moisture: classical formulations derived from mineral soils may not adequately capture responses in organic soils, as noted in other peatland modeling studies (Qiu et al., 2019 ; Guenet et al., 2024), emphasizing the need for further research on moisture–respiration parameterizations.

By combining PFTs with contrasting functional responses, the model captures compensatory dynamics across vegetation types: herbaceous layers respond strongly to moisture deficits, while Sphagnum maintains near surface moisture and microbial activity. This functional diversity improves site scale carbon flux estimates and suggests increased model robustness under variable hydrological conditions, which could be further enhanced by including interactive dynamics between Sphagnum mosses and herbaceous following the work of (Kim and Verma, 1996) but also competition and coupled carbon–water processes (Lippmann et al., 2023; Heijmans et al., 2008; Wu and Blodau, 2013a; Gong et al., 2020).

In addition, we have clarified the methodology in the revised manuscript to better describe how θ(z) was applied across vegetation types. Specifically, the changes are summarized in the Methods section:
"In this study, soil moisture did not appear to strongly constrain organic matter decomposition in near surface moss dominated layers, and we aimed to preserve contrasting drought responses across vegetation types. Therefore, θ(z) was removed for Sphagnum, while it was retained for herbaceous to maintain drought sensitivity where moisture deficits are expected to constrain belowground carbon turnover."

As an idea for future refinements of the *Sphagnum* PFT parameterization: As you already consider CH4 oxidation as a source of CO2, it would be interesting to add the (enhancing) effect of a *Sphagnum* layer on CH4 oxidation (e.g. Larmola et al., 2010; https://doi.org/10.1890/09-1343.1).

We thank the reviewer for this insightful suggestion. Indeed, incorporating the enhancing effect of a Sphagnum layer on CH4 oxidation could represent an interesting refinement of the PFT parameterization, particularly given that CH4 oxidation contributes to CO2 fluxes. While this mechanism is not currently included in our model, we recognize its potential relevance for future developments and have noted it as a possible avenue for improving the representation of peatland carbon cycling.

Regarding the second and third research objectives on long term NEE dynamics and their drivers, you hint at the growing importance of shoulder season fluxes with a lengthening growing season. I think that this finding would be worth investigating further as in-situ measurements in northern peatlands and consequently many studies are often limited to the growing season.

We thank the reviewer for this suggestion. In response, we have expanded the analysis of seasonal contributions to NEE and improved Figure 6 by including the distribution of SHAP values by season. This now provides a clearer view of the direction and magnitude of each season's contribution to NEE fluxes, including the shoulder seasons, which highlights their growing importance as the growing season lengthens.

L.399-408 are now : « *Figure 6 (a) shows that across all time periods, summer is the season contributing the most to annual NEE variability, accounting for approximately 39 % of the total contribution over the 1959-2022 period. Autumn and spring follow, alternating in second place depending on the period, with comparable contributions of around 23-25 %. Winter consistently exhibits the lowest contribution, around 11 % of the annual NEE variability. The distribution of signed SHAP values for the full period (Figure 6 (b)) further highlights the seasonal dynamics. Summer displays a wide variability, with the median and central 50 % of values slightly below zero, but with long positive tails reflecting years with strong CO2 release to the atmosphere. Autumn is generally shifted toward positive values, with extreme positive contributions in some years. Spring is centered slightly below zero, with extremes toward negative values. Winter shows relatively low variability, with a skewed distribution including many negative contributions but a long positive tail, indicating occasional meaningful contributions despite its overall smaller role.*

Overall, these results confirm that summer dominates the interannual variability of annual NEE, but also reveal that other seasons particularly autumn and spring can contribute substantially in certain years. This supports the focus on summer NEE drivers while recognizing the importance of seasonal context. »

Minor comments:

I do not think that there is a need to always repeat all the information that is given in the figure captions also in the main text. Instead, I would recommend to just refer to the Figure in brackets at the end of a sentence.

We thank the reviewer for this suggestion. While we agree that redundancy should be minimized, we chose to briefly restate some key information in the main text to ensure readability without requiring the reader to constantly refer to the figures.

In the Materials and Methods chapter it would be helpful to clarify further which ones of the described model equations you altered and which ones were kept as they are. As the manuscript and especially the methods chapter is quite long you could consider leaving out sections 2.4.6 to 2.4.10 as the described process parameterizations were already included in the original model (if I am not mistaken) and instead refer to a respective description of the original model.

We thank the reviewer for this suggestion. We agree that, given the length of the Methods section, it is important to clearly distinguish between equations that were modified in this study and those inherited from the original ISBA formulation. In the current version of the manuscript, we already explicitly indicate throughout Section 2.4 which parameterizations were newly implemented or altered (notably the Sphagnum-specific developments) and which were kept unchanged from the baseline model. Following the reviewers' comments, we also added further clarifications regarding the treatment of heterotrophic respiration and the soil moisture limitation function $\theta(z)$. In addition, Table A1 provides a direct comparison between the new parameterization and the original one, helping the reader identify what has been changed versus what has been kept.
Regarding the suggestion to remove Sections 2.4.6 to 2.4.10, we respectfully prefer to keep it in the manuscript. Although these processes are part of the original model, we consider it important to provide the full set of governing equations used in the simulations for clarity and readability, and to make the study as self-contained and reproducible as possible. We do, however, consistently reference the original ISBA documentation/publications when describing inherited parameterizations, so that readers can consult the baseline model descriptions if needed.

l. 262: What do you mean with "reaction"? Maybe "decomposition"?

Thank you, we've rephrased : « *The last part of the equation considers oxygen availability with Cmax(z) representing the maximum carbon mass producible from available oxygen.*»

Figure 3: Which vegetation distribution was used for these model simulations? 30% *Sphagnum* and 70% herbaceous?

Thank you for the comment, all simulations shown in Figure 3 use the same vegetation distribution as the rest of Section 4, namely 70% herbaceous plants and 30% *Sphagnum* mosses, as derived from the cartography of Henry et al. (2014). This information was already stated in the experimental protocol, but to make it more visible to readers, we have added a short introductory paragraph at the beginning of Section 4:
"This section analyzes long-term NEE dynamics and their drivers using ISBA simulations forced by the S2M reanalysis. Unless stated otherwise, all simulations and analyses presented in this section use the site vegetation distribution derived from Henry et al. (2014), i.e., 70% herbaceous plants and 30% Sphagnum *mosses."*
This clarification ensures that readers understand that the vegetation distribution is consistent across all figures and analyses in Section 4, including Figure 3.

l**. 350 "a) shows a significant […]**

Thank you.

l. 371 consistent and increasing accumulation, right? Maybe this could be worth mentioning.

Thank you for this suggestion. Figure 4 has been updated to include the analysis of slopes, p-values, and the standard deviation of NEE across the three periods studied, which allows a clearer assessment of the consistent and increasing accumulation highlighted by the reviewer. The figure now presents the data more clearly and supports the discussion of temporal NEE dynamics.

« Figure 4 illustrates (a) the annual Net Ecosystem Exchange (NEE) and (b) the cumulative NEE from 1959 to 2022. The lowest annual NEE is modelled in 2011 (−171 gC.m^{-2}.yr^{-1}), while the highest value occurs in 2022 (122 gC.m^{-2}.yr^{-1}).
Panel (b) shows a long-term decrease in cumulative NEE, indicating that the ecosystem acts as a net carbon sink over the entire study period. Piecewise linear trends computed for three successive 22 year periods (1959–1980, 1980–2001, and 2001–2022) reveal a progressive intensification of carbon uptake, as evidenced by increasingly negative slopes of cumulative NEE. The comparison of slopes between periods indicates that this intensification is not linear through time. The strongest increase in carbon sequestration occurs between the first and second periods, while the rate of intensification decreases after the early 2000s, suggesting a slowdown in the acceleration of the carbon sink despite continued strengthening.

Interannual variability, quantified by the standard deviation of annual NEE and reported as text annotations for each period, shows a marked temporal evolution. Variability is highest during the early period (1959–1980), decreases substantially during the phase of strongest sink intensification (1980–2001), and slightly increases again during the most recent period (2001–2022). This pattern suggests that the period of rapid carbon sink strengthening coincides with a more stable interannual behaviour, whereas recent decades combine sustained carbon uptake with a renewed increase in year-to-year variability.

Overall, despite substantial annual fluctuations, the long term signal remains robust and highlights a persistent accumulation of carbon by vegetation over the past six decades. »

Figure 5: I think that the seasonality in NEE, GPP, and ER would be easier to see here if they were not displayed as cumulative fluxes. Only ll. 388-390 refer to the cumulative representation – Figure 5 could therefore be moved to the appendix and be replaced by the respective annual time series.

We thank the reviewer for this suggestion. We agree that displaying seasonal fluxes as time series could provide a different perspective. However, presenting cumulative fluxes in Figure 5 has several advantages. First, it avoids redundancy with Figure 1, which already shows the seasonal dynamics of NEE, GPP, and ER as annual time series. Second, cumulative fluxes provide complementary information on the total carbon balance over time, which is particularly relevant for peatland carbon cycle studies, where cumulative fluxes are commonly reported. Therefore, we decided to retain Figure 5 in its cumulative form, as it adds meaningful insight beyond the seasonal time series.

Figure 6: Please add a definition of the seasons here.

Thank you, the definition of the seasons have been added : « *(a) Seasonal contributions to annual NEE across four time periods : 1959-1980 in blue, 1980-2001 in orange, 2001-2022 in green, 1959-2022 in grey. Each bar represents the relative importance of a season in explaining the total NEE, as determined by Shapley regression coefficients. Seasons are defined as winter (December–February), spring (March–June), summer (July–August), and autumn (September–November). (b) Distribution of SHAP values by season for 1959–2022. Positive or negative SHAP values indicate the direction of each season's contribution to annual NEE, showing whether a season increases or decreases the yearly flux. »*

l. 408: Remove one "seem to"

Thank you for noticing. As Figure 6 has been updated, "seem to" has been removed and no longer appears in the manuscript. « *Figure 6 (a) shows that across all time periods, summer is the season contributing the most to annual NEE variability, accounting for approximately 39 % of the total contribution over the 1959-2022 period. Autumn and spring follow, alternating in second place depending on the period, with comparable contributions of around 23-25 %. Winter consistently exhibits the lowest contribution, around 11 % of the annual NEE variability.*

The distribution of signed SHAP values for the full period (Figure 6 (b)) further highlights the seasonal dynamics. Summer displays a wide variability, with the median and central 50 % of values slightly below zero, but with long positive tails reflecting years with strong CO_2 release to the atmosphere. Autumn is generally shifted toward positive values, with extreme positive contributions in some years. Spring is centered slightly below zero, with extremes toward negative values. Winter shows relatively low variability, with a skewed distribution including many negative contributions but a long positive tail, indicating occasional meaningful contributions despite its overall smaller role.

Overall, these results confirm that summer dominates the interannual variability of annual NEE, but also reveal that other seasons particularly autumn and spring can contribute *substantially in certain years. This supports the focus on summer NEE drivers while recognizing the importance of seasonal context. »*

Figure 7 (caption): I don't understand what you mean by "bold colormap" and "shaded colormap".

Thank you for pointing this out. We have revised the caption of Figure 7.
« (a) Summer net ecosystem exchanges (in red) compared to annual (in blue) from 1959 to 2022, as simulated by ISBA … »

I think that Figure 8 together with ll. 443-453 could be moved from the Discussion to the Results chapter.

We thank the reviewer for this suggestion. Following your advice, Figure 8 and the corresponding text (Lines 443–453) have been moved from the Discussion to the Results section.

The Discussion chapter could be strengthened by more specifically discussing the key findings of the study. In it's current form a large part of the discussion refers to shortcomings of the study and future research objectives.

We thank the reviewer for this suggestion. In response, the Discussion section has been revised and strengthened to more directly highlight the key findings of the study. In particular, we now emphasize the role of the Sphagnum PFT in improving the representation of heterotrophic respiration and the effects of combining Sphagnum and herbaceous vegetation, as well as how these findings enhance the understanding of ecosystem-scale carbon fluxes.

ll. 473-480: I don't quite understand the introduction of VPD here. First you state that VPD is important to consider (without a reference) but in the next sentences you show that VPD does not have a significant effect on NEE at your research site or in northern peatlands in general. Maybe rephrasing this paragraph can clarify your point.

Thank you, we've rephrased this paragraph with :
« Vapor Pressure Deficit (VPD) is generally an important factor to consider, particularly for vegetation development, as it influences both GPP and plant transpiration (Fu et al., 2022). However, at the Bernadouze site, VPD is low and exhibits little variation (Figure A9 (a)), suggesting it has a limited effect on NEE. Furthermore, VPD is strongly correlated with temperature, which captures much of its potential influence. A recent study in northern hemisphere peatlands (Chen et al., 2023) also indicates that VPD has a neutral effect on vegetation and does not necessarily induce stomatal closure in vascular plants. The humid conditions at the site, along with the presence of bryophytes, help satisfy atmospheric water demand. Overall, air temperature and water table depth remain the primary drivers explaining NEE variability. »

Figures A4-A6: It would be interesting to add another column of plots comparing the results of the statistical model with the ones from the ISBA model assuming 30% *Sphagnum* and 70% herbaceous species.

We thank the reviewer for this suggestion. Following your advice, an additional column of plots has been added to Figures A4-A6, showing the comparison between the statistical model results and the ISBA simulations using the mixed vegetation distribution of 30% *Sphagnum* and 70% herbaceous species. These new plots highlight that the mixed vegetation generally improves the representation of NEE compared to simulations with a single PFT.

Figure A5: Please add to the figure captions which years are included in the figures.

Thank you, we have updated the captions :
« Daily annual cycle (2017-2022) of (a) Gross Primary Productivity, (b) Ecosystem Respiration, (c) Net Ecosystem Exchange, (d) Water Table Depth from the statistical model in black, the ISBA Sphagnum model in orange, the ISBA herbaceous model in blue, and the ISBA mixed vegetation in green. »

Bibliography

Guenet, B., Orliac, J., Cécillon, L., Torres, O., Sereni, L., Martin, P. A., Barré, P., and Bopp, L.: Spatial Biases Reduce the Ability of Earth System Models to Simulate Soil Heterotrophic Respiration Fluxes, Biogeosciences, 21, 657–669, https://doi.org/10.5194/bg-21-657-2024, 2024.

Fu, Z., Ciais, P., Prentice, I. C., Gentine, P., Makowski, D., Bastos, A., Luo, X., Green, J. K., Stoy, P. C., Yang, H., and Hajima, T.: Atmospheric Dryness Reduces Photosynthesis along a Large Range of Soil Water Deficits, Nature Communications, 13, 989, https://doi.org/10.1038/s41467-022-28652-7, 2022.

This part presents the figures that have been updated following the reviewers' comments.

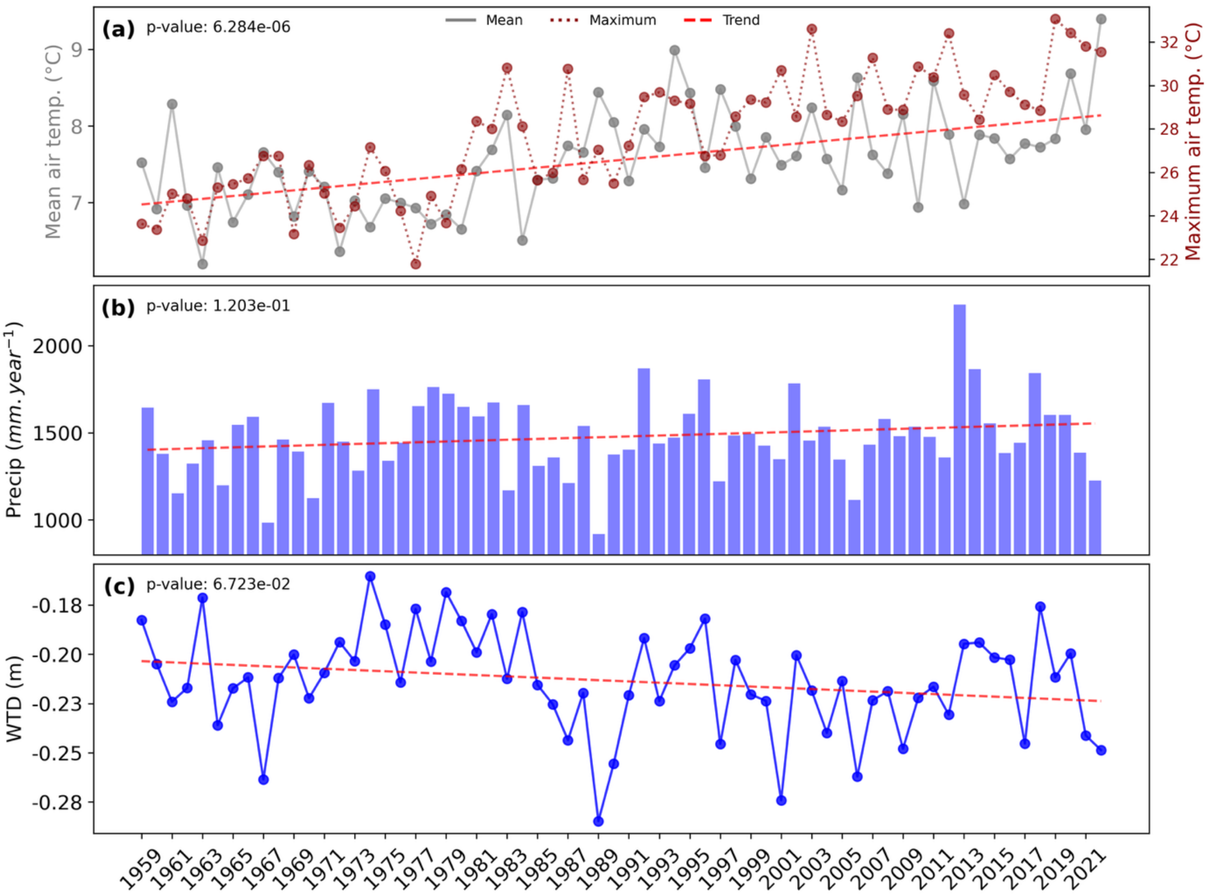

Figure 3. ***(a) Mean and maximum annual air temperature*** $^\circ$ ***C and (b) annual cumulate precipitation*** $mm.year^{-1}$ ***both from the S2M reanalysis and (c) mean water table depth*** m ***diagnosed from ISBA outputs, along with their trends as red dashed lines and corresponding p-values.***

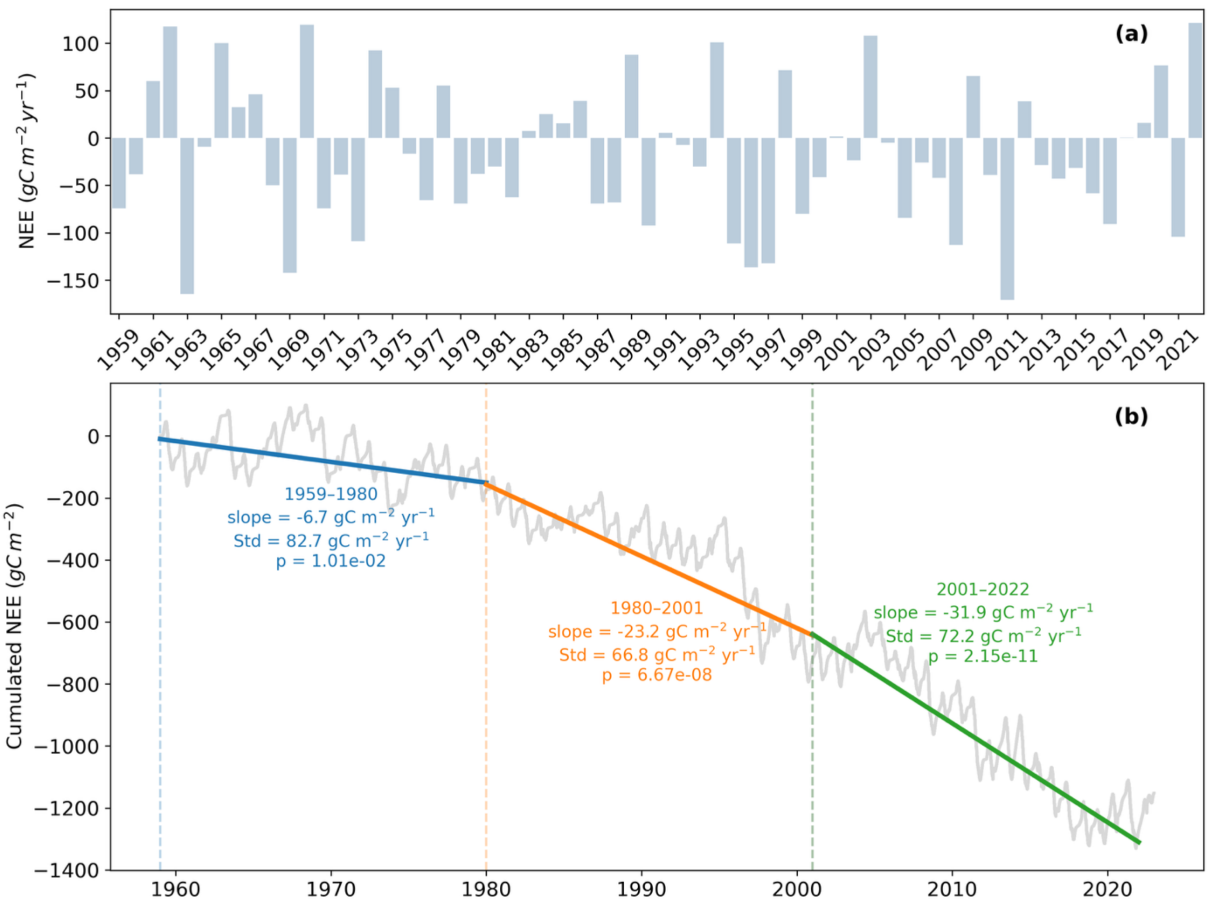

Figure 4. ***(a) Annual net ecosystem exchange*** $(gC.m^{-2}.year{-1})$ ***from 1959 to 2022, as simulated by ISBA. (b) Hourly cumulated net ecosystem exchange*** $(gC.m^{-2})$ ***from 1959 to 2022, also from ISBA. The pannel additionally reports the linear trend (slope), its p-value, and the standard deviation of annual NEE for three distinct periods: 1959–1980, 1980–2001, and 2001–2022.***

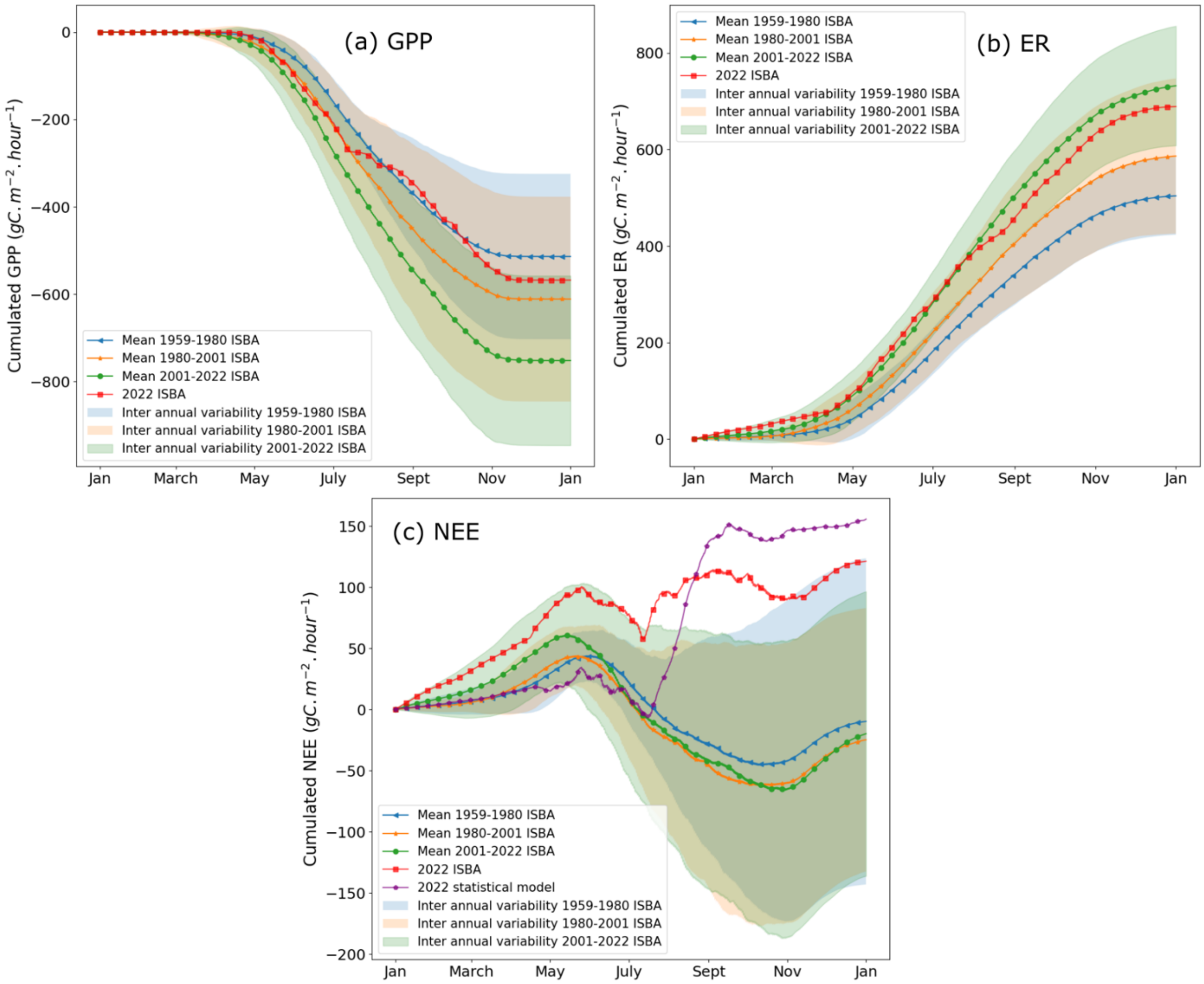

Figure 5. ***Seasonal evolution of cumulated (a) gross primary productivity (shown with negative sign by convention), (b) ecosystem respiration, (c) net ecosystem exchanges from ISBA over several time periods: 1959-1980 in blue, 1980-2001 in orange, 2001-2022 in green with interannual variability represented as a 90% confidence interval. Superimposed, the 2022 NEE seasonality simulated by ISBA (red curve) and the statistical model (purple curve).***

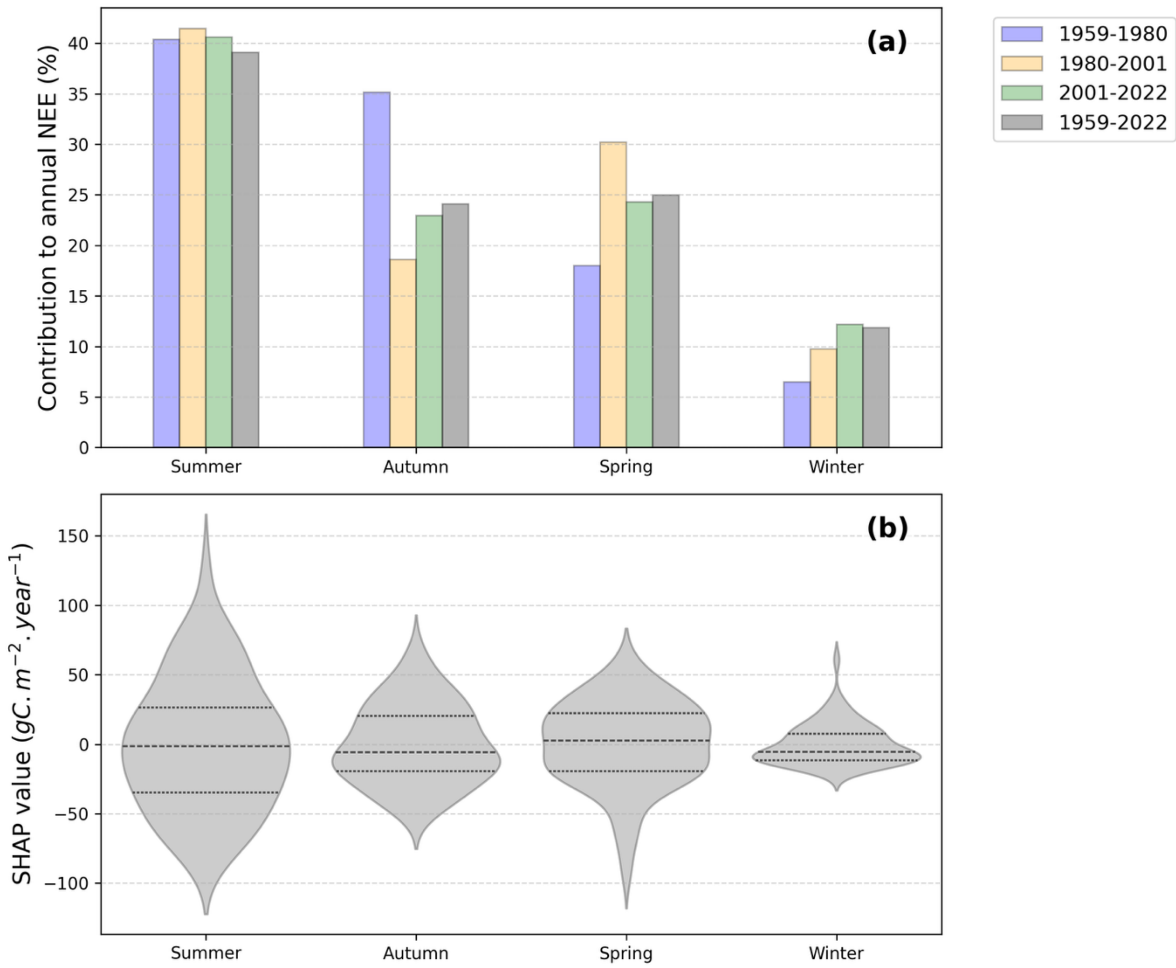

Figure 6. ***(a) Seasonal contributions to annual NEE across four time periods : 1959-1980 in blue, 1980-2001 in orange, 2001-2022 in green, 1959-2022 in grey. Each bar represents the relative importance of a season in explaining the total NEE, as determined by Shapley regression coefficients. Seasons are defined as winter (December–February), spring (March–June), summer (July–August), and autumn (September–November). (b) Distribution of SHAP values by season for 1959–2022. Positive or negative SHAP values indicate the direction of each season's contribution to annual NEE, showing whether a season increases or decreases the yearly flux.***

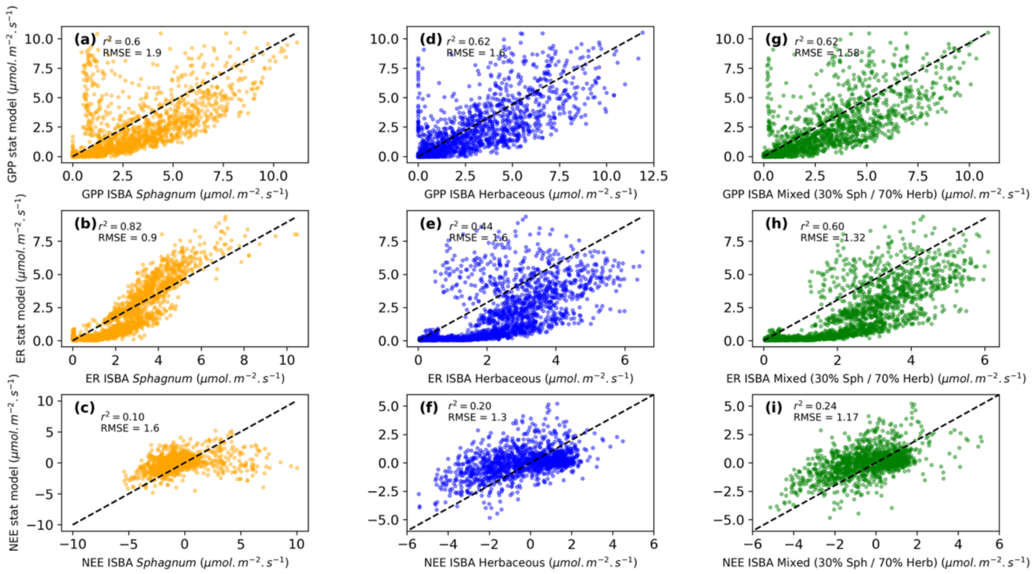

Figure A4. ***Comparison of daily ecosystem photosynthesis, respiration and net ecosystem exhange from the statistical model with: (a) the new Sphagnum photosynthesis, (b) the new Sphagnum ecosystem respiration, (c) the new Sphagnum net ecosystem exchange, (d) the previous herbaceous photosynthesis, (e) the previous herbaceous ecosystem respiration, (f) the previous herbaceous net ecosystem exchange, (g) the mixed vegetation photosynthesis, (h) the mixed vegetation ecosystem respiration, (i) the mixed vegetation net ecosystem exchange.***

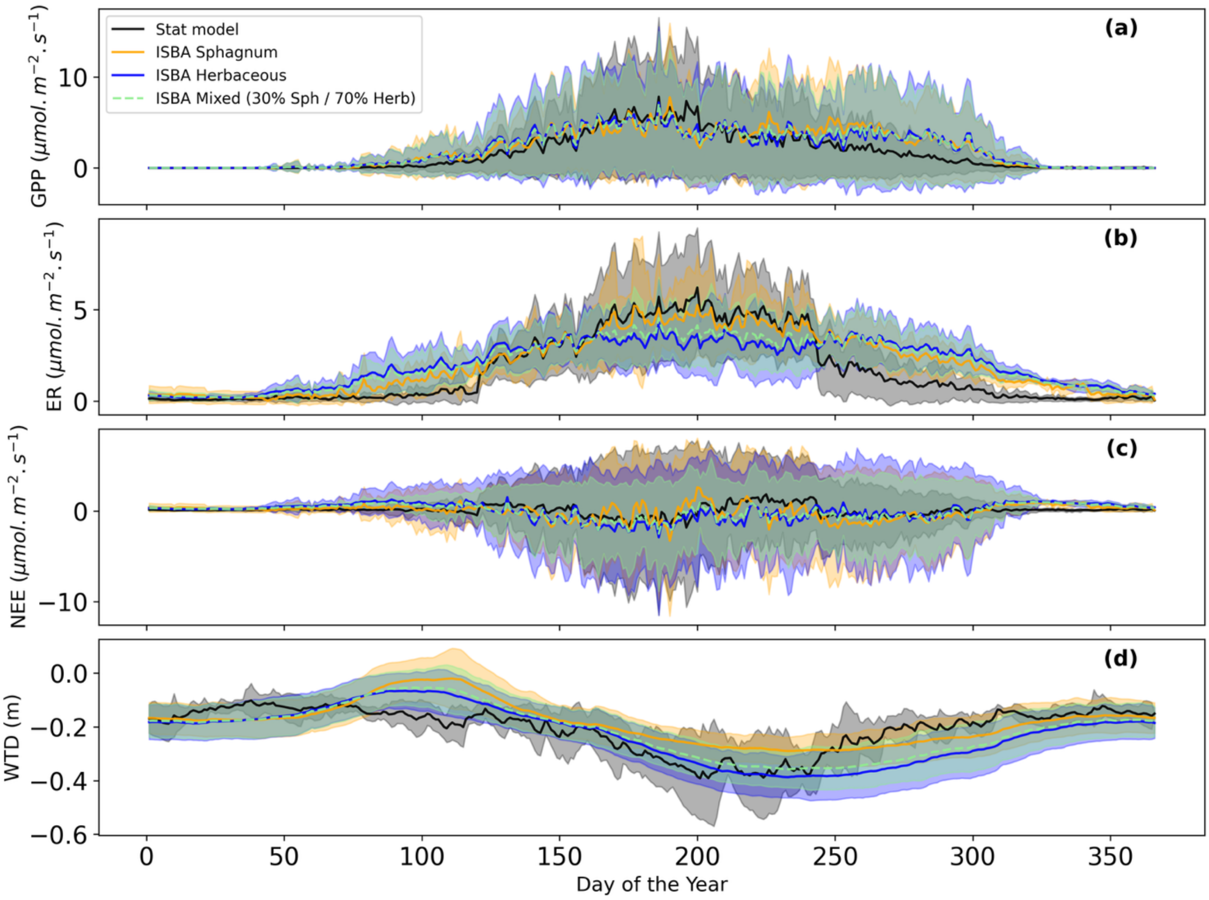

Figure A5. ***Daily annual cycle (2017-2022) of (a) Gross Primary Productivity, (b) Ecosystem Respiration, (c) Net Ecosystem Exchange, (d) Water Table Depth from the statistical model in black, the ISBA Sphagnum model in orange, the ISBA herbaceous model in blue, and the ISBA mixed vegetation in green.***

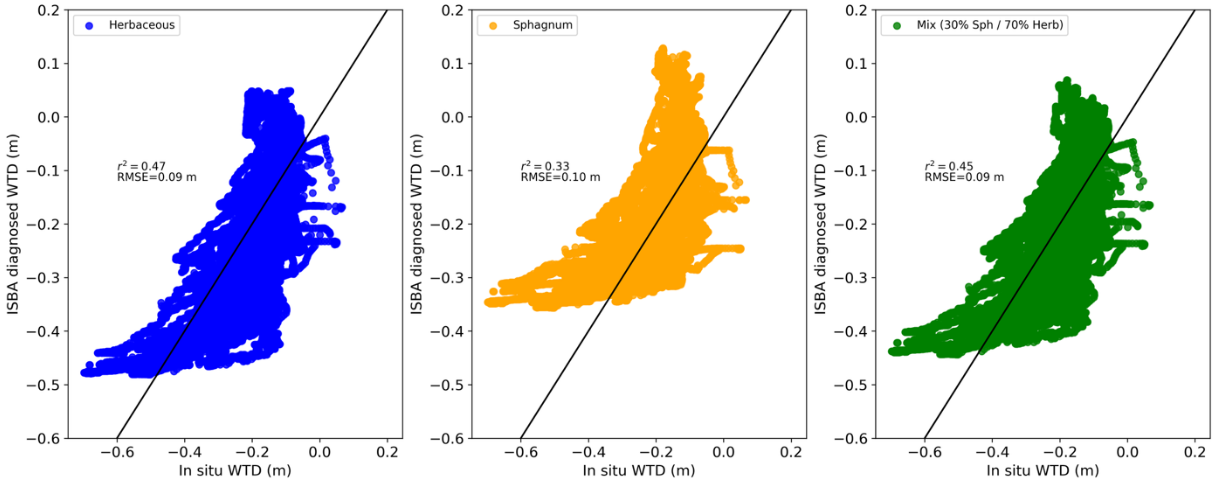

Figure A6. ***Hourly ISBA-diagnosed water table depth (WTD) with herbaceous vegetation as the dominant cover is compared to hourly in situ WTD in the left panel, while the right panel presents ISBA-diagnosed WTD with Sphagnum as the dominant vegetation versus in situ WTD.***

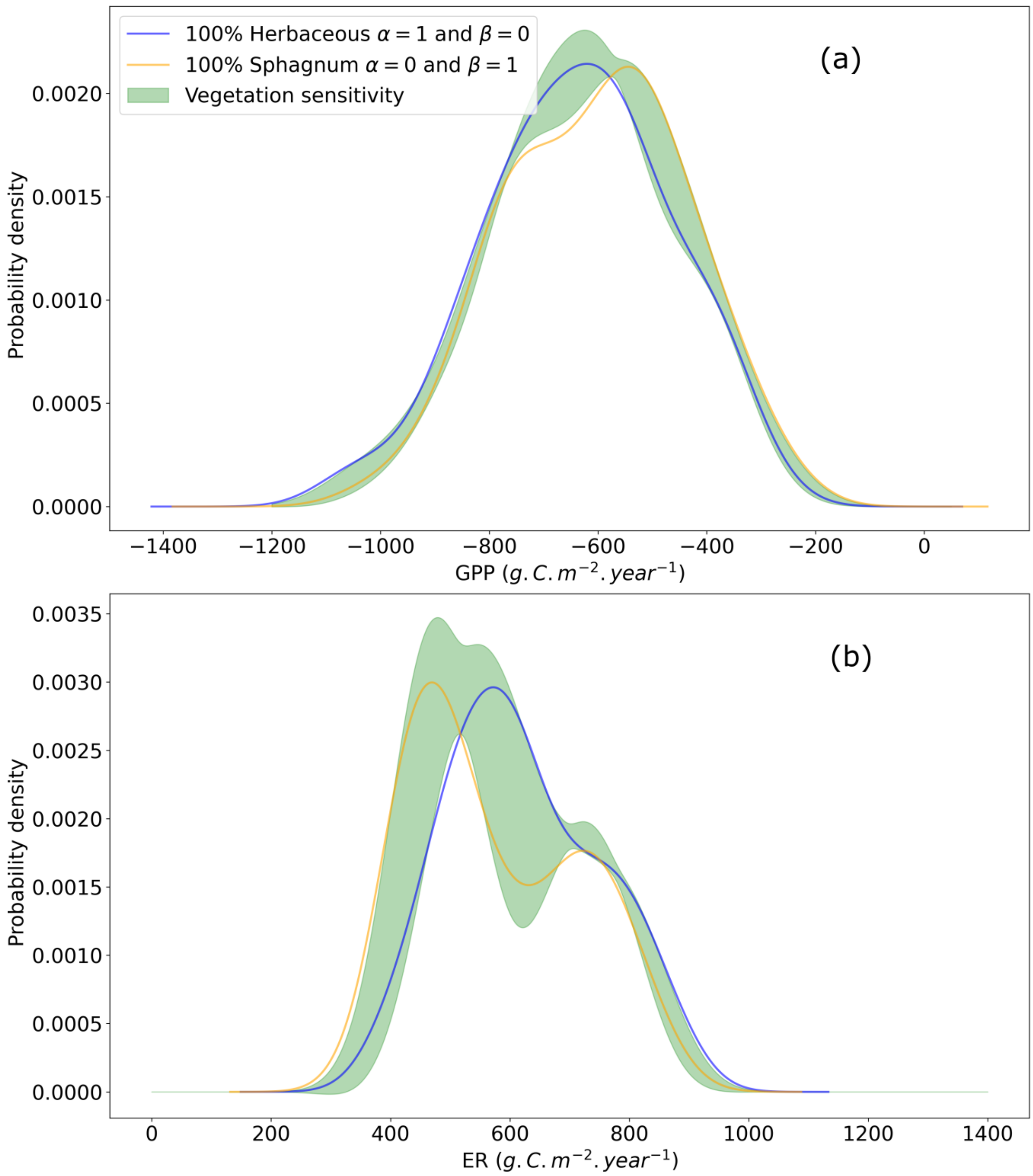

Figure A10. *Probability density function of annual cumulated (a) GPP and (b) ER over 1959-2022. In black, the vegetation mix corresponds to 70% herbaceous and 30% Sphagnum. In orange a 100% Sphagnum mix and in blue a 100% herbaceous mix. In shaded areas, the 95% confidence intervals corresponding to the variation of the vegetation mix in the form* $\alpha \times Y_{Sphagnum} + \beta \times Y_{herbaceous}$ *with* $\beta = 1 - \alpha$*,* α *varying from 0 to 1 in steps of 0.01 and* Y *being GPP or ER.*