Author responses to reviewer comments on manuscript ESSD-2025-756: "Peat core research in Western Siberia: methods applied, regions studied, and future prospects"

We would like to express our sincere gratitude to the reviewers of our manuscript, Sebastian Wetterich and the anonymous Reviewer #1, for their thorough evaluation, insightful suggestions, and highly constructive comments. Their careful review and detailed recommendations significantly contributed to improving both the Western Siberian Peat Core database and the accompanying manuscript. We greatly appreciate the time and effort devoted to reviewing our study, and we believe that the manuscript and database have been substantially improved as a result of their feedback.

Note: In blue, we indicate the original authors' comments provided during the Discussion phase (https://doi.org/10.5194/essd-2025-756-AC1; https://doi.org/10.5194/essd-2025-756-AC2), while in red, we highlight additional changes and explanations introduced during the revision of the manuscript and database.

Reviewer #1

Review 'Peat core research in Western Siberia: methods applied, regions studied, and future prospects', Agnieszka Halaś and Michał Słowiński

Halaś and Słowiński present a comprehensive review on peat cores from the Western Siberian Lowland, Russia, derived from 156 publications, spanning the years 1953 to 2025. The authors compiled 654 peat cores, providing an overview on 26 palaeoecological proxies. The authors also undertook the considerable task of geo-correcting peat core positions and standardizing the basal age of the peat cores if required. The authors provide with the Western Siberian Peat Core Database (WSPC) an interesting and timely overview of available data on peat cores spanning a wide range of literature sources, historical and recent, as well as in-depth analyses of the abundance, number and complexity of the different palaeoecological proxies and of the spatial and temporal evolution of peatland studies, based on the studied peat cores and proxies. They found a clear shift from early single-proxy, low-resolution investigations to modern multi-proxy, high-resolution studies.

Overall, the manuscript is well written and the figures, particularly the maps, are well produced.

We sincerely thank the reviewer for the positive evaluation of our manuscript. We are particularly grateful for the constructive comments regarding database structuring and formatting, which have significantly helped us improve the clarity, consistency, and overall presentation of the dataset. We appreciate the reviewer's acknowledgment of the scope and effort involved in compiling and harmonizing the Western Siberian Peat Core Database (WSPC). Responses to the specific comments are provided below.

The discussion chapter on 'challenges and future directions in Western Siberian paleoenvironmental research' provides an interesting discussion. Given the insight of the authors into the topic, how do the peat cores sampled in the densely sampled Great Vasyugan Mire or densely sampled other regions are representative of the Western Siberian peatlands?

We thank the reviewer for this insightful comment, which addresses the important issue of the representativeness of individual peat cores for larger peatland areas. This is particularly relevant in the context of Western Siberia, where peatlands form a dominant landscape type, in contrast to many regions (e.g., much of Europe) where peatlands occur as more isolated systems. In such extensive peatland complexes, it is inherently challenging to infer the characteristics of the entire ecosystem from a single core.

The degree of representativeness strongly depends on the type of proxy considered. For example, pollen data generally reflect broader, regional-scale vegetation patterns, whereas proxies such as testate amoebae primarily capture local hydrological conditions. For locally sensitive proxies, interpretation requires comparison across multiple sites to distinguish between site-specific signals and broader regional trends.

In our study, we explicitly address spatial representativeness by introducing a simplified scoring approach, in which we assume a nominal radius of 30 km for each core. We acknowledge that this is a generalized and somewhat subjective assumption, and that representativeness varies depending on both proxy type and local environmental conditions. However, this approach provides a useful framework to illustrate the current spatial coverage of available data. Even under this relatively generous assumption, substantial gaps remain across the Western Siberian Lowland.

This is also evident in well-studied regions such as the Great Vasyugan Mire, where sampling is concentrated primarily along the margins and more accessible areas, while large central parts remain poorly investigated. Furthermore, we note that the spatial accuracy of older core locations is sometimes limited. In some cases, multiple cores collected along transects (as indicated by the source publication) are assigned identical coordinates in published datasets, which may influence spatial analyses. We address this limitation in Chapter 6 (Variable spatial precision of reported core locations).

Therefore, to address the reviewer's question, the Great Vasyugan Mire is one of the best-studied peatland regions in Western Siberia, and this extensive body of research provides a strong understanding of this vast and internally heterogeneous complex. Importantly, it should not be treated as a single uniform peatland, but rather as a mosaic of interconnected peatland units that differ in structure, developmental pathways, and likely also in their timing of initiation. This complexity underpins its value as a reference area, as it captures a wide range of peatland types and histories within one region. At present, the Great Vasyugan Mire lies within the transition zone between the temperate broadleaf and mixed forest biome and the boreal forest (taiga), and it is located in a region without permafrost. It can therefore be regarded

as a well-characterized example of peatlands developing under these modern bioclimatic conditions.

However, caution is required when extrapolating findings from this region to all Western Siberian peatlands. Both biome distributions and climatic regimes differed during the Holocene compared to today, and Western Siberian peatlands as a whole exhibit substantial spatial heterogeneity. Consequently, peat cores from the Great Vasyugan Mire, or from other densely sampled regions, should not be considered fully representative of the entire region in a uniform sense. Rather, they provide regionally informative records that reflect specific peatland types, environmental settings, and developmental trajectories at local to subregional scales. This highlights the importance of broader spatial coverage to adequately capture the environmental variability of Western Siberian peatlands, which we consider a key takeaway of our study.
We will revise Chapter 5 to more clearly emphasize these aspects of spatial representativeness and associated uncertainties.

We added an additional section to the first paragraph of Chapter 5 addressing this issue:

"Moreover, even regions that appear relatively well studied, such as the Great Vasyugan Mire, are often sampled unevenly, with research concentrated mainly along accessible margins and transport corridors, while large central areas remain poorly investigated. This issue is particularly important in the WSL, where peatlands form extensive and internally heterogeneous landscape-scale complexes rather than isolated systems. Consequently, individual peat cores cannot always be considered representative of entire peatland regions, especially for locally sensitive proxies such as testate amoebae, whereas broader-scale proxies such as pollen may reflect more regional environmental patterns."

There is the Skye et al. (2025) DB Peat Base: https://essd.copernicus.org/articles/17/7313/2025/ on global peatland depths that can be also integrated into the discussion

We thank the reviewer for this suggestion. The article referred to was published after the initial submission of our manuscript, and after May 2025, which was the cut-off date for literature included in this study; therefore, it was not included in the original draft. We are aware of this database; however, it is difficult to incorporate it into the discussion, as it was not included in our compiled dataset and falls outside the defined literature scope of this study.
Additionally, for Western Siberia, our dataset is largely comparable. The biggest difference is that we did not include data from the World Soil Information Service (WoSIS) (Batjes et al., 2019), as this database is based on soil profiles, whereas our study focuses primarily on peat profiles, and it was not possible to reliably distinguish complete peat profiles within this dataset. Therefore, including these data would introduce inconsistencies in the dataset structure and methodological scope.

Batjes, N. H., Ribeiro, E., and Van Oostrum, A.: Standardised soil profile data for the world (WoSIS SnapshotSeptember 2019), ISRIC – World Soil Information [data set], https://doi.org/10.17027/isric-wdcsoils.20190901, 2019.

The WSPC data base in Zenodo is well described in the Zenodo abstract, it is of high value that the WSPC provides the original core name related to the different literature sources and all linked literature sources are provided, locations and basal ages of the peat cores are error-corrected and standardized. However, while the manuscript would only require minor edits, I suggest a major revision related to some formats of the WSPC database and their metadata presentation – less related to the content.

We thank the reviewer for the very detailed suggestions to improve our database. We will implement them and upload the updated version of the WSPC database to Zenodo. Responses to the detailed comments are provided below.

i) Could the authors optimize their data base internal codes for the Core_ID: Instead in the form of WS_1, WS_2,..WS_10, WS_11, ..WS_100, WS_101 - the code can be changed into a data code format that is better for sorting: e,g., WS_001, WS_002,..WS_010, WS_011, .. WS_100, WS_101

The format of internal codes will be revised according to the reviewer's suggestion.

ii) O_names – this relevant data column should directly follow the Core_ID column, the column name O_names could be sharpened to include Core in the column name

We agree with this comment. We will move the "O_names" column right after "Core_ID" and rename it to "Original_Core_Name".

During the revision of the database, we decided to rename this column to "Core_names" in order to make it shorter and more concise than our initial designation.

iii) references in the DB, the authors should separate the references that are currently set in one column and add additional data columns containing the references separatly followed by their URL link, DOI or other handle forms, (see comment below) - if available, (example PANGAEA data publication Li et al. (2025) https://doi.pangaea.de/10.1594/PANGAEA.971802?format=html#download) to enable the peat cores to be directly linked in the DB to the literature source.

We are very grateful for this suggestion. We agree that it would improve access to the original publications. We will add each reference in a separate column with full bibliographic information, so that readers do not need to consult the reference list to find the core they are interested in.

iv) in addition, the authors also should change the format of the literature list from pdf to a file format in table format, e.g. csv with separate columns for the reference and the links and add it to the updated version of the Zenodo data publication. In case there is no DOI, the authors should add other URL/handle link if they exist, e.g. to conference papers

We will change the literature list from PDF to CSV format.

We revised the format of the database reference list, which is now available in both Excel and CSV formats. The reference list is currently provided as a table containing: (1) a short citation format used in the column with the original core names, (2) full bibliographic references, including transliterations of original Russian titles where possible, and (3) DOI numbers and/or URLs to facilitate easier access to the publications for readers.

v) DATABASE description: the authors should change the description related to 'x – data available' (this reads misleading as the data values are not provided or in digital format) to a simpler expression, e.g. 'x = yes'

We will revise the description related to palaeoecological proxy availability in the database description file and in the main text.

We changed the coding of data availability from "x/none" to a binary "0/1" system, where "1" indicates the availability of data and "0" indicates its absence. We also revised the accompanying descriptions in accordance with the reviewer's suggestion.

vii) the authors could also consider adding the georeferenced and digitized map that they prepared for their study displaying the digital spatial extent of peatland zones in the updated version of the Zenodo data publication as this also represents a useful tool.

We will add a shapefile of major peatland zones that we digitized for our study from Kremenetski et al. 2003.

viii) important - the authors should include a table of variables (similar to the table of variables in the DATABASE description) also in the manuscript text, preferably with further information / grouping on the chronological, physical, chemical, and biological content.

We will include the table of variables titled "The column headers within Western Siberian Peat Core database and their meaning", similar to the table included in the database description in the Zenodo repository, in the Method section of the main text.

Details manuscript

Supplement / appendix: suggestion supplement to appendix: the authors could merge the figures and tables from the supplement directly into the main manuscript file by adding this content inf the form of an appendix, thereby also merging the two reference lists together.

We agree with the reviewer. We will convert the supplementary materials into two appendices and include them in the main text. The first appendix will contain tables referenced in the Methods section ("Appendix A: Additional methodological information"), and the second will

present a figure consisting of 26 maps showing the spatial distribution of palaeoecological proxies applied in Western Siberia ("Appendix B: Spatial distribution of palaeoecological proxies in the WSPC database").
For this purpose, we will rename all tables and the figure from Table S1, Table S2, etc. to Table A1, Table A2, etc. We will also adjust the current Figure S1 (Now Table B1) so that the maps can be presented in a vertical orientation, consistent with the layout of the main article. In addition, we will merge all references into a single reference list.

Title: suggestion: the authors could sharpen the title of the manuscript - Instead of 'methods applied', a term containing 'palaeoecological proxies' in the title

We agree with the reviewer, and we propose to change the initial title to "Peat core research in Western Siberia: applications of palaeoecological proxies, regions studied, and future directions."

After considering the suggestions from both reviewers regarding the title, as well as the terminology used throughout the manuscript, we decided to maintain consistent nomenclature by using the term "Western Siberian Lowland" (or the abbreviation WSL) throughout the manuscript instead of the more general term "Western Siberia." This change also affected the title, which was revised to: "Peat core research in the Western Siberian Lowland: applications of palaeoecological proxies, regions studied, and future prospects" in order to ensure consistency with the terminology used in the manuscript.

Abstract: The description of the content of the data base is very clearly set in the 2nd sentence of the abstract. However, there is a sentence on the content of the data base at the end of the abstract that is less clear and could be misleading: 'The WSPC database represents the most extensive compilation of peat-core-based palaeoecological data for this region", - readers may misunderstand that the database contains the variable datasets. The authors could repeat the information content of the data in the WSPC, on the abundance of proxies and related literature sources. A very useful data content of the data base is the provision of the original core name, an information that could be also part of the abstract.

We agree with the reviewer that the last sentence of the abstract can be misleading for readers. We propose to revise it to clarify that the database contains metadata rather than raw datasets, and we will add information on the database content as suggested by the reviewer.

Proposed change (new fragments are underlined)::

"The WSPC database represents the most extensive compilation of metadata on peat cores in the region, integrating georeferenced core locations, original core identifiers, applied palaeoecological proxies, and associated literature, offering critical guidance for targeted sampling and future research to address spatial, temporal, and proxy-specific gaps in the study of Western Siberian peatlands."

Introduction: p.1 L40 one/two sentences introducing and explaining palaeoecological proxies are needed

We agree with the reviewer that an introduction to "palaeoecological proxies" is needed. In the Introduction section, at the point indicated by the reviewer, we will include a few sentences explaining what palaeoecological proxies are and briefly classify them to introduce the classification used later in the manuscript (biological, physical, and chemical).

We restructured the beginning of the Introduction (the first three paragraphs) by adding additional information about peatlands as natural archives and by providing a definition of palaeoecological proxies. The revised version of this section with all specific changes can be found in the track-changes file (lines: L34-L55).

Chapter 4.1.2 title: 'Evolution of proxy use in Western Siberian studies' -> this title seems not so clear

We agree that the chapter title is too vague; we propose to change it to "Trends in palaeoecological proxy use in Western Siberia".

As stated in our additional response regarding the manuscript title, we decided to consistently use the term "Western Siberian Lowland" throughout the manuscript. Therefore, we changed the title of this subsection to "Trends in palaeoecological proxy use in the Western Siberian Lowland."

Figures and numbering: In chapter 4.2. Fig 3 a,b,c do not exist, do they refer to Fig 4 a,b,c,d? Fig. 4b, 4c is Fig. 5? Fig 5 a,b is Fig 6a,b?

Thank you for pointing this out. There is indeed a clear mistake in the figure references in Chapter 4.2, where they incorrectly refer to Fig. 3 instead of Fig. 4, as noted by the reviewer. We will carefully check all figure references throughout the manuscript and correct any inconsistencies.

Reviewer #2

Review on ms no. essd-2025-756
by Sebastian Wetterich

GENERAL REMARKS

The manuscript by Halaś & Słowiński entitled "Peat core research in Western Siberia: methods applied, regions studied, and future prospects" presents and summarizes literature data on paleontological research of West Siberian peat cores. Data of more than 600 records have been compiled and result in a database that documents the application of paleo-ecological, geochemical and physical proxies as well as geochronological data. To my opinion, such compilation is of special value as it provides particularly access to hard-to-obtain Soviet and Russian research results, which are unfortunately often lacking in circum-arctic studies (for example see Zhang et al., 2022; https://doi.org/10.1038/s41467-022-32711-4).

The present work is certainly of interest to improve the understanding of peatland hydrology-vegetation feedback mechanisms in permafrost ecosystems. As comprehensive database it clearly fits into the scope of Earth System Science Data. Such database is novel and especially the scoring system and the deduced density maps are very helpful for identifying research gaps and planning research. I especially value the clearly outlined relation of the compiled data the regional permafrost conditions. However, I wonder whether distinct permafrost proxies such as the presence of cryostructures and the resulting ice content have been addressed in the referred studies from permafrost areas of the study region as ice content largely defines accumulation rates at least in ice-rich permafrost.

The overall presentation of the study is excellent. The text is well structured, concisely written and easy to follow. The figures and tables are clear and informative. The applied methods to structure the database are valid and sufficiently described to make the results traceable. Needed references to previous studies are indicated and appropriate. Therefore, I recommend publication after minor corrections. Please, find my minor remarks below referring to line (ln) numbers of the submitted ms.

As the database itself has been carefully and thoroughly commented by rev#1 and the authors already agreed to implement the substantial recommendations (https://doi.org/10.5194/essd-2025-756-AC1), I have no further comments on this topic.

We sincerely thank the reviewer for the careful evaluation of our manuscript and for the very positive and constructive feedback. We highly appreciate the recognition of the value as well as the usefulness of the database, scoring system, and density analyses for identifying research gaps and guiding future studies in Western Siberia.

We also appreciate the reviewer's detailed comments and suggestions provided in this review, which helped us improve the clarity and consistency of the manuscript. Responses to the specific comments are provided below.

MINOR REMARKS

Title

The title clearly reflects the scope of the paper although rev#1 recommended some adjustment which is fine with me.

The title will be revised accordingly, as indicated in our response to Reviewer #1.

Abstract

ln19: "high density of peat-core studies" instead of "high peat core density".

This phrase will be changed according to the Reviewer's suggestion.

1 Introduction

ln31-33: Probably cite already here the later referred Global Peatland Assessment (Greifswald Mire Center, 2022) as more recent reference.

We thank the reviewer for this suggestion. We will add the reference to the Global Peatland Assessment (Greifswald Mire Centre, 2022) in the indicated section.

ln33-34: Do I understand correctly that the Western Siberian Lowland stretches over about 3 Mio km^2 (see number in ln97) of which 600 000 km^2 are peatlands?

We thank the reviewer for pointing this out. The value of 3 million km² used in the manuscript was an overly broad approximation. Based on the shapefile boundary of the West Siberian Lowland defined by Sheng et al. (2004), which we used as the limit of our study area, the total extent is approximately 2.6 million km². We will correct this value in the manuscript.
Regarding the reviewer's question about peatland extent, yes – the value of approximately 600,000 km² (more precisely 592,440 km²) refers to the peatland area within the WSL (Sheng et al. 2004, Smith et al. 2004). However, this estimate should be considered a minimum value because the Russian survey data compiled by Sheng et al. (2004) did not include thin peat deposits (<50 cm).

The reviewer's comment also prompted us to re-evaluate subsection 2.1 "Peatland extent mapping", where we discuss differences among selected peatland extent inventories. We realized that we had not explicitly included information about the peat depth threshold associated with the Sheng et al. (2004) map, despite using this dataset as the primary peatland

extent layer in our study. We will therefore revise this section to clarify the applied peat-depth threshold and discuss its implications for peatland mapping and palaeoecological applications.

Sheng, Y., Smith, L. C., MacDonald, G. M., Kremenetski, K. V., Frey, K. E., Velichko, A. A., Lee, M., Beilman, D. W., and Dubinin, P.: A high-resolution GIS-based inventory of the west Siberian peat carbon pool, Global Biogeochemical Cycles, 18, https://doi.org/10.1029/2003GB002190, 2004.

Smith, L. C., MacDonald, G. M., Velichko, A. A., Beilman, D. W., Borisova, O. K., Frey, K. E., Kremenetski, K. V., and Sheng, Y.: Siberian Peatlands a Net Carbon Sink and Global Methane Source Since the Early Holocene, Science, 303, 353–356, https://doi.org/10.1126/science.1090553, 2004.

We propose the following additions to subsection 2.1 (new fragments are underlined):

"...Geoltorfrazvedka field surveys, Russian wetland maps, satellite imagery, and extensive digitized peat depth and carbon data (Fig. 2a). However, the authors noted that this estimate should still be considered a minimum value because the Russian survey data used in the compilation did not include thin peat deposits (<50 cm). Modern global products, such as the Global Peatland Map 2.0 (GPM2.0), classify regions as peat-dominated or peat-in-soil-mosaic at a 1×1 km..."

"Therefore, for this review, the regional map created by Sheng et al. (2004) remains the most reliable source for WSL peatlands. Although this inventory likely underestimates the total peatland extent because peat deposits thinner than 50 cm were excluded, its methodological framework and closer correspondence to the ≥30 cm threshold commonly applied in palaeoecology make it more suitable for this review than GPM. Nevertheless, the selection of peatland datasets and peat depth thresholds should be considered in relation to the specific research objective. Inventories based on lower thresholds (e.g. ≥10 cm) may be more appropriate for large-scale carbon balance and climate-related studies, whereas thresholds closer to ≥30 cm are generally more applicable in palaeoecological investigations focused on sufficiently developed peat sequences suitable for long-term environmental reconstruction. Therefore, future field campaigns and research expeditions in WSL should evaluate peatland products and thresholds according to the aims of the study."

After reviewing

ln51: "major legacy of early Soviet and Russian studies" instead of "major legacy of Russian scientists".

This phrase will be changed according to the Reviewer's suggestion.

ln52: Please add "in the WSL" after "oil reserves" to be concise.

The phrase will be added in the indicated line of the manuscript.

ln56: "in the Middle Taiga zone" of West Siberia?

Yes, this refers to the Middle Taiga zone of the WSL. As indicated by Lapshina and Zarov (2023), the research was conducted in the basins of the Tromyegan, Vakh, Ket', and Vasyugan rivers. We will clarify this in the revised manuscript as follows:

"... produced the first large-scale estimates of peat stocks for the region, with similar work carried out in the Middle Taiga zone of the WSL in a following decade (Lapshina and Zarov 2023)"

Lapshina, E. D. and Zarov, E. A.: Stratigraphy of peat deposits and mire development in the southernpart of the forest zone of Western Siberia in Holocene., Environmental Dynamics and Global Climate Change, 14, 70–101, https://doi.org/10.18822/edgcc568688, 2023.

ln83: "application of palaeontological proxies" instead of "suite of palaeontological proxies".

This phrase will be changed according to the Reviewer's suggestion.

ln84: "gaps in the coverage of peat-core studies" instead of "gaps in peat core coverage".

This phrase will be changed according to the Reviewer's suggestion.

2 Study region

ln94: As the Western Siberian Lowland has been previously defined as WSL in ln14 and ln 33, you could use here and in the forthcoming text just the abbreviation.

We completely agree with the reviewer that the use of the term "Western Siberian Lowland" and its abbreviation was not fully consistent throughout the manuscript. To improve consistency and readability, we will define "Western Siberian Lowland (WSL)" at the beginning of each main section and subsequently use only the abbreviation "WSL" throughout the text.

ln115: As previous spatial information is given in km^2, please consider using here also km^2 instead of hectares.

We will change 6.78 million hectares to 67,800 km^2 and revise the manuscript so that all spatial information is presented consistently in km^2.

ln117: To be distinct, please consider using here the term "thermokarst lakes".

This will be changed according to the Reviewer's suggestion.

ln121: "Despite its vast area" refers to WSL?

Yes, this statement refers to the WSL. To avoid ambiguity, we will revise the sentence as follows:

"Despite the vast area, population density in the WSL is low, especially..."

ln124: Do "substantial pressures on peatlands" also include pollution?

Yes, substantial pressures on WSL peatlands also include pollution, particularly related to oil and gas exploration, industrial emissions, and heavy metal deposition (Solomeshch, 2005; Kovaleva et al., 2021; Kharanzhevskaya et al., 2023).

Solomeshch, A. I.: The West Siberian Lowland, in: The World's Largest Wetlands: Ecology and Conservation, edited by: Fraser, L. H. and Keddy, P. A., Cambridge University Press, Cambridge, 11–62, https://doi.org/10.1017/CBO9780511542091.003, 2005.

Kharanzhevskaya, Y., Gashkova, L., Sinyutkina, A., and Kvasnikova, Z.: Assessment of Present-Day Heavy Metals Pollution and Factors Controlling Surface Water Chemistry of Three Western Siberian Sphagnum-Dominated Raised Bogs, Water, 15, 1869, https://doi.org/10.3390/w15101869, 2023.

Kovaleva, E. I., Trofimov, S. Ya., and Zhongqi, C.: Impact of oil contamination on ecological functions of peat soils from West Siberia of Russia, Journal of Environmental Quality, 50, 49–62, https://doi.org/10.1002/jeq2.20171, 2021.

Figure 1: While in the manuscript, and in the legend and in the caption of Fig. 1 the WSL is named, the map indicates the "West Siberian Plain". Please adopt.

We thank the reviewer for this comment. Throughout the manuscript we use the term "Western Siberian Lowland (WSL)" because it is the term most commonly applied in peatland and paleoenvironmental literature and refers to the specific physiographic region considered in this study. We also followed this terminology because it was used in one of the key early synthesis papers summarizing the state of knowledge on peatlands in this region – Kremenetski et al. (2003). However, in Figure 1 we would like to retain the label "West Siberian Plain" on the topographic basemap because this designation is conventionally used in cartographic and geographic map products. Both terms refer to the same large physiographic region and are commonly used interchangeably in the literature.

Kremenetski, K. V., Velichko, A. A., Borisova, O. K., MacDonald, G. M., Smith, L. C., Frey, K. E., and Orlova, L. A.: Peatlands of the Western Siberian lowlands: current knowledge on zonation, carbon content and Late Quaternary history, Quaternary Science Reviews, 22, 703–723, https://doi.org/10.1016/S0277-3791(02)00196-8, 2003.

3 Materials and methods

ln210-211: Just for your information, there is a more recent permafrost map available the Arctic Permafrost Geospatial Centre (APGC): Permafrost Extent and Ground Temperature Map, 2000-2016, Northern Hemisphere Permafrost (https://apgc.awi.de/dataset/pex). The map is based on Obu et al. (2019; https://doi.org.10.1016/j.earscirev.2019.04.023) that might be useful once you decide to update your database.

We thank the reviewer for this valuable suggestion and for pointing us to the APGC permafrost dataset. This is indeed a useful and more recent resource, and we will consider incorporating it in future updates of the database and related analyses.

4 Results and Discussion

ln258: See comment on WSL abbreviation in ln94.

This will be corrected according to our response to the comment on ln94.

ln268: "reflecting the onset of international collaboration after the collapse of the USSR."

This phrase will be changed according to the Reviewer's suggestion.

ln278: "the most widely applied chronological tool in peatland research in Western Siberia" instead of "the most widely applied chronological tool in research in Western Siberia".

This phrase will be changed according to the Reviewer's suggestion.

ln286: "After 2000, more …" instead of "After 2000 more …".

This phrase will be changed according to the Reviewer's suggestion.

ln294: "peatland ecosystems" instead of "these ecosystems".

This phrase will be changed according to the Reviewer's suggestion.

ln301: See comment on WSL abbreviation in ln94.

This will be corrected according to our response to the comment on ln94.

ln316-317: Use dots instead of commas in decimal coordinates.

We thank the reviewer for noticing this inconsistency. Decimal commas in the coordinates will be replaced with decimal points.

Figure 4: In the caption to FIG. 4a probably WSL is meant instead of Western Siberia?

We thank the reviewer for noticing this inconsistency. The caption will be corrected, and we will carefully check all figure captions throughout the manuscript to ensure consistent terminology.

ln325: Delete “in some cases”?

We will delete “in some cases” according to the Reviewer’s suggestion.

Figure 6: Please, define “FTIR” as “Fourier-transform infrared spectroscopy” in the caption as it is not defined elsewhere in the manuscript.

We thank the Reviewer for pointing this out. Following the suggestion of Reviewer #1, we will add a table of variables of WSPC database to the main text (titled “The column headers within Western Siberian Peat Core database and their meaning”), where all abbreviations, including FTIR (Fourier-transform infrared spectroscopy), will be fully defined.

We also decided to provide full definitions of FTIR, XRF, and XRD in the captions of all figures where these abbreviations are used.

ln410: Please, see my general comment on ice content.

We thank the reviewer for raising this important point. We agree that cryostructures and ice content are highly relevant for interpreting accumulation rates in permafrost-affected peatlands, particularly in ice-rich settings. We did not aggregate cryostructure or ice-content information in our dataset. To address this limitation, we have added a clarification to the revised manuscript in the subsection 4.2.3. (“Relative use of different proxy and their regional patterns”) stating that accumulation rates in permafrost-affected peatlands should be interpreted with caution, as they may be influenced by cryogenic structures and variable ice content that are not consistently documented in the source studies.

To address this limitation, we added the following statement to the revised manuscript in the subsection indicated in our previous answer:

“Nevertheless, accumulation rates in permafrost-affected peatlands should be interpreted with caution, as cryogenic structures and variable ice content may substantially influence peat accumulation and preservation processes (Treat et al., 2016). However, such information was not consistently reported in the analyzed studies and therefore could not be systematically included in the database.”

Treat, C. C., Jones, M. C., Camill, P., Gallego-Sala, A., Garneau, M., Harden, J. W., Hugelius, G., Klein, E. S., Kokfelt, U., Kuhry, P., Loisel, J., Mathijssen, P. J. H., O’Donnell, J. A., Oksanen, P. O., Ronkainen, T. M., Sannel, A. B. K., Talbot, J., Tarnocai, C., and Väliranta, M.:

Effects of permafrost aggradation on peat properties as determined from a pan-Arctic synthesis of plant macrofossils, Journal of Geophysical Research: Biogeosciences, 121, 78–94, https://doi.org/10.1002/2015JG003061, 2016.

ln435: Please, specify geochemical and stable-isotope proxies and furthermore define the abbreviations "XRF", "XRD" and "FT IR" (see also my comment to Fig. 4).

As noted in our response to the comment on Figure 6, the newly added table describing the variables of the WSPC database will include definitions of all abbreviations, including XRF, XRD, and FTIR, as well as examples of geochemical and stable-isotope proxies included in the database.

ln458 and ln462: "WSL" instead of "Western Siberia".

We will change "Western Siberia" to "WSL" in the indicated lines of the manuscript.

Data availability

ln671-674: I am just curious whether you plan to expand the database also to East Siberian records?

We thank the Reviewer for this interesting question. At present, we do not plan to extend the database to East Siberian records, as our current focus is on maintaining and updating the Western Siberian dataset. However, we acknowledge that such an expansion could provide valuable opportunities for broader comparative analyses. This would be a particularly interesting direction, as Eastern Siberia is a highly diverse region in terms of peatland development history, genesis, and peatland typology, and may therefore provide important insights into regional peatland variability across Siberia.

Conclusions

ln698: "basal ages" instead of "basal cores"?

We thank the reviewer for this comment. Here, we intended to refer not to basal ages themselves, but to unclear or inconsistent reporting of whether individual peat cores represented complete basal sequences reaching the peat base. To avoid ambiguity, we will revise the sentence accordingly.

We propose the following change:

"Several limitations must be acknowledged, including incomplete access to older or Russian-language literature, inconsistent reporting of complete basal peat sequences, variable spatial precision of core locations, reliance on secondary sources, and the existence of unpublished or inaccessible core data."

As similar phrasing was also used in Section 6 ("Database limitations"), we will revise this part of the manuscript accordingly and replace it with the following text:

"Ambiguity in reporting complete basal peat sequences – In most cases, the oldest core from a study site was assumed to represent a complete basal peat sequence; however, some publications did not clearly specify whether the core reached the mineral substrate. This may introduce minor uncertainty into the interpretation of basal depths included in the database."

References

As I still use Russian-language literature for research in Siberia, I recommend including the original title of the publication also in transliteration, not only in translation. Such information might be useful to make references to Russian literature easier findable.

We thank the Reviewer for this great suggestion. We will revise the reference list to include transliterated original Russian titles in addition to English translations.

We added transliterations of the original Russian titles where possible. However, in some cases we did not have access to the original Russian publications, and the full bibliographic information had to be obtained from secondary sources. As a result, we were limited by the citation format available in those sources, which did not always include the original Russian titles. In such cases, we were only able to retain the English translations of the titles.

List of all relevant changes made in the manuscript and associated database.

Manuscript changes

1. The title of the manuscript was changed to: "Peat core research in the Western Siberian Lowland: applications of palaeoecological proxies, regions studied, and future prospects."
2. We standardized the terminology used for the study area throughout the manuscript by replacing the more general term "Western Siberia" with "Western Siberian Lowland" (or the abbreviation WSL). The full term "Western Siberian Lowland" is now provided only at the first mention within each section.
3. We incorporated the table describing the database variables into the main text of the manuscript.
4. During the revision of the manuscript and database, we identified an error related to the number of cores containing carbon accumulation data. In the original version, we incorrectly stated that 395 cores (60.4%) included carbon accumulation information, whereas the correct number is 224 cores (34.3%). This correction did not affect the conclusions of the study, but required updates to numerical values, percentages, and several figures throughout the manuscript. In the main text the subsection most substantially affected by this correction was Section *4.2.2 Variation in the number of proxies per core.* The following figure modifications were implemented:
    a. Figure 6 (most substantial changes) – the number of cores with one and two applied proxies was corrected (panel a), and the percentage of cores containing carbon accumulation data was updated (panel b).
    b. Figure 7 – panel a ("carbon accumulation") was updated, including both the spatial distribution map and the number of cores.
    c. Figure 8 – the map in panel (a) was updated; in panel (b), changes affected only category "3 – isolated permafrost and non-permafrost zones," where the number of cores per time interval decreased.
    d. Figure 10 – the original spatial scoring was based on the correct number of carbon accumulation cores (224), and only the values related to the number of proxies per core were incorrect. After recalculating the scores, the resulting changes were minor; nevertheless, all maps in the figure were updated.
    e. Figure B1 – the map and numerical value for carbon accumulation in panel (s) were corrected.
5. We corrected incorrect figure references and figure numbering throughout the manuscript.
6. We added references to the updated version of the database deposited in the Zenodo repository in the *Data availability* section.
7. We moved the supplementary materials (Tables S1–S4 and Figure S1) into the main manuscript as appendices (A-B) to improve accessibility. Corresponding references within the text were updated accordingly.
8. Figure B1 (previously Figure S1) was revised following the reviewer's suggestion to classify proxies into physical, chemical, and biological groups in the database variable

table. To maintain consistency throughout the manuscript, we applied the same grouping scheme in the figure presenting the spatial distribution of peat cores with selected proxies. The maps are now organized into chronological, physical, biological, and chemical proxy groups and ordered within each category from the most to the least frequently applied proxy.

Database changes

1. We changed initial column name from "O_names" to "Core_names". And we reaaranged attribute table - columns with proxies are ordered so now first are chronological proxies, followed by groups of biological, physical and chemical proxies.
2. We updated the table of variables in the database description
3. We changed the phrasing in the database description table from "presence of X data" to "avaibility of X data"
4. Individual references in the attribute table are provided now in separate columns (Ref_1-Ref_12) and doi or url are provided also (URL_1-URL_12). Additionally where possible we added transliteration of original Russian titles to the references.
5. During the revision of the database we found the mistake in the first version - all records were doubled and instead of 654 records, the database contained 1308 records. We changed that in the updated version of the database.
6. We added a digitalisezed map of major peatland types in the Western Siberian Lowland
7. We updated the database in the Zenodo repository (10.5281/zenodo.20323517).