Response to Reviewers' Comments

Loisel et al: C-PEAT's Global Peatland Carbon Database (v.2025)
(https://doi.org/10.5194/essd-2026-222)
Earth System Science Data

The reviewers' comments are presented in grey, bolded text.

The responses to those comments are presented in black, indented text.

Reviewer #2

The paper presents the C-PEAT Global Peatland Carbon Database v.2025, with 267 peat cores and large numbers of depth measurements, including dry bulk density, organic matter, carbon, nitrogen, raw chronological data, and calibrated ages.

Few comments

-The title says "Global Peatland Carbon Database", which is fine but the dataset is heavily dominated by northern extratropical sites. This is a major limitation because tropical peatlands differ strongly in peat formation, hydrology,etc. The paper does clearly discuss this

Thank you. As you said, we do discuss the low representation of tropical datasets in the database and look forward to adding tropical sites to C-PEAT! For now, the compilation only includes 4 previously published databases, and only one of those 4 includes tropical sites (Gallego-Sala et al. 2018); that 2018 dataset only included cores with at least 2 radiocarbon dates from the past 1000 years and contiguous bulk density measurements at <2 cm resolution (see Table 1 in the main text), which limited the number of cores that were integrated.

Whether there is a possibility for future improvements for e.g. many data are now collected in the ttropics eg, Anshari, Gusti Z., et al. "Peatland inception and development across Kalimantan, Indonesia." Scientific Reports (2026).

Absolutely! We envision improving the database by adding numerous cores from the tropical biome (and beyond), including the excellent work presented in Anshari et al. 2026 and many others. But as mentioned above, this current database simply aimed at making available the raw data from 4 existing compilations (Yu et al., 2010; Charman et al., 2013; Loisel et al., 2014; Gallego-Sala et al., 2018).

At the end of the manuscript (section 4.1), we specified that: “Data contributors interested in sharing one or a handful of datasets are asked to follow the instructions and use the templates provided by PANGAEA (https://wiki.pangaea.de/wiki/Best_practice_manuals_and_templates). Contributors who wish to share a larger quantity of datasets (> 10) should contact a PANGAEA editor through the contact form linked above.”

-The manuscript says PANGAEA performed quality control, but it does not fully explain what was checked, what was corrected, and what remains uncertain.

We added the following text to address this comment: “Quality control of data and metadata is part of PANGAEA’s harmonization workflow, which ensures FAIRness (findability, accessibility, interoperability and reusability) of all data by checking for completeness, correctness, and machine readability. As the curator, PANGAEA does not check the completeness, accuracy, and legality of the research contents.”

For example, Table 5 reports unrealistic values of max : dry bulk density values up to 3.380 g cm^{-3}, total carbon up to 100%, and nitrogen at 56.6%.

Thank you for pointing this out. We are aware that some unrealistic values are present in the dataset, but those data were entered as such by the data contributors or in the original papers, and we have decided to refrain from manipulating, deleting, or correcting said data. The rationale is that we act as curators of the original data; we do not apply filters or pick which data to keep vs. reject. It is ultimately the responsibility of the data user to select the data they wish to work with. There is already a statement addressing this issue in the main text.

- Table 6. The peat versus mineral soil comparison is interesting, but it is distracting. The comparison needs more caution because NCSS is not a globally representative mineral-soil dataset in the same way that C-PEAT is not globally representative of peatlands. Also, the NCSS table includes impossible or problematic values such as negative SOC and coarse fraction up to 4229%.

Thank you for pointing this out. We originally presented the comparison between mineral and peat soils as a means to expand the discussion on the need for a peat (i.e., organic-rich soil) database, as most of the soil-data available come from mineral soils. Since both reviewers find this analysis distracting, we have decided to retract it from the final publication.

- The manuscript compares C-PEAT with the NCSS pedon database and reports that “On average, soil organic carbon content for the top 100 cm was 16 times greater in peat soils 17.53 g cm^{-2} than in mineral soils 1.08 g cm^{-2}.” This seems to be erroneous SOC stock=bulk density×C fraction×depth. For the top 100 cm: 0.140×0.467×100=6.54 g C /cm2. Alternatively,

using their reported mean organic C density: 0.058×100=5.8 g C /cm2. So the cited value does not make sense.

Thanks for pointing this out. This section has been retracted (see comment above).

-"C-PEAT GD contains 267 cores", explain whether duplicate cores across previous syntheses were reconciled and how.

Duplicate cores across the 4 synthesis papers were reconciled to avoid duplicate cores in the database. When the datasets were exact replicates, cores from the most recent synthesis were selected (e.g., we would opt for Charman et al. 2013 rather than Yu et al. 2010). This selection allowed to integrate the most updated values into the C-PEAT database, should the core data were updated by a data contributor over time. We have added this text to the revised document.

"carbon content values (total carbon and carbon combined)" Better "C%, TC%, and TOC% records combined."

Updated as suggested.

-The paper includes age determination and calibrated age parameters, but the treatment of chronological uncertainty is still descriptive. The number of chronological constraints varies from 1 to 41 per core, with a median of 6, and the average is only 0.76 dates per 1000 years. That means carbon accumulation rates can be highly uncertain

The treatment of chronological uncertainty is beyond the scope of the work presented in this study. Age determinations are completely dependent upon the data contributions from the original papers and datasets. In the C-PEAT database, raw chronological constraints (i.e, uncalibrated data) are provided, so data users can calibrate them following their own methodological preferences. We also provide the calibrated ages that were presented in the original datasets. This information is already presented in the main text (section 2.3).

-For a data paper, the question is: How should users use this database correctly? The paper has usage notes, but they are too general.

In the 'usage notes' section, we explain how to access, download, and cite the database. We also provide words of caution that pertain to the datasets themselves (e.g., some peat core profiles are incomplete or may unrepresentative, etc.), such that each data user should be thoughtful when they select and download datasets. We also recommend that data users refer to the original articles (where the data were originally presented) to better understand data collection context.

The database is useful for summarising peat properties, analysing Holocene apparent carbon accumulation rates, and benchmarking Earth system models, and global mapping of peat properties. See also recent peat data and mapping effort that the C-peat can contribute to Skye et al. "Peat-DBase v. 1: a compiled database of global peat depth measurements." Earth System Science Data Discussions 2025 (2025): 1-26. Widyastuti et al. "Digital mapping of peat thickness and carbon stock of global peatlands." Catena 258 (2025): 109243.

Thank you for pointing out those other studies. While they cannot be integrated into our database because they do not provide high-resolution data on peat properties or chronologies, we did add those references to the main text (see the last sentence of section 1).

The writing is generally clear but somewhat sloppy in presentation, mainly because of inconsistent terminology, awkward phrasing, formatting errors.

Thanks for pointing out those irregularities. We have updated them all and re-read the manuscript several times to improve terminology and formatting.

Some examples:

L.39 "peat soil-c density" -> "peat soil C density" or "peat-soil C density"

Updated to “peat soil carbon density”.

L.63–64 "The need for transparency in methods, code, and data have also been fueling..." -> "The need for transparency in methods, code, and data has.."

Done.

L.79 "provides means to assess" -> "a means to assess"

Done.

L.97 "with the latter also acknowledging..." -> "Fig. 2 also acknowledges..."

Done.

L.128 "peatland C storage (kgC)" -> "peatland C storage (kg C)"

Done.

L.129 "C density (kgC/m2)" -> "C density (kg C m^{-2})"

Done (here and elsewhere in the text).

L.131 "gC/m2/yr" -> "g C m^{-2} yr^{-1}"

Done (here and elsewhere in the text).

L.143 "the use of these datasets come with important limitations" -> "the use of these datasets comes with important limitations"

Done.

L.212 "4 thesis, dissertations, and conference papers" -> "4 theses "

Done.

L.233 "labs where the analysis were performed" -> "laboratories where the analyses were performed"

Done.

L.252,259, 310 "representativity" -> "representativeness"

Replaced by “data coverage” (per reviewer 1’s comment on the meaning of representativeness).

L.260 "MAT and MAP was extracted" -> "MAT and MAP were extracted"

Done.

L.268 "we also contrast changes" -> "we also contrasted changes"

Done.

L.315–320 "KoppenGeiger" / "Koppen climate classes" -> "Köppen–Geiger" / "Köppen climate classes"

Done.

L.344 "g/cm3" -> "g cm^{-3}"

Done (here and elsewhere in the text).

L.367 "may be used as references" -> "may be used as reference values"

Done.

L.403–405 "IQT" -> "IQR"

Done.

L.405 "1.5 x IQT" -> "1.5 × IQR"

Done.

L.431 "Soil Organic Carbon" -> "soil organic carbon"

Done.

L.455 "some of them may not have reached" -> "some cores may not have reached"

Done.

L.456 "Along those lines" -> "Similarly" or "In addition"

Updated to “Similarly”.

L.459 "collected near the edge" -> "collected near basin margins"

Done.