

Earth Syst. Sci. Data Discuss., author comment AC3
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Reply on RC3

Furong Li et al.

Author comment on "Gridded pollen-based Holocene regional plant cover in temperate and northern subtropical China suitable for climate modelling" by Furong Li et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-148-AC3>, 2022

Review of ESSD-2022-148 by Li et al.

This paper describes a new REVEALS data set of vegetation in China during the Holocene. As this data set is the first of its kind it's a welcome contribution for everyone interested in the vegetation and climate of the Holocene. I think that the paper describes the data set and methods well.

I have only one major concern, and that is about how the word "gridded" is used here. I understand that gridded information here means that several data point together represent a larger area, a grid cell, instead of being just point data. On the other hand, when I hear about a gridded data set I expect it to cover a larger region. If the grid contains more empty than filled grid cells it's not that different from point data. I understand the problems of creating such a data set for the Holocene in China. I think that it's perfectly fine to publish a data set like this, but I think that the authors should mention this, especially since you write that the data could be used in climate model simulations. The use for such a data set is limited in a climate model. The data can be used to evaluate results from climate or vegetation models, but it can't be used in a climate model simulation.

Answer: **We agree with the reviewer, and have clarified this as follows:**

In the Introduction (L90-96) "Given that the gridded REVEALS reconstructions are not continuous over space, i.e. only a part of the grid cells have pollen-based REVEALS estimates of plant cover, such a dataset is comparable to a collection of point data in space. It implies that the REVEALS data need to be interpolated over space to produce a true gridded dataset with values of plant cover in all grid cells. Such interpolations were performed using the European gridded REVEALS reconstructions (e.g. Pirzamanbein et al., 2012; Githumbi et al., 2022; Strandberg et al., 2022) and used for the first time in climate modelling by Strandberg et al. (2022)."

In the Discussion's last section (L513-518) "They can be used for various purposes, such as the evaluation of scenarios of past deforestation (HYDE and KK) (Kaplan et al., 2017) or comparison with simulations of past vegetation cover using dynamic vegetation models (Marquer et al., 2014, 2017). For use in climate modeling experiments looking into e.g. past human-induced land cover (or land use) as a climate forcing, the REVEALS plant-cover data need to be interpolated over all grid cells of the simulation geographical

domain using for instance spatial statistics (e.g. Strandberg et al., 2022; see also the Introduction section)."

Comments

L140: Maybe it would be good to explain that the grey colours are fill colours in the boxes and not the grey lines mentioned earlier.

Answer: we have edited the sentence as follows (L152-154): "Grid cell reliability in terms of REVEALS estimates of plant cover is indicated by fill colours, light grey for high reliability and dark grey for low reliability, as defined on the basis of the number and type of pollen sites (see text for detailed explanations)."

L155: "from 1 large and small sites." What does that mean?

Answer: we deleted "l", this was a mistake!

L165: "350, 250 and 100 years" How does this fit with the requirement of 2 counts/500 years (L127)? Does it mean that the temporal resolution is higher in the last years, or that one point represents several time periods?

Answer: Yes, the temporal resolution is generally higher over the last 1000 years, which is explained in the methods (L177-180).

L180: "several adjacent grid cells (2-8)" Maybe I just don't get this, but I cant see more than 5-6 adjacent grid cells in figs 2-5.

Answer: This was indeed expressed in a confusing way. We changes the sentence as followed (L193-195): "It implies that, in these cases, the grid cells covered by a group of pollen sites (varies between 2 and 8 grid cells, Fig. 1) have the same REVEALS estimates, i.e. the same mean vegetation cover (Figures 2-4)."

L189: "atmospheric conditions" What's atmospheric conditions more than wind speed, and why is wind speed not considered an atmospheric condition? Please explain.

Answer: In the context of pollen-vegetation modeling, atmospheric conditions refer to the movements of air masses in the atmosphere that can influence pollen transport in the air, wind speed included. In the models pollen-vegetation modelers are using, atmospheric conditions include the parameters C_z , C_y , n and u . C_z and C_y are vertical and horizontal diffusion coefficients, n is a dimensionless turbulence parameter, and u is wind speed (expressed in m/sec). The values of C_y , C_z , and n depend on atmospheric stability. If neutral conditions are assumed, the values of the three parameters are 0.12, 0.21, and 0.25, respectively. We do not explain this in detail in the paper as it has been described in several papers earlier. **We refer instead to one of the major paper on the subject, Jackson and Lyford (1999), as follows (L206-207):** "and atmospheric conditions (expressed by four parameters, i.e. vertical and horizontal diffusion coefficients, a dimensionless turbulence parameter, and wind speed (see Jackson and Lyford, 1999 for details).".

L245-247: I don't get this at all. What does it mean that the "map changes are expressed in comparison to the former"? One interpretation of this is that 80 % means 80 % of the cover in the previous time slice. If the first time slice shows 50 % and the second 80 % that would in fact mean 80 % of 50 % = 40 %. I don't think this is the case, because it would make it extremely complicated to calculated what the vegetation fractions are in 100 BP. Also, since the legends in figs 2-4 show 0-100 % I think that the absolute fractions are what is show. Otherwise the scale would include negative values or values

over 100. Please rephrase or explain.

Answer: Yes, you are perfectly correct, what we show in the map are absolute fractions, and we describe these maps in the text using absolute fractions. We have been thinking of the confusion the use of absolute fractions in a text might lead to. Thank you for the solution you suggest to us, this is definitely the best way to explain this. We changed the text as follows (L274-279): "For each land-cover type the maps are described from the oldest (11.7–11.2 ka BP) to the youngest (0.1 ka–present) map, and the map for each time window is described in comparison to the map for the earlier time window (e.g. for the 9.7–10.2 ka BP map, changes are expressed in comparison to the 11.7–11.2 ka BP map). Land-cover changes (decrease or increase) are expressed in absolute fractions, e.g. an increase of 20% at 9.7-10.2 ka BP compared to a cover of 50% of the grid cell at 11.7-11.2 ka BP implies that the cover at 9.7-10.2 BP is 70% of the grid cell."

L489-496: As said above, in its present form this data would be complicated to use in a climate model. That would require a denser grid. Maybe you could say something about that, or say that it's a long term goal to make it work in climate models.

Answer: YES, we agree. See answer to your comment above.

Typos

L63: "Iii" I think it should be "III".

Answer: done, thank you

L69: LULC usually means more than land-use change as it would be interpreted here. Please spell out land-use and land-cover changes, if that's what you mean.

Answer: LULC should be understood as the abbreviation of what precedes it in the sentence, i.e. "anthropogenic land-cover (LC) transformation due to past land-use (LU) change" (or simply land-cover change due to land-use change, "LU change-induced LC change", LULC, commonly used in the literature). However we have corrected LULC into "LULC change" (L69, L72, and L89).

L204: "obtainedusing" -> "obtained using"

Answer: corrected, thank you

L457: "and The is a" Something is wrong with this sentence.

Answer: corrected, thank you

L469: "rby" -> "by"

Answer: corrected, thank you

L491: "Iii" -> "III"

Answer: corrected, thank you

L496: "coverl" -> "cover"

Answer: corrected, thank you