

13.10.2023 Frankfurt am Main

Dear Editor-in-Chief and associate editor, Petr Kuneš

Thank you for your comments on our revised manuscript: *Charcoal morphologies and morphometrics of a Eurasian grass-dominated system for robust interpretation of past fuel and fire type*. We have carefully considered and incorporated your suggestions into the revised manuscript.

l.70 - "open systems" - perhaps it is better to use "open landscape" or "open ecosystems"
R: Done: "One of the largest extents of open **ecosystems** is in Eurasia, which has been heavily impacted by human activities for millennia". L 70.

l.82 - instead of "characteristics of the plants" use "plant traits"
R: Done: "These keys can help link charcoal particles to **plants traits**, such as plant types (moss, graminoids, forbs, shrubs/trees) or plant parts (stems, branches, roots, leaves, wood)." l. 82-83.

Material and Methods - similar to rev #1, I find it useful to have a map, you could indicate the position of your study areas (nowhere to be found) and also the positions of forest zones (l.123)

R: Map presented as figure 1.: **Figure 1. The distribution of open ecosystems (steppes/grasslands and forest-steppes) in Eurasia. Mangalia Herghelie, Black Sea, SE Romania (1), and Tom and SH sites, Konoplyanka, Trans-Urals, Russia (2), are located in the grassland ecosystems.** l.638.

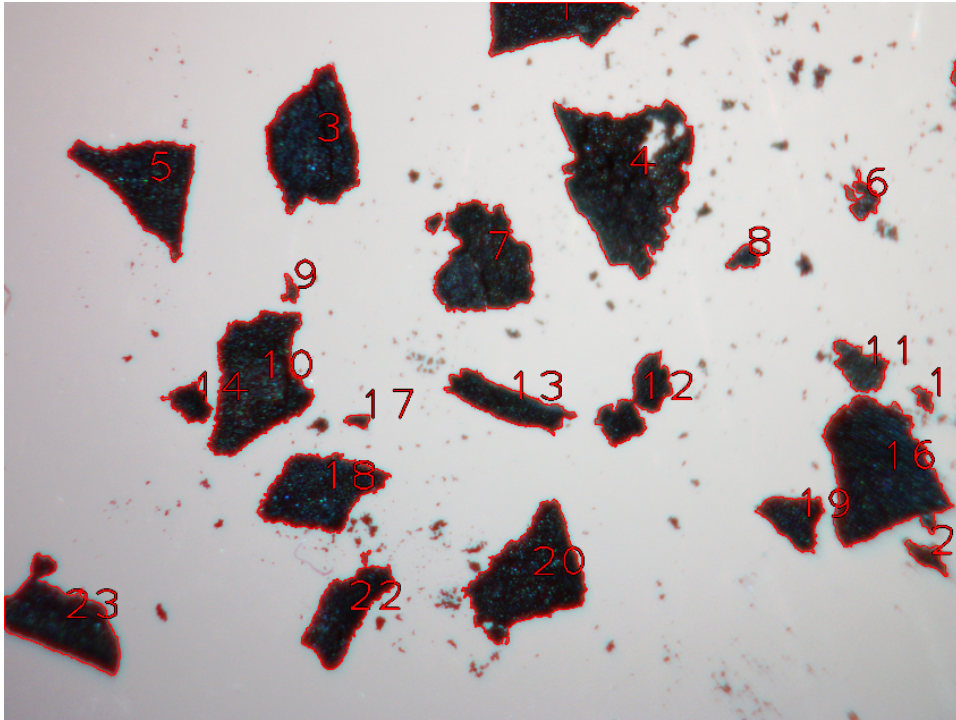
The geographical coordinates of these sites are also provide in the Methods: "To demonstrate the applicability of experimental charcoal morphologies and morphometrics for the identification of fuel burnt in sedimentary records, we randomly selected five Holocene samples from a core taken from Mangalia Herghelie wetland, Romania (43.838056 N, 28.583333 E), and six samples from wetland sites near the Karagaily-Ayat river (profile Tom 52.864648 N, 60.222420 E and profile SH 52.858475 N, 60.226214 E), where our plant material samples were collected (Fig. 1). L. 157-162.

The existing maps presented the open ecosystems together (grasslands and forest-steppe), thus so does our Fig. 1. For details on the location of the forest-steppe, the readers will need to rely on the information in the text and the geographical coordinates we provide.

l.138 - It is not clear to me how the particles were "automatically detected"? Is it the feature of the camera used?

R: The particles on these photographs were automatically detected following an algorithm described in Feurdean (2021) see also figure below. The revised text reads "Photographs of charcoal particles were manually taken at 4X magnification with a digital camera (KERN ODC 241 tablet camera. The charcoal particles and morphometric measurements, including the major (L) and minor (W) axes surface area (A), and perimeter (P) for individual charred particles larger than 150 μm , were automatically determined from these photographs using the algorithm of Feurdean (2021). Subsequently, we calculated the aspect (L/W ; W/L) and A/P ratios). These metrics were applied on more than 150 charcoal particles (range between 41 and 508), per sample; the lower number of measurements generally corresponds to samples burnt at high temperatures, where particles were more susceptible to breakage or partial ashing". l. 136-142.

The figure below shows a picture with automatic detection of charcoal particles in photographs. Afterwards, the algorithm calculates the major (L) and minor (W) axes surface area (A), and perimeter (P).



l.335 - Phragmites belongs to the Poaceae family and its pollen grain is, therefore Poaceae-type. Please reformulate this sentence.

R: Done: ‘‘ Additionally, the stratigraphy at this site indicates the presence of peat with abundant remains of wetland graminoid *Phragmites*, which belongs to the Poaceae family, and its pollen morphology is, therefore, Poaceae-type‘‘. l. 336-338.

In addition, Data availability: Apart of storing these measurements in the SI, we are also in process of storing it FAIR and OPEN access. At the poof stage we will likely be in the position to provide a DOI for the data storage. The text now reads: ‘**Data availability:** All raw measurements of length, width, area, perimeter, and ratios of L/W , W/L , and A/P for all taxa and temperatures are presented in File S1. This dataset is going to e stored at the GFZ Data Services under a CC BY 4.0 International License and will soon be assigned Digital Object Identifiers (DOI). <https://dataservices.gfz-potsdam.de/portal/about.html>.’

Kind regards,

Angelica Feurdean, on behalf of the coauthors