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Interactive comment on "Reconstructions of biomass burning from sediment charcoal records to improve data-model comparisons" *by* J. R. Marlon et al.

Anonymous Referee #1

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The paper "Reconstruction of biomass burning from sediment charcoal recoards to improve data model comparisons" by Marlon et al. aims at presenting the version 3 of the Global charcoal dat base. The goals here, beside the new sites included in the database, are to present the benefits of GCD in global fire studies and to present the strength and weaknesses of the approach. The paper also presents the gridded database and the tools for end-users to practice and interpret the data. The paper is well written and pinpoints useful points for endusers. It also browses an interesting panel on what it can be used for. The methods are clearly described and have been well documented in previous publications. It seems suitable for the readers of Biogesciences and should contribute to a better understanding and further of the char-

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coal database within this community. I recommend the publication with some minor concerns below:

1. Temporal uncertainty in the dating of charcoal and in the final gridded product: the authors clearly mention the uncertainty in the dating of charcoals sampled in the cores. Then we also have variability when merging numerous samples in one grid cell. We understand that the variability associated to the number of sample is part of the grey shade around the temporal Zscore trend in the figures. As far as I understand, it's mostly the Y-axis uncertainty associated with sample variability. how is temporal uncertainty accounted for? I think it's related to §4.2 but this paragraph would be worth being more informative and lengthened.

2. Merged samples for the gridded product: my question is also around §4.2 and §5. We understand that the Zscore are built for each sample then merged together within a grid cell, allowing the quantification of uncertainty. Then grid cell area is also accounted for. If all sample are Z-scored before merging, they all have the same weight. At 5° resolution, it means that large burned area are mixed with less affected areas. I understand they might not be other to do so as the charcoal amounts are poorly informative for comparison as clearly explained in the document. For the end user it would be worth have some lines clearly stating that weakness. If I missed something, then the merging paragraph might not be clear enough.

3. Number of samples according to time: as an end-user, we understand soil cores collecting charcoal from the top surface (the youngest period) to the deepest layers (the oldest period). Whatever the depth of the core, we could then believe that if a sample has an information for 10ky ago, it also has information for the recent period. In turn, from this empirical assumption from a non-specialist end-user, we wonder why, in figure 5 for exemple, we have data in Africa or northern EU for the 950-1050 period, but no more available for the 1950-2010 period. It seems to be fine for the longer series where we have more stations in the present than in the past in figure 6 and 7. It should be explained somewhere if some core have information in the past, but not in

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the present for whatever technical reason.

Few more details:

P3L20 : the author use “vital” some few times in the document. I am not a native speaker, but I understand the meaning as “important” or “keystone”. “Vital” sounds weird or way overrating the actual importance of fire in ecosystems. . . Some Ecosystems can actually be sustained in the absence of fires. Or p6l13, not filling the gaps of missing information in Africa is important. . .maybe not vital. . .

P3L21 : I would replace “determining species distribution” by “affecting”. Some additional key references:

P4l5-6: I would cite Mouillot et al. (2014) for a review of global burned area products instead of Giglio 2010 ansd Hyer 2013.

Mouillot F., Schultz M.G., Yue C., Cadule P., Tansey K., Ciais P., Chuvieco E. Ten years of global burned area products from spaceborne remote sensing : a review : analysis of user needs and recommendations for future developments. International Journal of Applied Earth Observation and Geoinformation, 2014, 26, 64-79.

P19l7-8: the authors list references of DGVMs embedding fire modules. As this is a paper for Biogeosciences where many DGVMs applications are published, I would cite some few more as listed below. . . I could not find a full comprehensive review paper of existing fire modules in DGVMs.

Kelley, D. I., Harrison, S. P., and Prentice, I. C. 2014. Improved simulation of fire–vegetation interactions in the land surface processes and exchanges dynamic global vegetation model (lpx-mv1), Geosci. Model Dev., 7, 2411-2433.

Lasslop, G., Thonicke, K., and Kloster, S. 2014. Spitfire within the mpi earth system model: Model development and evaluation, J. Adv. Model. Earth Sy., 6, 740-755.

Le Page, Y., Morton, D., Bond-Lamberty, B., Pereira, J. M. C., and Hurtt, G. 2015.

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Hesfire: A global fire model to explore the role of anthropogenic and weather drivers, Biogeosciences, 12, 887-903.

Yue, C., Ciais, P., Cadule, P., Thonicke, K., Archibald, S., Poulter, B., Hao, W. M., Hantson, S., Mouillot, F., Friedlingstein, P., Maignan, F., and Viovy, N. 2014. Modelling the role of fires in the terrestrial carbon balance by incorporating spitfire into the global vegetation model orchidee – part 1: Simulating historical global burned area and fire regimes, Geosci. Model Dev., 7, 2747-2767

Interactive comment on Biogeosciences Discuss., 12, 18571, 2015.