

## ***Interactive comment on “Mid and late Holocene dust deposition in western Europe: the Misten peat bog (Hautes Fagnes – Belgium)” by M. Allan et al.***

### **Anonymous Referee #1**

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The authors Allan, M. et al. of the manuscript “Mid and late Holocene dust deposition in western Europe: the Misten peat bog (Hautes Fagnes – Belgium)” declare that the aim of the manuscript is first of all reconstruct atmospheric dust composition detected from peat layers, secondly determine the origin of the dust and thirdly to define the relationship between dust deposition patterns and climate. Unfortunately the authors seem to fail in their third aim which I understand should be the most interesting part of this study. It appears that the authors cannot make up their minds whether their scope is local, regional or global. Dust transported from Sahara and Canadian dust events are reflecting environmental conditions far away and European climate phases should not be connected straightforwardly. The authors for instance refer to cold periods (page 2901,

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line 11) but it remains unclear where - references are missing. Further confusion is created by a comment “influence of dust on climate remains poorly quantified. . . (Page 2893, line 14)”. In addition my opinion is that it is an old-fashioned way to refer to climate phases as Atlantic and Subatlantic etc.; it is possible that the younger generations do not even recognize this terminology anymore...

Moreover the manuscript seems to be relatively badly designed and written: it is full of spelling mistakes and the language needs to be improved. Some words are misused such as flux and evolution. There is quite a lot of repetition.

The manuscript cannot be accepted to be published before it has been drastically changed and amended. It can also be speculated if the Climate of the Past is the right forum for this material because eventually climate as such seems to play only a minor part in this manuscript. Below I list some issues that should be considered when writing the next version. It is actually quite impossible to go into very details because the current version is relatively chaotic.

The authors use BC not BP ages for their own data. This is quite annoying because all climate data the authors use for comparisons are presented as BP ages.

In Introduction the authors list proxies and archives that have been used to reconstruct climate. The list is random and in many ways incomplete and neglects many important biological proxies (Note: they are not measured! and for instance macrofossils etc. are not organic but biological proxies) and many important northern European records and climate reconstructions are basically missing. Actually I am not convinced that this kind of (intended) profound listing is necessary at all when the forum is Climate of the Past. It appears that perhaps the author(s) are not at their strongest area in discussing past climate because the topic is introduced in a very confusing way. And it should be noted that the view of the Holocene climate patterns is also changing. Increasing amount of data (other than pollen-derived) is suggesting warm early Holocene temperatures. Because the authors are working with peat layers and dust deposition, in the

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Introduction these elements and previous studies on these subjects as related to climate should be introduced and get the main attention. Some important references are missing of studies where dust deposition has been used to infer past climate (Kylander et al. QSR on line) and where quantitative climate reconstructions have been carried out from bogs showing prominent changes in moisture conditions for the late Holocene (Väliranta et al. 2007 Holocene; 2012 QI). I wonder why the authors did not carry out proper plant macrofossil analysis on their record even though plant remains were searched for radiocarbon dating. Plants reflect moisture conditions at least as well as testate amoebae. Such an extended multiple proxy approach could have provided the authors robust tools to perform environmental reconstructions for their own study site. This would have been an interesting addition to the data available from elsewhere in Europe. Now they seek support from pollen records (perhaps not the best proxy to reconstruct moisture conditions) from adjacent locations.

In Material and methods chapter it should be stated why different analyses were carried out – what is their purpose in this study. I wonder why fen phase is included to this study even though the authors mention that it is influenced also by catchment processes, not only atmospheric load.

In Results chapter ages should also be displayed when presenting data, not just cms.

My opinion is that some of the text in Discussion should be removed to the Results. Discussion of climate linkage is on quite vague grounds. Supporting data are fetched randomly: sometimes from Greenland, sometimes from Spain, sometimes from nearby pollen record etc. Moreover the impression is that the Misten bog data are over-interpreted in terms of climate. Based on figures there seems to be no consistent pattern between the proxies or between the different sediment records. Perhaps this could even be statistically tested. Testate amoebae species record should be displayed; it is not enough just to indicate “major taxa”. Some of the figures use Detph scale, some Age scale. Age is more relevant.

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The Reference list is far too long and should be reduced. Yet some relevant references are clearly missing.

I can agree that the manuscript potentially includes some important achievements as related to identifying origin of the dust but the link between dust deposition(s) and climate remained ambiguous.

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