

Interactive comment on “Climate-driven expansion of blanket bogs in Britain during the Holocene” by A. V. Gallego-Sala et al.

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Received and published: 3 November 2015

We thank reviewer #1 for taking the time to read our manuscript and for raising two interesting questions, which we endeavour to answer here:

1. The scientific significance of the paper is limited to the British Isles and therefore does not significantly broaden our knowledge in the field. Would this model/concept be applicable to other type of peatland initiation? For example to raised bogs to areas of large peatland extends (Canada, Siberia etc.)?

Interestingly, the debate over the initiation causes of blanket bogs is limited to the British Isles. Blanket bogs initiated also in other parts of the world where anthropogenic influences were non-existent or very sparse, but past papers seems to suggest British

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blanket bogs are “different” from those. Moreover, this incorrect view continues to be influential in the UK and, in our experience of discussions involving local stakeholders, to cloud understanding of the overall control of blanket bog distribution and thus also understanding of the importance of considering climate change when planning conservation measures. Thus we attempt, as the reviewer says, to end a rather long-standing debate. This is the reason for focusing solely on the British Isles.

We have used PeatStash to model the distribution of other types of peatlands using different bioclimatic thresholds. Variants of the model with different threshold definitions perform remarkably well in predicting the broad geographic distributions of other types of peatlands, including the raised bogs of the northern latitudes, and even tropical peatlands. However, there is an important limitation on these results because of topographical controls on peatland extent: without adding a topographic component, the model greatly overestimates local peatland extent. Therefore, we choose to focus on blanket bogs. These peatlands uniquely are not limited to flat areas or the bottom of valleys, as they are able to extend to sloping ground, and when present, typically “blanket” the whole landscape.

2. Also, is the PeatStash model really needed to draw one of the two main conclusion points (L1-10, p4821)? Because these conclusion could simply be drawn from the pollen hydroclimatic reconstruction, right?

If the climatic thresholds were solely determined by MAT, MTWA and MAP, one could draw the same conclusions from the pollen reconstructions directly. However, we use the Peatstash model because the model represents the moisture regime by a moisture index (MI), which requires a more complex calculation (for potential evapotranspiration) that is more appropriate in a process sense and also provides a threshold that fits the present distributions more accurately than MAP. Changes in MI, in turn, can be estimated from changes in the alternative moisture index α , for which pollen-based reconstructions exist. The use of an explicit model further allowed us to make quantitative predictions based on climate model simulations for the mid-Holocene and to show

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conclusions consistent with the pollen-based approach.

Interactive comment on Clim. Past Discuss., 11, 4811, 2015.

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