

***Interactive comment on* “The role of land cover on the climate of glacial Europe” by Patricio Velasquez et al.**

Anonymous Referee #2

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The manuscript presents new simulations aiming at highlighting the role of vegetation cover in climate change in Europe during the LGM. I found this paper particularly interesting and well written. Nevertheless, I have some comments concerning the model-data comparison section.

Regarding the results presented in Fig. 3, the statement "The LGM climate agrees with the pollen-based paleoclimate reconstructions at most sites" (l.198) is not very convincing. I will not say that only "few locations show considerable differences" (l.199) since 5 out of 14 sites show temperatures reconstructed in July significantly different from the simulations and since 6 out of 14 sites show precipitation in July significantly different from the simulated ones. The regional character of the January precipitation in Southern Europe during the LGM compared to PD (higher LGM precipitation) is not

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supported by the data, as noted by the authors. They discuss this point but the cited works are not well cited or at least the text as written is misleading for the reader. Roucoux et al. (2005) effectively suggest that the LGM is not the driest and coldest interval of the last ice age, but wetter than the periods before and after it. However, in Roucoux et al. (2005) these colder and dryer periods are the Heinrich events and not the recent period. The Estanya lake record in the NE Iberia (Morellon et al. 2009) is also cited as showing wetter LGM conditions. This is ok but unlike the simulations, these lake data show that the LGM is wetter than the H1 in the NE of the Iberian Peninsula but much drier than the Holocene and in particular the final Holocene. The same applies to the modelling work of Ludwig et al, 2018, showing that the LGM is wetter than H1 but drier than the pre-industrial period. Citing all these works for justifying that other data or modelling experiments show wetter conditions during the LGM but avoiding to say "wetter than what" is misleading for the reader. In any case, they cannot be used as a justification to explain that the simulations show wetter winter conditions at the LGM than at the PD.

A comparison with a larger number of sites would be beneficial for the evaluation of the simulations. It would be good to add sites whose reconstructions are available in the literature and not only those from a compilation made more than 14 years ago. A strong added value to the paper would be to estimate the temperature and precipitation (with a MAT or another method) over the 71 sites used in Figure 6. Doing a model-data comparison on the basis of 71 sites instead of the 14 currently used would bring more robustness to the validation of the simulations by the data. Nevertheless, I would understand that it is a too much work for this paper.

The authors chose to compare simulated tree cover % to the available arboreal PFT % from pollen records to evaluate the model simulations. However, it would be great to take into account in the discussion that arboreal PFT % "is a relative rather than absolute metric of landscape openness" as stated by Davis et al. 2015.

p. 6, l. 179: "Fig. 3" instead of "Fig. 4".

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