

Interactive comment on “Simulating the vegetation response to abrupt climate changes under glacial conditions with the ORCHIDEE/IPSL models” by M.-N. Woillez et al.

Anonymous Referee #2

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Woillez and co-authors present a numerical study on the vegetation response to abrupt climate changes during the last glacial. The study discusses many interesting results which are worth publishing in Biogeosciences. Contrary to expectations raised by the title and by the “main issues” stated at the beginning of the chapter Discussion and Conclusion, the authors restrict themselves to the analysis of changes in parts of Europe. That is legitimate because a number of reconstructions are available for that region. On the other hand the authors are in a position to tackle the fascinating global case. This would have made the paper much stronger. Using a rather coarse-scale model for analysis in a rather small-scale region makes the paper weaker.

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It is not the task of a reviewer to suggest to the author which paper they should have written. The reviewer should just assess whether the content of the paper is coherent, contains no flaws or oversights and whether the conclusion drawn is consistent with the analysis. Accordingly, I suggest that the authors change the title of their paper to be consistent with the main focus of the study. Furthermore, I believe that the paper would benefit from making the chapter on Discussion and Conclusion more concise by highlighting the most important results only and by focussing on the main message.

The authors stretch their analysis to the limit of applicability of the global model, when discussing small regional changes. How many grid points encompass Spain? A meaningful average would include at least 4x4, better 9x9, grid boxes. The jumps in vegetation area depicted in Figure 15 seem to reveal the limits of the model rather than any realistic vegetation dynamic. Does it make sense to discuss these features?

With respect to European pollen, the authors should look at the Monticchio record (Allen et al., 1999) which is supposed to show rapid vegetation fluctuations in the Mediterranean over the last 100,000 years.

If the authors wish to include the global case, then the main findings depicted in Figure 2 should be put into perspective. A global view on data is given by Voelker et al. (2002), a numerical simulation of global-scale response pattern to D/O and Heinrich events can be found in Claussen et al. (2003), or by Tuenter et al. (2007) who focus on the African and Asian summer monsoon. The response of Northern Africa climate and vegetation to D/O and H events is assessed by Tjallingii et al. (2008), for example.

Minor, but nonetheless important issues:

- 1) The authors mention that vegetation changes are sensitive to changes in atmospheric CO₂ concentrations. What does this imply for D/O and H events? Are the changes in atmospheric CO₂ too small to be considered?
- 2) Please check the political definition of “Western Europe”. Certainly, Western Europe

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does not reach to 20 E. The maps shown in Fig.12, for example, include Western Europe, Southern Europe and Central Europe.

3) For the readers' convenience, it is useful to show the longitude bands mentioned in Figures 5 and 6 in one of the maps.

4) The figures must be improved a) It is not sensible at all to use rainbow-coloured scales for everything. The strong blue, red, orange and green colours conceal important information. If a plot depicts just a pattern with more-or-less information (more vegetation - less vegetation; warmer - colder, ...) then a single colour does the job. If differences are shown, then two colours are appropriate with strong colours for large differences, e.g. red = warmer, blue = colder b) Some figures (e.g. Fig.2, 3, 4,) and the labels of many figures are too small to read. c) Fig. 5 includes many tiny labels. Why do you have to refer to the latitude band, if it is the same for all sub figures and if the latitude appears on the x-axis explicitly? d) Figures 1 and 7 can only be compared if they are plotted next to each other. I suggest redrawing Figure 7 to include Figure 1. (But please, do keep Figure 1, as it nicely illustrates the main differences between the four climate simulations.

References:

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