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Biogeosciences Discussions

Interactive comment on "Evolution of the potential distribution area of french mediterranean forests under global warming" *by* C. Gaucherel et al.

C. Gaucherel et al.

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Anonymous Referee #1 Received and published: 11 March 2008 General comments: The paper is within the scope of BG and gives an interesting contribution on the understanding of tree species response to climate change. The authors used a model based approach (MAIDEN model) to understand the response of two important Mediterranean species to climate change after parameterization and validation on the basis of evapotranspiration measurements and tree ring data. There are some inconsistencies that need to be solved before the paper can be published. I encourage the authors to resubmit the paper because of the importance of the topic. Specific comments: Introduction P. 575, L. 18: "temporal and spatial scales"; instead of "time and space scale"; P. 575, L. 24: "temporal and spatial scales" instead of "time and space scale"; P. 576 L. 1: "Several modelling approach have been proposed&"; instead of "Modelling

approaches are diverse";

Methods: dendrochronological and ecophysiological data You used data from 21 Aleppo pine and one oak stand. While you stated that tree ring series were based on annual earlywood width and latewoodwith and report an appropriate reference for the Pine, you do not give any information about the way you used to determine tree ring series for the oak. In fact, I expect problems in tree ring readings because of multiple growths on the same year (not real rings). How did you solve this problem ?

-> The tree-ring chronology for the oak was built by sampling 15 stem disks from 15 trees. Because of the eccentricity of the stem, only the longest radius was measured in each disk. The tree-ring width chronologies on these 15 disks were interdated 2 by 2 in order to give the exact year for each tree ring. Ring with very high and very low width help us interdating the chronologies. Some ring had cells that showed some disruption because of very low winter temperature that damaged the cambium (1963, 1985, 1987). These rings too help us interdating the chronologies. Even with these indicators, it was sometimes difficult to date some chronologies. In total, only 7 stem disks were kept and give chronologies that could be interdated.

Why are you using an average regional chronology instead of using each single stand for parameterization and validation ?

-> The basic idea here was to characterize the global species response instead of the local responses. The model is finally calibrated for each species and not for each site.

How do you calculate average biomass index of each 21 stands over first 50 years if you have a 34 year regional chronology ?

-> The 34 years (actually only 32 shown) are common years for all sites, each of them having more than 50 years.

P. 77 L. 19: how did you calculate the index ? Please report equation

-> Equation has been added.

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5, S963–S966, 2008

————————- Methods: ecophysiological model P. 578 L. 13-15: these phases are true for not Mediterranean species. In the case of meditteranean species as Quercus ilex L. it is possible to have a stop in growth during summer because of not enough water availability and a restart in September with rainfalls. Did you take into account this possible different growth behaviour ?

-> No.

Results P. 582 L. 10-12: For the oak: is there any reason why after 1990 fits worse ?

-> The agreement between chronologies was good from 1942 to 1990 and degraded after, probably under the influence of a biological factor such as the canopy closure.

P. 582 L. 12: "Details are given in Gaucherel et al 2007"; is part of the methods not of the results

-> Done.

P. 582 L. 18-19 and figure 2: it does not seem to me that there is a correct agreement. In fact maxima are not located at the centre for both maps.

-> Agreement is qualitatively acceptable (Fig. 2). Even if maximum growth zone simulated by model is shifted at west (by about 30 km), we in both maps two poles of low growth: at east and on the southern coast. There is an additional low growth pole recorded by the data at northeast but not simulated by model. Even if the agreement is far to be perfect, it is noticeable that the model calibrated with the mean tree-ring chronology is able to reproduce a part of the spatial variability, at least the part related to climate. It is obvious that the part of spatial variability related to not model features as edaphic factors cannot be reproduced.

Discussions P. 585 L. 16-17: see first comment about the results section P. 585 L. 23: see first comment about the results section Tables: Table 1: please explain the meaning of CRU and APG

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5, S963–S966, 2008

-> Done.

Table 2: what does 21/20 mean ?

-> Corrected.

Figures Please improve the quality of the figures.

-> Done, yet not perfect! We apologize; this is not easy, due to Matlab outputs.

Figure 1: why you start the data for pine in 1960 and the data for oak in 1965 ? The dotted line is hardly visible

-> As it is explained in the document, bole increments have been averaged into a 32-year regional chronology (1963-1994) concerning 21 sites. The 38-year oak series (1968-2005) is more local as it is based on a single site.

Figure 2: it is not clear which is the region and the borders of it. You have to uniformate to the following figures. Figure 7: the dotted line is hard to see

-> Done. We have located figure borders between each others; we have superimposed study sites; we have shown a map of France and the coastline when possible.

Interactive comment on Biogeosciences Discuss., 5, 573, 2008. S134

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