

# Interactive comment on “Late Holocene vegetation changes in relation with climate fluctuations and human activities in Languedoc (Southern France)”

By J. Azuara et al.

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In this interesting study, Azuara et al. carried out a high-resolution pollen study of two mid- to late Holocene cores from S France. The data was interpreted in terms of vegetation changes due to climate and human impact. I don't have problems with the science of the paper and the data seem sound. However, in my opinion there are some issues that should be addressed before publication– see below:

Thank you very much for your comments and advices. We answer below each of your comments.

-My mayor concern is the interpretation of the vegetation changes. One of the main goals of this study would be to separate the climate signal from the human impact. Sometimes this is not an easy task but the way this was done here is kind of confusing as many of the changes observed are explained as caused by both climate and human impact in two different sections (5 and 6). A better way of doing this would be dealing with a change at a time (from past to Present) and discussing about both factors in the same section.

*We first tried to organize the paper in a chronological way as you suggest to do. However, it was very difficult because the vegetation changes highlighted in the study (driven by climatic or anthropogenic factors) have very heterogeneous durations (several millennia, around one thousand years, few hundred years, hundred years,...). Therefore the chronological outline was very confusing and the clarity of the paper would have suffer from this. That is why we finally choose to follow a thematic outline.*

-I was trying to find information about the lithology and age control of the studied cores but they were nowhere to be found. It seems that this information has been previously published but for many people this would be the first time they see these two records and so I strongly recommend showing this.

*We added a table with al the ages and control points of the sequence and r we draw in the palynological diagram the position of the storms layers (arrows) and the high storm activity periods that also appear in the figure 3.*

In this respect, the sand intervals that are mentioned in the text are very interesting as they could somehow explain some of the changes observed in the pollen due to local vegetation changes in the marshy area.

*The pollen abundance of the local marshy vegetation is very low. Because the lagoon is very large, the pollen spectra mainly represent the regional vegetation. Moreover, no change in this local vegetation is recorded in relation with the storminess. However the changes in the lagoonal sedimentation due to the storms could have led in the case of Palavas lagoon to taphonomical issues. This is why we chose to discard the samples with a low pollen concentration according to a previous taphonomical study we carried out. While some major vegetation changes affecting hinterland taxa such as Fagus are correlated with the storminess they are not exactly contemporaneous. This confirms that these changes are effective and not due to a biases linked to the sedimentation changes.*

-It is not clear in the paper why the expansion of evergreen Quercus is related with human impact. Please explain. Could that be due to climate? Maybe more seasonality in the precipitation in the late Holocene?

The paragraph explaining this point of the demonstration was not clear so we modified it.

To sum up, the hypothesis of climate driven evergreen Quercus spread in southern France is not consistent with all the observations. Of course, it is not possible to completely discard a climatic influence on evergreen Quercus forest but the anthropogenic causes are much more supported by the data.

-In many different parts of the paper the authors talk about “migration” of plant species (Fagus, Abies, etc) towards the North during arid periods. This should be changed as plants do not migrate – they cannot “walk”. Those plants rather disappeared from the South due to tough conditions and remained in the North were they probably already occurred during mild conditions.

Corrected. Talking about migration was not appropriate so we replaced this term by “range contraction” as you suggested.

-It took me a while to get that a composite record is shown. That should be clearly stated in the material and methods section.

Corrected

-The graphical information in the paper is quite poor – only three figures are shown. Why aren't the red shade-lines going to the top of figure 3, towards the AP proportions? In the same figure it is not clear why there are two colors in the graph with macrofloral remains. The use of letters in the different plots is kind of confusing as well.

*We modified Fig 3 to clarify that point, adding more captions into and below the figure. The shaded area are not reaching the top because it was clearer to keep in two different parts of the figure the climatic and the anthropogenic data. Otherwise too many information would have been superimposed.*

I hope my comments help improving the manuscript.

Cheers, Gonzalo Jiménez-Moreno