

Interactive  
Comment

## ***Interactive comment on “Stable isotope and modelling evidence that CO<sub>2</sub> drives vegetation changes in the tropics” by F. J. Bragg et al.***

### **Anonymous Referee #3**

Received and published: 24 December 2012

The authors used climate model simulations and a biogeography model to investigate the contribution of climate change and atmospheric CO<sub>2</sub> concentrations on the observed shifts in delta 13C values (n-alkanes) measured in offshore South Atlantic sediment cores during the transition from the Last Glacial Maximum to the Holocene. The paper provides new insights into past and current vegetation shifts. The methods are clearly outlined. This paper is of general interest and is well done on the whole. Yet, I have a number of concerns with the paper in its current form.

The authors propose to “We combine climate model simulations of LGM and Holocene climates with a state-of-the-art biogeography model, . . . . in order to quantify the contributions of climate change and physiological CO<sub>2</sub> effects in driving the observed large temporal shift in delta 13C values in the tropical part of the transect (15704, 2-5)”.

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The model outcome shows that using glacial-interglacial climate change data cannot explain the  $^{13}\text{C}$  shift found in the offshore sediments. The authors state “This finding points to a key role of atmospheric  $\text{CO}_2$  concentration in determining glacial-interglacial biome distribution changes in the tropics” (15709, line 24-26). However, I miss a quantification of the contribution of climate change and  $\text{CO}_2$  effects and a more thorough interpretation of the results. Most of the discussion focuses on the (re) interpretation of findings from other studies and on the implications for the interpretation of current trends in vegetation shifts (woody thickening). The effect of precipitation changes should be looked at more closely.  $2\text{H}$  in sediment leaf wax n-alkanes might provide further insights.

Another point of criticism is the use of pollen data to support the authors’ model predictions. The authors state that “data are too sparse to allow simulations to be evaluated unequivocally” (15709, 2-3; Figure 3a). Still the authors claim that “they are consistent with model results” (15709, 3-4). Why didn’t the author’s use the  $^{13}\text{C}$  leaf-wax n-alkanes data from the southeastern Atlantic Ocean sediments obtained by Vogts (2011) and Vogts et al. (submitted) to verify their findings?

Finally, I suggest using a more conservative title like ‘Stable isotope and modelling evidence that  $\text{CO}_2$  governed vegetation changes in tropical southern Africa after the Last Glacial Maximum”.

Figure 1: x and y axis are not labeled

Figure 2a and Figure 2b. Increase font size of x and y axes labels

References: 15718, line 29. Should be Prentice et al. 2011b

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