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Comment

## ***Interactive comment on “GCM characteristics explain the majority of uncertainty in projected 21st century terrestrial ecosystem carbon balance” by A. Ahlström et al.***

**Anonymous Referee #1**

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General:

The present paper investigates the importance of climate change patterns from 4 GCMs and CO<sub>2</sub> emission scenarios on the global terrestrial ecosystem carbon balance, especially on net primary production and net biome production using the DGVM LPJ-GUESS and a statistical emulator of that. The study uses a powerful method for analysing the characteristics of GCM specific climate patterns with regard to the global terrestrial ecosystem carbon balance.

Methods:

The method of the SVD analysis should be translated into language the more casual

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reader would understand. It was not easy to understand the different modes of this. Page 6 line 15 to 25 should be revised.

BGD

How is the replacement model [eq. 2-4] validated? For cross validation, the validation data should be not included for deriving the  $\beta$ -parameter. Of course not many data are available but maybe 1 emission scenario or different runs could be used.

Is the initial pool of eq. 4 the values of the LPJ-GUESS model with CRU-climate? It is not explained clearly, which values are assumed for the first iteration?

The differentiation of the statistical analyse of the GCMs, LPJ-GUESS simulations driven by these GCMs and results from the replacement model should be more structured.

The authors need to pull out the inferences more fully.

Special comments:

Page 3 first sentence the reference should be Table S1

Page 13 line 9 Fig.5 shows "that the discrepancy between the global and land temperatures are becoming smaller" - I can't see that

Page 14 line 14 if that influences the  $\alpha$ -value the CRU-data of the first at least 30 years should be not included for analysing the data. It is known that this occurs mainly at the beginning of the 20th century in the CRU-climatology.

Figures:

Figure 2 The difference of SST-TS1 and SST-TS2 (TS?) is not explained and figure 2e has no label on the y-axis.

It would be nice if the figures of the supplementary material would be revised. Many plots are redundant, I suggest to join figures S1 and S2.

9, C6048–C6049, 2012

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