

Interactive comment on “The African contribution to the global climate-carbon cycle feedback of the 21st century” by P. Friedlingstein et al.

Anonymous Referee #2

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General comments

The manuscript tries to identify the African contributions to the global climate-carbon cycle feedback using a global land surface model coupled with an atmosphere ocean general circulation model (IPSL-CM4-LOOP). The authors found great contributions of the African ecosystem to net ecosystem productivity induces by rainfall reduction, but only small contributions of the African rainforest to the positive climate-carbon cycle feedback. The analysis is of high scientific relevance, and well-written.

In order to understand the role of the different ecosystems to the climate carbon feedback and the impact of climate change on the carbon cycle of the African continent it needs some more investigation. It is not explained why both experiments react so

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divers in terms of the carbon fluxes and stocks in different regions (Fig. 3). It is also not clear how different the climate system of these two experiments are. I would expect changes at least due to differences in water fluxes. Are there no changes in the UNC experiment to the climate in 1860?

The discussion contains a long paragraph about the IMOGEN experiment. This appears a bit displaced here. This needs a different study or it could be explicated in the result capture.

In general I have noticed that the theme is not comprehensively discussed. In the introduction you find only one sentence about the African biomes. And the discussion part is filled with the Amazon forest and the IMOGEN project.

Specific comments

p. 4850, para. 1: Please explain the method of this two runs more detailed to avoid misunderstanding. I'm not sure if the UNC experiment includes climate change or is only the carbon-climate feedback missing.

p. 4851, para. 2: The carbon sensitivity describes how much carbon the biosphere releases respectively uptakes. The indicator suggests that the carbon balance changes linear with temperature change, but these changes are more abrupt.

p. 4852, para. 1: Could you show why climate change is the main driver? In most studies CO₂ fertilization plays an important role. The COU run shows an enhancement of 14 GtC/yr and UNC only 2 GtC/yr less. Regarding this the fertilization part must amount to 12 Gt/yr.

p. 4853, para. 2 and p. 4855: This study emphasises the minor contribution of the African ecosystem to the global carbon cycle, but here is shown that the local changes are very great. That means major changes occur in the African biosphere due to climate changes and in the same order as in Amazon forest. It is only owing to the small area of the rainforest that the global contribution of the African rainforest are so

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small. That is known.

Technical comments

Fig. 1: Please use the same units in caption and figure.

Fig. 3: What does relative mean if your units are gC/m^2 ?

Fig. 4 and 5: Please use the same units in caption and figure.

Captions have not the same letter size.

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