Point-to-Point Reply to Referee #3 (C776, received and published: 14 December 2012**)**

We thank all reviewers for their thoughtful and important comments. In the following the citation of our modifications in the manuscript are related to the new, revised version.

I am unable to review this paper in detail, and I can only express some general concerns:

- the coast line to the Mediterranean basin, and of the Spanish and Portugese Islands in the Atlantic has already been converted into vegetable farming. This had major impacts on coastal plant communities and biodiversity, and un-quantified impacts on nutrient and pesticide export to the oceans

This is correct but we are focusing on coast lines in hot, dry deserts. In the Mediterranean basin, summers are dry and hot but winters can be still wet and cold, which is not optimal for the plants considered in this work.

- the arid regions of the world were identified by Running (science, 2012) as one remaining large block of land, where human impact is relatively low, except for local nomadic populations

We guess you are referring to *Running, S.W., 2012: A Measurable Planetary Boundary for the Biosphere, Science* 337, 1458. This is indeed a very interesting approach to relate the available land for human use to NPP. Furthermore, defining arid regions by human activities can be quite misleading, as human activities may also be low in humid or cold regions. Therefore, we prefer the well-known agrometeorological definitions of arid as a region with precip < evapotranspiration for 10-12 months per year, and semi-arid with precip < evapotranspiration for 6-9 months per years are used.

- if it is the aim to apply this approach at large scale, then a large scale climate model should demonstrate, that this change in land cover has no effect on other climate regions.

We agree that this will be necessary, if the domain becomes even larger than 100 km squared. Whether teleconnection becomes important is also dependent on the local and large-scale forcing conditions. In the regions of interest, at a scale of (100 km)^2, teleconnection and downstream effects are very small and hardly visible in our simulations. Consequently, we are convinced that our approach using a nested model is appropriate on this scale. In the future, we will perform large-scale simulations and make

sure to use larger domains which permits an analysis of teleconnection pattern. We added the following paragraph on p. 25, 2nd par.:

"So far, in our simulations, effects on atmospheric variables downstream of the plantations were small. If larger scale plantations are simulated, the teleconnection of weather pattern also needs to be studied by increasing the domain simulated in the model around the plantations substantially or even by global simulations."

- The "sustainability" in the sense of the Brundtland commission (1987) has not been demonstrated. My basic concern is that the change in flora and fauna, the change in local precipitation and albedo may have adverse effects on other regions, which outweigh the local benefit.

Yes, sustainability is also essential for our work. This is certainly an issue, which must be analyzed in great detail in the future. However, before additional ecosystem effects have to be considered we need to know the strength of the effects on the local conditions and climate by plantations of different sizes and shapes. Therefore, we consider this study an essential and valid starting point in this direction. In order to include the concerns of the reviewer, we added the following sentences in the introduction on p.6, 2nd par.: "This combination of modelling efforts is also essential for studying the substainability of carbon farming." and on p.29: "The interdisciplinary combination of simulations presented in this work can be considered as starting point for studying the substainability of carbon farming."