We thank Referee #1 for his/her latest comments generated from our authors' reply.

We somewhat agree with the first point that using the word 'harvest' could lead readers to erroneous assumptions. While we do, in the same sentence of the revised MS, describe the fate of the “harvested” biomass, we have now avoided this term. Monfreda et al. (2008) report harvest index (HI) of 175 different crop types. HI is a standard measure of the proportion of total aboveground biological yield allocated to the economic yield of the plant. Monfreda et al. (2008) average HI value is 42% (calculated from supplementary information) implying that about 58% of the harvested biomass is left as litter. In current version of CTEM, 100% of the “harvested” biomass is left as litter. What is a 'realistic' treatment of the biomass removed (42%) is, however, entirely speculative. The return of that carbon to the atmosphere could be anywhere from immediate to much longer than the timescales of litter respiration.

The second point raised by the referee makes her/his earlier comment (initial review) about crop productivity more clear to us. The referee is likely responding to the statement (page 16021 line 4 in original MS): ' In CLASS-CTEM, crops have higher productivity than the natural vegetation they replace '. This statement was somewhat inaccurate as written as it was intended to refer to maximum photosynthesis rate (Vmax). Indeed, Vmax for crops is higher than that for other PFTs. But the realized net primary productivity (NPP) of trees is higher because NPP also depends on leaf area index which is higher for trees. In CTEM, crops are harvested when their leaf area index reaches 3.5 m2/m2 for C3 crops and 4.5 m2/m2 for C4 crops signifying that the crop has matured. We have revised this sentence (and other comments related) to be more precise and thank the referee for catching it.

The final remark of the referee is regarding an explanation of the impact of LUC in the mosaic configuration. We believe the referee is correct in supposing that it is a combination of factors. These factors include: i) the larger rate of increase of NPP of crops in the mosaic configuration as CO2 increases, ii) the subsequent large transfer of biomass to the litter pool over croplands in the mosaic configuration, and iii) the different heterotrophic respiration rate in the two approaches due to differing soil temperature and moisture. CTEM does have higher base soil carbon decomposition rates for crops compared to other plant functional types to simulate the influence of tillage. The differences in heterotrophic respiration reflect the soil temperature and moisture differences, between the two approaches, not the parameter values. We agree that increased heterotrophic respiration in the composite approach has likely been compensating for the higher litter transfers when crops are harvested. As the usual configuration of CLASS-CTEM is composite, this behaviour was not apparent until we were able to compare the model results between the mosaic and composite configurations.

Monfreda, C., N. Ramankutty, and J. A. Foley (2008), Farming the planet: 2. Geographic distribution of crop areas, yields, physiological types, and net primary production in the year 2000, Global Biogeochem. Cycles, 22, GB1022, doi:10.1029/2007GB002947.