

Interactive comment on “Multi-factor controls on terrestrial carbon dynamics in urbanised areas” by C. Zhang et al.

Anonymous Referee #2

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The manuscript closely follows Zhang et al. 2012 with the use of the same study domain, temporal period, process model, and analysis of C dynamics to better understand the effects of urbanization on vegetation and soil carbon storage. The map presented in Figure 2 seems identical to the map published in 2012. Distinct from Zhang et al. 2012 the present study conducts a series of sensitivity analyses to better understand what causes the modeled loss of carbon found previously. From my reading of the results and the discussion provided by the authors of major findings (paragraph 2 of discussion) – the results presented are primarily confirmatory of existing literature without clearly identified new insights. Of equal importance the study lacks any validation or comparison with field data. Based on these concerns I consider this manuscript more suitable for a journal such as Ecological Modelling.

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As a more general concern, using net soil and plant carbon storage as a measure of carbon sequestration potential is misleading. For example the manuscript advocates Milesi et al. (2005), 17 Tg C / yr of sequestration for urban lawns; this number does not include the large amount of emissions associated with the extensive management required. This seems akin to advocating corn ethanol based biofuel because some energy is produced – regardless of the fact that the energy is less than required for production.

Detailed Comments: The large number of abbreviations that are unique to this manuscript creates a challenge for reading. Fewer abbreviations would be helpful.

Pg 17600 line 3: I disagree that urban areas can provide a meaningful C sink. For this comparison, provide the amount of potential urban vegetation C sink relative to the total urban emissions for a useful comparison.

Pg 17601 line 12: I wouldn't characterize the study as examining “all” the environmental changes associated with urbanization. Perhaps “dominant” would be better? I don't think we have a good idea what all these changes may be.

Pg 17602 line 10-15: This passage is unclear, I don't understand what is meant here.

1st paragraph of results: This paragraph is entirely literature review and doesn't address findings from the research conducted in the manuscript.

Pg 17614 line 8-9: Provide some quantitative estimate of renewable fuel potential. I am skeptical about this point.

Pg 17614 last line: Commonly, urbanization leads to reduced tree longevity. Another sentence is warranted that note this discrepancy and provides some explanation.

Figure 5 is almost completely redundant from Figure 1. I don't think both are needed.

Figure 6a,b are difficult to read with the seemingly random color map of stacked bars.