

Interactive comment on “Ignoring detailed fast-changing dynamics of land use overestimates regional terrestrial carbon sequestration” by S. Zhao et al.

Anonymous Referee #2

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This MS identifies limits of temporal resolution thresholds concerning carbon sequestration in managed areas. The authors do well document the influence of temporal resolution within their medium scale region under investigation; in terms of know land use/cover change application in models.

I recommend the MS to be accepted with major revisions.

In my point of view such analysis is necessary. In addition more complex questions appear on the methodology of such an approach. In fact, is it entirely correct to attribute time lag effects as introduced by the different intervals to a reduced ability of temporal resolution on carbon sequestration? This artifact seems to extrude in Fig 4

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in accordance with Fig 3. While the western part of the study area represents the almost equal spatial patterns of carbon sequestration from high to low frequency intervals the eastern parts increase in carbon sequestration potential respectively, defined by reduced land use changes. But does this picture include the assumption, that all land use change effects on carbon sequestration are represented within the study period. While I assume that the first time step of the 5- and 10-year interval is equal to static representation of land use change, this biases the mean of carbon sequestration also in subsequent time steps, leading to the conclusion that the carbon sequestration differences rather relate to a time delay, than a decreased ability to track rapid forest change? If one would apply two 20 year periods of investigation, the mean of carbon sequestration between the different intervals would most likely to be unchanged, especially relevant for the study area, mainly determined by short rotation forestry.

While recovery is proclaimed for clear cutting areas (roughly 80% of total 10.1% land use change) within 20 years one should clearly identify differences in land use change and management (short to long term), relevant for carbon sequestration.

Additionally, wouldn't it be good to use Land Cover Change Models in a 'reverse mode', so one is more likely able to retrieve more detailed information between large time intervals. This way such time shifts could be reduced.

Minor:

Fig 1: At which time step this map represents the study area?

The study period needs to be explicitly mentioned under Methods.

Is it correct, that different land use change scenarios include no change for 1992 (section 2.3), than this should be explicitly mentioned.

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