

Interactive comment on “Calibration and analysis of the uncertainty in downscaling global land use and land cover projections from GCAM” by Min Chen et al.

Anonymous Referee #1

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This study developed a method to calibrate key parameters in Demeter, a community spatial downscaling model, by using a long-term global satellite-based land cover dataset. The sensitivities of the key parameters and propagation of the uncertainties in the projection were also evaluated. The parameterization in the Demeter is important for a better performance of downscaling land use and land cover data from projection at the regional level. I'd recommend accepting this paper upon some minor revisions. 1. The section of introduction needs to be improved. The first paragraph discussed multiple topics such as background and motivations. They can be separated as individual paragraphs for readers' understanding. The challenges can also be briefly discussed in the introduction. 2. Although the Demeter has been published, an overview illustra-

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tion of this model will be very helpful for readers to understand the work in this paper without reading the Demeter paper. 3. As this paper focused on the calibration of parameters, these parameters are important and deserve some explanations. For example, it is not clear what is selection threshold. 4. I read the paper in pdf. I found the symbols in the equations do not show up. They are “sum”? 5. Figure 7 can be improved regarding readability. For example, some boundaries of AEZ can be removed? 6. Figure 8 can be improved. 7. Figure 8: I expected the uncertainty will increase monotonously. But for some land cover types, it even decreases after the middle of the century. Any explanations? 8. This study is an important contribution to the development of the community spatial downscaling model, Demeter. It is still worth to discuss the limitations and future directions. For example, a set of global parameters were used in the Demeter. Further efforts should be made for the regional level and even AEZ level parameterization, especially with the capability of parallelized computing. The second effort should be made in the future work is the improvement of urban land use. Currently, the performance of urban land use is not good as other land cover types. It could be due to the limited consideration of complex urbanization process as well as the input historical urban data. More spatially and temporally consistent urban extent data can be explored (references: A global map of urban extent from nightlights; A global record of annual urban dynamics (1992–2013) from nighttime lights) in the future research. With some minor revisions, I would like to see this paper published.

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