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Interactive comment on "The North American Carbon Program Multi-scale Synthesis and Terrestrial Model Intercomparison Project – Part 2: Environmental driver data" *by* Y. Wei et al.

Anonymous Referee #2

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The manuscript provides descriptions of the environmental driver data for the Multi-scale Synthesis and Terrestrial Model Intercomparison Project (MsTMIP). The authors described the background information about the driver data, such as climate, atmospheric CO2 concentrations, nitrogen deposition, land-use and land-cover changes, major crop distributions, phenology, and soil characteristics for the global domain and the North America domain. The manuscript also describes the rationale for the choice of specific environmental driver data and details associated with processing. Lastly, the authors provided suggestive comments from their experiences preparing the driver data for the MsTMIP project.

The manuscript is well written and organized overall. A topic addressed in the

manuscript is certainly appropriate for publication in Geoscientific Model Development because the journal is open specifically for model intercomparison descriptions, including experimental details and project protocols. Yet, there are certain aspects which need to be improved in the current manuscript.

First, the authors need to characterize the driver data prepared for the global domain and the North America domain in detail. According to Huntzinger et al. (2013), one of the purposes for designing two simulations at different domains is to test the influence of both spatial resolution and changing driver data on model estimates. For the purpose, it would be informative if the manuscript includes descriptions about similarities and dissimilarities between the two driver data and their potential impact to model results. Specifically, I recommend to include comparisons of the long-term trend and spatial distribution of air temperature, precipitation, and shortwave radiation of the two driver data.

In particular, it is interesting to see the long-term trend of the MT-CLIM-based and NCEP-based downward shortwave radiation data. Do they commonly show a decline in the 1980s and an increase in 1990s (previously reported by Wild et al., 2005, Pinker et al., 2005, and others)? I remember that NCEP shows a similar declining trend during 1980s, but I suspect that MT-CLIM does not capture the trend seen in observations.

Also, you may want to cite previous works that compared climate data including ones described in the current manuscript (e.g., Simmons et al., 2004; Wan et al., 2010; Saito et al., 2011).

Second, the authors need to discuss similarities and dissimilarities in environmental driver data compared with other model intercomparison activities, such as VEMAP, ISI-MIP, and TRENDY GCP. I'm surprised that the authors completely neglected to mention how driver data were prepared in predecessor projects, VEMAP and NACP. Discuss lessons learned and improvement in data preparation from those projects. Also, please check how driver data were prepared in Trendy GCP, for which the data choice is very similar to MsTMIP. i.e. Climate forcing from CRU+NCEP (1901-2010) with spatial resolution of 0.5° x 0.5° and temporal resolution of 6 hours and land use change from Hurtt et al.(2011) (1860-2005).

Lastly, though I understand the importance of sharing experience, "Lesson learned" section is not very informative in this context. There would be other suitable opportunities to share your opinions. Instead, a thorough characterization of the driver data would strengthen the aim of the paper. So, I recommend removing or shortening this section (if you insist).

This manuscript may be suitable for publication after major revisions.

Specific comments

P 5382 Line 23

Reference for CRU TS3.2 needs to be update to Harris et al. (2013). See http://badc.nerc.ac.uk/view/badc.nerc.ac.uk__ATOM__dataent_1256223773328276.

P5383 Line 10

If "CRUNCEP" mentioned in the manuscript is different from "CRU-NCEP" which is maintained by Nicolas Viovy, the authors need to explicitly state so.

P5385 Line 10- According to the data processing described, only the magnitude of the 3-hourly NARR precipitation data were calibrated with the monthly GPCP product by linear rescaling. Did you perform any calibration to the frequency of rainfall events?

P5386 Line 9-21 Recently, Bohn et al. (2013) validated the performance of MT-CLIM at the global scale. You may want to cite their work to support a reliability of MT-CLIM simulation.

P5394 Line 12-14 I believe that you are aware of fPAR3g and LAI3g products derived from GIMMS NDVI3g data (in conjunction with neural network and MODIS products) (Zhu et al., 2013). The spatio-temporal specification of the fPAR3g and LAI3g (15 day-

quarter degree data from 1981-2011) is suitable for being used in diagnostic model runs. Instead of relying on a simple method from Sellers et al. (1996), you may want to consider switching to these observation-based products. Though I do not insist to use the fPAR3g and LAI3g products, at least provide validation of the calculated fPAR and LAI based on Sellers et al. (1996) against the fPAR3g and LAI3g products.

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Interactive comment on Geosci. Model Dev. Discuss., 6, 5375, 2013.