

Interactive comment on “Global cropland monthly Gross Primary Production in the year 2000” by T. Chen et al.

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Response to Referee # 2 where our response is marked by “Response:”. We sincerely appreciate the reviewer’s comments and time spent on our manuscript.

The manuscript uses flux data, augmented with values from the literature, to apply crop-specific LUE to a GPP model. There are a number of efforts and methods currently being tested to improve global and regional estimates of crop GPP and NPP. This manuscript represents one of those methods. There are many assumptions associated with this method, including (a) the limited flux site data that is intended to represent crop LUE globally, (b) the fact that there are multiple crops within each grid cell, and (c) that LUE can differ across space and time for each crop species. The authors have acknowledged all of these assumptions. The authors provide the LUE

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estimates from flux sites and from their literature search in tables 1 and 2. Also provided, are the results and global estimates of GPP per crop and per region. While there is still much improvement to be made, these values should prove useful for comparison to other methods and, as such, help move this field of discipline forward. The manuscript is well-written.

Page 3474, 1st paragraph. Efforts to estimate LUE by crop type were also conducted by the late Paul Doraiswamy at US Department of Agriculture. He did this using inventory data on a state-by-state basis. A similar effort was also recently conducted by Bandaru et al. 2013. ISPRS Journal of Photogrammetry and Remote Sensing 80:61-71. I agree that refinement of LUE per crop will be useful, even if the mixed pixel issue (multiple crops per pixel) is not addressed. You might refer the reader to some of these recent studies. Response: These references were added in the revision as: “Inventory-based estimates could be used to validate and improve crop models from local regions (Bandaru et al., 2013; Doraiswamy et al., 2007) to continental scale (Lobell et al. 2002).”

Page 3476, 1st paragraph. “On average, the LUE values based on biomass measurements are higher than our estimates based on Fluxnet observations. ...we adjusted the literature-based LUE values using ratios between the fluxnet and literature based estimates.... values finally used in our model are therefore higher...” This line of reasoning leads me to believe that the values in your model should be *lower* not higher than other models. Please review this and make sure this isn’t mistated. Response: “ ϵ^* GPP values based on biomass (dry matter) measurements” and the “those used in other models” are two different things, i.e. ϵ^* GPP values evaluated by field measurements and ϵ^* GPP used in LUE models. One particular issue in LUE model development is the difference between ϵ^* as used in models and that constrained by field measurements (e.g. Lobell et al., 2002). Usually, ϵ^* values based on field measurements in croplands are much higher than those used in models, sometimes more than 2 times.

We further discussed this part in the Discussion section. This also relates to one novel

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aspect of this study indicating that “There is therefore no conflict between field based ϵ^* GPP and the direct parameterization application in our model.”

To make this point clear, we added “Because both the ϵ^* GPP values based on biomass as well as the FLUXNET based values are relatively high, the values finally used in our model are therefore higher than those used in other models (Zhao and Running, 2010; Lobell et al., 2002; Field et al., 1995; Potter et al., 1993).”

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