

Interactive comment on “Expansion of oil palm and other cash crops causes an increase of land surface temperature in Indonesia” by Clifton R. Sabajo et al.

Clifton R. Sabajo et al.

clifsabajo@gmail.com

Received and published: 22 August 2017

1. I only suggest some minor edits and (if the authors can) and expansion of the discussion of what these LST changes might translate to in the atmosphere?

The reviewer brings up an important issue of land surface – atmosphere feedback. A recent study by Tölle et al. (2016)# showed for SE Asia as a whole that land use change at large scale impacts the boundary layer structure, cloud-cover regime and other aspects of local and regional weather and climate. Particularly, land clearings can amplify the response to climatic extreme events such as El Nino Southern Oscillation. Analyzing this kind of effects require however a regional climate model, which is beyond

Printer-friendly version

Discussion paper



the scope of our study. We now discuss this aspect in the manuscript and added the following sentence: Line 773: “A recent study by Tölle et al. (2016) showed for SE Asia that land use change at large scale may increase not only surface temperature but also impact other aspects of local and regional weather and climate occurring also in regimes remote from the original landscape disturbance. Land clearings can amplify the response to climatic extreme events such as El Niño Southern Oscillation.”

#Tölle, M. H., Engler, S., and Panitz, H. 2016: Impact of Abrupt Land Cover Changes by Tropical Deforestation on Southeast Asian Climate and Agriculture. *Journal of Climate*, 30(7), 2587 – 2600, doi: 10.1175/JCLI-D-16-0131.1.

2. How much larger of a region will they affect? How would you determine this?

This study focuses on local and effects at the provincial level. Estimating or predicting the effects at a larger regional scale also requires a regional climate model as used in the study of Tölle et al. (2016). Tölle et al. (2016) show that the effects of land use changes occur in remote regions other than where the land use changes occur. These effects are caused by the impacts the land cover change has on El Niño/La Niña episodes thereby enhancing wetter conditions in other regions, whereas in other regions wetter conditions decrease.

3. Line 96: missing an “as” after “such”.

We added the missing word as suggested.

4. Methods: Could you describe the study sites in a little more detail (rather than the reference Drescher).

We added the following information: L. 186: “Previously logged rainforests in the Jambi province have been converted into intensively managed agro-industrial production zones as well as into smallholder farms to grow cash crop trees of rubber (*Hevea brasiliensis*) and oil palm (*Elaeis guineensis*) or fast-growing tree species such as *Acacia mangium* for pulp production (Drescher et al., 2016). The area cultivated with oil

Printer-friendly version

Discussion paper



palm grew faster than the area cultivated with rubber plantations between 1990 and 2011 (Clough et al. 2016).”

5. ET calculations: I’m familiar with the use of satellite data for all of the variables except for ET. Did you compare ET with the tower sites? How well does it work? I see that you added this to the supplement, but it would be nice to have a validation of this method explained in the main text.

We have ET and LE estimates from eddy covariance measurements for two oil palm plantations in Jambi Province (young and mature oil palm plantation). Our SEBAL based LE estimates are within the variability range of LE measured from eddy covariance under similar meteorological conditions.

We added the following text: “The SEBAL based LE estimates are within the variability range of LE measurements using the eddy covariance technique under similar meteorological conditions (see SI).”

6. Results: Line 405-406: Hot = red? And cool = Blue colors. Can you please specify this?

In our description of the figure we added the matching colors as suggested. Line 405 – 406: “the hot areas (red) correspond to the known clear-cut areas, urban areas or other sparsely vegetated areas, the cooler areas (blue) correspond to vegetated areas such as forest, plantation forests and mature oil palm plantations.”

7. Discussion: Line 668: When I look at the figures, there also seems to be a high correlation between NDVI and ET (simply because the response pattern, the pattern of the changes, look very similar). Can you explain this? Is it because of the ET calculation?

Yes, ET and NDVI are highly correlated on one hand because the NDVI is used in the calculation of ET. On the other hand, another input for ET is LST, which is calculated from the raw thermal band (L6). L6 and NDVI are also highly correlated ($r = -0.87$)

[Printer-friendly version](#)[Discussion paper](#)

(see table 2, Line 494 – 502) even though NDVI and L6 are derived/measured from independent satellite bands. Thus, it come as no surprise that there is a correlation between NDVI and ET.

8. Line 763: “concurrent to” should be “concurrent with”

We changed the sentence with the correct prepositions as suggested.

9. Line 768: “governmental” should be “government”

We changed this and used the correct word.

We thank the anonymous referee for reviewing the manuscript and for the suggestions to improve the manuscript.

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2017-203>, 2017.

BGD

Interactive
comment

Printer-friendly version

Discussion paper

