Interactive comment on "Precipitation-fire linkages in Indonesia (1997–2015)" *by* Thierry Fanin and Guido van der Werf

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Dear Dr Zemp
We appreciate the comments on our draft. Please find a detailed response below with the reviewer's comments in italics.

Regards,

Thierry Fanin

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1   Specific comments

1. *Description of the study region (L. 135-143) This section uses a lot of vague expressions such as "most of", "largely covered by", "abundant", "a large scar of", "widespread area", "extensively. . . The authors should give quantitative estimates and provide associated references.*

   We agree with the reviewer and removed these vague expressions and added referenced quantitative estimates. For example we added "Between 1990 and 2010 75.400 km2 of primary forest was cleared (Margono, 2013)" or "The other side of the island with the provinces of Riau, Jambi, and South Sumatra is largely covered with rain fed agriculture for subsistence and commercial forestry with agricultural activities (114.928 km2 and 44.307 km2 respectively, (LADA, 2008))"

2. *Merging precipitation datasets To merge the precipitation datasets, the authors use a linear regression based on the 4 driest months (L. 168). What is the rationale behind this procedure? Unless the authors have a solid justification for this choice, they should deepen the analysis of the (linear or non-linear) similarities between the full time series (and not only dry months). For example, while a linear correlation seems appropriate in most of Indonesia (as shown by high R2 values in Fig. 2b), it is not in the case in the northern part of the country. The authors mention the low inter-annual variability as explanation, but this statement should be justified by quantitative analyses. To strengthen the methodology, further assessment of a possible non-linearity between*

   We have tested several regression types but linear relations gave the highest correlations and also fundamentally most defendable. In addition, we aimed to keep our approach consistent for all of Indonesia. We agree that in some of the northern regions the regression was poor but as stated in the text these regions

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contributed very little to total fire detections. Over all Indonesia, 93

3. *Merging fire datasets: The authors mention the spatial resolution of the Terra product (L. 182), but not of ATSR. Please give this information. Why are the data combined at $1_i on/lat grid? Is this the resolution of ATSR? The "correction factor" that the authors calcu linear similarities between the time series.*

The resolution chosen is somewhat arbitrary but we aimed to balance having enough spatial detail while keeping the impact of different sampling strategies between MODIS and ATSR (and the low number of observations from the latter) minimal. As mentioned above, we have tried different regression types (e.g.,. linear, exponential) with less success, mainly in grid cells with lower fire activity (l 206-207). Overall, we feel that the high coefficient of determination (R2 of 0.97) between ATSR and MODIS justified this approach and have added additional text (l 212-213) where we discuss the spatial variability in the correction factor, mentioning that all grid cells with a high correction factors had a low amount of active fires.

4. *"Our fire correction factor compensated for the lower sampling rates from ATSR over Terra between 2001 and 2011 in all Indonesia (R2 is 0.97)" (l. 200). The authors should better explain their arguments. What correlation was quantified?*

We clarified this statement by explaining that we applied this correction factor to the ATSR data for the whole time series on a monthly time step. The correlation was the coefficient of determination of monthly Terra and corrected ATSR for the period where both datasets were available.

5. *How is the "fraction of daytime fire burning over night" (l. 211) calculated? Is this ratio calculated on a yearly or daily basis? The authors should give more details*
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on their methods.

Following the referee's recommendation we added details on our method in line 231-233. Specifically, we have inserted "To observe the proportion of daytime fire burning overnight we compared the annual day and night fire. Due to data availability, this exercise could only be produced since 2003."

2   Results

1. *Fig. 1: What is the unit: number of active fires per year? Furthermore, I suggest to increase the size of the colorbar and to add ticks in order to make the figure more informative.*
   We modified the caption mentioning that we show the sum of AF between 1997 and 2015. As recommended by the referee, we increased the colorbar size and added ticks.

2. *Fig. 5: It is not clear what is meant by "monthly fires" and "annual fires" in the figure caption.*
   We have modified it to "number of annual and monthly active fire detections" to make it more clear.

3. *Fig. 9: Is it an average over Indonesia? Perhaps this could be specified.*
   The results are the general indices in Niño 3.4 for ENSO and the Indian Ocean for IOD as mentioned in the introduction and added now to the caption

3   References

LADA. Mapping Land Use Systems at global and regional scales for land Degradation Assessment Analysis, 2008.

Margono, B. A.: Mapping deforestation and forest degradation using Landsat time series: a case of SumatraâĂŤIndonesia, 2013.

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