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

Anonymous Referee #1

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General comments

The manuscript presents valuable information on the influence of precipitation on vegetation and peat fires in Indonesia, especially as two datasets each of precipitation and satellite-derived active fire detections are merged to cover the period 1997 to 2015 and thus two very strong El Niño years. While it is generally very well written, the manuscript combines a rather large number of single aspects (combining the datasets to build time series, comparing 1997 to 2015, discussing the full time series, discussing seasonal patterns in precipitation and fire occurrence, correlation of different rainfall accumulation periods to fire occurrence, peat vs. non-peat fires, diurnal fire occurrence, spatial patterns, links to ENSO and IOD), some of which are not treated with the required level of detail.

I would suggest that the authors revise their manuscript, concentrating on the main findings and describing and discussing them in greater overall detail.

Specific comments

Number of fires vs. area burnt. In many cases (e.g. l. 101-102 (Introduction)), the authors refer to the number of fires in a specific area only. Please note that in a peat/vegetation fire context, the area burnt (if available) may be more meaningful or at least a valuable addition to number of fires. In addition, stating the number of fires per unit area may also be helpful for comparing the different areas (e.g. in lines 236-244).

Matching GPCP and TRMM data, dry season definition. Why are only the 4 driest months of the year used for regression (l. 168)? Later it is stated that correlations were low for part of the region due to low variability of the dry month data. Was the regression performed with daily or monthly data? Please report in more detail. Later on, are lines 252-265 referring to the same dry period definition? If no, how was this period defined (daily vs. monthly, consecutive dry days vs. lowest sum of precipitation)?

Combining MODIS and ATSR data. Please add information on how this was achieved in a mathematical sense (linear regression?) How was it possible to compensate for lower ATSR sampling rates (l. 192-203).

Analysis of fire occurrence vs. rainfall thresholds/accumulation periods. In the Introduction, time frames for rainfall accumulation are duly described (l. 207-210). However, the methods for processing these data and combining them with active fires (Results l. 274-293, Fig. 8, Table 3) are not mentioned. More detailed information is needed here as well, as this part of the manuscript is currently not reproducible.

Analysis of diurnal fire occurrence. This aspect is currently present but not well covered in the manuscript, i.e. the main analysis is focusing on night-time data, there are few references to other studies of diurnal fire activity and the sections dealing with this are

rather weak. Additional 10:30 AM data from Terra would have been available but were not used and no attempt for a comparison to meteorological data (which would have to be diurnal as well) was reported. Consider either expanding or removing this aspect.

Links to ENSO and IOD. This is coming up somewhat surprisingly when Fig. 9 is first mentioned in l. 310 (Discussion) although it would be an interesting aspect if covered in more detail and in all appropriate sections of the manuscript.

Technical corrections

l. 53 and onwards: add a space between values and units (e.g. 117,000 km^2)

l. 54 GFED4s This abbreviation has been explained in the abstract; please do so in the text as well.

l. 55 20kgC per m-2, change to: 20 kg C m-2

l. 61 represents, change to represent

l. 70-72 Is it possible to cite a reference confirming this?

l. 91-92 move 'region' in front of the brackets

l. 93 insert a comma after the 2nd citation

l. 98 change 'then' to 'at the time' or similar

l. 98 add 'However, . . .' before 'Fires do not solely occur. . .'

l. 99-100 Giglio (2010) is missing in the reference list

l. 117 Please clarify that you mean extinction of light and not extinction of fires.

l. 123-124 In this context, 1997-98 is not a fire event, but rather a fire season. Also applies to fire years.

l. 134 and further occurrences, also for tables: check if 'fig X' is the correct way to refer to figures.

l. 160-161 I would guess that 0.25° is the final product spatial resolution and not the rain gauge resolution. Please rephrase to clarify this.

l. 170-173 Here you repeatedly report the results of a linear regression as 'correlation'. The correct term would be coefficient of determination.

l. 180 amount of fires: change to number of fires?

l. 185 change comma to semicolon or to 'where'

l. 186 2x 'use' in one sentence

l. 193-195 and elsewhere MODIS data is sometimes called MODIS, MODIS Terra or just Terra. Please harmonize; also applies to Aqua mentioned later on.

l. 209 Build-up of rain sounds inappropriate; how about accumulated precipitation, sum of rain or similar?

l. 215 Wetlands International (2015) is missing in reference list.

l. 220 and 223 Refer to parts a) and b) of Fig. 4 or include the area names in the figure for easier reference.

l. 230-231 Move the naming conventions to the Methods section.

l. 273 A reference to Fig. 7 is made, but as far as I understand Fig. 7 is not showing the data discussed here (120 driest days vs. monthly rainfall).

l. 274 Please add a comma after 'all regions studied'.

l. 310-311 The properties of the two El Niño years could also be mentioned in the introduction.

l. 322-328 Are you sure the years and the reference to Fig. 6 are correct? Years 2005 and 2014 are not shown there and neither is northern Sumatra. If you meant to refer to Fig. 5, the 'monthly fires' line is much too compressed to observe any of the details reported here.

l. 337 Do you mean Field and Shen (2008)?

l. 372-373 How do you define the start of the fire season and is it not related to the meteorological preconditions?

l. 376 Consider rephrasing to: '. . . there were more days with rainfall in 2015 than in 1997.' or similar.

References: some references (usually with URL addresses) have a different formatting/font size (e.g. l. 421) and sometimes the doi is reported differently than for most other references (e.g. l. 446-447). There are some unusual symbols in my PDF version (l. 428 and 467), a comma is missing between doi and year in l. 462 and there is a blank in 'Nino' in l. 532.

Tables 1-3 Please explain the area codes in the table caption or spell them out in the table.

Fig. 1 State what 'active fires' (number of fires detected?) means. What is the white area?

Fig. 2+3 Consider merging those two figures.

Fig. 4 Please consider writing the area name after a), b) etc. in each panel for easier reference. Also, consider if adding a legend and monthly mean temperatures may be helpful for the reader.

Fig. 5 The monthly fire detections are hardly visible in this figure. If this information is vital, consider a different arrangement of the panels or a different plotting technique. Please also add the area names directly in the panels.

Fig. 6 Data from 2006 does not seem to be mentioned in the manuscript. Is this intentional?

Fig. 7 Do you mean monthly sum of precipitation? – Creating averages would hardly be useful for this parameter.

Fig. 8 Please consider reporting the years as 99, 00, 01 etc., if possible.

Fig. 9 What is the data source for this figure? How is 'strongest fire activity' defined? Would it be useful to add sea surface temperature of the El Niño 3.4 region and to show the years 1997 and 2015 that are discussed in the text in greater detail?

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