

Biogeosciences Discuss., referee comment RC4  
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## Comment on bg-2020-476

Anonymous Referee #4

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Referee comment on "Methane gas emissions from savanna fires: what analysis of local burning regimes in a working West African landscape tell us" by Paul Laris et al.,  
Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-476-RC4>, 2021

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Reviewer: Comments on ms bg-2020-476-manuscript-version1

Methane gas emissions from savanna fires: What analysis of local 2 burning regimes in a working West African landscape tell us

### General Comments:

The ms tackles an interesting issue and a globally important one at the same time. Improve estimation of methane (one of the most important GHG) in the fire continent (Africa) is a very interesting study. Moreover, this study will help to improve estimation of methane emitted during different fire seasons in West Africa (with high fire activity). This study is also very important for management purposes, since it is helpful to mitigate GHG emission through the best fire season applying.

The manuscript will benefit from a revision of the plan, data analyses, results and discussion sections. Data analysis section have to be rewrite. I suggest that Fire intensity and fuel moisture formula to be include in methods section. Surprisingly, all the result tables do not include statistical analysis. Statistical analysis must be done and explain in data analysis section. Arguments in this manuscript are based on the comparisons in the table 1, 2 and 3, whereas no statistical analysis have be done. In discussion section, I suggest author to integrate the many important other works undertaken in West Africa savannas on fire ecology in Burkina Faso, Côte d'Ivoire, Togo, ....

The conclusion is too long, you have to keep the main results only.

## Specific Comments:

- Line 19: Among the 97 experimental fires, how many for EDS, MDS and LDS? I suggest the precision of the number of experimental fires considered for methane emissions.

- Line 28: I suggest author to propose this value for the study area as they suggest themselves and it is true that emissions are strongly influenced by the vegetation/fuel type, fire season, weather conditions,...that defer strongly among West Africa savannas.

- Line 119 to 133: this part have to be move in methods section. A resume part could be kept there.

Line 137 and 119: standardize according to the precipitation in your study area; above 750 or 900 mm?

Line 150 to 153: The clear description of vegetation (main tree and grass species, density, savanna types ...) is necessary as emissions depends on it, and as precise by the authors themselves at line 61-62. Moreover, in abstract (line 20) authors suggest that they considered these aspects in their study for better estimation of emissions.

- Move from line 178 to 187 (Plot design) at line 155 (before Data collection)

- Plot design section (line 178-187) have to be clearly describe. How many plots? How many for EDS, MDS and LDS. How many repetitions for statistical purpose? The dimension of each plot for back and head fire? The distance between plots and sites? Is the seasonality define for each site based on long term data, as one site could burn during the EDS one year and during the MDS the next.

- Line 198: Why do the amount of ash is take into account for the calculation of amount of fuel consumed since usually the pre-fire and unburnt fuel are consider. Ash being a part of fuel consumed.

- Line 214: for the 36 experimental fires used for emissions estimation, how many were in EDS, MDS and LDS, back and head fires?

- In all the result section, authors have to based commentary on clear statistical analysis.

Statistical analysis conclusion (for example Tuckey HDS test) could be include in table 1, 2 and 3 (comparison of different parameters between fire seasons). Sections 3.2, and 3.3 are concerned. For example (line 286): the characteristics of the fires vary by season...; the BE increased as the dry season progressed, and elsewhere...this sentences have to be based on statistical analysis showing statistical difference between seasons for BE.

- Line 286: decline BE as you use it for the first time in result section. I suggest to do it in all the manuscript.....(line 305: for MCE...).

- Line 286 and table 1 and 2: The lower fire intensity in MDS plots could be explain by higher total fuel moisture (table 1). But I don't understand that while total fuel moisture content is higher in MDS, fire rate of spread slower in comparison to EDS and LDS, the burn efficiency could be higher in MDS than EDS. Could you explain that result please? May be that is not statistically different? I read your explanation from line 405 to 411 and I'm more confused. At line 409 you argue that during EDS grasses are often too moist to carry a fire, whereas your data showed highest moisture content during MDS.

- Line 334: may be delete the parenthesis.

- Please add dry (1) between early and season at line 374 and 392, (2) between the and season (line 379)

- Line 410: you could add the other important and recent studies on fire characteristics in West African savannas.

Your conclusion have to be reduce please.