

Biogeosciences Discuss., referee comment RC3
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Comment on bg-2020-476

Anonymous Referee #3

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-RC3>, 2021

This study conducts several site experiments using an approach grounded in the burning practices of people who set fires to working landscapes and collect fire-related data in West African Savanna. They find that in the dry season, methane emission factors ranged from 2.86 g/kg to 3.71 g/kg and methane emission densities ranged from 0.981 g/m² to 1.102 g/m². Overall, the results improve estimates for savanna fire emission and have important implications on earth system model development and policy making. However, I have some concerns about the presentations and hope the authors can further improve this study.

My major concern is that the connections between fire emissions and environmental factors are not explored in depth. For example, the study measured simultaneous meteorological conditions including temperature, air humidity and wind speed. How these parameters affect the fire emissions of CH₄? The authors need to plot some figures to show the relationships between emissions and weather conditions, and to identify the possible driving factors determining the differences of emissions at different stages.

To make the results more robust, the author should add more discussion about (1) the possible causes of the differences in fire-related variables at early, mid-, and late dry season and (2) reasons for different change trends among variables in dry season. In addition, the representativeness of the selected two sites and uncertainties of experiment methods need to be discussed explicitly. This manuscript is full of tables, one or more of them can be converted into figure (figures) to make the information more intuitive.

Pay attention to the consistency of tenses in the manuscript. For example, "finds" in Line 22 and "found" in Line 23.

Acronyms should be marked in the main body at the first time, not just in the abstract. For example, the author does not specify what does "MCE" stands for in the main body.

Line 191-195: The unit of I in *equation (1)* is wrong. The unit of product of H (kJ/kg), w (kg/m^2), and r (m/sec^1) might be kJ/m/sec^1 .

Line 272: "12.04% and 3.65% in the LDS" might be "12.04% in the MDS and 3.65% in the LDS".

Line 285: "85.3% to 92.3 to 99.2" might be "85.3% to 92.3% to 99.2%".

Equation 6: What's the differences between CC and BE? How the inclusion of BE will improve the estimate of fire emissions without introducing more uncertainties?