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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "New experimental diagnostics in combustion of forest fuels: Microscale appreciation for a Macroscale approach" *by* Dominique Cancellieri et al.

Anonymous Referee #1

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This study attempt to relate between using parameters issued from small scale testing methods in very specific conditions and their application to describe the burning dynamics of large scale fires. The developed methodology is impeccable and the analysis is well balanced between showing the benefits of the proposed approach and its limitations due to the lack of heat transfer and physiology considerations.

Overall, I think that this study is very valuable for the community but it needs more elaboration, especially since it has already been published in 2014, with the exact figures, methodology and results, under the following: D. Cancellieri, V. Leroy-Cancellieri, E. Leoni, Multi-scale kinetic model for forest fuel degradation, in Advances

in Forest Fire Research, 2014. http://dx.doi.org/10.14195/978-989-26-0884-6_40 URL: http://hdl.handle.net/10316.2/34103

In order to avoid repetition of what is already published, I propose that the authors include novel elements, such as more in depth analysis on the differences between laboratory scale and field scale measurements, or perhaps testing the proposed kinetic model in a CFD code, as it is already suggested by the authors. Other elements can also be added, if they are novel. Only for that reason I consider that major revisions are necessary. Please consider my recommendation in a positive light.

More detailed comments on the manuscript are listed below:

Page 2 (line 8-10): Wind and heat flux conditions can be very similar in FPA and cone calorimeter than in real scale conditions, could you elaborate on how the gap between real scale and laboratory scale tests is significant?

Page 2 (line 15): It is worth mentioning that Dupuy in international journal of wildland fire (1995) measured the mass loss for an intermediate scale fire spread on a tilted table and Mell et al. measured the mass loss for a single Douglas fir tree in Combustion and Flame (2009)

Page 2 (line 28): The last sentence is incorrect as numerous publications by Morvan, Mell, Rochoux and others reported back on the use of kinetics models implemented in physical models and compared to field data.

Page 3 (2.1 samples): In the field experiments, were the samples living fuels? Is there an estimation of their fuel moisture content? It would be valuable to at least mention it, since, the evaporation process is not included in the model.

Page 5 (2.3.2 experimental and meteorological conditions): Was there any measurement of the flame height or of the heat flux received by the sample? This is important in order to relate to real scale and laboratory scale fire conditions. Page 5 (2.3.2 experimental and meteorological conditions): I understand the purpose of placing the

samples at the edge of the fuel bed. However, placing the samples in the middle of the fuel bed would have provided more realistic fire conditions, such as more radiation from the back of the flame front and more induced wind. This could have significant impact on the temperature and mass loss curves at t>550s. What there any other technical limitations for choosing this configuration?

Page 7 (Figure 5): Could you add more explanation on the significance of the first small peaks that are reached around 480-510sec? Do they represent local ignitions? Are these small peaks included in the “straight line” described line 7? Is this simplification overlooking the influence of evaporation process on the mass loss, especially for pine? Page 8 (line 18), There is a typographical error in the equation. Apostrophe to be removed

Page 9 (line 25): The authors highlight the importance of taking into account the physiological nature of species and to integrate them in CFD models. This is the exact same conclusion from the authors study in 2014. Could the author provide results or even guidelines on of the implementation of this model in a CFD code?

Page 9-10 (Conclusion): What it the conclusion on the similarities and the differences between laboratory and field experiments? Mass loss and temperature can be measured in laboratory as well, why aren’t they compared?

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