

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

Anonymous Referee #2

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The paper is devoted to mass loss measurements of three natural fuels under laboratory (TGA, DSC) and field (custom made setup) conditions and subsequent calculation of thermokinetic parameters using an approach developed earlier. The authors raised a very important problem of scale effect on thermal decomposition of fuels; however, I did not find any discussion of the problem and comparison of their results with the literature. I also find the description of the methods and presentation of the results to be somewhat insufficiently detailed and clear. The English language requires some polishing as well. Nevertheless, the results are interesting and have a potential to be published in the peer reviewed journal. Therefore, I recommend a major revision. Specific comments are given below.

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The shape of the fuel sample, as well as its “biological structure”, will significantly influence its thermal degradation. Two samples with different number of twigs will burn differently. What was the exact procedure of selecting samples for field experiments, what was the number of twigs and leaves? This also will effect TGA results. As the sample was 5 mg, did it contain only crushed leaves, or twigs as well? If yes, what was the proportion? All of this must have significant effect on the thermal degradation of samples. Full description of the sample preparation procedure should be added to Section 2. Also, after reading the paper it is not clear to me if only one field experiment or several were conducted as all the results are presented as a single measurement. There are no confidence levels and comparison of repetitions.

The authors should add more analysis and discussion to the results. Why wasn't the difference of MLR between the experiment and the simulation for pine significant compared to other species? Why MLR of pine two times slower than those of Rockrose and Heather? What is the difference between the obtained kinetic parameters and those found in the literature with regard to multi-scale approach?

The authors should highlight throughout the paper that the obtained results are applicable for surface fires. More intense fires will give different heating and mass loss rates and can result in a mismatch between experimental and simulation results. It would also be worthwhile describing limitations of their approach.

Additionally, I have the following minor comments: 1. The abstract needs to be rewritten. Specific results and conclusions should be added. 2. Section 2.1. A picture of samples needs to be added 3. It's better to move Fig.1 to the beginning of section 2.3.1 4. Page 4, lines 21-23. It is not clear where the thermocouples were located, at the end of the tube or mid-height of the fuel brunch? 5. There is no reference to Fig. 3 in the text. 6. Page 6, line 16. Temperature units need to be changed to K. 7. Figure 4. Axis ticks are needed on temperature axis. It is also hard to see them on other axes. 8. Figure 5, Table 1-3. It would be worthwhile adding confidence levels. 9. I would recommend merging Fig. 5 and 6. 10. Table 3. A column with relative or absolute

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errors needs to be added.

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