

Rebuttal Letter to Anonymous Referee #1

In the present Letter, we report in *italic* the report by the Referee and in Times New Roman our reply.

Authors present a physical parametrization of a model developed by one of the authors to include random processes into operational fire spread models as a post-processing scheme. These random processes include mainly fire-spotting, but also turbulence. Authors applied this scheme to wildfire spread models based on the Level Set Method. The topic of the paper is well suitable for the journal, and of current interest as wildfires are increasing concerns in the research community in the context of climate change. The organization of the paper is correct. The state of the art included in the introduction is complete and the bibliography used is updated. I suggest revising also the following paper: Calculation of Spotting Particles Maximum Distance in Idealised Forest Fire Scenarios José C. F. Pereira, José M. C. Pereira, André L. A. Leite, and Duarte M. S. Albuquerque, Journal of Combustion, Volume 2015 (2015), Article ID 513576, <http://dx.doi.org/10.1155/2015/513576> In this section, there is a minor typesetting error in line 33 of page 2, no of the them...

We have included the suggested reference in the introduction where other approaches are reviewed. In particular, where approaches based on LES are reported. The typo has been corrected.

Section two is a resume of the mathematical model that is more deeply described in previous works of one of the author.

Section three is the main part of the article, where the physical parametrization is detailed. To make it easier to read and understand we suggest including a notation table. Does U represent the meteorological wind?

In the revised version we have included a table with symbols.

In section four, a more detailed description of the experiments is required, for example the simulation area size and the computational cost of the experiments.

The required information on the simulation set-up are included, and the computational costs are reported in the section "Code availability".

Why the turbulent diffusion coefficient is assumed to be $0.15\text{m}^2\text{ s}^{-1}$? Sentence of line 15 in page 8 should be detailed with data and/or references.

At the end of section 3, we have included a more detailed estimation of the value of the diffusion coefficient.

Section 5 deserves more attention. We suggest an improvement on figure 1,

top panel by adding intermediate contour lines between 25 and 60 min.

We have included intermediate contour lines.

In this top panel are considered both, turbulence and fire-spotting? The parameter β_e is an interesting idea to evaluate the effective increase in the burned area but, we found that the sensitivity of the model to the wind speed, fire intensity and firebrand radius is not complete with the experiments developed. A global sensitivity analysis should be performed in order to a comprehensive study of the physical parametrization of the model.

We did not include a general sensitivity analysis as required by the Referee. The main reason is that such work is the subject of an other paper in preparation and next to submission. We intend to upload it in arxiv.org before the end of August 2018. Actually, the sensitivity analysis to input parameters and the uncertainty quantification on outputs were performed by A. Trucchia during a 6-months periods at CERFACS, Toulouse, France, in collaboration with M. Rochoux. The description of the adopted methods, comprehensive list of figures and the discussion of the plots needed many pages, hence we think that such analysis deserves a separate paper.

In conclusion section, sentences between line 20 and 25 in page 10 raise doubts. When the wind speed or fire intensity is high, ROS is higher, and the fire front quickly achieves secondary fires, so β_e could be smaller, but maybe this does not mean that the firebrands fail to cause new ignitions. When is measured β_e in figure 2?

The referee is right. We changed that explanation.

With the improvements suggested, the paper can be accepted.

We hope the Referee considers the revised version properly improved and deserving publication.