

Response to editor comments

Thanks for your additional comments on our article for publication in ACP. We have undertaken a targeted revision of our results and discussion sections to better elucidate the fire behaviour related aspects of the emission factors. You quite rightly point out that the CO emission factor for heading fires is quite high when compared to our FTIR data. We only included the FTIR data for illustrative purposes and were not presented for detailed comparison as the fuel moisture content and fuel load were different for this experiment.

Our revisions have focussed on clarifying the behaviour of the heading fires, in particular the extensive period of smouldering combustion that is associated with these fires especially after the fire has ceased forward spread. For a heading fire, the period of flame only combustion is very short, typically about 30 seconds, which is then followed by an extensive period of increasingly smouldering dominated combustion until there is no flaming combustion at all. Emission factors applicable to real heading fires cannot assume flame only combustion as this would very rarely occur (it is predominantly a mixture of flaming and smouldering combustion). On the next page are some stills extracted from video of heading and backing fire experiments, illustrating the changes in the combustion phase over the life of the experiment. The bottom line here is that smouldering is a dominant combustion phase in a heading fire.

We understand the need for a sensitivity analysis of the placement of our sampling manifold; however, to undertake such a task is beyond the scope of the current work. We have further expanded the discussion of potential sampling biases and put these in the context of the associated fire behaviour observed in these experiments. We have inserted two new Figures - one detailing the MCE time series stratified by combustion phase and one detailing MCE for one experiment by percentage area of fuel bed that is smouldering. These results, while not satisfying the need for a sensitivity analysis, at least provide some insight into the results we obtained from the study, particularly those concerning high CO values from heading fires (as discussed above) which we believe is a real result and not a sampling artefact.

We have changed the colour scheme for flanking fires in all the figures to make them more readable.

We hope that these revisions meet with your satisfaction.

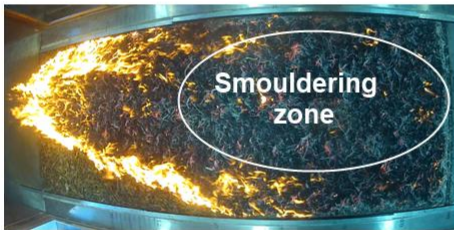
Heading fire: 1 minute



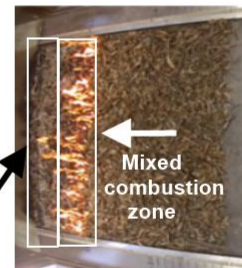
Backing fire: 1 minute



Heading fire: 2 minutes



Backing fire: 6 minutes



Wind direction in all experiments

Heading fire: 3 minutes



Backing fire: 11 minutes



Completed combustion ash zone