

## ***Interactive comment on “Hydrometeorological conditions preceding wildfire, and the subsequent burning of a fen watershed in Fort McMurray, Alberta, Canada” by Matthew C. Elmes et al.***

**Matthew C. Elmes et al.**

elmes.matt@gmail.com

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Thank you for taking the time to review our manuscript. We found the comments very helpful and have no serious issues with them. Please find our responses to your attached comments below.

Regards,

- Matthew Elmes, et al.

Introduction/Discussion: It would be useful for the international reader, particularly when considering those who may read it in future years, to set the Horse River fire

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into the wider context of burning in this wider region. I.e. some lines on ignition sources, area burned, burn depth and duff fuel consumption observed in other fires and years in this region. You could also state the evacuation need and financial losses that made this fire so high profile (e.g. <http://www.abc.ca/bc/resources/media-centre/media-releases/northern-albertawildfire-costliest-insured-natural-disaster-in-canadian-history>).

- These are very good points, and we agree that some more context would be appropriate for those who may not be fully aware of the significance of the fire. We will add more context into our next version.

Methods: a) Burn depth was assessed based on survey data from well stick-up (length of PVC above ground surface). This is a little unclear. Would PVC length not have been potentially affected by burning? Is DOB determined at monitoring sites not affected by the fact that organic soils may have been somewhat compressed/disturbed compared here. Have there not been other systematic ground surveys of DOB?

- To be more specific, we compared our pre-burn ground surface (top of pipe elevation – depth to ground) to our post-burn ground surface (top of pipe elevation – depth to ground). It is important to note that we completed DGPS surveys in the fall of both 2015 and 2016, so even though the pipes burned, we were able to determine burn depths by comparing surveys. We will make sure we describe this in better detail in the next MS version.

b) Hydrometeorological data averages have been derived from 1996-2016 and are compared to 2015/16 data. Would it not be more meaningful to compare the 2015/16 situation with the average of the preceding period rather than including it when calculating the average?

- Yes this would make more sense. We found it important to identify where the four most recent high-burn years fell within the 20-yr historical record. However, when comparing the 2015-16 winter temperatures to the average, it would make more sense to compare

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it to 1996-2015. We will change this for the next version.

Discussion/Conclusion: These sections have been phrased very carefully and are fully supported by the data. To strengthen the implications of the work, however, it would be very useful to provide a quantitative estimate of how frequent the synchronisation of these hydrometeorological factors may be in this region. What is their likely return interval under current and perhaps even future climatic conditions in this region?

- Considering this synchronization has happened four of the past 20 years. It would suggest that our current recurrence interval would be every five years. However, it would be difficult to quantify how this will change in the future given the uncertainties regarding climate change. We can only speculate that it will become more frequent, and any actual predictions may be outside the scope of the paper.

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