

## ***Interactive comment on “Wildfire impact on Boreal hydrology: empirical study of the Västmanland fire 2014 (Sweden)” by Rafael Pimentel and Berit Arheimer***

### **Anonymous Referee #1**

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#### Reviewer Comments

This is a review of the manuscript entitled, “Wildfire impact on Boreal hydrology: empirical study of the Västmanland fire 2014 (Sweden)” by R. Pimentel and B. Arheimer. This is the first version of the manuscript I have evaluated. In their manuscript the authors describe an observational study which uses remote sensing and hydrologic gage information to evaluate the hydrology impacts of forest fire in the boreal forests of Sweden.

The manuscript has strong points. The topic of forest fire effects to watershed hydrology is important to science and society, although has not been explicitly evaluated at

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the watershed scale. The authors use pre-fire and post-fire remote sensing and hydrologic data to interpret the broad scale impacts of forest fire to hydrological parameters using two experimental and two “control” watersheds. Although the study is generally sound, there are a few issues which need to be addressed in order to ensure the study can be compared to other studies and that confounding factors not be confused in the interpretation of results. I have listed the broad issues below and the compact listing of technical corrections (of which there are many) in the comments of the PDF version of the manuscript. Please refer to the commented PDF manuscript for detailed comments.

The following issues need to be addressed:

1. There are many English language grammatical errors throughout the manuscript. Please use first person and active voice throughout the manuscript. I tried to make suggestions throughout the manuscript to improve the grammar but my comments are by no means exhaustive.
2. Throughout the manuscript the authors imply that the forest fire removed 100% of the forest canopy within the burned area, however this is very rarely the case. It is important the authors more accurately describe the severity of the fire and define the % loss of the forest canopy within the research watersheds or some equivalent information which directly addresses the proportion of forest canopy burned and density removed by forest fire.

For example, the two burned experimental watersheds are supposedly different severities (intensity was used in text but I think you mean severity). Although this is never explicitly defined. How do you define the parameters which distinguish the “High Affected Catchment” from the “Mid Affected Catchment”?

3. The influence of burned forest to earlier snowmelt is attributed primarily to the opening of the canopy (interception and evapotranspiration), which is probably the first order influence. However when discussing influences of burned forests on snow hydrology

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parameters, it is important the authors discuss the “albedo effect” of burned forests darkening the snow pack surface which in concert with increased solar radiation drives a doubling of net snowpack shortwave radiation (Gleason et al., 2013).

4. In the discussion, the authors lump all forest fire effects together as though it is the same as forest harvest/clear Authors lump all forest fire effects together as though it is the same as forest harvest. There are many things going on here which should be separated 1. loss of forest canopy = less interception, 2. loss of forest canopy = increased solar radiation, 3. burned forest remains = darker snow albedo.

4. Also, there is no evidence that dust has anything to do with forest fire effects on snow hydrology, therefore omit discussion of dust and Painter et al 2007 citation. Although the darkening of snowpacks by dust is a different darkening phenomenon that may be worth discussing in a different sentence, it has nothing to do with forests or forest fires in snow dominated watersheds. Be clear about what you are attributing for the changes you observe.

5. I am concerned about glossing over any statistics or examination of the inter-annual variability within the pre-fire vs. post-fire periods and how this may be due to the discrepancy in duration of data availability and of data sources. Please include more explicit information about the climate variables and their impacts in the experimental vs. control watersheds.

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-387/hess-2018-387-RC1-supplement.pdf>

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-387>, 2018.