

## ***Interactive comment on “Impact of bushfire and climate variability on streamflow from forested catchments in southeast Australia” by Y. Zhou et al.***

### **Anonymous Referee #1**

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#### Overall

This is an important and relevant topic that deserves consideration. However, for a paper that focuses on the impact of fire on a forested catchment, there is little consideration of the impact of fire on the hydrological processes that are affected by fire. For example, it is well documented that depending on the fire severity, there is a change in the infiltration rates of the soil, due to, amongst other factors, burning of the organic matter in the topsoil which may result in a hydrophobicity of the soil. This may then result in an increase in surface overland flow. It is such factors that may describe some of the discrepancies between modelled and observed streamflow. These factors are

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identified as “climate variability” in this paper which may not necessarily be the case. This has been briefly acknowledged in the conclusion section of the paper (P4418L26 to P4419L1), but not adequately enough. In the methodology, it is stated that “changes of catchment characteristics are primarily due to vegetation changes ( $\Delta Q_{veg}$ )”. I do not believe this is the only factor contributing to the change in streamflow. Where assumptions are used, these need to be well backed up. Therefore, I do not think this work should be published until major revision has been done and/or the reason for not including fire induced changes are well justified and backed up by suitable references. If these factors are considered, then the conclusions will be strengthened.

#### Specific comments

P4398L13 – remove the word “model” i.e. . . .simulated runoff, not . . .model simulated runoff.

P4398L17 – you mention ET and interception. Interception is an evaporative process and is part of ET (total evaporation). Therefore, remove interception.

P4398L20 – change “reasonable” to “reasonably”.

P4399L3 – remove the word “natural”

P4399L5 – change to “. . .the capital of the State of Victoria”

P4399L10 - add the word “are” after bushfires.

P4399L10 – add the word “and” after SE Australia.

P4400L14 – change the word “greater” to “more”

P4400L14 – change “essentially endorsed” to “agreed with”

P4400L24 – add the word “the” before trunk.

P4400L26 – add a comma after However.

P4401L18 – be consistent with the spelling of “modeling” and “modelling”. Both are  
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correct, but choose one spelling and be consistent throughout the document.

P4402L5 – change “usefully” to “successfully”

P4402L10 – change “parameter” to “parameters”

P4402L14 – add the word “on” before the word streamflow.

P4402L21 – this is the first time that you mention the three models that you are using (i.e. AWRA-L, Xinanjiang and GR4J). Therefore, you need to reference the authors/developers of these models here.

P4403L13 – add a reference to the statement “the ash stands were all regrowth originating from the 1939 bushfires (reference)”.

P4403L17 /18 – reword the sentence “it is assumed. . .fire-killed ash”.

P4403L24 – change “significant percentages” to “a significant percentage”

P4404L2 – remove the word approximately.

P4404 – The data used for the calibration and validation of the GR4J model in Table 6 is not discussed in the data section (i.e. section 2.2). Please include this.

P4404L23 – change “are resulted from” to “as a result of”

P4405L8/9 – you mention that the changes of catchment characteristics are primarily due to vegetation change. However, as this is a paper about the impact of fire, the impacts thereof on the soil hydrophobicity due to burning of organic matter and the changes this has on the infiltration etc. also play a role in the changes in streamflow. This is not accounted for in this paper and is a major shortcoming of the methodology.

P4405L15 – change “second” to “secondly”

P4405L16 to19 – Further to the point made previously (P4405L8/9), it is stated that the models are only driven by climate variables. Therefore, if this is true, then the models do not take physical catchment characteristics into account and cannot account for the

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changes due to fire.

P4406 – give the references for the models in each of the model descriptions.

P4407L1 change “. . .in the year 1980. . .” to “. . .in 1980. . .”

P4407L12 – vegetation not vegetations

P4409L15 – insert the word “enough” after the word robust.

P4409L23 – add “a” before the word reduction.

P4409L24 – you mention interception and evapotranspiration as separate processes. However, interception is an evaporative process and is part of evapotranspiration. Evapotranspiration means the same as “total evaporation” which includes ET = transpiration + interception + soil evaporation + open water evaporation). I think you mean a reduction in interception and transpiration (as these are both canopy dependent processes).

P4410L4 - insert “the” before 1983.

P4410L7 – Is the “vegetation cover change” due to different species (pioneer species) being introduced? Please be a bit more specific in describing “vegetation cover change.

P4411L20 - insert “the” before 1983.

P4411L25 – insert “to” before the word “vegetation”

P4411L29 – insert “the” before Xinanjiang model

P4413L12and13 – change the sentence to “In the first 15yrs after the bushfires, . . .”

P4414L12 – change sentence to “All four of these catchments have a long. . .”

P4414L15 – Why is only the GR4J model used for the parameter transposability experiments. This needs to be fully justified or else do this with all three models.

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P4414L18 to P4415L23 – this section is under the “discussion” heading, but is really a description of the results in Table 6. It would fit better under the “results and discussion” heading.

P4415L24 – Change sentence to “A caveat to this is that. . .”

P4418L5 – change the word “sketchy” to “limited”

P4418L19 – once again, there is a separation of interception and evapotranspiration. See earlier comments.

Fig 1. Please add what the Roman numerals i, ii, iii and 1v represent in the figure caption.

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