

We thank the reviewers for considering our manuscript and our responses (in blue) to their comments (in black) are provided below. One will note that we have implemented most of the major changes suggested by the reviewers. In the few cases that we did not agree we explain the reason. We believe the revision process has improved the clarity of the manuscript.

### **Responses to major comments (M.C) of reviewer #2**

**M.C1:** In particular, some kind of in situ or other reliable LAI data comparison should be included rather than solely concluding from GLASS datasets. The claimed improvement is not enough. If, for some reason, this particular study area has limited data, then why were these watersheds chosen for the study? It would be easy enough to pick watersheds in the same general region that do have some flux observations.

The main objective of this paper is to investigate the impact on VIC modelled runoff of using different LAI input data – in this case mean monthly LAI and observed monthly LAI. To achieve this objective we need spatially distributed LAI data across the entire catchment, not spatially and temporally limited point LAI estimates. Since GLASS is a spatially distributed LAI dataset, with a long period of record (31 years), it is ideal for the purposes of our study. It is known that the benefit of using in-situ, or flux tower, observations would be to verify the quality of the GLASS LAI data set at a limited set of locations. However, this verification would be of limited value due to the mismatch in spatial scales between GLASS and in-situ LAI values.

No change to manuscript.

**M.C2:** The manuscript would be more valuable if the authors used multiple data comparisons or theory to explain the observed differences between monthly LAI and long-term mean monthly LAI. The extent of improvement of the VIC model simulation can be understood if more LAI data are compared. As it stands, the result does not provide any explanation behind the computed outcome.

Again we re-emphasise the main objective of this paper is to investigate the impact on VIC modelled runoff of using different LAI input data – in this case mean monthly LAI and observed monthly LAI. We were not seeking to explain differences in monthly LAI relative to long-term mean monthly LAI, although these could be due to fluctuations in soil moisture state, evaporative demand, phenological cycles and/or timing of planting or harvesting. We do not believe additional LAI data will improve understanding as the LAI used are sufficient to investigate the impact on VIC modelled runoff of using different LAI inputs.

No change to manuscript.

**M.C3:** Do the two products differ systematically by land cover, vegetation parameters? Long-term mean monthly LAI not improving the model output, why that might be? The authors may combine Results and discussions to demonstrate complete story of the outcomes.

The objective of this paper is to investigate the impact on VIC modelled runoff of using different LAI input data – in this case mean monthly LAI and observed monthly LAI. The GLASS LAI data is the only LAI data set used here. Mean monthly LAI were calculated from the GLASS monthly LAI data. The ‘two products’ are from the same data set (GLASS).

In the modelling exercise the land cover and VIC non-LAI vegetation parameters are kept the same and only the LAI input data varies.

We thank the reviewer for suggesting combining the Results and Discussion sections, but we think keeping the sections separate helps the reader easily understand the complete story.

No change to manuscript.

**M.C4:** The methodology is not solid. Consideration of the observed LAI fed model estimates as reference is not appropriate. Rather observed streamflow can be taken as reference to see the improvement of both monthly LAI and long-term mean monthly LAI.

This issue was also raised by reviewer #1. Please see our response to their comment M.C1, where we outline the changes to the manuscript to address this issue.

**M.C5:** The authors decided to title specified for model performance and simulation of streamflow during drought, however, the manuscript assessed with the findings for both wet and dry climate. How do you justify the conclusion of the paper to the title?

This issue was also raised by reviewer #1. Please see our response to their comment M.C3, where we outline the changes to the manuscript to address this issue (remove drought from the title).

## **Responses specific comments (S.C) and questions of reviewer #2**

**S.C1:** Please replace “variable infiltration capacity” with Variable Infiltration Capacity in the manuscript.

Agreed. We will replace variable infiltration capacity with Variable Infiltration Capacity.

**S.C2:** Page 10519/Line 3: In most cases canopy storage (mm) in VIC is estimated as 20% of the LAI (Dickinson, 1984). Please explain.

Agreed. An explanation for canopy storage being 20% of the LAI value will be added to the text.

**S.C3:** Page 10519/Line 4: Replace “(Deardoff, 1978)” with “Deardoff, 1978”

Agreed. We will replace Deardorff with Deardorff, 1978.

**S.C4:** Page 10520/Line 4: Replace a.m.s.l with above mean sea level (AMSL)

Agreed. We will replace the acronym of above mean sea level (a.m.s.l) with above mean sea level (AMSL) in all places it appeared.

**S.C5:** Page 10522/Line 12-16: Repetition of lines (Page 4 Line 26): Delete

Agreed. We will remove redundancies in the revised manuscript.

**S.C6:** Page 10523/ Line 19: How vapor pressure and solar radiation are used as input in the VIC model? Please explain

Agreed. An explanation that VIC uses the Penman-Monteith equation to estimate potential evapotranspiration will be added into sub-section 3.1.

**S.C7:** Page 10529/ Line 13/14/16: Sect. 4.2.1, Sect. 4.2.2, and Sect. 4.2.3 does not need to be mentioned if not included in the manuscript.

Agreed. We will fix the sub-section numbering in the revised manuscript.

**S.C8:** Page 10529/Line 24: In terms of Nash-Sutcliffe ... for all catchments. Please provide explanation.

Agreed. We will modify the sentences in the revised manuscript.

**S.C9:** Page 10530/Line 8: The observed monthly LAI ... showed some bias. Please provide explanation.

Agreed. We will modify the sentences in the revised manuscript.

**S.C10:** Page 10532/Line 7: Replace “develop” and “connect” with “are developed” and “is connected” respectively.

Agreed and will do.

**S.C11:** Page 10533/Line 7: Replace “(Zhang at al. 2009)” with “Zhang at al. 2009”

Agreed and will do.

Tables and figures:

**S.C12:** Table 2/3: Please include units if available.

Partially agree. We will include the parameter units in Table 2, but not Table 3 as the units are now available in Table 2.

**S.C13:** Figure 2/4/5: Increase the font size of the labels

Agreed and will do.

**S.C14:** Figure 3: What is the significance of placing VIC model parameters “X” before stream flow simulation “Qsim” and “XLAI” after Qsim for successive simulation in the schematic diagram? What is XLAI stands for?

Agreed. We will revise figure 3 in the revised manuscript.