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 #1

M.C1: There is a flaw in the method. Comparing with the model fed with LAI climatology, the model fed with the observed LAI does not show significant improvement in term of streamflow simulation. The streamflow estimated by the model fed with the observed LAI was then taken as ground truth (synthetic streamflow) and any difference departed from it was taken as error. This is not right because the estimates from the model fed with the observed LAI are not observations. It is not surprised that no significant improvement is found for long term simulation. The year-to-year variability of LAI affects mainly the simulation at the seasons with extreme low or high LAI. It may be useful to assess the effects at some special season or year, rather than compare the overall performance in a long period.

Our apology for causing a mix-up between the two different tasks in sub-section 3.4 of the methodology. In the revised manuscript we will divide the old sub-section 3.4 into two sub-sections (3.4 and a new 3.5) so that the distinction between the two tasks is clearer and the basis of the synthetic methodology is more clearly explained. In sub-section 3.4 we have tested the sensitivity of the model predictions to including the inter-annual variability in the seasonal LAI pattern. We have made comparisons against observed data. The model is calibrated against observed streamflow twice, once using the observed monthly LAI and once using the climatology (mean monthly) LAI. The performance of the model for these two calibrations will be assessed against observed streamflow in validation mode. The results of the model performance are listed in Table 4.

In the new sub-section 3.5, we will describe and employ the synthetic methodology that removes the impact of errors in data input and model structure. This methodology is used to assess the difference in model performance between observed monthly LAI and mean monthly LAI once model structure and data input errors are removed.

We will revise the manuscript accordingly and discuss the seasonal change in streamflow simulated from using observed monthly LAI or mean monthly LAI. We will also revise Figure 5 to show box-plots of the difference in modelled runoff using the two LAI inputs for each month to show in which seasons the effect on modelled runoff is the largest.

M.C2: The difference in NS efficiency (4-25%) cannot be interpreted as the systematic improvements due to the use of observed LAI.

The revised methodology section (new sub-section 3.4 & 3.5) will clearly explain the basis for this analysis and conclusion, which will clear up this misunderstanding.

M.C3: The title says the simulation of streamflow during drought but there is basically nothing essential about drought in the text. The interpretation of Figure 5 mentions a little about drought but it seems the figure cannot directly support the arguments about the prolonged drought. It is hard for me to identify the underestimation or overestimation, arguably corresponding to wet and dry periods, in Figure 5. More solid evidence should be shown to support the link between drought and LAI and the related model performance change.

We agree that drought in the title was confusing and will remove it. The title will become "Effect of year-to-year variability of leaf area index on Variable Infiltration Capacity model performance and simulation of streamflow".

M.C4: All the selected 13 sub-catchments lie in the south part of the basin with annual precipitation of 659-1407 mm. However, the paper concluded the largest effects are found for pasture. It is understandable that pasture is generally in semi-arid area where LAI largely affected by precipitation. Previous studies also suggest year-to-year variability of LAI has large effects over arid area. Why this study selects the humid areas only (with annual precipitation more than 600 mm)? In the arid area, the linkage between drought and LAI would be stronger. It may be useful to take a look at the semi-arid area.

We agree that including a catchment from a more arid part of the catchment will make the story richer by providing a broader understanding on the effect of using the two forms of LAI information in different climate region. Unfortunately streamflow data from the semi-arid part of the catchment are unable to be modelled satisfactorily with VIC. To respond to the reviewer's suggestion in the revised manuscript we will include one catchment (number 14 in a revised Figure 1) with lower mean annual rainfall (526 mm) and higher PET (1132 mm) than the other catchments. This catchment has an aridity (dryness) index value > 2, which is the most water limited catchment of the 14 catchments.

For catchment 14 the use of mean monthly LAI degraded the Nash-Sutcliffe model performance by 12.9%. The performance of model calibration and validation for catchment 14 is low due to poor representation of runoff generation mechanisms and soil moisture processes (Kalma et al., 1995; Western et al., 1999).

Responses to specific comment (S.C) and questions of reviewer #1

S.C1: Page 10523, line 13. Normal University of Beijing should be Beijing Normal University.

We will replace Normal University of Beijing with Beijing Normal University. Thanks

S.C2: Please revise the statistic NSE may be NSE (%) in the equations.

Thanks for noting. We will include the percentage sign in Eqn. 1 and 2. NSE (%) and log NSE (%).

S.C3: Page 10527, how to change the mean annual LAI? To change the monthly LAI at the same proportion?

We agree with the suggestion of the reviewer to include the proportional change in monthly LAI for the sensitivity analysis. The sensitivity analysis description will be modified to include the following sentences. "*A sensitivity analysis was also conducted using a variety of levels of mean monthly LAI. This was done by calculating the sensitivity of the hydrologic response of the study catchments for different proportional changes (+/-10%, +/-30% and +/-50%) in the mean monthly LAIs from the observed base line period (1982 – 2012) while all other inputs were kept constant.*"

S.C4: Page 10529, section 4.2, line 13-16. I cannot find "sect. 4.2.1", "sect. 4.2.2", and "sect. 4.2.3" in the manuscript.

In section 4.2, the sub-section numbering was incorrect. We will correct the sub-section numbering to Sect. 4.2, Sect. 4.2.1, Sect.4.2.2, and Sect. 4.2.3 in the revised manuscript.

S.C5: Page 10531, line 3 The arguments in section 4.5 are not directly supported by Figure Please revise the figure and interpretations.

We will revise the manuscript accordingly and discuss the revised Figure 5.

S.C6: Page 10533, line 15. I cannot find “Fig. 7c”.

Our apology for error when citing figure 6. We will replace Fig.7c with Fig 6c. Thanks

S.C7: Page 10533, line 24 “: : :mean monthly LAI : : :” or “: : :mean annual LAI : : :”?

Agreed. We will replace mean annual LAI with mean monthly LAI were appropriate to remove confusion.