Intro paragraph:

The manuscript *Modelling glacier mass-balance and climate sensitivity in a context of observations: applications to Saskatchewan Glacier, western Canada* addresses the research question of glacier mass balance modelling with sparse observations and the applicability of reanalysis climate model data to simulate glacier mass balance and its sensitivity to future climate. The authors break down the components of the surface energy balance to understand the sensitivities of glacier mass balance to future climate scenarios represented by the IPCC RCP scenarios. The modelling work in the manuscript have previously been used but the novel aspects of their work assess how a continental mountain glacier will respond to a warmer and wetter/drier climate future. They use the case study of Saskatchewan Glacier and aggregate several in situ datasets to calibrate and validate their model results.

The handling of the precipitation gradient remains a concern for the study as they use off glacier precipitation data and over smaller elevation range to derive their precipitation lapse rates. However, considering the limitation of in situ data, the authors do a good job on constraining their errors and discussing the limitations of outlined methods. Overall, the manuscript adds progress to reconciling glacier mass balance with sparse and in consistent datasets combined with remote sensing data to achieve holistic results of the future of mountain glaciers in a warming climate.

General Comments

-Throughout the manuscript there was no mention of handling of inversions for the calculated lapse rates from the AWS on the glacier and from the permanent weather stations. Is this due to the authors not finding the occurrence of inversions in their study area. Please add in the discussion the implications of inversions in the calculated lapse rates.

-Elevations of the permanent weather stations barely covers the elevation gradients over Saskatchewan Glacier. The authors do a good job of discussing this and pointing out that the higher elevation above 2900 m represents only 8% of the accumulation area and therefore has small impact on the overall simulated mass balance. But it remains a weakness of paper. In the discussion it would be prudent to compare results of precipitation downscaling from other studies such as Jarosch et al. 2012 to understand if more complex methods would better resolve precipitation trends for a further justification of the use of a statistical downscaling method.

-Presentation of the results between fixed and dynamic glacier mass balance results remains unclear throughout the manuscript. Earlier on when discussing the topographic data, it should be mentioned the negligible effect of the conventional glacier simulation and therefore only the reference mass balance simulation results are presented for final glacier mass balance results.

Specific (Line by line):

Title: Modelling glacier mass-balance and climate sensitivity in a context of observations: applications to Saskatchewan Glacier, western Canada -> Modelling glacier mass-balance and climate sensitivity in a context of sparse (or limited) observations: applications to Saskatchewan Glacier, western Canada

Line 19: was little -> was a little

Line 120: (ii) should this objective also include the air humidity and albedo feedback as they are the major conclusions of the paper?

Line 89+120: spare -> sparse

Figure 1: Reduce the interval of labeled contours. Increase font size on Fig. 1c legend. It is not immediately clear the location of the air temperature points, since the color of the star is overlapped with the snow survey points – change the symbol of the air temperature point or increase the size of the symbol.

Line 195: Why were the precipitation records from the other five permanent weather stations not used?

Line 209: State the temporal and spatial resolutions of ERA interim and NCEP reanalyse products.

Line 337: te -> the

Line 353: Says depth scales was calibrated with snow depth at AWS but section 3.2.1 does not describe recording snow depth measurements. Although the supplementary material describes snow depth sounding measurements. Clarify where the snow depth measurements are coming from.

Line 358: bias correction -> downscaling?

Line 419: I think this should be from 0 to 7 °C to be consistent with results and abstract.

Line 421: Define GCM at first mention

Figure 5: Are the values correct for relative wind direction on Fig. 5a? If so, why do they vary from the monthly wind directions?

Line 546: Mention the ultrasonic snow depth sounder in section 3.2.1

Figure 6: check the figure caption for correct lettering of figure numbers

Figure 6d: Shows the limitations of the precipitation gradient since the gradient derived is not within the same elevational ranges and should be discussed further as per previous comments.

Line 580: Dynamical adjustment explanation should be explained in the methods somewhere between lines 180 and 185.

Line 595: The use of lapsed interpolated should be reworded for clarity to ‘lapse rate corrected’.

Line 611: ‘an even more so ice surface morphology’ reword to clarify if you mean that the surface morphology is more uneven than the snow surface or less uneven.

Line 800: Include that there was difference in elevational ranges used for precipitant gradient compared to the elevation of the Sask. Glacier.

Line 941: The air humidity feedback is one of the main findings from the paper, expand on the implications for glacier mass balance at Sask. Glacier with increasing atmospheric warming from this feedback.

Supplementary Martial:

- ‘Errors in glacier outline delineation were not considered’ Please provide justification for why they were not considered.

-Figure S1: interesting to see Lake Louise precipitation data included here. Did you compare the record with Columbia and Park Ridge to show the variation? Include a few sentences to say why the Lake Louise and other precip record was not included in the study.

----------END OF REVIEW----------