Interactive comment on "Temporal inventory of glaciers in the Suru sub-basin, western Himalaya: Impacts of the regional climate variability" *by* Aparna Shukla et al.

Anonymous Referee #2

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The study by Shukla et al. entitled, "Temporal inventory of glaciers in the Suru sub-basin, western Himalaya ....." provides very useful data sets glaciers in the Suru Sub Basin in Western Himalaya that are very useful for better understanding the status and fate of the glaciers in the Western Himalaya. The data and manuscript quality is good, except that it would require a major revision to make it in the framework of data paper. Currently, larger focus is on the scientific implications of the data, which is not focus of the journal. While authors have also followed standard methods to process and analyse the data, the methods are not unique.

Overall, large amount of digitization work has been done for this study. However, the

Suru basin is a small sub-basin of the Indus river basin, with only 11% of its area is covered with glaciers. So the authors need to substantially revise the manuscript to be useful as a regional representative of Western Himalayan glaciers. Considering the unique scope of the journal, it would therefore, require that the authors to incorporate similar dataset from other distinct basins of Upper Indus Basin to make it more regionally relevant.

Few specific comments are:

1. Unlike the Karakoram , the Ladakh Range is not a well known nomenclature. Chudley et al., (2017) have used the Karakoram and Ladakh range, not differentiated about Karakoram and GHR. Mir et al. (2018) have represented it as a part of the GHR. It is therefore, important to define/clarify the same.

2. The accuracy of CRU-TS data is not analysed independently. It is critical as the Fig. 3 data looks bit unrealistic. The temperature data indicate dramatic changes after 1990, which needs to be confirmed. Since India Met Department has long term station data in this region as well as gridded data (http://www.imdpune.gov.in/Clim_Pred_LRF_New/Grided_Data_Download.html), it is critical to check the data consistency and conduct error statistics.

3. Considering the large uncertainty involved in LandsatMSS data, it s important to mention the inherent uncertainties while interpreting the temporal variability. Table 1: include the Scene ID for clarity.

4. Lines 236- 240: The procedures used for determining the glacier boundaries are apparently manual digitization. While this is reasonable to undertake manual processing in such complicated areas, it also necessitates a study of uncertainty estimations in such manual work. Authors may also undertake repeatability tests with different analysts to determine repeatability.

5. Lines 272 – 300: The uncertainty assessment is biased with the very limited field

validation on only one glacier for a very limited time frame. One issue that needs to be addressed is the reliability of ground truth data when different types of data were used through the nearly 50 years time period.

6. Please discuss why the projective transformation was required for the satellite data sets other than Corona?

7. Line 328- 330: Categorization of glaciers - is there a scientific standard for categorizing the glaciers in the different categories or was more based on the author's selectivity? Check DeBeer and Sharp (2009, Journal of Glaciology). Since the data descriptions needs to be internationally consistent, may revise.

8. Statistical significance could be included to explain the effect spatial characteristics (size, aspect, debris cover) or any difference spatial control over LR and GHR.