Open Access Earth System Science Data Discussions

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 #1

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Paper entitled 'Temporal inventory of glaciers in the Suru sub-basin, western Himalaya: Impacts of the regional climate variability' by Shukla et. al. presents an analysis of changes in the 252 glaciers of the Suru sub-basin from 1971 to 2017 using remote sensing data. Paper is well written, interesting and present an insight in the variation of the glaciers of different Himalayan ranges i.e. Great Himalaya and Ladakh range. However there are number of flaws in the manuscript, particularly related to data presentation and interpretation. These flaws need to be addressed. Manuscript needs a major revision.

1. Long-term climate data presentation and analysis needs attention. Page 8, Line

183; Mean precipitation of the SSB for the period 1901-2017 has been 393+-76 mm. However, If we see plots in Figure 3 (d), 3 (c) and 3 (f), monthly mean precipitation for the same period are quite high indicating high precipitation during the same period.

2. Figure 3(a), 3(b) and 3(c) shows continuous increase in the temperature during the period 1995-96 onwards till 2005-06. It shows sudden change in temperature pattern. The reason for the sudden shift in temperature pattern should be discussed. It will be interesting to see the temperature pattern of the IMD recorded data at Leh or any other in-situ recorded data in the study region during the same period.

3. A comparison of the CRU data with in-situ data (temperature and precipitation) in the study region will provide information about the biases in the CRU data.

4. Page 13, Line 339; How authors will explain the mean slope variation of 16.2°+-71° to 41° +- 66° .

5. Figure 4(a) Frequency distribution histogram depicting maximum frequency in the perent area change between 0.52 - 0.97. How it is conclude that majority of the glaciers have undergone an area loss of 3.3%.

6. Figure 5; Majority of the glaciers have undergone length change of 5% is not seen in the frequency distribution histogram.

7. What could be the possible reasons of decrease in SLA in LR glaciers despite of increase in temperature and retreat in glacier length in the region?

8. Page 16, Line 405; there is a large difference in the number of glaciers reported in the sub basin by earlier researchers and reported in the present paper. It needs discussion and possible reasons. Is there any difference in defining a glacier?

9. Page 18, Line 462; statement 'However a sudden decrease in the precipitation anomaly is observed in the year 2016 with an increase thereafter', it is not clear to me that Figure 3(a),(b) and (c) are showing 'precipitation' or 'precipitation anomaly'? Year 2016 is missing in the Figure.

10. Page 18, Line 462-463; statement regarding mean annual precipitation is not clear if I look at Figure.

11. Page 18, Line 463-464; 'temperature and precipitation anomaly' not understood.

12. It is advised to draw a trend line for temperature and precipitation variation in Figure 3.

13. Page 18, Line 466; 'Percentage increase in the average, maximum and minimum temperature observed to be 99, 12 and 17%', generally temperature variation is not shown in percentage. I will give an example, if mean temperature varies from 0.1°C to 0.2°C for one year and next year it drops to 0.1°C again, should one conclude that temperature variation was 100% increasing for the first year and 100% decreasing for next year. Statement will be misleading, since the temperature variation was minimal. If the unit of temperature changes from °C to K, then still the statement will hold good? It is advised not to represent temperature variation in % throughout the manuscript.