Response to the comments from Mingyang Lv, reviewer #2.

This study provides a new quantifying approach to describe the elevation change patterns of glacier surge events, based on high temporal resolution successive DEMs. The method applied to automatically detect the surge elevation signals is inspiring, and its application on large scales would be quite interesting. I recommend the paper be published after the following suggestions are considered by the authors.

We thank Mingyang Lv for their review and feedbacks on our manuscript. We have made all the minor changes suggested, please find below the remaining points addressed. Our answers are in blue.

- About the selected time series
  To better illustrate the elevation change patterns over the reservoir and receiving areas during surge events, I suggest the authors to add more number of typical time series analysis results in the paper body or Appendix.

  We added in supplementary file 6 to 9 time series for each of the analysed glacier, sampled at regular interval (each 5 or 2.5 km) along the selected centerlines.

- About the method
  Start date and end date of glacier surge events are one of key information to describe the surge process. It will be more convincing if the authors add more information about the criterion to identify the start and end dates of these glacier surge events, based on the processed DEM time series datasets.

  The identification is visual, looking for abrupt changes of the elevation time series, we do not propose a measurable criterion in our method. This is now explicitly written in the text. We added these sentences to the subsection 3.4 Methods / Volume transfer estimate : "It is difficult to constrain precisely the initiation and termination of surges. The surge dates (Table 1) are estimated visually from two sources: the pre-filtered timeseries and the interpolated elevation changes. None of these sources permits to be sure of the exact month of start or end of the surge. We estimate the dates from interpolated elevation change (e.g. Fig. 8) when computing volume transfers, such "apparent" dates are less exact but capture the overall mass transferred in our dataset generated. We may also estimate the dates from pre-filtered time series (not affected by filtering and interpolation defects) for information or validation, which permit to be more exact although we are still limited by the number of observations. For example, for the time series in Supplement Fig. A2.a (from the Khurdopin glacier): the surge period estimate at this location from the interpolated time series would be around 2016-06 to 2019-02, and 2016-12 to probably around 2017-10 using trends (but between 2017-06 and 2018-07 due to observations, time series at other locations are required).".

- About the temporal information of the glacier surge events
  In the Section 4.3, the authors used multiple temporal expression formats simultaneously, such as "mid-2014" in Line 234 and "late 2015" in Line 264. According to Fig. 8 and Tab. 1, the start and end dates of surge events are described in monthly units. In order to show the method could realize monthly glacier surge monitoring, the temporal expression formats could better be unified as monthly units.

  As discussed in the previous comment, our approach for dating surges is subjective, and our final dataset is not precise up to the month in a number of situations (artefact, smoothing, diverging trend depending on the glacier's location...). Even with ideal data and for a fast-trigger surge, defining a strict month may not be possible or relevant. Therefore, we use precise dating only for volume transfer calculation, when it is necessary to choose a specific date.

- Figure 2 – in this figure, the orange part is easy to understand, but the blue part is not. The legend of this figure could be improved.

  The figure has been simplified (following the comment of reviewer #1), and the caption should now be clearer.

- Line 254 – it seems like “glacier source” is not a common glaciology terminology, perhaps what you are referring to is “the highest peak of the glacier centerline” or “the top end (head) of the glacier”. Please check it. (also Figure 8)

  In agreement with the comment of another reviewer, we have chosen to go with “glacier head”.

- Table 1 - you may also add the areas of reservoir and receiving polygons for each glacier.

  We added the area of each zone in the table. We will certainly reformat the table in the revised version to make the table clear and make space for uncertainties estimates.

Glacier RGI 7.0 code	Date start [time series]	Date end [time series]	Reservoir vol. change [Surface area]	Receiving vol. change [Surface area]	Imbalance	Data gap [after interp.]
Hispar 21670	2014-01 [2014-05]	2016-09 [2016-06]	-2411 x 10^6 m^3 [106 km^2]	3110 x 10^6 m^3 [48 km^2]	700 x 10^6 m^3 4.55 m	0.6% [0.2%]
Yazghil 21865	2003-07 [2004-01]	2007-01 [2006-08]	-32 x 10^6 m^3 [8 km^2]	63 x 10^6 m^3 [6 km^2]	-31 x 10^6 m^3 -2.19 m	0% [0%]
Khurdopin 14958	2016-03 [2016-04]	2019-03 [2017-07]	-801 x 10^6 m^3 [33 km^2]	711 x 10^6 m^3 [15 km^2]	-90 x 10^6 m^3 -1.9 m	1.4% [0.8%]
Kyagar 14958	2012-11 [2013-10]	2017-01 [2015-12]	-271 x 10^6 m^3 [21 km^2]	267 x 10^6 m^3 [8 km^2]	-4 x 10^6 m^3 -0.12 m	2.4% [0.2%]
Kyagar without artefact	—	—	-228 x 10^6 m^3 [20 km^2]	267 x 10^6 m^3 [8 km^2]	39 x 10^6 m^3 1.33 m	5.6% [0.2%]

Table 1 of the manuscript, with the new field « Surface area ».

- Table 2 - the Product ID and Acquisition Time of reference DEMs may be added to Appendix.

  We added a corresponding table in appendix, and reference it at the beginning of the 5.1 subsection : “We use SPOT5 HRS and SPOT6 DEMs generated by Berthier and Brun (2019), and along-track HMA DEMs (Shean, 2017) ((list in Table S2 of the Supplement)).”.

- Figure 10 - the labels of points TSa-c should be indicated in both Fig. 6 and Fig. 10.

  We added the labels in Fig. 10. We did not changed Fig. 6, as the labels (a-c) are already the same as TS(a-c), we did not write exactly TS** for conciseness and clarity.