General comments:

Shangguan et al. provide a case study on multi-decadal elevation change on Inylcheck Glacier in central Tian Shan. The paper analyses elevation changes for a time period between 1974, 2000 and 2007 using digital elevation models derived by digital photogrammetry from declassified Heaxgon KG-9, ALOS PRISM and SPOT-5. The freely accessible DEM from bi-static SRTM C-band shuttle radar mission in 2000 is also included. As a local study the presented work is certainly of interest for the detected elevation changes. Inylcheck Glacier has been subject to various previous studies and still is. However, in a general view it does not contain a high innovation content; in particular the velocity and area change data are not really new. While the paper presents some interesting results and analysis on the ice elevations, there are various points that need clarification and more attention. The paper is difficult to read and the structure might be improved to better guide the reader (sometimes one gets lost in too many details and almost misses the overall picture). The authors should best use the dates and time intervals throughout the paper rather than mixing with the sensors and DEM differences. The derived surface velocities are not well linked to the elevation changes. So the frontal change and surface velocities are there but no real use is made out of them. The paper requires in particular a thorough English language proof reading and grammar check. A much better quality could have been achieved if the co-authors would have done a respective revisions instead leaving this to the reviewer. Considerable rephrasing is mandatory and in some aspects more specific formulations should be used. The current wording is sometimes misleading; commas are consistently omitted. Some of the graphs require editing in order to improve readability. The links on the graphs are often wrong. In the current form it is not suitable for publication and needs a second reviewing process.

Specific comments:

P2574L9: ... showed strong velocities ==> change to showed high velocities

P2574L10: I do not really understand this sentence – is it stagnant, then it does not flow or it flows at low speeds towards Lake Merzbacher

P2574L11: Better rephrase: The northern branch of Inylcheck Glacier advanced by … while the southern branch continuously retreated since 1974 (* km^2).

P2574L16: ALOS PRISM

P2574L21: „A possible thickening … and a clear thickening“ - reword to e.g. indication for a thickening have been revealed …

P2574L25: „... possibly due ...“ - in the following text this is not stated as possible, but attributed as surge

P2574L28: As it is, the sentence describes a relation between glacier velocity and debris coverage. The sentence is not clear.

P2575L8: ”... glaciers shrank also ...” – also to what?

P2575L13: “In addition, glaciers in Central Tian Shan are polythermal ...”, backing this statement by observations or a reference would be adequate.

P2575L17: rephrase this sentence, very complicated formulation and difficult to understand

P2575L19: “Glacier mass balance ...” - the authors most likely refer to surface mass balance and should consider the terminology of the UNESCO glossary throughout the manuscript.

P2575L23: Refer also to Kääb et al., 2012: Contrasting patterns of early twenty-first-century glacier mass change in the Himalayas, Nature 488, 495-498.

P2575L15: ALOS PRISM, SPOT-5 HRG

P2576L1-5: Refer to Fig. 1. Locate mountains/glaciers referred to in the text in Fig. 1.

P2576L1-14: Please clarify the relation between glaciers in the Ak-Shyrak Massif etc and the IG.

P2576L4: mass descriptions should be expressed as m a^{-1} w.e.

P2576L26: ELA, please introduce any abbreviation first

P2577L5: The sentence is not clear. Do you mean 1500 to 2000 m ^{3}/s?

P2577L7: Please provide a quantitative reference for the velocity measurements (e.g. Li et al; Hagg et al.)

P2577L8: It should be Merzbacher Lake not Merzbacker Lake

P2577L10: Please mention Aksu River in Fig 1.

P2577L22: estimated or assumed?

P2577L24: “The mean annual temperature is about -7.7°C ...” - do these values refer to one or a mean of the weather stations? Please provide a clear location and elevation, otherwise it's a useless statement. Please indicate in Fig.1

The methods section is very extensive and might be shortened particular in regard to data description. On the other hand important facts like penetration depth and coverage of the different DEMs are not addressed sufficiently. Many number on accuracy and errors should be backed by references.

P2578L20: Perhaps it would be appropriate to state the official error by the processing teams and error values by other studies. Gorokhovich et al. (2006) might not be the most appropriate reference for such high mountain ranges as the Tian Shan.

P2579L1: This statement is true in all cases. Surface conditions, firn structure and moisture content are important for the penetration depth of radar signals. Hence, this statement is to general and the authors need to address the penetration issue in more detail, in particular, as it may contribute differently to the error term in different elevations and glacier facies.

P2579L14: B/H. Please also explain for non-photogrammetrists

P2580L13: “... lines of demarcation ...” - this terminology sounds a bit strange and the reviewer never came across it for a glacier outline – sounds more like a line under political dispute or border line for a property.

P2580L21: One might doubt that a glacier boundary can be identified on a sub-pixel level manually. Hence, at least an error of 30m should be assigned for Landsat TM/ETM+ multispectral imagery.

P2580L27: “Finally, ...” - the study is not at its end yet. It is unclear how the authors come to their overall error. Please provide a basis for the computations from the uncertainties of the individual outlines to the overall error budgets.

P2581L13: How was this accuracy assessment done? What are the results? How do the values translate into m/a^{-1} used as in the graphs. Removal of unsound values is not an accuracy assessment! The errors given are probably overall error. One might suppose that the errors depend on the contrast and features in the image. Please give more details also on the settings of the tracking, window and step size, signal-to-noise ratios, etc.

P2581L25: How was the Hexagon DEM generated? Give more details, what is the overall quality, are there regional quality differences (s. figure)?

P2582L6: The last sentences needs to be stressed much better in the abstract and conclusions. The coverage of the HEXAGON image strongly limits the entire analysis since elevation change values for the entire glacier are partly inter-/extrapolations. e.g. Tab 2

P2582L11: reformulate “... match relatively well to each other ...”, be precise and give a mean and median error.

P2583L6: The difference between x-band and c-band is NOT the mean penetration! You measure the penetration difference, since also X-band has some penetration depending on surface conditions! X-band SRTM also has a better resolution, was this considered? How can no penetration be assumed in the debris-covered part? What were the DEM differences in ice&snow free flat areas? How was the uncertainty of radar penetration finally estimates?

P2583L22: Tab.4 does not follow a clear structure and needs more description in the text. Why not just showing differences, before after registration + yxz of the GPS points. It is a bit unclear for which DEM after coregistration the values refer.

In total the error budget / estimation needs improvement and clarification. Although the authors tried to give considerable detail – they miss to draw a clear picture nor they provide clear computations or a synthesis. Is there a difference made between the error assigned to the DEMs and an error resulting from the extrapolation to uncovered areas. How a re spatially variable errors addressed (see figures with DEM differences where those are obvious)

P2584L15: It remains unclear why glacier flow was derived. What contribution to the overall analysis did it provide? Since the two flow fields look quite similar a difference map could have pronounced the changes better.

P2585L13-26: It would be clearer to present all values of elevation changes for each period in Tab. 6. Please provide surface lowering/thinning data as negative values throughout the whole manuscript. Why did you mostly consider the DEM differences from SPOT-KH9, which obviously covers the smallest area. Is there

any synonym for ‘significant’ or at which level are the observed elevation changes significant? Did you test for this? How was the extrapolation on the entire KH0-SPOT5 area done?

P2585L15: I wouldn’t say ‘overall thickening’, because actually the whole glacier thinned between 1975 to 2007. It would be easier to follow the logic of this sentence when it would be divided into two.

P2585L17: Figure 5 is not referred to in the text. The Figures should be presented in a chronological order.

P2585L21: Do you mean Table 6? The period 1974 to 1999 is not listed in Table 6! Could you please explain why you use the difference derived from SRTM-KH9 here and not SPOT-KH9 as above? It is hardly reproducible.

P2585L22-23: Please refer to Tab. 5 and Fig. 4. The sentence does not clarify that your assumption of a surge event results from glacier thickening and advance. Could you also provide surface velocities for this period?

P2586L8: Do you mean Fig. 3?

P2586L9-11: The altitudes mentioned in the text are not clearly identifiable in Fig 6. This makes the text very difficult to follow and unclear. It also remains unclear how the areas not covered by a DEM at the respective data are considered/compensated (==> should have been addressed in the method section).

P2587L18: Which information?

P2587L20: What is the difference (dates, image, processing techniques) of Nobakht et al. (2011) and the results here? Both seem to have used Landsat and ASTER data. Splitting this sentence in parts would also be a good idea.

P2587L23: A velocity rate would be velocity/time hence a de-/acceleration, but the units indicate velocities.

P2587L23: Unclear what is meant. Please verify logic of the sentence

P2588L1: Is there really calving observed and how can a velocity be assigned to calving? Reference to Fig.5 is unclear here as the resolution does not allow any identification of velocities near a lake. Indicate the location in the graph.

P2588L20: an altitude higher than…

P2588L26: Geodetic mass balance is meant ==> again, keep terminology clear. Please give some reasoning for the use of a comparably high sensitivity.

P2589L18: “This result …”, the statement by Paterson & Cuffey (2010)? clarify

P2590L2-6: reduced glacier flow, you did not mention any indication for a reduction of flow speeds nor did you measure this. The link to englacial conduits remains unclear.

P2590L16: The conclusions read more like an abstract – please provide real conclusions and impacts of this study. The last sentences are not clear at all.

The quality of the figures needs to be considerably improved. Often the legend cannot be read or even the entire figure.

Fig.1: It is difficult to differentiate the different DEM coverages. Locations and place names are missing! Needs complete rework. Scale bar is cut to the edges.

Fig.2: Why only SRTM and SPOT? You also address ALOS PRISM, similar figures would be helpful at least in a supplementary file

Fig.3: Legend and dates cannot be read. Arrows for flow direction cannot be identified. Figure is kind of useless as is. Since ice dynamics are only a marginal objective and do not reveal substantial new information in regard to other papers, consider revising the figure for velocity change or better integrate the velocity information in the paper.

Fig.4: Again of bad quality in print. Lines cannot be identified well, place names (Merzbacher lake) missing. Scale bar needs improvement.

Fig.5: Very small, impossible to read numbers/legend in a printed version. There are sometimes obvious offsets on slopes also on ice free areas (same magnitude as changes) that are not discussed in the text (a, b). In particular in panel (b) the large elevation increase in the northern ice free area north of the glacier is striking – same magnitude as the elevation change on the glacier. Please explain in the Text. It gives the impression that the quality of one of the DEMs is very heterogeneous and should not be described by one single error value.
The entire glacier is not covered, but hidden by the legend in all panels. Place names are missing.

Fig.6: Too small to read numbers well. Scale to same axes. Use the same elevation bands/intervals in order to allow a comparison. Headings are strange.

Fig.7: Cannot be read. Needs magnification. Caption needs rewording (sentence should not start with “And…”).

Figure 6/7: The different periods in the figure can not be identifies - which were equals which time period?