

Interactive comment on “A Close Observation to a Typical Continental Valley Glacier Surge in Northeastern Pamir” by X. Yao et al.

Anonymous Referee #2

Received and published: 14 June 2016

A brief summary This is an interesting submission that presents a surge-type glacier in Northeastern Pamir based on field surveys and satellite images. This paper presents developments of its surface features by a glacier surging. The results are presented clearly and are worthwhile publishing. However, I have reservations about the interpretations of surging process. My broad comments are as follows:

1. The development process of glacier surging should be based on surface features and the surface velocity. Authors showed temporal changes in flow speed along the profile using an offset-tracking method with satellite SAR datasets in the supplemental figure. Please add temporal velocity maps and evaluate its uncertainty. I would recommend that authors revise the development of glacier surging based on changes in the surface velocity and surface features. Also please summarized characteristic of this surging (e.g. the timing of initiation/termination, the duration of the active phase, peak

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speed). Which method do you use to convert the offsets to the surface velocity? (e.g. Mattar et al., IEEE TGRS, 1998) The SAR offset-tracking method generates displacements along the line-of-sight and the platform direction. An assumption is needed to convert these offsets to surface velocity from one path pair (an ascending/descending pair).

Mattar, K.E. et al., 1998. Validation of alpine glacier velocity measurements using ERS Tandem-Mission SAR data. *IEEE Transactions on Geoscience and Remote Sensing*, 36(3), pp.974–984.

2. The volume section seems to be few useful to this manuscript. I agree with another referee comment. I would like to recommend that authors might remove the volume section.

3. I would recommend that the authors modify figures. For examples, you should change font/line/marker color and size in Figure 1 and 3, which are difficult to read. In figure 2, how to determine the bed/surface profile and the transverse profile before/after surging? Is there any field measurement or reference for these profiles?

4. Please use a general terminology for surge-type glaciers (e.g. Grant et al. 2009; Jiskoot, 2011)

Grant, K.L., Stokes, C.R. & Evans, I.S., 2009. Identification and characteristics of surge-type glaciers on Novaya Zemlya, Russian Arctic. *Journal of Glaciology*, 55(194), pp.960–972. Jiskoot, H., 2011. *Encyclopedia of Snow, Ice and Glaciers: Glacier Surging* (p415-428), Springer.

Less major comments are as follows:

L60-61: “In the southeast... Kungai Mountains.” These are shown in Figure 1. I recommend removing these sentences to spare space.

L63-64: Please add “the Gez active fault” on Figure 1.

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L64: “, and its active” -> “. This fault”

L98: “(a), (b) and (c)”. Add “Figure 1”. As mentioned above, you should changes font size and color in Figure 1. These are difficult to read.

L119-135: Please modify this paragraph. It seems to be difficult to understand what the authors explain.

L187-189: “the subglacial flow...”. How to measure this reduction? Englacial hydrology is an important factor of glacier surging. If possible, please add details.

L206: “the low velocity glacier”. Please indicate the speed of the glacier flow.

L228-229: “distance 1-11 km, velocity 0.15-6 km/day”. Please add references.

L262: What is a stability coefficient? How to calculate it?

L266: What is “the critical glacier coefficient”?

L266-268: Why these factors are capable of inducing a surging? Multivariate analyses only indicate that a surge-type glacier tend to have a wider width and a longer length.

L316: “From weather station” -> “From a weather station”

L328-332: Which mechanism is responsible for surge triggering of the examined glacier?

L342: “the burst of ice lakes”. Do you mean “GLOF (Glacier lake outburst flood)”?

L366-368: These are general characters of a surge-type glacier.

Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2015-235, 2016.

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