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Interactive comment on "Revealing glacier flow and surge dynamics from animated satellite image sequences: examples from the Karakoram" *by* F. Paul

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This is an unusual submission that contributes more to the literature than is necessarily apparent at first glance. First, it highlights that small and debris-free glaciers also surge - most recent studies on surging in the Karakoram focus on large and often debris-covered glaciers because they are easily identified in medium to coarse resolution satellite imagery. Second, it gives some useful information on surge return periods, which is generally lacking for this region (although historical reports and papers are relatively untapped I suspect). Third, it emphasises that surging glaciers are difficult to integrate into studies of climate-glacier coupling, and recommends they are

excluded from such analyses. Therefore, despite this paper not conforming to a 'normal' research article, I would be pleased to see it published, and only have a handful of relatively minor comments that I hope will improve it.

P2598

Line 10: 'might help to demonstrate'... I think you can be more certain and remove the word 'might'.

P2599

Line 9: 'what is going on' is probably better phrased as 'morphological changes' or similar

Line 26 delete 'these days'?

P2600

Line 6 (and elsewhere in this paper): probably 'surface lowering' is more technically correct than 'down-wasting'

P2601

Line 1: remove the word 'basically' and replace with 'and'?

Line 4 (and elsewhere in this paper): if possible it would be better to remove references to yourself e.g. 'to my knowledge'

Lines 11-12: I think you can remove this last sentence. Why would you publish a discussion with only initial perspectives?

Lines 14-15: should 'and including' have commas before and after?

P2603

Lines 9-11: can you label and refer to these four glaciers in the appropriate figure?

P2604

Lines 11-13: do surge velocities really overlap with those of non-surge glaciers? Not in my experience...

Lines 22-25: I'm not sure you need to include this analogy - suggest removal

Line 26 onward: I'm not sure I follow this sentence. Are you saying that one glacier has a 30 yr quiescence and 2 yr surge whereas another has a 15 yr surge and a few yrs quiescence? Perhaps you can word this better? On another matter, is the 15 yr advance really a surge? Or is it simply an advance? I'd suggest the latter given those timescales...

P2605

Lines 1-9: Here you are touching on the fact that glacier surges cannot be neatly pigeon-holed. I think you should state this, and leave it at that, rather than suggesting a new 'Karakoram surge type' - fundamentally, many surges in the region do not conform to your description (so the term would be misleading), but also there are more 'types' than we could ever find categories for.

P2606

Line 2:'supra-glacial' does not need hyphenating

Section 3.6: I'm not sure this section adds anything and think it should be removed

P2608

Lines 2 and 12 and elsewhere: do you show us surface elevation data anywhere? I think you have to be careful assuming that because the glaciers are small, they are steep. Probably you are right, but your data do not show it.

P2609

Line 25: Why 'finally'? Is this a hangover from a previous draft?

Section 4.4: I'm also not sure this section is really required. It is background (method-

ological?) information

P2611

Line 26: probably worth clarifying they are out of phase 'with one another'

Figure 1: The regional map is poor - can you digitise something rather than use this map product? And zoom in more to focus on the HKH belt? The underlying image needs a scale-bar, and could be presented in colour?

Figure 6: needs a scale bar. And can you cross-reference this image to Figure 2? Also, why do you choose 2004 imagery for these figures? Can you not use some of the (radiometrically improved) OLI imagery that has no striping?

Supplementary

I strongly suggest you insert a time-gap at the end of every loop, as it takes a good few seconds or longer to work out where the first and last images are in each sequence. And perhaps slow them down? Or provide two speeds - one slower one for orientation (training of the eye) and the second at full speed? Given you put these forward for educational purposes, you need to make sure that the inexperienced viewer can follow what is happening for themselves. A scale-bar wouldn't go amiss on the images either...

Interactive comment on The Cryosphere Discuss., 9, 2597, 2015.