

## ***Interactive comment on “Satellite monitoring of glaciers in the Karakoram from 1977 to 2013: an overall almost stable population of dynamic glaciers” by R. M. Brahmhatt et al.***

**Anonymous Referee #2**

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Review of "Satellite monitoring of glaciers in the Karakoram from 1977 to 2013: an overall almost stable population of dynamic glaciers"

by R. M. Brahmhatt et al., submitted to The Cryosphere

Brahmhatt et al. analyzed glacier changes in the Karakoram using satellite time series. They found that the majority of the glaciers remained stable between 1977 and 2013 based on the investigation of termini position changes. They present area changes of stable, retreating and advancing glaciers covering several time periods. The authors identified some surge-type glaciers based on annual area changes. The work is of general interest to the region, however some considerable shortcoming are

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obvious. The authors do not manage to resolve contrasting findings of previous studies as stated in the introduction (P1558L24) nor are their methods really new as stated (P1557L20). The three examples of surge-type glaciers are very well known from literature. The present study does not make the novelty of the findings clear and its impact for glacier research in the Karakoram. The analysis shown has been included in previous publications that have been cited by the authors. The authors do not make clear where their advance in regard to these studies emerge besides that they provide area changes and not only frontal changes (e.g., Rankl et al., 2014; Copland 2011; Scherler et al., 2011). The resulting pattern of stable, advancing or retreating glaciers is basically the same. A more profound analysis in regard to glacier types would be required. The discussion lacks any relation to previous publications and do not place the authors observation into a large context. Substantial new conclusions are not made. The presentation of the material must be considerably improved. In particular the maps from Fig. 7-13 cannot be read in the present version. The connection made of surge-type glaciers to climatic changes need to be reconsidered. Unfortunately, the sentences are sometimes misleading and grammatically incorrect. The paper needs a thorough English proof reading and a revision of the structure.

Detailed comments: P1557L18: Gardelle et al. (2013) did not use gravimetry for their measurements. P1558L2 and below: the citation is not correct. It should be Mayer et al. (2004) has carried out... P1558L11: it should be 'area changes' P1558L18: I don't think that all the data on glacier inventories, velocities etc. are available in GLIMS. P1558L20ff: It is not really clear what the satellite images were analyzed for. What was the goal of this study? P1558L23: Please make clear what is new in your study in regard to previous ones P1560L18: Although your glacier mapping was done by one author only, it might be influenced by subjective errors. This kind of error is not eliminated by choosing only one person who does the mapping. I think your interpretation of Raup et al. (2014) might be misunderstood. P1565L20: Reconsider the wording 'deglaciation/glaciation' for describing retreating/advancing glaciers, respectively! P1565L23: What is described here, are the surges of the tributary glaciers into

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Panmah/Nobande Sobonde Glacier. It has been already studied in detail by Hewitt (2007). The main trunk glacier is called Panmah Glacier and it was already there and not formed out of the surging tributary. P1565L22-27: The examples of surging glaciers described here are all well known from previous literature (e.g., Bhambri et al., 2013; Hewitt 1998, 2007; Copland et al., 2011 etc). P1566 Discussion: The discussion section does not really discuss the results. It looks more like a collection of assumptions on the behavior of different types of glaciers. The section repeats findings of previous studies without referencing them. P1567L18: It is very common for surge-type glaciers to retreat in their quiescent phase. P1568L9: Where are the new results? Table 2: The periods of investigation differ from these mentioned in the introduction (P1558L21). Figure7: reconsider using a stretched color bar in order to show the distribution of 3 discrete classes in the map! What is the difference between red and orange pixels? Figure 17: It would be nice to see the location of these glaciers in an overview map.

References Bhambri R, Bolch T, Kawishwar P, Dobhal DP, Srivastava D and Pratap B (2013) Heterogeneity in glacier response in the upper Shyok valley, northeast Karakoram. *The Cryosphere* 7(5), 1385–1398 (doi:10.5194/tc-7-1385-2013) Copland L, Sylvestre T, Bishop MP, Shroder JF, Seong YB, Owen LA, Bush A and Kamp U (2011) Expanded and Recently Increased Glacier Surging in the Karakoram. *Arct. Antarct. Alp. Res.* 43(4), 503–516 (doi:10.1657/1938-4246-43.4.503) Gardelle, J., Berthier, E., Arnaud, Y., and Kääb, A.: Region-wide glacier mass balances over the Pamir-Karakoram-Himalaya during 1999–2011, *The Cryosphere*, 7, 1263–1286, doi:10.5194/tc-7-1263-2013, 2013 Hewitt K (1998) Recent Glacier Surges in the Karakoram Himalaya, South Central Asia. *Am. Geophys. Union Hewitt K (2007) Tributary glacier surges: an exceptional concentration at Panmah Glacier, Karakoram Himalaya. J. Glaciol.* 53(181), 181–188 Kääb A, Nuth C, Treichler D and Berthier E (2014) Brief Communication: Contending estimates of early 21st century glacier mass balance over the Pamir-Karakoram-Himalaya. *Cryosphere Discuss.* 8(6), 5857–5874 Mayer, C., Lambrecht, A., Belo, M., Smiraglia, C., and Diolaiuti, G.: Glaciological characteristics of the ablation zone of Baltoro Glacier, Karakorum, *Ann. Glaciol.*, 43, 123–

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131, 2006 Rankl M, Kienholz C and Braun M (2014) Glacier changes in the Karakoram region mapped by multitemporal satellite imagery. *The Cryosphere* 8(3), 977–989 (doi:10.5194/tc-8-977-2014) Raup, B. H., Andreassen, L., and Bolch, T.: Remote sensing of glaciers (Chapter 7), in: *Remote Sensing of the Cryosphere*, edited by: Tedesco, M., Wiley, ISBN: 9781118368855, 123–156, 2014

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