

## ***Interactive comment on “Ice flow velocity as a sensitive indicator of glacier state” by Martin Stocker-Waldhuber et al.***

**Anonymous Referee #1**

Received and published: 3 May 2018

It seems that the authors have more data and ideas that what was included in their initial submission. I then look forward to read a revised version including a deeper discussion of their results and their implications.

Authors asked some clarifications about some of my comments. See below:

Seasonal velocity “It actually is not clear if the above comment suggests to skip or to extend the topic.” Right now, the analysis of seasonal velocity variations seems disconnected from the rest of the analysis. I indeed suggested to skip it except if seasonal fluctuations are helpful to understand the multi-year velocity trends.

Ice sheet velocity “The question why in general flow velocity is an interesting parameter seems to be rather obvious, so that this part could be skipped – correct?” The impor-

C1

tance of measuring velocity variations should be explained I think but I suggested to restrict the text to mountain glaciers and remove the ice sheet / ice stream part. (land terminating glaciers around the ice sheets are relevant though)

Jacob et al./Gardner et al. “With a clear focus on mountain glaciers, this discussion is out of scope.” Not necessarily. Both papers (Jacob et al., 2012 and Gardner et al., 2013) indeed deal with mountain glaciers (together with ice caps). I just meant that the Gardner et al. study is a more comprehensive assessment because in situ measurements, laser altimetry and Grace data are used and compared.

Repeat measurements of stone position with a tape “The initial position (x,y) is revisited with DGPS and used as starting point for the tape measurements ending at the stone.” Given this response, then the next question is: why using a tape and not directly two DGPS positions if you bring a GPS in the field (i.e. measured the location of the stones each year with a DGPS)?

Tranverse Velocity “Maybe you could give us some additional hint on the expected depth of the answer” This is rather the choice of the authors themselves. If they have some data showing velocity variation across the profiles (transverse) I think they are worth reporting (for example the 80% mentioned below could be useful to report). Is the reduction in speed similar all across the profile for example? Is the 80% ratio stable with time? There are not that many tranverse velocity profiles published.

Specific mass balance “So do you suggest to change specific mass balance in glacier wide specific mass balance? i.e. not divide by area? Or just rename specific mass balance in specific glacier wide mass balance? ” I was not 100% clear about what “specific” was. So maybe using “average over the accumulation area” is the best option to avoid ambiguity (as Cogley et al., that you quoted in your response, suggested that “specific” has been used in different contexts).