Reviewer 2:

We would like to thank Reviewer 2 for his/her comments. Since the reviewer sent a lengthy letter hereby we will orient ourselves on his/her general comments. We will take seriously all of his/her specific comments that do not require additional discussing (e.g., suggested references, rewriting the manuscript in order to check the spelling and inconsistencies, rephrase the sentences/phrases pointed by the reviewer in order to make them clear). The rest of the comments are addressed separately as following:

General comments:

As it is the case with the other two reviewers, we feel that we need to better stress the novelty of our paper. Here, we will summarize our guiding idea and the main conclusion, but for detailed reading (i.e., in detail motivation, comment on the CPU time differences between the models, comment on the relation to the characteristic aspect ratio) we refer the reviewer to our response to Reviewer 1.

Models based on the SIA capture most of the broad characteristics of valley glaciers, and therefore may be a good candidate for the numerical experiments in which future behavior of a valley glacier is studied. In these type of experiments, careful calibration with a historical record is a necessity. Since such experiments are computer-time costly, models based on SIA are good candidates to test the results of a full-Stokes model.

In this paper, we investigate whether these ideas hold. We compare runs performed with an SIA model with runs of a full-Stokes model (FSM based on the Elmer/Ice code). We focus on the response of bulk glacier characteristics (length and volume) to different climatic forcings. Although there are studies examining general differences between SIA and FSM based on a single forcing function and a simple glacier bed profile (e.g., Pattyn, 2002 and Leysinger Vieli and Gudmundsson, 2004), a study that systematically builds up the complexity of the defined problem by applying several configurations of climatic forcing and glacier bed characteristics has not been performed up to our knowledge. Additionally, we derive and test an equation (Equation 1 in the paper) that allows users of Elmer/Ice code to study glaciers in 2D simulations when glacier width is included. This equation is of great importance because Elmer/Ice code does not have a developed solver that accounts for changing glacier width in 2D set-up.

As the reviewer's comments are mainly focused on the technical details of the study, we would like to emphasize one more time the main point of the paper: the used FSM model shows consistent lag in climate simulations. This raises the question whether a sophisticated ice-flow model, such as the one based on Elmer/Ice code, is capable of correctly simulating a response time of a real mountain glacier or whether a simple SIA model is sufficient (as we stated in the discussion section).

Specific comments:

P.6, L.16: Please note that the length for the large glacier is really shifted by 1 km (and for the small glacier by -1 km). What might be confusing is that it is difficult to notice the correct volume for the glacier after 1 year of simulation. At that time, the volume is no longer 0 km^3 (as it might seem on the figure), but about $0.03*10^{-4}$ km^3. Having that in mind, we believe it is understandable that the length cannot be 0 km (since the calculation for the glacier length depends on the ice height and thus, any grid point that has the ice height >0 is taken in length calculation).

Equation 11: Tau_V is the time at which the volume $V = V_2 – (V_2 – V_1)/e$.

P.7, L.29, P.8, L.3 and P.12, L.24: We would like to thank the reviewer for his/her concern. We will repeat our simulations using higher grid resolution in order to be more accurate in our discussion.

P.8, L.11: We believe that it is important to show the mentioned figures (especially the ones for the length evolution). In these figures, we can see that lengths in SIA and FSM do not respond equally to the forcings and that there is at least 10 years delay in the response of FSM compared to the response of SIA. We find that difference substantial.

P.8, L.20: For clarification, we will overlay a temperature record on the length evolution plot, the same as we have overlaid change in ELA on Figures 2-3.

P.12, L.30: We agree with the reviewer that the attempt to justify high velocity in SIA by bringing into discussion paper by Wangensteen et al. (2006) is unnecessary. We will incorporate the discussion suggested by the reviewer.