

Interactive comment on “Use of an ultra-long-range terrestrial laser scanner to monitor the mass balance of very small glaciers in the Swiss Alps” by M. Fischer et al.

Anonymous Referee #2

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The manuscript by Fischer et al. presents the application of a near infrared long-range terrestrial laser scanning to estimate the surface elevation changes and the mass balance using the geodetic method of five small glaciers in Switzerland. The geodetic mass balance changes were compared, for validation purpose, with the results obtained by a direct glaciological mass balance. The authors assessed the uncertainty and errors of both methods and demonstrated the feasibility of the remote sensing technique to estimate the mass balance. Moreover they highlighted the relevance of studying small glaciers as they can provide important insight into the atmospheric changes. The context of the research is well formulated in the introduction as they reported the main techniques currently used to calculate the mass balance, and they

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highlighted the characteristics, advantages and gaps of the presented methods. The structure of the manuscript is correct, the methods are properly described and executed, and the results are interesting for the scientific community. In my opinion the paper deserves for the definitive publication in the Cryosphere. I include below very few comments/suggestions that could be taken in consideration in the final version of the manuscript. - Personally I consider more easy for reading to report the acronyms of the glaciers rather than the entire name. For example by including their acronym (Glacier de Prapio (PRA), Glacier du Sex Rouge (SER), St. Annafirn (STA), Schwarzbachfirn (SWZ) and Pizolgletscher (PZL), as you reported in the Table 3) in the Study sites section. If you change their name, then you should verify that you change it throughout the whole paper. - Page 7, line 9: I suggest to change "the second point cloud" with "the other point clouds" or "the unregistered point clouds" as one point cloud was fixed (e.g. the 2013 scan) and then the others two (e.g. the 2014 and 2015 point cloud), were co-registered using stable areas. Similar comment at line 12. - Page 11, line 5: Please change "the latter" with " σ MSA". - Page 12, line 7: (Fig. 3). Please add the name of the glaciers as done for Tab. 3, example..., line 10. (Fig. 3, examples for St. Annafirn and Pizolgletscher) - Page 18, line 14. As a first sentence of the Discussion section I suggest to make clear that the average value is for the glaciers measured with both TLS and ablation stakes. - Page 20, line 12: Ins-situ ->in-situ

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