

## Reviewer 1

### General comment:

This paper focuses on advancing methodological approaches to quantifying the contribution of avalanche to mass accumulation at an alpine glacier. It details a comprehensive field programme in challenging terrain, comparing elevation change (via Structure-from-Motion) derived from UAV survey with those derived from time-lapse photography. The authors find that the remote camera data underestimates elevation change on an avalanche cone when compared to UAV derived data. However, remote camera data provide a time-series of change not possible with mission-based UAV data.

The authors describe a robust approach to determining elevation change and convert that change to surface mass balance by accounting for submergence velocity (dynamics and compaction). Field data (e.g. snow density, ablation stakes) are utilised to improve the mass balance estimates, and checks were made between submergence velocity estimates and snow pit/density stratigraphy. The papers discussion is well organised progression logically from discussion of the methods and their limitations through to the process of avalanche accumulation – all sections are well cited.

This is an excellent contribution, providing a robust workflow to improving estimates of avalanche contribution to surface mass balance and at the same time adding to knowledge about how important this secondary accumulation source can be.

We would like to thank Reviewer 1 for their enthusiastic comments on our paper.

### Specific/Technical Comments (minor):

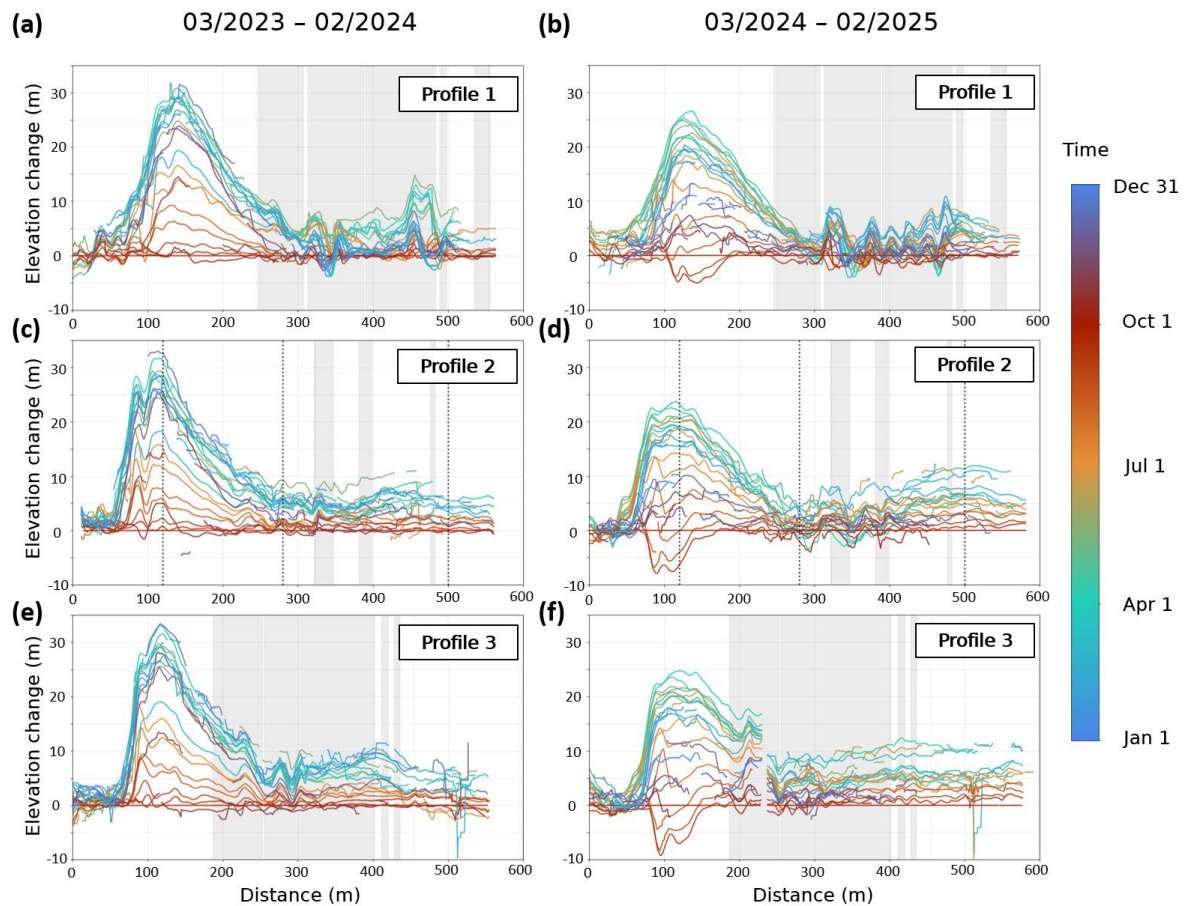
1. In relation to Figure S5, the intra-day repeatability tests, which compare DEMs generated within 48-hr windows, the authors state they expect no change to have occurred. Can the authors confirm these dates are away from any precipitation events and/or radiative heating? As either of these meteorological conditions could stimulate sluffing/deposition onto the avalanche cone, especially during the Nov accumulation time period. It is somewhat difficult to assess the precipitation data shown in Figure 9 against that time-slices in S5.

We confirm that the 48-hr windows selected for the intra-day repeatability tests were away from any precipitation or important melt event. We have added this to the text accordingly (L269-271):

*'These findings are consistent with our intra-day repeatability tests (Fig. S5). Comparing nine DEMs generated within 48-hour windows over which we assumed negligible changes (no precipitation and limited melt)'*

2. Figure 5: On the pdf this appears to be missing a title horizontal axis title

We have added the x-axis title, which corresponds to a distance (in meters), as well as the title of the colorbar (Time). We have also increased the font size of the different elements of this figure following a comment from Reviewer 2.



- Section 4.3.3: Order of content. The time chronology seems a little jumbled in this section making it difficult to follow. Can the authors present the data time sequentially, describing the total precipitation and number of avalanche events for the 2023-24 period and then the 2024-25 period so it is easier for the reader to assess the overall weather/snow conditions between the two field seasons?

We have changed the time chronology of the first paragraph of section 4.3.3 for the precipitation events and avalanches to be described sequentially (L373-384):

*'The two-year study period (March 2023 - February 2025) was characterized by contrasting meteorological conditions (Fig. 9a). There were no avalanche events visible in the summer 2023, which was characterized by only 279 mm of precipitation in June-July-August. The 2023–2024 winter was characterized by a wet November 2023 (161 mm precipitation, 351 mm between November and February), with numerous avalanches. The 2024 summer was wetter than the previous one, with 447 mm of precipitation in June-July-August, which partly fell as snow at high elevation. As a result, avalanches occurred every month from October 2023 to the end of the survey period in February 2025 (Fig. 9b). The start of the 2024–2025 winter was significantly drier than 2023-2024, receiving 235 mm of precipitation between November and February, with also less avalanches.'*