We would like to thank both editor and reviewer for their comments on the revised manuscript. The responses to reviewer comments are shown in blue font, proposed additions and revisions of the manuscript are shown in red font, and any original manuscript text is shown in gray font.

Editor

Dear Dr. Fang:

Please address the comments by Referee #1 on Figure 7 of the revised manuscript. Also change 1.11022e-16 to 0 on x-axis in the lower sub plot.

Response:

Thank you for your comments. We have addressed the comments by Referee #1 on Figure 7 and changed the 1.11022e-16 to 0 on x-axis in the Andes panel on Figure 7.

Referee #1

SUMMARY AND OVERALL RECOMMENDATION

The authors were receptive to the critiques I provided and have delivered reasonable responses to the comments/concerns I raised in my initial review. In particular, they have provided additional supplementary analyses justifying certain aspects of their work (e.g. peak SWE vs. April 1 and March 1 SWE) and more detailed analyses on SWE-elevation relationships in the main text (Section 4.1.2, Fig. 7). As I indicated previously, I think the community will find value in this paper, and it should be published once all outstanding comments are resolved. I offer two final minor corrections/comments.

Minor/technical corrections:

- Figure 7 caption: Please include “a” and “b” in the figure panels and reference “a” and “b” in the caption (as is done in the main text).

Response: Thank you for your suggestion. We added “a” and “b” in the figure panels and in the caption.

- Figure 7 and L. 304-312: The shape of the windward SWE distribution with elevation for Andes-SR is quite odd to me, particularly above 4.5 km elevation, and I think warrants some commentary (currently the discussion focuses only on the lower elevations in the Andes). I can understand SWE increasing with elevation until a certain elevation and then decreasing at higher elevations due to limitations in atmospheric moisture availability (as appears to be the case in the WUS). However, what can possibly explain the increase in SWE from 4.5 km to ~6 km elevation in the Andes? Some physical explanations and/or corroborating studies of this pattern would be helpful to provide some confidence and context, especially since none of the other SWE datasets have values at these higher elevations on the windward side.

Response: Thank you for your comment on the elevational pattern above 4.5 km in Figure 7. The increase in SWE above 4.5 km is likely due to noises arising from limited number of pixels per elevational bin at high elevation. The total number of pixels above 5 km is only 30% of the pixels number between

4.5-5 km. To avoid the non-representativeness arising from small number of pixels per bin, we used roughly equal number of pixels per elevational bin in the revised Figure 7. The revision only slightly affects absolute values of lapse rate. The key results remain consistent that moderate to high resolution (MR/HR) products show closer snow lapse rate with WUS-SR, whereas low resolution products (LR) underestimate snow lapse rate. Thus, downscaling LR products to high resolution using lapse rate will not resolve the issue of underestimation of snow. We revised the content (in red text) as follows with original text in gay:

"Based on the WUS-SR, climatological swe_{peak} on the windward side of the Sierra Nevada monotonically increases up to ~3.5 km. Across different products, the uncertainty of swe_{peak} is smaller at the lower elevation ~ 1-1.5 km, however, the differences in lapse rate project to larger swe_{peak} uncertainty as elevation increases. The gradients of windward swe_{peak} (i.e., d(swe_{peak})/dz) from WUS-SR, averaged over HR and MR products, and averaged over LR products are 0.34~~0~~ m/km, 0.26~~38~~ m/km, and 0.~~1~~05 m/km, respectively. On the leeward side of the Sierra Nevada, the swe_{peak} increases monotonically with elevation from ~ 1 – 3.5 km in the WUS-SR and most of the other products. Similarly, the uncertainty of swe_{peak} is smaller at low elevation from 1 – 2 km and gradually increases with elevation corresponding with the differences in lapse rate across different products. The gradients of leeward swe_{peak} (i.e., d(swe_{peak})/dz) from WUS-SR, averaged over HR and MR products, and averaged over LR products are 0.2~~2~~1 m/km, 0.~~23~~19 m/km, and 0.07~~13~~ m/km, respectively. HR and MR products have qualitatively similar elevational distributions of swe_{peak} on both the leeward and windward side of the Sierra Nevada for elevations below 3 km, whereas that swe_{peak} from LR are underestimated with large differences in lapse rates compared to WUS-SR.

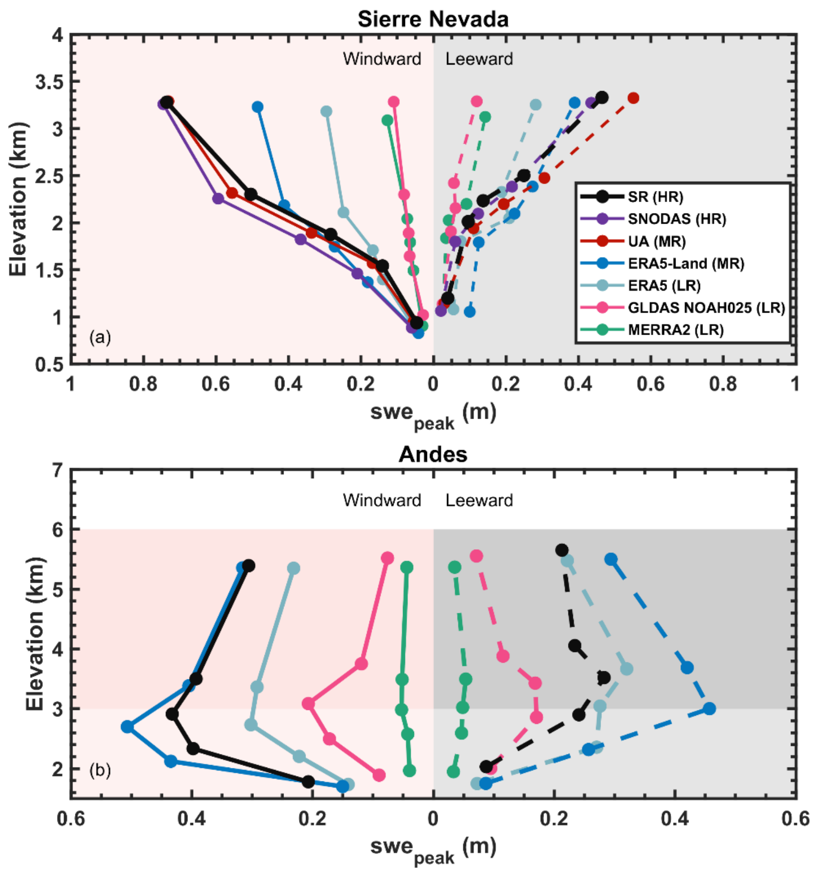

Figure 7. Elevational distribution of windward and leeward swe$_{peak}$ in the Sierra Nevada (a) and Andes (b) across reference datasets and products with spatial resolution higher than 1°. Each dot represents the elevation bin-averaged swe$_{peak}$. ~~The interval of each bin is set to be 0.5 km.~~ The number of pixels per bin is roughly equal. GLDAS products at 1° are not included for comparison due to too few points. On the windward side of the subdomains, dots within the red shaded areas are used to compute lapse rates. On the leeward side, dots in the darker shaded areas are used to compute lapse rates.

On the windward side of the Andes, swe$_{peak}$ from the Andes-SR increases from ~ 1.5 – 3 km, with decreases between 3 and ~~5~~6 km due to the limitation of moisture. The swe$_{peak}$ uncertainty is smaller at low elevation bands between ~ 1.5 - 2 km. The uncertainty gets larger as elevation increases from 2 – 3 km corresponding to large differences in positive lapse rates. In contrast, large differences in negative lapse rates above 3 km reduces the uncertainty as elevation increases. The lapse rates of windward swe$_{peak}$ from the Andes-SR are 0.3~~4~~0 m/km between elevation bands of ~ 1.5 – 3 km and -0.08~~16~~ m/km between ~~2.5~~3 – ~~5~~6 km (Table S1). On the leeward side, swe$_{peak}$ increases between ~ 1.5 – ~~4~~3 km and slightly decrease above ~~4~~3 km in the Andes-SR. Similar to the windward side, differences in positive lapse rate below 3 km project to larger swe$_{peak}$ uncertainty as elevation increases from 1.5 km, whereas differences in negative lapse reduces uncertainty as elevation increases above 3 km. The lapse rates of lee~~wind~~ward swe$_{peak}$ from the Andes-SR are 0.2~~7~~2 m/km between elevations of ~ 1.5 – 3 km, and -0.02~~3~~ m/km between 3~~.5~~ – ~~5~~6 km.

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