The Cryosphere Discussions

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Comment on tc-2021-386

Anonymous Referee #2

Referee comment on "11-year record of wintertime snow surface energy balance and sublimation at 4863 m a.s.l. on Chhota Shigri Glacier moraine (western Himalaya, India)" by Arindan Mandal et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2021-386-RC2, 2022

Review 11-year record of wintertime snow surface energy balance and sublimation at 4863 m a.s.l. on Chhota Shigri Glacier moraine (western Himalaya, India)

The authors present a very clear study on multiple winters worth of energy balance data from a site in the Western Himalaya. They show the consistent importance of sublimation during snow cover times and find results that generally match well with previous studies in the field. The work is very timely and the numbers found here will guide research conducted on the larger scale that is not able to include the process on a distributed scale. The paper is very clearly written, well supported with data and clear Figures that leave only very few general comments from my side which I detail below and which I hope you can address. I have a number of minor comments at the end. I applaud the authors for the field work that this work is based on as well as the clear way of presenting the results. It is important work and I think this should be an important paper in the TC library in future.

General:

In the Discussion I would expect more discussion of the role of cloud cover, which as you note is important but to me has a surprisingly low correlation and obviously wind plays a very different role in these regimes (your Figure 12). Could you compare the relative cloud cover to the other sites, or at least the ones from (Guo et al., 2021; Stigter et al., 2018). Not to cite here as still in review but (Conway et al., 2022) also provides some new great insights in this direction. I would hope to learn here how different I can expect my sublimation rates to be when I work in a different regime of overcast conditions.

Table 2: In text you say max T_a is 0.1, in Table 0.0

Table 4: R2 for u is 0? I am also surprised that CF seems to be more correlated to sublimation in the transition phase than in overcast or clear sky condition. Can that be explained? I would have expected a higher correlation under overcast condition.

L505ff/Figure 15: This is interesting – could you expand here what that means for a potential future change especially of T_air? Also in the text you mention the big sensitivity to T_s, but that under melting condition won't change much. It seems to be equally (or just slightly less) sensitive to T_air though, which likely will change. That seems important to me for future consideration.

Minor comments:

L20: replace 'consequently' with 'resulting in'

L21: ‘largest fraction’ or ‘proportion’

L24: ‘to the region’

L26: sublimation is a variable, not a parameter; remove the two ‘the’ articles

L40: ‘more abundant’

L53: ‘The contribution …is …’

L:57: ‘poorly understood’

L71: Technically it has been applied (Sakai et al., 2004) although they did not term it sublimation and on this debris cover (as in (Steiner et al., 2018)) it is more an evaporative process. But this is a grey area, and at least our attempt to measure sublimation over snow with a pan lysimeter have simply been unsuccessful because they freeze and can’t measure properly. You also later mention the PhD thesis by Yang (2010).

L101: ‘radiation’, no need for a plural here

Table1: The superscript a at the bottom is missing. Also again I would use ‘radiation’ in singular

L134: ‘single-Alter-shielded’

L164: you use ‘net radiation’ here but earlier used net all-wave radiation’. I would go throughout for the shorter version.

L166: The two sentences should be conjoined with comma or you need to restructure syntax

L189f and in general: no need to include [in …] with the units

L229: remove ‘equation by’ or ‘the equation by’

L292: I would leave ‘snow cover’ in singular

L299: does not

L310: maybe rather ‘down to’

L322: ‘such a high contribution’

L336: remove ‘thin’

Figure 11: Nice figure and just a pedantic comment – can you make Tair-Ts instead of Tair_Ts in the axis label? Also you introduce D here but only introduce it much later in the text (L447). Make sure to somehow introduce it earlier, otherwise as a reader I need to go looking forward in the text, which is awkward. The question is though why you show it at all here as it is just the reverse from q-qs – you could consider to just remove the column/row in both subfigures.

L433: ‘restrict’

L453: It is quite clear that D is directly positively related to LE as it is the main part of the equation/definition, so it can’t really be any other way. I would remove this sentence.

L523: remove one ‘in this study’

L525/L540: maybe ‘similar’ or ‘comparable’ instead of ‘identical’

L577: ‘with the major part’

L581: ‘This supports …’

L600: ‘impediment’

L603: maybe ‘reducing by 70%’ and ‘raising by 25%’

L604: Bit confusing – restraining to what? Also ‘50% cloud fraction’ to be clear.

L607: remove ‘were’

L608: ‘suggesting it is crucial for …’

L612f: remove ‘significantly’ – that is a hard term and you don’t really show that here. I would also remove the part behind the semi-colon. That is always a given and a bit redundant. And you say the same in the following sentences already.

L620: Please provide this for the final version. It is a pity if such a statement remains without a link in a final publication.

References:

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