

General comments

I thank the authors for their efforts in revising the paper, and in particular including the new Fig. 11. This figure indicates that the enhancement of snow albedo reduction associated with internal mixing of dust in snow as compared with external mixing is typically 28% for the effective medium approximation used by the authors and 16% for the geometric-optics surface-wave approach. Whether or not this is a small difference is a matter of taste, but the main point is that this difference is now adequately documented.

I recommend the acceptance of this paper in ACP subject to a small number of minor comments, as given below.

Minor comments

1. p.14, lines 11–13: “For example, the α_λ decreased by 0.6%, 1.4% and 1.4% ... for dust concentrations of 2, 10, and 100 ppm respectively”. The latter 1.4% is a typo? Fig. 6d suggests that snow albedo decreases from about 0.89 to 0.85.

2. p. 17, lines 12–14: “it should be emphasized that the uncertainty of $E_{\alpha,\text{integrated}}$ induced by dust size comes purely from the uncertainty of broadband albedo of dust-snow external mixing due to different dust sizes”. This sentence can easily be interpreted so that in the case of internal mixing, there is no albedo uncertainty associated with dust size. But this is only an artifact of your approach. In reality, it is virtually certain that snow albedo depends on dust particle size also for the case of internal dust-snow mixing. So it would be more appropriate to say something like: “This uncertainty estimate accounts only for the impact of dust size on snow albedo in the case of external mixing, since the impact on albedo due to dust size cannot be evaluated when using the effective medium approximation.” (In fact, it might be speculated that a change in dust particle size would change the snow albedo in the same direction both for external and internal mixing — and therefore, the uncertainty in $E_{\alpha,\text{integrated}}$ (i.e., the ratio of albedo for internal vs. external mixing) could be smaller than calculated here.)

3. p. 17, line 18: uncertainties of $\pm 11.0\%$ and $\pm 11.2\%$ are reported for the ratio of $\alpha_{\text{integrated}}$ for internal vs. external snow-dust mixing. This sounds like quite a large uncertainty. What was assumed about snow grain size and dust concentration? I would assume the uncertainties are largest when snow grains are large and the dust concentration is high.