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Interactive comment on "Soot on snow experiment: bidirectional reflectance factor measurements of contaminated snow" *by* J. I. Peltoniemi et al.

Anonymous Referee #2

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The authors present the results of the experiments on depositing various contaminants on a snow cover surface and measuring resulting albedo. The contaminating particles were found to sank into snow cover due to heating by sunlight and the resulting albedo of the snow cover was varying in dependence on viewing angle. Such evident behavior seems not to be accounted for in the previous snow albedo-related constructions (at least I am not aware on published results like those, presented in this paper). Probably not many were interested both in dependence of albedo on the viewing angle and the contaminants affecting the snow albedo. The described experimental data is interesting, though the figures are a bit confusing. In my view the following needs clear explanation: 1. At nadir the optics measure the properties of a 20 cm diameter

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round on the snow cover surface. With different view angle the optics see something else. How this can affect the results? 2. Radiation of different wave length has different effect on the “black” particles heating and the snow melt. Basically the black particles should be heated above 0°C to melt ice particles around them and to “sink”. Some calculations are possible and with data presented should be part of the paper. 3. The effect of such “sinking” (or better “the difference between contaminated and clean snow is largest rom nadir”) 4. on the energy balance of snow cover should be quantified and compared with “no sinking” accounted for. I think it should be small, but it does not make the presented results less valuable. From the technical side: There is word “metamorphosis” in the text. This term was, indeed, used in past in relation to snow metamorphism but it is not considered as a proper one by the present time snow community (please check the terminology in the International Classification of Seasonal Snow on the Ground, which is even cited). I also do not think the word “diffusion” is used properly. I would suggest “sinking”. Since the authors are not discussing the metamorphic processes around the contaminating particles and without them, it is better to minimize referring to this process. “. . . all other snowpack properties change” is probably exaggeration.

Interactive comment on The Cryosphere Discuss., 9, 3075, 2015.