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The Cryosphere
Discussions

Interactive comment on "Quantifying bioalbedo: A new physically-based model and critique of empirical methods for characterizing biological influence on ice and snow albedo" *by* Joseph M Cook et al.

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Dear Dr He,

Thank you very much for joining the discussion and for your supportive comments. You have understood correctly that the model is based upon the so-called "equivalent sphere" assumption and that the impurities are externally mixed. We are aware of the recent literature on grain shape influencing albedo and agree that incorporating these effects into the model would be a useful development aim. We have made the code

openly available to encourage other researchers to be active in enhancing the model and we have now added a comment to our README that highlights this opportunity to potential developers. However, we also point out that the incorporation of biological impurities into SNICAR represents a significant advance in our ability to quantify their effects on ice and snow albedo. To establish a framework for bioalbedo modelling it is appropriate to start with SNICAR because it remains the 'industry standard' for snow and ice albedo prediction. While the main aim of the paper is firstly to advance our bioalbedo modelling capabilities, it is also to establish standard operating procedures for measuring biological albedo reduction in the field. This is achieved using our current version of BioSNICAR. We agree that incorporating the literature you suggested would improve the paper, so we will expand our discussion of the effects of grain shape on snow albedo in our final manuscript.

Many thanks again for your input.

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