

Interactive comment on “Snow processes in mountain forests: Interception modeling for coarse-scale applications” by Nora Helbig et al.

Anonymous Referee #2

Received and published: 13 October 2019

This manuscript describes an empirical approach to quantify snow interception. This is an important topic and the authors use interesting data sets. However, I have to admit that I felt rather confused when reading the manuscript. The language is partly ambiguous, the structure is unclear, details of the field observation and ‘modelling’ are missing and the applicability of the empirical equations remains unclear to me.

The language needs to be improved to be more concise. Just as one example: P1L17: Would snow in another season not be intercepted? Both in this sentence and the next one I assume the authors mean that in a coniferous forest 60% may be intercepted. As it reads now, 60% of some total are intercepted in coniferous forests and 24% are intercepted in deciduous forests in the Andes, i.e. 84% are retained in total. I agree that this is a minor detail and one can guess what the authors mean, but in a scientific

C1

paper these things should be formulated as clearly as possible.

Central parts of the methods are described first in the result section.

The field observations need to be described in more detail. I honestly do not understand what has been measured how. It also sounds as if some data were selected from a larger set, the reasons for this are not entirely clear.

The two central equations suddenly pop up in the result section. How were these two types of equations derived? Is there any physical reasoning for certain functional relationships like the exp or power function? How exact can the coefficients be determined? Uncertainty? Sensibility? Furthermore, I do not understand what the stdev of the DSM is. Variation of ground surface? But this would not have anything to do with the trees. Variation of vegetation heights? But then DSM is the wrong term.

My major concern regarding usability is the choice to express everything as snow height rather than SWE. When used as part of a larger model, I would assume one is most often interested in SWE rather than heights. Also conceptually I am not sure what the height of intercepted snow implies? Height on branches? Probably rather height as the snow would be if being on the ground? But then at which density, that of the other snow on the ground or that of the intercepted snow? Sorry, but I find this very confusing and limiting. Thus, I would prefer to see the interception etc expressed in SWE.

As the two equations are derived from data for ideal situations (no prior snow ...) I am not sure how these should be used for the real case, where there is often a history of prior snow on the trees. It seems here one might run into the problem that a simple empirical equation is not really a model after all. For a ‘model’ I would expect some canopy storage accounting, which is an aspect that is missed here.