



## Representing the effects of snow heterogeneity in a land surface model

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Research shows the importance of including separate energy balance calculations for the snow-covered and snowfree fractions of the land surface within land surface models. The next step is to quantify the fractional cover of snow for a given snow-depth. Small scale heterogeneity of snow cover is included in land surface models via a vegetation-height-dependent parameter on the snow-albedo. A similar parameter based on orographic roughness is proposed to represent the larger scale impact of orography. However, at even larger scales, the heterogeneity of snow cover in the Arctic is also dependent on the spatially distributed accumulation and melt of snow, not just the snow-depth to land-roughness ratio. At these large scales, both melt and accumulation are affected by altitude. Representing this heterogeneity as a sub-grid process in a land surface model has been investigated by including an altitude function to the effective snow-albedo, which gives distinct altitude-bands when used to model snow cover across Fennoscandinia. Earth Observation data can be used to verify this result. This presentation will explore the need for representation of snow heterogeneity in land surface models and future directions for this research.