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# Snow physics as relevant to snow photochemistry

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Abstract. Snow on the ground is a complex multiphase photochemical reactor that dramatically modifies the chemical composition of the overlying atmosphere. A quantitative description of the emissions of reactive gases by snow requires knowledge of snow physical properties. This overview details our current understanding of how those physical properties relevant to snow photochemistry vary during snow metamorphism. Properties discussed are density, specific surface area, thermal conductivity, permeability, gas diffusivity and optical properties. Inasmuch as possible, equations to parameterize these properties as functions of climatic variables are proposed, based on field measurements, laboratory experiments and theory. The potential of remote sensing methods to obtain information on some snow physical variables such as grain size, liquid water content and snow depth are discussed. The possibilities for and difficulties of building a snow photochemistry model by adapting current snow physics models are explored. Elaborate snow physics models already exist, and including variables of particular interest to snow photochemistry such as light fluxes and specific surface area appears possible. On the other hand, understanding the nature and location of reactive molecules in snow seems to be the greatest difficulty modelers will have to face for lack of experimental data, and progress on this aspect will require the detailed study of natural snow samples.

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