



One-dimensional model of air-snowpack chemical interactions: Implications for Arctic bromine explosion and surface ozone depletions

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The one-dimensional chemical-diffusion model PHANTAS (PHotochemistry ANd Transport in between Air and Snowpack) is developed for simulating photochemical processes in snowpack and overlying air especially in the springtime Arctic. The model describes the vertical transport of chemical species within and out of snowpack, as well as their photochemical reactions occurring on snowpack surface and in snowpack-interstitial air. We will discuss what is going on in the air-snowpack system, focusing on the chemistry of reactive halogen species and ozone. In particular, we examine several potentially important factors, such as the ventilation rate induced by pressure pumping at the air-snowpack interface or by changing snow texture, actinic flux variations with depth, and the photochemical release of NO_x and VOCs from snow grains. The reduction of the model for 3-D CTM implementation is also discussed.