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Improved Albedo Formulation for Chemistry-Transport Models based on satellite observations and assimilated snow data and its impact on tropospheric photochemistry

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Present parameterizations of the UV surface albedo in global chemistry transport models are generally based on a crude land cover classification and do not account for interannual variations of the snow covered surface. The introduction of a more realistic scheme based on two years of MODIS albedo data, GOME albedo data and daily assimilated snow cover maps from NCEP improves the calculation of photolysis frequencies in particular in the sub-arctic region as shown by a comparison of the calculated ratio of upwelling and downwelling actinic fluxes with spectral measurements from the TOPSE campaign (January-May 2000). The impact of surface albedo changes on tropospheric photochemistry has been investigated with a 1-year simulation with the global MOZART-2 chemistry transport model. Compared to simulations using the present parameterization of the surface albedo,significant changes in tropospheric OH-concentrations were observed which also affect the NOX-budget and the ozone production. This high sensitivity of the photochemistry on the surface albedo shows the importance of accurate UV-albedo maps for chemistry-transport models.