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Prediction of future erythemal UV-radiation for Austria

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Since the discovery of anthropogenic ozone depletion more than 30 years ago the scientific community and general public has shown an increasing interest in UV-radiation due to multiple environmental and health effects. UV measurements were started at several locations but difficulties in the operation and maintenance of the instruments have limited the length of reliable records two about 2 decades or less, too short and too sparse for a detailed understanding of UV changes. Therefore reconstruction of past UV-doses developed to a major research topic in recent years stimulated also by European Union's COST Action 726 and the SCOUT-O3 process. The first reconstruction of erythemal UV-doses for two stations in Austria (Hoher Sonnblick, Vienna) was performed by Rieder et al. (2008). Within this study erythemal UV could be reconstructed until the 1960s providing a comprehensive data set for the analysis of past UV changes and short-term to long-term trends. This data set together with the reconstructed UV-data for Davos, Switzerland (Lindfors and Vuilleumier, 2005) was recently analyzed to adress the relationship between high erythemal UV-doses, and changes in total ozone, surface albedo and cloudiness in the Central Alpine Region (Rieder et al., 2010).

Within the presented study we developed and evaluated a reconstruction/prediction technique for erythemal UV-doses from Chemistry-Climate Model (CCM) Output. Two different CCMs, SOCOL and E39/C, are used in this study. UV-doses are calculated under clear-sky conditions using the DISORT radiative transfer code (Stamnes et al., 1988) and CCM ozone fields and surface albedo data. In a second step the clear-sky calculations are corrected for cloudiness by the use of a so-called cloud modification factor (CMF). First comparison of the reconstructed data from the CCM output shows a good agreement with the results from Rieder et al. (2008). Therefore upcoming model runs for the prediction of future UV-doses for the 21st century can be assumed to be valid within the uncertainty range stemming from the CCM input data and the underlying modelling approach.

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